C U R S O S E C O N G R E S O S

Santiago de Compostela (Spain)
April, 2-4, 2019

Book of Abstracts

XXIV European Association of Fisheries Economists (EAFE) Conference

Edited by
Gonzalo Rodríguez
Hugo M. Ballesteros
Helena Martínez-Cabrera
Eduardo Sánchez-Llamas

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Fisheries Economists (EAFE) Conference

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Organization

ECOPESCA – Fisheries and Natural Resources Economics Research Group.
Applied Economics Department – University of Santiago de Compostela

with the endorsement of Xunta de Galicia and the European Union.

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EAFE Conference 2019

Searching the Blue: Economics of the Post-Millenial fisheries and aquaculture

Santiago de Compostela, Spain (April 2 - 4, 2019)

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Words from XXIV EAFE Conference Host

This book gathers the abstracts for the researches presented during the XXIV Conference of the European Association of Fisheries Economists (EAFE). The meeting was held from 2nd to 4th April 2019 in Santiago de Compostela. The meeting exceeded one hundred researchers from diverse European locations, from Turkey through Portugal over Finland, Sweden, Norway, Iceland, Faroe Islands, Denmark, United Kingdom, Ireland, Germany, Netherlands, Greece, Croatia, Italy, France, or Spain. It constituted an extraordinary sample of the European scientific and technological sector capability to contribute towards achieving the fishing sector social and environmental sustainability.

Thematic heterogeneity reflected the conference geographic diversity. The conference held twenty-one thematic sessions, in which, not only contemporary fisheries' management constituted the conference cornerstone but widely, marine environment management. In fact, one of the most specific debates focussed on the blue economy. In addition, relevant fisheries' management topics such as the Common Fisheries Policy (CFP) implementation, fishing access and rights, markets and commercialization of marine resources, small scale fisheries (SSF) role on EU fisheries management, aquaculture, climate change economic implications, social fisheries dimension, legal aspects under fisheries' management, IUU (illegal, unreported and unregulated) fishing, blue economy, recreational fisheries, fisheries value chain and fisheries management. Any researcher interested in fisheries topics would find this document an interesting repository of the main debates and an access route to valuable and relevant researches. Summaries may not be all you need, but the researchers would be happy to assist you and to provide a more elaborate discussion of the topics in case you contact them.

Over the years, until the publication of the XXIV edition, the main fisheries economists' continental experts have participated in the conferences, meetings, and workshops organized by EAFE. It enabled the consolidation of EAFE forums as a key tool towards the creation of a fisheries' economics overview in the European Union and the whole of Europe. This forum for discussion, to be genuinely productive could not be limited to the interacademy interchange. The forum has to be focussed on the enhancement through the dialogue with policy-makers, fisher-

men, NGO's and other relevant actors in marine topics. Effectively, one of the main targets was to discuss academic results within the productive sector, corporative challenges and governance research necessities framework which allowed to create spaces towards the co-generation of knowledge.

In the same line, it should be highlighted the participation of the administration members at different levels. Representatives as Rosa Quintana Carballo (Political Counsellor on Maritime Affairs, Xunta de Galicia); Mercedes Rodríguez Moreda (Deputy Director of Fisheries, Aquaculture and Technological Innovation of the Consellería do Mar); Alicia Villauriz Iglesias (General Secretary of Fisheries, Ministry of Agriculture, Fisheries, and Food of Spain); Mario Lopes dos Santos (Deputy Head of the Unit at the EU Fisheries Control Agency, EFCA) and Frangiscos Nikolian (Head of the Unit responsible for Economic Analysis, Markets, and Impact Assessment in the Commission General-directorate for Maritime Affairs and Fisheries, DG MARE) actively participated during the conference and represented some of the most important government bodies.

Big fishing firms placed the productive sector voice during the conference. Companies such as Pescanova through its RSC responsible, Angel Matamoro-Irago and SSF organizations such as Cofradía de Noia by means of its secretary Juan Manuel Gómez-Blanco; certifying bodies such as PescadeRias and Pescaenverde under the representation of Antonio Rodríguez and Gumersindo Feijoo respectively; and advisory councils such as Long-Distance Advisory Board whose General Secretary, Alexandre Rodríguez, participated during the conference. On-field visits to Jealsa, Ribeira food market or the Ría de Noia mussel farms (bateas) enabled a straight outreach to the fishing sector reality in Galicia.

Neither the narrative nor the abstracts collected during this volume do justice to the richness, intensity, and dynamism of the debates. Neither the fraternity lived for those that feel every world university as our home, but maybe constitute the beginning for new lessons, future researches and productive debates.

The journey elapsed from this moment has been truncated by the COVID-19, a pandemic which has shaken the whole planet. This suspension time has simply duplicated the desire of see us again in the next EAFE Conference, shake our hands and resume the conversations that both crave with the sea as backdrop.

Dr. Gonzalo Rodríguez-Rodríguez
University of Santiago de Compostela
Titular Professor and XXIV EAFE Conference Host

Letter from the EAFE President

Dear EAFE Conference Book of Abstracts Readers,

We had our EAFE 2019 in the incredible city of Santiago de Compostela in Galicia, one of the last EU fishing dependant regions located in the northwest of Spain and with a cultural and research capital that reflects this fisheries tradition.

With the theme "Searching the blue: economics of the post-millennial fisheries and aquaculture", during the conference we had the opportunity of exchanging ideas, research and experiences on fisheries management, blue growth, aquaculture, social dimension of fisheries and recreational fisheries, among other topics. As in previous EAFE conferences, this occurred in a friendship environment and with the support and participation of different management authorities from Galicia, Spain and the EU Commission. I'd like to thank these authorities for coming and supporting us but also the organizing and the scientific committees for building up this forum that made possible an exchange of ideas on economics related to the fisheries and aquaculture sectors.

This conference was also special for me. After several years being part of the EAFE Bureau, it was time to take the lead and become the president of EAFE. Preciously, I had the pleasure to work with the former EAFE presidents, Hazel Curtis and Bertrand Le Gallic and observe their hard work on promoting and working towards the success of the association. In these years, I've also seen the commitment of the EAFE Bureau and the necessity that the president has on being supported by it. In that sense, I'd like to thank those that have leaved the Bureau but also welcome the "new" and "old" members, noting that to keep EAFE alive, is not only the president nor the bureau who has to be actively involved, but all EAFE members, which at the end have the possibility of making the association what we want to be.

This book of abstracts reflects the contributions that the participants made during the conference and is a reflection of the quality of the works presented, however, it does not reflect the full spirit of the EAFE conference, in terms of friendship and environment to promote personal and professional relationships. To

live this experience, you have to come to the conference and experiment it. Therefore, and in these last words, I'd like to invite you all to come to the next EAFE conference in the year 2021.

Dr. Raúl Prellezo
President of the European Association of Fisheries Economists (EAFE

Letter from the Regional Minister for Maritime Affairs

Dear EAFE conference Delegates,

When we think on Galicia and its economy is inevitable to redirect our thought on the primary sector. These activities that arise from the most green and blue: our Galician land and sea. While it is true, it has to be noted that Galicia also has a powerful industry sector in which, naval, textile and automotive are particularly brilliant.

But if there is a reason why we are grouped on this conference is due to the quintessence of the Galician spirit is our maritime and fishing activity. Sea represents the defining element of our region. A production system that sustains more than 44,000 persons which live and work of our sea and by the more than 4,400 vessels that compose our fishing fleet. This production system, in 2018 commercialized approximately 175,000 tons of marine products, which resulted in an economic value of more than 490 million euros.

Clear facts such as that: i) Galician fishing sector value added is almost 25 times bigger than the European average; ii) the Galician fishing sector production constitutes the 20% of the total EU marine production; iii) fresh marine products landed in Galicia constitute the 10% of the total EU landings, and; iv) The important canned fish and seafood production volume which allocates the region in the European top production region and second worldwide in canned marine products, makes Galicia a key piece in the European blue economy.

In addition, according to the Fishing and Canning Industry Input-Output Tables developed by the University of Santiago ECOPESCA team, fishing sector interactions with the adjacent industries generate a total economic impact of 1.770 million Euros. Such direct impact affect to 64 economic branches of the 81 existing in the Galician region. Despite the high impact, not just the economy is the most important indicator. People constitute the key stone of the fishing sector. One indicator of this fact is that the payment of wages in the region ascends to almost 550 million euros.

Notwithstanding the current economic importance of the fishing sector, we are convinced about the fact that this relationship between the sea and the Galician economy will rise during the following years, which, nowadays generate more than 8.850 million euros. These numbers allocate the fishing sector as the 4th most important sector in the Galician economy. One of the most responsible factors under those values is the high development of the supply chain elements present in the fishing sector.

Beyond our frontiers, we can state that Galician fishing sector is at the forefront of the world fishing industry, directly competing with industry giants within an aggressive world market framework. Nowadays, we are situated as the 10th world power, overcoming countries with a consistent marine industry such as Argentina, France or Japan. It is a relevant indicator, furthermore if we take the value in territorial implementation and economic dynamism terms. This activity is accompanied by the Spanish administration remarkable effort, which counts with embassies and specific teams working specifically in fishing affairs.

Within this context, the truly extraordinary thing is to do very well the ordinary, being the particular strength of our fishing sector. To this end and to achieve the purpose of generating socioeconomic progress we relied on in forums such as the EAFE conference. These activities together with research activities carries out on those topics constitute the basis to orientate and test our management decisions success.

It is necessary to improve available information, data and knowledge to increase fishing and marine activity management and planning performance for a strengthened sector economic wellness while protecting and preserves our natural resources. A target for which we are especially proud of count with the University of Santiago de Compostela collaboration. This close collaboration is personified in the participation of Maria Do Carme García-Nero and Gonzalo Rodríguez. They prepared the Input-Output Tables for the Galician Fishing and Canning Industry in 2014 and are already working on the 2020 edition. High-excellence works towards supporting the fishing industry such as mentioned before together with others of high relevance for the administration such as the ones based on discarding or on the socioeconomic importance of Brexit in the fishing sector.

I would like to specially highlight the work done by the Research Group on Natural Resources and Fisheries Economics team (ECOPESCA) of the University of Santiago de Compostela. Thanks for bringing us the 14th edition of the EAFE conference to Galicia, for making this centenary University the perfect host to all EAFE colleagues and, finally, for positioning Galicia as the centre of the debate and the progress in European fisheries management and aquaculture.

To all the attendants of the EAFE meeting, I would like to explicitly express my appreciation for the work and effort undertaken on behalf of the fishing activity and our local communities' development.

Thanks a lot,

Ms. Rosa Quintana Carballo
Regional Minister for Maritime Affairs, Xunta de Galicia

General Information

Venue
Faculty of Geography, University of Santiago de Compostela
Praza da Universidade, 1, Santiago de Compostela (Spain)

Internet connection
The internet connection during the conference will be available by connection to the "EDUROAM" WiFi network provided by the University of Santiago de Compostela with your institutional mail account. For people whose institutional account is not linked with the EDUROAM service, a username and password will be provided at the conference check-in point.

Registration
The conference registration will start on Monday 1st at 7:30 p.m. at the Food Market hall (Mercado de Abastos).

Social dinner
The social dinner will be held on Wednesday 3rd, 8 p.m. at the "San Francisco Hotel", at Campillo de San Francisco no. 3.
Guided tour – Social Day
Conference participants can participate in open-air walking and sailing tour to the Ribeira region, located in the A Coruña province. Tour will show at 10.00 am the mussel farms and maritime heritage in the Muros-Noia Estuary (Ría de Muros-Noia) aboard the *Joaquin Vieta* vessel. At 3.30 pm a visit to *Jealsa* is programmed. *Jealsa* constitutes one of the biggest canning companies in Spain and Europe. At 6.00 pm is programmed the visit to the Ribeira auction market. Return to Santiago de Compostela is programmed at 7.30 pm.

Taxi Service
The cost of taxi trip from Rosalia de Castro Airport (Santiago de Compostela) to Santiago City centre is fixed at € 21. Bookings are available filling out the form available at https://radiotaxicompostela.com/reservas/, by using the radio taxi ser-

vice calling to +34 981 56 92 92 (active 24h) or through the PideTaxi App (available for Android and iOS).

During the conference participants can also use the radio taxi service by the same mechanisms.

Scientific Program

Program Overview

	Monday (1st April)	Tuesday (2nd April)	Wednesday (3rd April)	Thursday (4th April)
8:30		Registrations		
8:45				
9:00			Plenary Session 4	Plenary Session 6
9:15				
9:30		Plenary Session 1		
9:45			Parallel Sessions 7-8-9	
10:00		Parallel Sessions 1-2-3		Parallel Sessions 15-16-17
10:15				
10:30				
10:45				
11:00			Coffee Break	Coffee Break
11:15				
11:30		Coffee Break	EAFE General Assembly	
11:45				
12:00		Parallel Sessions 4-5-6		
12:15				
12:30			Lunch	Parallel Sessions 18-19-20
12:45				
13:00				
13:15		Lunch		Lunch
13:30			Plenary Session 5	
13:45				
14:00				
14:15			Coffee Break	Plenary Session 7
14:30		Plenary Session 2		
14:45				
15:00			Parallel Sessions 10-11-12	Conference Closure
15:15		Coffee Break		
15:30				
15:45		Plenary Session 3		
16:00				
16:15				
16:30			Coffee Break	
16:45				
17:00				
...			WGECOM World Café Session and Parallel Sessions 13-14	
18:45				
19:30	Early Registrations	Blue economy dinner		
19:45				
20:00	Welcome Cocktail		Social dinner	

Plenary Sessions

• *Plenary Session 1*
Greetings from EAFE President and Regional Minister of Fisheries
Keynote speaker **Raúl Prellezo** *(Researcher, AZTI)*

• *Plenary Session 2*
Chair: **Rosa Chapela** (CETMAR)
EU aquaculture and the place of producer organisations
Keynote Speaker: **Frangiscos Nikolian** *(Head of the Economics Analysis Unit Directorate-General for Maritime Affairs and Fisheries, EU Commission)*

• *Plenary Session 3*
Chair: **Angel Calvo** (DG MARE)
Blue economy session
Keynote Speakers: **Pedro Díaz Simal** *(Researcher, University of Cantabria)*; **Regis Kalaydjian** *(Marine Economic Unit, IFREMER)*; **Mitja Caboni** *(Communication specialist, Port XL)*; **Meredith Loyds Evans** *(Managing Director, BioBridge).*

• *Plenary Session 4*
Chair: **Gonzalo Rodríguez** (USC)
On the goals of the Common Fisheries Policy (CFP)
Keynote Speaker: **Alicia Villauriz** *(General Secretary of Fisheries, Government of Spain)*

• *Plenary Session 5*
Chair: **Bertrand Le Gallic** (UBO)
On the social responsibility of the Fishing firms
Keynote Speaker: **Angel Matamoro Irago** *(CSR Director, Nueva PESCANOVA Group)*

• *Plenary Session 6*
Chair: **Gonzalo Rodríguez**
Advances In fisheries adaptation to climate change, how can economic research help?
Keynote Speaker: **Elena Ojea** *(Future Oceans Lab, University of Vigo)*

• *Plenary Session 7*
Chair: **Bertrand Le Gallic**
Monitoring the compliance with Landing Obligation
Keynote Speaker: **Mario Lopes dos Santos** *(Head of Unit EU Waters and North Atlantic, EFCA)*

List of Sessions

No.	Title	Chair	Time	Room
1P	Greetings from EAFE President and Regional Minister of Fisheries	Gonzalo Rodríguez	Tuesday, 2 / 9.30-10.00 am	Paraninfo
1Pa	Implementation of the CFP	Arantza Murillas	Tuesday, 2 / 10.00-11.30 am	Room 11
2Pa	Access to fisheries and the right to fish	Raúl Prellezo	Tuesday, 2 / 10.00-11.30 am	Paraninfo
3Pa	Markets and marketing of fish products	Antonio Alvarez	Tuesday, 2 / 10.00-11.30 am	Room 12
4Pa	Implementation of the CFP	Natacha Carvalho	Tuesday, 2 / 12.00-1.30 pm	Room 11
5Pa	The role of Small-Scale Fisheries	Gonzalo Rodríguez	Tuesday, 2 / 12.00-1.30 pm	Paraninfo
6Pa	Interdisciplinarity	Leyre Goti	Tuesday, 2 / 12.00-1.30 pm	Room 12
2P	EU aquaculture and the place of producer organisations	Rosa Chapela	Tuesday, 2 / 2.30-3.15 pm	Paraninfo
3P	Blue economy Session	Angel Calvo	Wednesday, 3 / 3.45-5.15 pm	Paraninfo
4P	On the goals of the CFP	Gonzalo Rodríguez	Wednesday, 3 / 9.00-9.45 am	Paraninfo
7Pa	Markets and marketing of fish products	Natacha Carvalho	Wednesday, 3 / 9.45-11.15 am	Room 11
8Pa	Aquaculture	Bertrand Le Gallic	Wednesday, 3 / 9.45-11.15 am	Paraninfo
9Pa	Economics of climate change	Raúl Prellezo	Wednesday, 3 / 9.45-11.15 am	Room 12
1Ga	EAFE General Assembly	Bertrand Le Gallic	Wednesday, 3 / 11.45-12.45 pm	Paraninfo
5P	On the social responsibility of the fishing firms	Bertrand Le Gallic	Wednesday, 3 / 1.45-2.30 pm	Paraninfo
10Pa	Legal aspects of fisheries management	Gonzalo Rodríguez	Wednesday, 3 / 3.00-4.30 pm	Room 16
11Pa	The role of Small-Scale Fisheries	Arantza Murillas	Wednesday, 3 / 3.00-4.30 pm	Paraninfo
12Pa	Social dimensions	Leyre Goti	Wednesday, 3 / 3.00-4.30 pm	Teacher's room
13Pa	ICES WGECOM World Café session	Raúl Prellezo	Wednesday, 3 / 5.00-7.00 pm	Room 16
1S	Galician small-scale. fisheries: learning from local experiences	Gonzalo Rodríguez	Wednesday, 3 / 5.00-7.00 pm	Paraninfo
14Pa	Implementation CFP	Arantza Murillas	Wednesday, 3 / 5.00-7.00 pm	Teacher's room
6P	Advances in fisheries adaptation to climate change, how can economic research help?	Gonzalo Rodríguez	Thursday, 4 / 9.00-9.45 am	Paraninfo
15Pa	IUU fishing	Hugo M. Ballesteros	Thursday, 4 / 9.45-11.15 am	Room 11
16Pa	Social dimensions	Antonio Alvarez	Thursday, 4 / 9.45-11.15 am	Paraninfo
17Pa	Recreational fisheries	Gonzalo Rodríguez	Thursday, 4 / 9.45-11.15 am	Room 16
2S	MedAid	Hugo M. Ballesteros	Thursday, 4 / 12.45-1.15 pm	Room 11
18Pa	Markets and marketing of fish products	Bertrand Le Gallic	Thursday, 4 / 12.45-1.15 pm	Paraninfo
19Pa	Blue economy	Gonzalo Rodríguez	Thursday, 4 / 12.45-1.15 pm	Room 16
7P	Monitoring the compliance with Landing Obligation	Bertrand Le Gallic	Thursday, 4 / 2.30-3.15 pm	Paraninfo

P = Plenary Session, Pa = Parallel Session, S = Special Session

Conference Program

XXIV EAFE CONFERENCE

Searching the Blue: Economics of the Post–Millennial Fisheries and Aquaculture
Santiago de Compostela 2-4 April 2019

Monday, 1 April 7:30 pm
Early registrations and welcome cocktail

Tuesday, 2 April 8:30-9:30 am
Registrations

Tuesday, 2 April 9:30-10:00 am
Plenary session 1
Greetings from EAFE President and Regional Minister of Fisheries
Bertrand Le Gallic
Université de Bretagne Occidentale
Centre for the Law and Economics of the Sea (AMURE)
EAFE President

Rosa Quintana Carballo
Regional Minister of Maritime Affairs

Tuesday, 2 April 10:00-11:30 am
(1) Parallel session

Implementation of the CFP
chair ***Arantza Murillas***

Hyperstability: the impact of stock productivity on input substitution
Raúl Pellezo (AZTI Tecnalia, STECF)

Impact assessment for fisheries management measures – an instrument to improve decision-making?
Ralf Doering *(Head of economic unit, Thünen institute)*

On the question of the cost of capital
Richard Curtin *(Economist, Ireland Seafood Development agency)*

Tuesday, 2 April 10:00-11:30 am
(2) Parallel session

Access to fisheries and right to fish
chair ***Raúl Prellezo***

The efficiency of Southeastern Black Sea anchovy fishery under unobserved heterogeneity
David Castilla Espino *(Associate professor, University of Huelva)*

The development of resource rent under ITQ management: Icelandic fisheries 1990 to 2017
Stefán B. Gunnlaugsson *(Associate professor, University of Akureyri)*

Balancing biological sustainability, economic value and social benefits in the management of fisheries with commercial and recreational exploitation: the application of system dynamics modelling to the European Sea bass (Dicentrarchus labrax L.)
Hannah J. Tidbury, Angela Muench *(CEFAS, United Kingdom)*

Understanding ownership and firm organization in French Atlantic fisheries: a typology
Arne Kinds *(Université de Bretagne Occidentale and, AMURE)*

Tuesday, 2 April 10:00-11:30 am
(3) Parallel session

Markets and marketing of fish products
chair ***Antonio Álvarez***

The role of price settling mechanism on value chain of cod
Ögmundur Knütsson *(Bussiness and natural sciences faculty, Iceland)*

The fish processing sector in Spain: the tuna canning industry
Ramón Jiménez Toribio *(Associate professor, University of Huelva)*

The improvements of the sustainability in the Vasque Country fisheries from the MSC certification of the Sardine, Anchovy, and Albacore: more than market benefits
Alberto Martín *(Fisheries manager, Marine Stewardship Council)*

Consumer perceptions about the coastal fishery and its products – What Focus Groups from Italy and France tell us?
Claudio Pirrone (*Researcher, University of Brest*)

The importance of employee and consumer labelling education for a fair market of fishery products
R.F. Grassi (*Quality manager, L'Equipaggio Snc*)

Tuesday, 2 April 11:30 am-12:00 pm
Coffee break

Tuesday, 2 April 12:00-1:30 pm
(4) Parallel session

Implementation of the CFP
chair ***Natacha Carvalho***

PreBiologic and economic consequences of using survey data when providing management advice
Itsaso Carmona *(Researcher, AZTI)*

Issues of ownership in EU fisheries: knowledge, practice, competition, fairness, and sustainability
Griffin Carpenter *(Economic modeler, New economic foundation)*

Brexit and Seafood Trade: key lessons learned so far
Sébastien Metz *(Consultant, Sakana Consultants)*

Tuesday, 2 April 12:00-1:30 pm
(5) Parallel session
The role of small-scale fisheries
chair ***Gonzalo Rodríguez***

Key Factors Influencing the Investment Behaviour in Small Scale Fisheries: A Research on Samsun Shelf Area (SSA) in Turkey
M.Selçuk Uzmanoğlu (*Associate professor, University of Mamara*)

Diversification of artisanal fishing fleet with marine litter removal activity
Marga Andrés (*Researcher, AZTI*)

Market-based management in small-scale fisheries: Empirical evidence from Nordic countries
Rasmus Nielsen *(Environment and Natural Resources Unit, University of Copenhagen)*

Small-scale fisheries in Germany – any chance for long-term economic viability?
Ralf Doering *(Researcher, Thünen Institute)*

Tuesday, 2 April 12:00-1:30 pm
(6) Parallel session
Interdisciplinarity
chair ***Leyre Goti***

Evaluation of Fisheries Value Chain dynamics; a case study of the cod
Ögmundur Knútsson *(Bussiness and natural sciences faculty, Aukeryi University)*

Fish and fisheries behavior – Using sparse data to understand variability in landings of commercially important species
Serena Wright *(University of London),* ***Angela Muench*** *(Researcher, CEFAS)*

The use of Hierarchical Bayesian Model techniques in fisheries modeling
Kári S Friðriksson *(Analyst, Intellecon)*

The use (and misuse?) of indicators in fisheries management
Rannvá Danielsen *(Researcher, Seafish)*

Comparison of Fisheries Value Chain dynamics; a case study of the herring
Guðmundur Stefánsson *(Researcher, ICEIDA)*

Tuesday, 2 April 1:30-2:30 pm
Lunch

Tuesday, 2 April 2:30-3:15 pm

Plenary session 2

chair ***Rosa Chapela***

EU aquaculture and the place of producer organisations

Keynote Speaker **Frangiscos Nikolian** (DG Mare, EU Commission)

Tuesday, 2 April 3:15-3:45 pm

Coffee Break and Poster Session 1

Tuesday, 2 April 3:45-5:15 pm

Plenary session 3

chair ***Angel Calvo***

Blue economy session

Keynote Speakers **Pedro Diaz Simal** (University of Cantabria), **Regis Kalaydjian** (IFREMER), **Mitja Caboni** (Port XL), **Meredith Loyds Evans** (BioBridge)

Tuesday, 2 April 5.15 pm

End of the first day

Tuesday, 2 7.30 pm

Blue economy dinner

Wednesday, 3 April 9.00-9.45 am

Plenary session 4

chair ***Gonzalo Rodríguez***

On the goals of CFP

Keynote Speaker **Alicia Villauriz** (General fisheries secretary, Government of Spain)

Wednesday, 3 April 9.45-11.15 am

(7) Parallel session

Markets and marketing of fish products

chair ***Natacha Carvalho***

Atypical market behavior of a sustainable fish stock: the case of plaice from the German North Sea fleets
Leyre Goti *(Researcher, Thünen Institute)*

The way the wind blows-tracing out the demand for Norway lobster using instrumental variables
Cecilia Hammarlund *(Lund University)*

What factors explain ex-vessel price formation in fish auction markets?
Antonio Álvarez *(University of Oviedo)*

The impact of price variations on seafood consumption on the sustainability of fisheries?
Lucas Sterenn *(Agrocampus Ouest)*

Price flexibilities for high valued fish species in the Port of Vigo
Gonzalo Rodríguez *(University of Santiago de Compostela)*

Wednesday, 3 April 9.45-11.15 am

(8) Parallel session
Aquaculture
chair ***Bertrand Le Gallic***

Barriers of Growth-experts' views on the stagnating aquaculture sector in Germany
Tobias Lasner *(Thünen Institute)*

Profit and resource rent in the Norwegian farmed salmon industry
Anders Skonhoft *(Norwegian University of Science and Technology)*

Adapt or lose: how to manage the socioeconomic impact of climate change in Spanish aquaculture, the case of blue mussel
José L. Santiago *(CETMAR)*

Economic feasibility and acceptance of insect meal in aquaculture products: a survey of the Italian supply chain
Luca Mulazzani *(University of Bolonia)*

The economic impact of the decline in mussel aquaculture production in the EU
Jordi Guillen *(EU Commission JRC)*

Wednesday, 3 April 9.45-11.15 am

(9) Parallel session

Economics of climate change

chair ***Raúl Prellezo***

Climate change, backwardness, and fisheries: The economic history of Iceland from settlement until the present time

Stefán B. Gunnlaugsson *(University of Akureyri)*

The role of non-fishing and household income diversification in managing an economic shock in fisheries

Sanmitra Gokhale *(Wageningen University and Research)*

Managing a natural asset that is both a value and a pest. Cooperation vs. competition: The Barents Sea Red King Crab

Melina Kourantidou *(Dalhousie University)*

Economic and socioecological indicators for marine resource use and management in the Arctic

Melina Kourantidou *(Dalhousie University)*

Wednesday, 3 April 11.15-11.45 am

Coffee Break and Poster Session 2

Wednesday, 3 April 11.45 am-12.45 pm

EAFE GENERAL ASSEMBLY

Wednesday, 3 April 12.45-1.45 pm

Lunch

Wednesday, 3 April 1.45-2.30 pm

Plenary session 5

chair ***Gonzalo Rodríguez***

On the social responsibility of the fishing firms

Keynote Speaker **Ángel Matamoro Irago** (PESCANOVA)

Wednesday, 3 April 2.30-3.00 pm
Coffee break

Wednesday, 3 April 3.00-4.30 pm
(10) Parallel session
Legal aspects of fisheries management
chair ***Gonzalo Rodríguez***

The role of Producers' Organisations in EU fisheries: a potential case of conflict between management and commercial regulations?
Celestina Caccianiga *(University of Salerno)*

An alternative, fisheries-based approach for the segmentation of the fishing fleet
Joerg Berkenhagen *(Thünen Institute of Sea Fisheries)*

The fisheries case in the light of a new binding agreement on the conservation of biodiversity in the areas beyond national jurisdiction
Manuel Pacheco Coelho *(University of Lisboa)*

Do subsidies to firms increase investments? – An analysis of the investment support to aquaculture and the fish processing industry in Sweden
Johan Blomquist *(Swedish University of Agricultural Sciences)*

Wednesday, 3 April 3.00-4.30 pm
(11) Parallel session
The role of small-scale fisheries
chair ***Arantza Murillas***

Small-Scale Fisheries, Communities, and Cultural Heritage
Juan J. García del Hoyo *(University of Huelva)*

A participatory-based mapping of the small-scale inshore fisheries: Towards holistic management in the Bay of Biscay
Arantza Murillas *(AZTI)*

Is there an optimal number of days-at-sea? An application to small scale fisheries
Antonio Álvarez *(University of Oviedo)*

The operational and financial performance of the British inshore fleet in the Eastern Channel: a mixed-methods analysis
Marta Quintana *(Seafish)*

Wednesday, 3 April 3.00-4.30 pm
(12) Parallel session
Social dimensions
chair ***Leyre Goti***

Measuring fishers' perspectives on the socio-economic barriers for the UK under 10m fishery fleet to integrate with aquaculture: A Qmethodological study
Heather Conejo-Watt *(CEFAS)*

Supporting small-scale fishers by increasing the market values of Lessepsian invasive species: A case of Akyaka Fishery Cooperative, Turkey
Vahdet Ünal *(Ege University)*

Socio-demographic profile of fishers employed in the Italian small-scale coastal fishing sector: characteristics of the employed and historical prevalence of family contribution
Maria Cozzolino *(NISEA)*

Social data collection in the EUMAP: first steps towards EU fisheries social profiles?
Arina Motova *(Seafish)*

The overlooked role of women in fisheries: the case of the Greek fishing sector
Liontakis Angelos *(Agricultural Economics and Policy Research Institute)*

Wednesday, 3 April 4.30-5.00 pm
Coffee break

Wednesday, 3 April 5.00-7.00 pm
(13) Parallel session
ICES WGECOM World Café Session
chair ***Raúl Prellezo***

Integrating economics into ICES science and advice: a survey of existing work and future needs
Olivier Thebaud *(Université de Bretagne Occidentale)*

Fishery Management with Poorly Known Dynamics
Patrice Guillotreau *(University of Nantes)*

Wednesday, 3 April 5.00-7.00 pm
(1) Special session
Galician small-scale fisheries: learning from local experiences
chair ***Gonzalo Rodríguez***

PescadeRías: promoting fish and shellfish from the Galician small-scale fleet
Antonio Rodríguez *(Xunta de Galicia)*

The cockle fishery in the fishing community of Noia
Juan M. González Blanco *(Cofradía de Noia)*

PescaenVerde: Opportunities and challenges of implementing life cycle assessment in seafood certification
Gumersindo Feijoo *(University of Santiago de Compostela)*

Wednesday, 3 April 5.00-7.00 pm
(14) Parallel session
Implementation of the CFP
chair ***Arantza Murillas***

Overcoming economic barriers to selective gear uptake: a framework to increase data available for analysis and advice
Anna Witteveen *(Seafish)*

A framework for quantifying the economic effects of quota allocation in mixed fisheries, the case of Galicia
José L. Santiago *(CETMAR)*

Auctions as a way to allocate fish stocks-experiences from the Faroe Islands
Hans Ellefsen *(Faroe Islands Ministry of Fisheries)*

Measuring capital of the Italian fishing fleet: reviewing the application of the Perpetual Inventory Method
Monica Gambino *(NISEA)*

Wednesday, 3 April 7.00 pm
End second day

Wednesday, 3 April 8.00 pm
Social dinner

Thursday, 4 April 9.00-9.45 am
Plenary session 6
chair ***Gonzalo Rodríguez***
Advances in fisheries adaptation to climate change, how can economic research help?
Keynote Speaker **Elena Ojea** (University of Vigo)

Thursday, 4 April 9.45-11.15 am
(15) Parallel session
IUU Fishing
chair ***Hugo M. Ballesteros***

Spatially explicit risk assessment of fisheries bycatch in data-scarce situations
Gregory Verutes *(University of Santiago de Compostela)*

Overview of EFCA activities in relation to the fight against IUU fishing
Pedro Galache *(European Fisheries Control Agency)*

Understanding progress in combatting illegal, unreported, and unregulated fishing
Barbara Hutniczak *(Organization for Economic Co-operation and Development)*

More ice? Overreproting ice percentage in Icelandic landings
Dadi Kristofersson *(University of Iceland)*

The role of EU fishing sector and NGOs on the fight against IUU fishing: proposals from the LDAC
Alexandre Rodríguez *(LDAC Secretariat)*

Thursday, 4 April 9.45-11.15 am

(16) Parallel session

Social dimensions

chair ***Antonio Álvarez***

Fisherman by motivation or situation? Social data collection on education for the fishing fleet in Croatia
Svjetlana Višnić *(Croatian Ministry of Agriculture)*

A comparative study of the effects of change in the fishing industry on settlement patterns in The Faroese Islands, Iceland, and Norway
Edgar Henriksen *(Nofima)*

The Dynamics of the Italian Maritime districts
Carlo Paolucci *(NISEA)*

An Economic Analysis of the Turkish Fisheries Sector 2001-2017
Sezgin Tunca *(University of Helsinki)*

Spatial challenges for the Dutch Fisheries, an economic approach
Van Oostenbrugge, J.A.E *(Wageningen Economic Research)*

Relative effects of fisheries support policies
Roger Martini *(Organization for Economic Co-operation and Development)*

Thursday, 4 April 9.45-11.15 am

(17) Parallel session

Recreational fisheries

chair ***Gonzalo Rodríguez***

Willingness-to-pay of anglers for catch-and-release: results from a choice experiment in Britanny
Carole Ropars-Collet *(Agrocampus-Ouest)*

Measuring the social value of sea angling: combining revealed and stated preference approaches for the UK
Angela Muench *(CEFAS)*

Managing marine natural capital: assessing the impact of fisheries management on the utility of recreational sea anglers
Barnaby Andrews *(CEFAS)*

The economic activity of recreational fishing charters in the North Atlantic: the cases of Galicia (Spain) and Madeira (Portugal)
Pablo Pita *(University of Santiago de Compostela)*

Thursday, 4 April 11.15 am-12.45 pm
Coffee break

Thursday, 4 April 12.45-1.15 pm
(2) Special session
MedAid
chair ***Hugo M. Ballesteros***

Overview of the economic situation of seabream and seabass companies in the Mediterranean area
Elisa Baraibar Díez *(University of Cantabria)*

Demand and Cost of capital in the seabass and seabream international market
José Fernández Polanco *(University of Cantabria)*

The Social Acceptability of aquaculture. Emergence, utility and amalgams of a new framework to address an old social issue in policy making
José A. Pérez Agúndez *(IFREMER)*

Perception and misperception of aquaculture in Italy: food for thought
María Cozzolino *(NISEA)*

Measuring the impact of mass media on consumers purchase of aquaculture products
Ángel Herrero *(University of Cantabria)*

Substitution of seabass and seabream in the Greek market
Lamprakis Avdelas *(University of Cantabria)*

Thursday, 4 April 12.45-1.15 pm
(18) Parallel session
Markets and marketing of fish products
chair ***Bertrand Le Gallic***

How to revitalize the sale of fresh seafood? The sedentary fishmonger of tomorrow
Stéphane Gouin *(Agrocampus Ouest)*

Competition Elements in the Marine Aquaculture Industry: A Research on Turkey
Selçuk M. Uzmanoğlu *(Associate professor, University of Mamara)*

The PrimeFish Project or how to create shared value in seafood sector by combining the competitiveness and the decision-making
Jose L. Santiago *(CETMAR)*

Sustainable seafood from Europe – a consumer perspective
Katrin Zander *(Thünen Institute)*

Market integration and price transmission in the Finnish salmonids value chain
Virtanen Jarno *(LUKE Institute)*

Recent economic developments and market analysis for the Dutch mussel sector
Maggie Skirtun *(Wageningen Economic Research)*

Thursday, 4 April 12.45-1.15 pm
(19) Parallel session
Blue economy
chair ***Gonzalo Rodríguez***

Operational instrument to assess the marine sectors activities direct impacts on the marine environment
Arantza Murillas *(AZTI)*

Fisheries and thriving harbours – is there a value for the tourism sector?
Staffan Waldo *(Swedish University of Agricultural Sciences)*

Size and Shape of the blue economy in Europe
Jose L. Santiago *(CETMAR)*

(Blue) Growth accounting in small-scale European Union fleets
Raúl Prellezo *(AZTI)*

Thursday, 4 April 1.15-2.30 pm
Lunch

Thursday, 4 April 2.30-3.15 pm
Plenary session 7
chair ***Bertrand Le Gallic***

Monitoring the compliance with Landing Obligation
Keynote Speaker Mario Lopes dos Santos (EFCA)

Thursday, 4 April 3.15 pm
Closure of the Conference
EAFE

Abstracts

XXIV European Association of Fisheries Economists (EAFE) Conference
Universidade de Santiago de Compostela, 2021
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Day 1 - Tuesday 2 April 2019
10.00-11.30 am Room: **Room 11**
(1) parallel session – *Common Fisheries Policy (CFP) implementation*
chair **ARANTZA MURILLAS**

Hyperstability: the impact of stock productivity on input substitution

Raúl Prellezo, José María Da Rocha, Javier García Cutrín,
María José Gutiérrez

Abstract: In the fisheries management literature it has been observed that fishing effort and fishing mortality do not show a positive correlation when fishing mortalities are high. This is called hyperstability. This phenomenon can create problems when designing management options, given that a reduction of effort does not necessarily imply a reduction in fishing mortality. To take into consideration hyperstability in a bioeconomic modelling framework, productivity has to be endogenously determined and has to depends on fish abundance. Furthermore, agents have to be forward-looking. Therefore, a general equilibrium modelling is adequate since it computes future labour and capital rental prices. Using a case study of a Spanish fleet, we empirically show the existence of this hyperstability and obtain a different source from what has been reported in the literature. In our case hyperstability is related to the expected recovery of the stock which is higher when fishing

mortality are high and hence fishing effort reacts slower because production factors substitution occurs.

Keywords: Fisheries management, Economic modelling, EU fisheries, Hyperstability.

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ISBN 978-84-18445-48-4, pp. 43-44

Impact assessment for fisheries management measures – an instrument to improve decision-making?

Ralf Doering, Loretta Malvarosa, Arantza Murillas

Abstract: During the last decades an increasing area on EU waters has been claimed by specific "users" (e.g., shipping, wind energy, nature) and this development seems to accelerate with the development of offshore wind energy. All of these claims limit the fishing area and affect its economic position. For the Dutch part of the North Sea, the locations of extended wind parks are currently being discussed and decided and might ultimately (2050) cover around 25% of the Dutch continental shelf area.

In this study, the value of the existing and planned wind farm areas (up to 2030) in the Dutch part of the North Sea for fishing was determined using the historical fishing patterns in the period 2010-2017. Also, we also take into account the cumulative effects of other spatial claims on the North Sea. The fishing activities in the planned wind farm areas contributed an average of 1.52 million euro per year in the period 2010-2017 to the gross added value of the Dutch cutter fishery. Although this effect is small the cumulative effect of the various future closures might affect up to 50% of the fishing revenue for the dominant gear types used in the Netherlands. For individual ships, the variation of the contribution from the planned closures to the income is much higher. It can be concluded that the fishing patterns of the sector will change considerably over the coming decades. The economic effects of the closure of the fishing areas are uncertain. Further analysis of the effects of the behavioral changes in the fisheries when closing the areas and the effects on the costs and income can provide an answer. Given all the area restrictions and their influence on foreign fisheries, it is important to keep in mind the international perspective.

An analysis of the Common Fisheries Policy (CFP) of the EU reveals that so far it does not achieve its objectives. That means that, for the achievement of the objectives, regulations need to be changed and/or adjusted.

For every new or revised regulation, the European Commission has to issue an impact assessment (IA). The aim of the impact assessment is to show short to medium-term impacts of management options by informing decision-makers of the trade-offs between the analysed options. However, a closer look at the current procedure of impact assessments for the CFP reveals that it is issued not at the right time in the policy process and is often limited to very few options. There is also normally no stakeholder involvement.

In the paper we first list some results of impact assessments for measures of the CFP, mostly from research projects. We show how an impact assessment can reveal the mid-term impacts of regulation. In a second part, we describe the current procedure of impact assessments in the EU and how we think the procedure should change so that the results have a better chance to influence the decision-making and to improve the achievement of the objectives.

Keywords: Fisheries management, Common Fisheries Policy, Impact assessment, Fisheries interactions.

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ISBN 978-84-18445-48-4, p. 45

On the question of the cost of capital

Richard Curtin, Philip Rodgers

Abstract: Work on several current aspects of fisheries, has raised the question of the cost of capital. As an opportunity cost this ought to be relatively simple; the return, an interest rate, on the next best perfectly safe investment. However, several factors cloud what this figure is. Clark and Munro (2016) recently suggested using a constant value, the expected return on long-term capital projects of 3.5% for the UK. This implies that the opportunity cost of capital, which by definition must always be equal to or less than the social time preference rate of discount, varies by country, which can only be true if international money markets are inefficient. This paper considers these factors which influence discount rates in public policy and formulates a novel method to estimate the opportunity cost of capital. This method is applied to the fishing fleets of 19 OECD member states and the results are discussed.

Keywords: Opportunity cost of capital, EU fleet, Economical modelling, Fisheries investment.

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10.00-11.30 am Room: **Paraninfo**
(2) parallel session – *Access to fisheries and right to fish*
chair **RAÚL PRELLEZO**

The efficiency of Southeastern Black Sea anchovy fishery under unobserved heterogeneity

David Castilla Espino, J.J. García-del-Hoyo, K. Bilashvili, M. Metreveli

Abstract: Southeastern Black Sea anchovy fishery stock in the Economic Exclusive Zone (EEZ) of Georgia is exploited by Georgia, Turkish and Ukrainian vessels. The historical evolution of this fishery is characterized by a process of overcapacity and consequently overexploitation which results from a limited management framework. Additionally, this fishery is also characterized by the lack of information available what makes it more difficult to impose proper management measures aimed at sustainability; and is a source of unobserved heterogeneity of fisheries production which includes different fishing gears. This paper is aimed at measuring the production efficiency of this fleet in the period 2005-2009 using econometric techniques accounting for production heterogeneity. A stochastic frontier latent class model is estimated at this aim (Alvarez y Del Corral, 2010; Orea y Kumbhakar, 2004). Results provide sound scientific advice for the management of this fishery on the technical efficiency of the fleet and the patterns of its distribution among it, and the technology of production. Some preliminary results using standard stochastic frontier methods show a mean technical efficiency level of around 60%.

Moreover, sample composition evidence the coexistence of unless 2-3 classes of technologies.

Keywords: Black sea anchovy, Fleet efficiency, Socioeconomic modelling, Fisheries production, Fisheries management.

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ISBN 978-84-18445-48-4, p. 49

The development of resource rent under ITQ management: Icelandic fisheries 1990 to 2017

Stefán B. Gunnlaugsson

Abstract: The economic literature states that ITQ (individual transferable quota) systems are ideal to facilitate rationalization, profitability, and hence resource rent (RR) in fisheries. The objective of this study was to chart the development of RR in Icelandic fisheries since the implementation of the universal ITQ system in Icelandic fisheries in 1990. The methodology applied was based on two measurements. The first estimated the cost of capital and then estimated the RR. The second method did compare the return on capital of fisheries to the aggregate economy and then calculated the RR. The findings were that there was no RR produced in the Icelandic fishing industry from 1990-2008. Since that time, the industry has been very profitable and high RR was present. The reason, why it took so long time to for the Icelandic fisheries to show RR, was mainly a reduction in landings. The volume of catches went down by half, from 1989 to 2008, and the industry just managed to keep up with the fall in catches in its rationalization. When catches increased after 2008, the industry became very profitable, and significant RR was present. The exchange rate and the fall of the Icelandic krona in 2008, when it lost almost half of its value, was also a major contributor to the emergence of RR.

Keywords: ITQ's, Fisheries management, Iceland, Bioeconomic assessment.

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ISBN 978-84-18445-48-4, pp. 51-52

Balancing biological sustainability, economic value and social benefits in the management of fisheries with commercial and recreational exploitation: the application of system dynamics modelling to the European Sea bass (*Dicentrarchus Labrax* L.)

Hannah J. Tidbury, Angela Muench, Kieran Hyder

Abstract: The European sea bass (*Dicentrarchus labrax*) is valuable and important for both commercial and recreational sectors. In UK waters, the International Council for the Exploration of the Sea (ICES) stock assessments indicate that sea bass stocks increased up to the mid-2000s, but declined rapidly since around 2008. This decline has been attributed to a combination of increased fishing pressure and poor recruitment. Measures, to reduce fishing mortality of sea bass associated with commercial and recreational fisheries, and increase selectivity, have been implemented by the European Commission since 2015. However, complex and dynamic links and feedbacks between the sea bass stock population and the value and activity of commercial and recreational fishing present challenges when trying to predict the short- and long-term effectiveness of proposed management strategies. As a result, models that assess the trade-offs between social, biological and economic factors are needed. Here, a system model framework that captures the biological, social and economic elements of the UK seabass fishery is developed, parameterised, and calibrated using ICES stock assessments. The model is refined to include simulated recruitment and incorporate management approaches under high, medium, and low recruitment, with different partition between recreational and commercial sectors. Model outputs are used to explore the relative merits of different management strategies in terms of the trade-offs between biological sustainability and economic value in terms of GVA created by recreational and commercial fisheries. Results show that, intuitively, recruitment size has a large impact on the fish

population dynamics and the viability of the recreational and commercial fishing sectors. Also, at high and moderate recruitment only, management measures contribute to the sustainability of the seabass population and the economic value of the fishing sectors. The impact of differential partition of the sea bass resource between the sectors is discussed

Keywords: Fisheries sustainability, European Sea Bass, Bioeconomic assessment, Fisheries management. Stock dynamics.

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ISBN 978-84-18445-48-4, pp. 53-54

Understanding ownership and firm organization in French Atlantic fisheries: a typology

Arne Kinds, Olivier Guyader, Pascal Le Floch

Abstract: This paper studies the changes in vessel ownership and firm organization in French Atlantic fisheries concerning successive stages of policy reform. Main reforms include the discontinuation of European subsidies and various reforms of the French quota system along with the introduction of sliding track records ("antériorités") per vessel. Although in the design of the system several measures were taken to prevent concentration (e.g., non-tradability of fishing rights, a percentage return to the national quota reserve when the vessel changes owner), vessel owners and investors have found another way to appropriate fishing rights: through the second-hand vessel market. Investing in second-hand vessels is the only way to acquire additional fishing rights, which has caused vessel prices to rise. French as well as foreign investors have exploited this situation to get their share of fishing rights, and are continuing to do so. This has made it difficult for small-scale fishers to access the fishery, especially for new entrants.

In a reaction to this, French vessel owners and governance bodies (i.e., Producer Organizations, fishing cooperatives) have restructured fishing firms to make them more adapted to the current competitive climate. While existing firm models are being reconsidered, also new models are emerging. This paper proposes a typology of vessel ownership and firm organization based on semi-structured interviews with vessel owners (both small-scale and large-scale) along the French Atlantic coast. The aim is to better understand the drivers behind firm organization and

investment in multiple fishing vessels. The analysis is rooted in industrial organization theory, theories of the firm, and transaction cost theory.

Keywords: Quota system; firm organization; firm ownership; concentration; transaction cost theory.

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10.00-11.30 am Room: **Room 12**
(3) parallel session – *Markets and marketing of fish products*
chair **ANTONIO ÁLVAREZ**

The role of price settling mechanism on value chain of cod

Ögmundur Knütsson, Sveinn Agnarsson, Kelly Moret, Valur N. Gunnlaugsson, John R. Isaksen

Abstract: One of the key factors which determine the dynamic in the value chain is the first gate price that the industry is capable of paying for the raw material and the form of selling. This research studies the role of the price settling mechanism in the value chain of cod is studied, using data from three countries, Newfoundland, Norway, and Iceland. All three countries have been competing for decades in the same markets for cod with similar products, but using different price settling mechanisms. In Newfoundland, The Fish, Food and Allied Workers Union (FFAW) and the processing companies determine through negotiations the first gate prices paid to harvesters before the start of each fishing season. In Norway, fresh fish is traded upon direct agreements between seller and buyer, but with minimizing price settling according to Act of the Fish Sales organizations (Fiskesalgslagsloven), which gives sales organizations owned by the fishers monopoly in the first-hand trade of fish. In 2016, two of those sales organizations were responsible for nearly 99 % of all cod landed by Norwegian fishers. In Iceland, two types of pricing are mainly applied, wet-fish auctions – which account for around 16% of landed cod –

and a price used in transactions within vertically integrated companies which is set by a government agency after consultation with sellers and buyers. This study also looks at how effective the price settling mechanism is in rewarding for attributes of the raw material, like quality and fishing gear used. Results show that prices paid to fishermen vary a great deal between the three countries and that there is a clear difference in the ability of the price settling mechanism to deal with the different attributes of the fish. The study also explores the impact the price settling mechanism has on the value chain of the cod in these three countries. This study is part of the PrimeFish EU Horizontal 2020 research project and PrimeFsih Canada focusing on the competition of the European fish and aquaculture industry.

Keywords: European Cod, Value chain, Fish prices, Price settling, EU H-2020.

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The fish processing sector in Spain: the tuna canning industry

Ramón Jiménez Toribio, Juan José García-del-Hoyo, Félix García-Ordaz

Abstract: The objective of this work is to analyse the fish processing sector in general, and, specifically looking at canned tuna. In this regard, the tuna canning industry and its market in Spain from 1900 to nowadays are described, being one of the most important in the world. This industry has proved to be competitive enough to survive the globalisation process as opposed to all other European countries. Its main characteristics, its strengths, and its weaknesses are shown.

The evolution and the current situation of production, imports, and exports of canned tuna are studied. Additionally, the historical evolution of the number of canning companies is presented and the level of concentration of the sector is determined.

To sum up, this study provides a current overview of the fish processing sector and its evolution throughout history. Interesting conclusions are drawn about the situation of the sector.

Keywords: Fish processing sector, Spain, Fishing industry, Fish production, Tuna.

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The improvements of the sustainability in the Basque Country fisheries from the MSC certification of the Sardine, Anchovy and Albacore: more than market benefits

Alberto Martín

Abstract: The producers' organisation from the Basque Country OPEGUI and OPESCAYA altogether with Cofradia de Laredo started the process to certify their main fisheries in 2014, boosted by the interest of the local canning industry. In 2015 they had succeeded to certify the anchovy, in 2016 was the time for albacore and in 2017 they ended the certification process of the Sardine of the Bay of Biscay.

All this process required extensive scientific research and counted with the support of the Basque research centre AZTI. The government of the Basque Country has also fully supported the process both financially but also implementing management measures and involving the fishing sector in the decision-making process. The local markets have started to valorise and prioritise the certified products and this has ended up with the most relevant Basque retailer, EROSKI, certifying the chain of custody for 348 fresh counters and offering MSC certified products to their consumers. The involvement of these four actors: fisheries representative, research centre, government, and markets is essential to understand the success of the Basque country fisheries model.

Five years later of the start of this process, there are clear market benefits: the certified products are getting preferential access to the international and local markets as well as very likely a price premium. There is evidence of an increase in the demand for certified sustainable fishing products and an improvement of the traceability and origin guarantee to the consumer. These benefits are pushing for fleets from other regions to join this model. Moreover, these 5 years of work have

generated a set of environmental and socioeconomic positive impacts. An observer programme to gather the scientific knowledge and interactions with endangered, threatened, and protected species has been established; implementation of a code of conduct and self-monitoring logbooks; promotion of harvest control rules both in ICCAT for Albacore and at EU level for the Sardine; establishment of management plans; improvement of the image and reputation both of the fishery and the fishing product; and empowerment of the fishing sector increasing their influence in the policymaking process.

Overall, this process has shown a successful business case where putting sustainability at the centre of the model generates value and increases benefit.

Keywords: MSC certification, Basque country, Sardine, Anchovy, Albacore, Fisheries management.

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Consumer perceptions about the coastal fishery and its products – What Focus Groups from Italy and France tell us?

C.laudio Pirrone , Loreta Malvarosa, F. Daurès, Bertrand Le Gallic, K. Zander, M. Cozzolino, C. Paolucci

Abstract: The paper is focused on catching the feelings related to the coastal fishery for some Italian and French consumers, carried out during the H2020 project SUCCESS. The aim was to understand the main drivers in buying and consuming fish products originating from coastal fisheries.

Information was collected during 9 "focus groups" hosting 77 participants, with a sample almost equally split into four sub-groups: a) Italian Tyrrhenian coast; b) Italian Adriatic coast; c) French Atlantic and Channel coast and d) Paris city (as an avatar of non-coastal consumers).

Almost none of the participants was able to spontaneously give an appropriate definition of the coastal fishery while, at the same time, almost all of them brought strong representations of it. On the other hand, one of the main lessons learned is that coastal fishery is mainly associated with positive feelings (e.g. coastal fishery is supposed to better deal with the resource, to be less aggressive with the seabed and to have a lesser carbon footprint). Third, and more operational, the focus groups highlighted that coastal fishery is likely to match important buying drivers: the freshness of products, high rated species, direct selling or other short circuits, and so on. This effect is strong in France, and even stronger in Italy. Also, people want (around 90% of the sample) to receive information about the "coastal" nature of the products. Required information is clear and strongly related to buying preferences: a) the exact catch date; b) the exact catch place (some even

suggested the distance from selling point); and, to a lesser extent, c) the fishing technique. Sellers themselves, labels, and pictograms were indicated as adapted solutions.

The work tried also to understand the feelings of consumers around labels focused on sustainability certification.

Keywords: Fish consume, Italy, France, Coastal fisheries, Traceability, Fisheries sustainability.

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The importance of employee and consumer labelling education for a fair market of fishery products

R.F. Grassi, M. Cozzolino

Abstract: Over time, the EU Common Fisheries Policy has given even more importance to correct information for consumers about fishery products.

Consequently, EU companies have been involved in complex procedures to improve their labelling and traceability systems to achieve the objectives of the CFP in this area.

While it might seem simple on paper, it becomes even more complicated in practice due to the globalization of the fish market.

Since the EU is the largest seafood market in the world and it is dependent on imports from third countries, EU importers need to give correct instructions to their foreign suppliers about how to label fishery products. But often the dialogue between the EU rules and those of other Countries is not automatic. Sometimes similar problems arise even as regards trade between the Member States because often what is allowed in one State is not allowed in another one.

In addition to this, it must be considered that the common consumer culture considered by EU rules is very complex and it seems more logical that before giving consumers the right information, it would be advantageous to teach them about what they may find in a fishery product label and how to read it. This could be fundamental to fight fraud and unfair competition between companies.

To respect EU labelling rules and correctly inform consumers, all companies involved in fishery products trade must have on their staff qualified workers who can study and apply EU and national rules in this field and can deal with fishermen,

processing factories, traders, importers, customs and control Authorities. The economic impact on the EU company budget of the costs for labelling and traceability could be a key point even for their position in the market.

Keywords: Social education, fish products, traceability, eco-labelling, EU legislation.

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12.00-1.30 pm Room: **Room 11**
(4) parallel session – *Common Fisheries Policy (CFP) implementation*
chair **NATACHA CARVALHO**

PreBiologic and economic consequences of using survey data when providing management advice

Itsaso Carmona, Raúl Prellezo

Abstract: Fishery surveys provide fishery-independent information about stock status. This information is used in the stock assessment process to provide management advice. The most common objectives of the surveys are to supply an abundance index, to estimate the spawning stock biomass, to provide biological characteristics of the stock (maturity, sex, age or size distribution, and migration among others), and from the ecosystem-based management point of view. The objective of this work is to analyse the biological and economic consequences of removing one informative survey from the fishery stock assessment process and evaluate the consequences of doing so from the fleet's performance point of view.

First, we review the existing literature about the economic importance of using surveys to evaluate the stock status and to provide management advice. Then, using a bioeconomic simulation model in a management evaluation strategy framework, we analyse how the advice process could be affected by the absence of a survey, and therefore, the consequences in the profitability of the fleets that catch each stock. We implement this theoretical framework, using data from the fishery of the northern stock of sardine in the Bay of Biscay (ICES Divisions 8abd). Sardine is mainly captured by France and Spain purse seine and pair otter fleets. Two surveys provide information on the fishery status. Three indices from two dif-

ferent surveys are used: the DEPM (Daily Egg Production Method) index and the egg count from the Bioman research survey and the abundance index obtained from the acoustic Pelgas survey. Results after the theoretical removal of one of the indices from the assessment and management process will be compared in terms of advised TAC (Total Allowable Catches), biological status, revenues, and numbers of vessels of each fleet, individually, considering also the dependency of each one to the sardine.

Keywords: Fishing surveys, Bioeconomic modelling, Fisheries stock assessment, Fisheries management.

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Issues of ownership in EU fisheries: knowledge, practice, competition, fairness, and sustainability

Griffin Carpenter

Abstract: What do we know about the ownership of fishing opportunities in the EU? And does it even matter? This presentation will detail the current state of knowledge regarding the ownership of EU fishing opportunities including findings from the recent EASME/MARE project on the ultimate owner of fishing opportunities in nine EU Member States. As the concept of ownership requires certain properties to be in place (i.e., a 'bundle of rights'), the method of allocation and other characteristics of fishing opportunities will be clarified in the EU context.

With this base understanding of definitions and current practices established, the implications of ownership over EU fishing opportunities will be explored. First, results from a competition analysis using measures of concentration (number of owners, concentration ratios, HHI) will be presented. Second, issues of fairness will be discussed in terms of process (allocation, intergenerational fairness) and outcomes (Gini coefficient). Third, some preliminary results from a study on the hypothesised link between the ownership of fishing opportunities and the sustainability of the fish stocks will be presented and discussed.

Keywords: Ownership, Distribution, Allocation, Right-based management, Catch shares, Competition, Sustainability

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Brexit and Seafood Trade: key lessons learned so far

Sébastien Metz, Simon Mardle, Bertrand Le Gallic

Abstract: The process leading to the Exit of the United Kingdom from the European Union has placed the seafood sector under the spotlight. Fishing has been one of the key elements of the debate before the referendum. It has also been at the heart of several parliamentary commissions in the UK parliament, in the EU parliament, and elsewhere since the vote. Numerous publications, conferences and workshops have dug into the complexity of the UK seafood sector and the numerous interconnections it has with the rest of the European fishermen and markets.

Despite the absence of information on the shape of the future relationship between the UK and the EU, the review of all the material produced over the last two years led the authors to some interesting findings:

1. The definition of a specific typology of seafood supply chains in the UK, which can help understanding where bottlenecks may appear once the Brexit is achieved;
2. The identification of several non-tariff barriers that could hinder trade between the UK and the EU even in the case of a soft Brexit, echoing the issue of "frictionless trade" demands from the UK seafood sector;
3. An exploration of the different concepts behind "zonal attachment", providing some insights on the potentiality for the UK to "take back control of UK waters", a totemic claim for the UK fishing industry.

Keywords: Brexit, Fishing resources, UK supply chain, Fish trade, Zonal attachment.

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12.00-1.30 pm Room: **Paraninfo**
(5) parallel session – *The role of small-scale fisheries*
chair **GONZALO RODRÍGUEZ**

Key Factors Influencing the Investment Behaviour in Small Scale Fisheries: A Research on Samsun Shelf Area (SSA) in Turkey

M.Selçuk Uzmanoğlu

Abstract: In this study, the drivers of investment in fisheries and how those can be activated to stimulate investment in alternative technologies to protect the benthos were investigated. To capture a wider range of factors than quantitative factors included interviews with fishing industries in SSA. The aim of the study, identify a wide range of reasons why fishers have (or have not) invested in alternative gears. As expected, the profitability of alternative technology is an important factor to invest but also had been found many others. Those drivers were classified as economic, technical, regulatory, social, governance, and environmental drivers. As advice to managers also had been identified where and how interventions could improve uptake of technology.

Keywords: Small-scale fisheries, Fishing technology, Investment, Fisheries management.

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Diversification of artisanal fishing fleet with marine litter removal activity

Marga Andrés, Oihane C. Basurko and Gorka Gabiña

Abstract: The European Maritime and Fisheries Fund "EMFF" (2014-2020) encourages the fishing fleet to present additional sources of income through diversification of their activity (Art. 30). They are also subjected to environmental challenges to answer the needs of a blue economy. Marine litter is one of these challenges and as such is enshrined in Art. 40 and 43 of the EMFF call for supporting waste collection by fishers.

Supporting the fishing sector to collect marine litter at sea has risen disputes and discussions at national and international forums. Here we present the results of a socio-economic analysis that shows the pros and cons of using the assistance of a retrofitted artisanal fishing vessel to collect Floating Marine Litter (FML) from the coastal waters. Removing FML has been therefore conceived as an additional source of income, through diversification of their economic activity, during their low activity season in particular.

Before the actual retrofitting of the vessel and collection at sea, it has been studied and selected the best artisanal fleet segment to collect FML, the best technology to retrofit the vessel, the best period of the year to collect FML. The selected vessels were equipped with a computing tool that provided forecasted information regarding the potential abundance and location of FML in the studied area to make the activity much more efficient.

The FML collection took place in the SE Bay of Biscay during 2017 and 2018. Results indicate that the best fleet segment is artisanal fishing vessel operating with gillnets gear, the most recommended technology to be installed onboard the

selected fishing vessels is the “one side surface trawling with hanged structure” combined with the hand tools, from the economic point of view of both shipowner and local authorities, the best period to collect FML is the summer which is in line with metocean models that indicate higher abundances during that period in the studied area. The operational FML detection and the computing tool improve the efficiency of the FML removal. Supporting the fishing sector for FML collection seems feasible.

Keywords: Small-scale fisheries, Bay of Biscay, Fishing technology, FML.

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Market-based management in small-scale fisheries: Empirical evidence from Nordic countries

Rasmus Nielsen, Max Nielsen, Ayoe Hoff and Peder Andersen

Abstract: If overcapacity exists in a given fishery, the introduction of Market Based Fisheries Management is expected to reduce the fleet and thereby the number of fishers and increase efficiency and thereby earnings within the remaining fleet. The expectation is most often that small-scale fisheries will suffer most from this fleet reduction, as increasing returns to scale with regards to vessel size is implicitly assumed. However, the study presented here suggests that in the Nordic fisheries the relative reduction in small- and large-scale vessels is relatively equal.

In the study, we investigate the effect over 10 years on the fleet structure of introducing Individual Transferable Quotas and other tradable rights, such as Individual Transferable Fishing Days in selected fisheries in seven Nordic countries. The most important result is that the small-scale fleet is reduced, however, proportionally not more than larger vessels. This is partly explained by small vessels targeting demersal species, where large vessels are fishing on pelagic stocks. However, a more important explanation is the regulation design, with limitations in quota sale and lease between small and large vessels, regionally restrictions in quota trade and holdings, quota limitations to individuals and vessels, and special schemes for the small-scale coastal vessels. This knowledge is important for countries considering introducing Market-Based Fisheries Management since the Nordic experiences show that a well-designed regulation can reduce overcapacity and increase efficiency. If there are increasing returns to scale it will at the same time protect the small-scale fishing fleet.

Keywords: Fish marketing, Fleet structure, ITQ's, Small-scale, Market-based fisheries management.

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Small-scale fisheries in Germany – any chance for long-term economic viability?

Ralf Doering, Loretta Malvarosa, Arantza Murillas

Abstract: Since the unification in 1990 a steady decline of the number of German small-scale fishers can be observed at the Baltic Sea coast. When retiring many fishers cannot find a successor as economic perspectives are perceived unfavourable. Besides, starting a fishing business requires considerable investment which is hard to handle for young fishers unless they inherit a vessel with a quota. At the Baltic Sea coast, the heavily decreased cod and herring quota put the fishers under high economic pressure urging more to give up the business in the near future.

At the North Sea coast, the situation is not as precarious compared with the Baltic Sea coast. There the main target species is brown shrimp, which is not under a TAC regime. Nonetheless, shrimp fishers have faced high uncertainties through highly fluctuating prices and catches.

Are there any chances for the survival of the small-scale sector? We firstly describe the situation of the German small-scale sector. This includes both the small vessels at the Baltic Sea and the shrimp fishing vessels at the North Sea. Then we give an overview of the economic situation and elaborate on which measures could be taken to improve the economic viability of the sector.

Keywords: Small-scale fisheries, Germany, Bioeconomy, Baltic sea, TAC.

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12.00-1.30 pm Room: **Room 12**
(6) parallel session – *Interdisciplinarity*
chair **LEYRE GOTI**

Evaluation of Fisheries Value Chain dynamics; a case study of the cod

Ögmundur Knútsson, Sveinn Agnarsson, Kelly Moret,
Valur N. Gunnlaugsson, John R. Isaksen

Abstract: Research of value chains in fish industries indicates that there is a great difference in the dynamic of the value chains. Increasing value creation is constantly the main agenda and objective for the value chains in a competitive environment and especially under the restrictions given by the limits of the fisheries management system and the structure of the industry. This study analyses the performance of the value chain of the North Atlantic cod in Norway, Iceland, and Newfoundland. Traditionally those countries have exported their cod products to the same markets in Europe and N-America and this study explores the underlying elements that are behind the different dynamics and performance of the value chain of cod in those countries. The findings indicate that differences in the processing stage, product mix, and flexibility of the value chains explain how well producers can respond to market needs. The comparison also reveals that the value chains differ in the ability to return profits and value creation and that this difference can partly be traced to the structure of the value chains in each country, not least as regards relationships between actors and in trust. Disparities in the flow of information and knowledge within the value-chains are also an important factor

in explaining the dissimilarity as well as different strategic positioning, investment opportunities, and fishery policies. The research leading to these results has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation (H2020/2014–2020) under grant agreement no. 635761 – PrimeFish.

Keywords: Value chain, Cod, Fish market, Traceability, Marine and commercial policy.

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Fish and fisheries behavior – Using sparse data to understand variability in landings of commercially important species

Serena Wright, Angela Muench

Abstract: In recent years, more granulate data on fisheries activity became available to researchers to inform fisheries behaviour models. However, stock availability is often not incorporated in these models due to a lack of data on the local fish abundance, despite being crucial for a range of applications (e.g., assess alterations in fisheries due to climate change). This study explores if data from electronic tagging can be used to indicate local stock abundance. We analysed data gathered by electronic tag deployments of the European sea bass (*Dicentrarchus labrax*) in UK waters This species is important for both commercial and recreational sectors, however, International Council for the Exploration of the Sea (ICES) stock assessments indicate that sea bass has declined rapidly in recent years irrespective of management measures implemented (e.g., seasonal closures, gear restrictions, bag limits). While effective fisheries management is crucial to reverse and prevent future overexploitation, information on the activity of the stock and the inshore fleet is sparse. About 95% of the UK seabass landings are harvested by the UK inshore fleet, vessels which are mostly below 12m length and therefore exempt from the EU Vessel Monitoring System regulation and often not part of fisheries dependent monitoring programs, due to lack of space on the vessels for the observers. We calculate the catch-per-unit-effort of the UK inshore fleet and compared it to the distributional maps of the stock, finding a Spatio-temporal mismatch in the distribution of stock abundance and vessels harvesting activity. We discuss potential sources of the mismatch in terms of fish and fisheries behaviour.

Keywords: Fleet modelling, Stock assessment, Vessel monitoring system, European seabass.

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The use of Hierarchical Bayesian Model techniques in fisheries modeling

Kári S Friðriksson, Gunnar Haraldsson

Abstract: Fisheries economists are often faced with problems relating to modeling different fisheries, where the amount of data is limited and time series short. When making general statements about fisheries from different regions or countries, the lack of comparable long-term data forces scientists to impose more or less restraining assumptions, which often further reduce degrees of freedom and erode statistical accuracies and outcomes. The data used in such studies are often of the hierarchial type, i.e., where for each country or region the data is on multiple attributes, such as vessel type, gear, species, and effort. The use of non-hierarchical models, such as panel data estimations, which are common in the literature, tend to either be too restrictive and fail to capture the differences between fisheries (i.e., fixed effects model) or too flexible, failing to use the information in the data to the fullest, leading to overestimation (i.e., random effects models). The use of hierarchical modeling techniques can greatly improve the modeling and are appropriate for modeling hierarchical data structures as those often found in fisheries. In this paper we present the Hierarchical Bayesian Model technique and how it can be applied to real-world fisheries and data, leading to higher statistical power and reduced statistical uncertainties.

Keywords: Fisheries modelling, Bayesian statistics, Uncertainty, EU fleet.

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The use (and misuse?) of indicators in fisheries management

Rannvá Danielsen, Hazel Curtis, Arina Motova

Abstract: Indicators are often used to assess fisheries management plans and performance. There are several guides and frameworks for selecting indicators for fisheries management, depending on whether the focus is social, economic, or environmental, and countless studies draw conclusions from a host of selected indicators. The process of selecting indicators and evaluating them against their intended purpose, however, is rarely analysed. The study aims to evaluate the indicators chosen to monitor the impact of Brexit on the catching, processing, and aquaculture sectors in the United Kingdom. We wanted to identify early warning signs of disruption to the three pillars of sustainability in the seafood sector as rapidly as possible. For that we needed indicators. Following a literature review on selecting indicators, a list of potential criteria for evaluating indicators was compiled and then narrowed down to those considered the most relevant to our aim of monitoring the impact of Brexit. The most important criteria were deemed to be responsiveness, i.e., how quickly does the indicator respond to changes; and sensitivity, i.e., does the indicator reveal changes in the phenomenon of interest? Once the selection criteria had been narrowed down, the next step was to select the indicators. However, it proved difficult to determine which indicators would be most responsive and sensitive prior to building the dataset and before the changes we wanted to monitor took effect. This presentation will critically evaluate how responsive and sensitive the indicators have proven at the time of presenting. Key questions will be 1) how do you determine sensitivity, and 2) how do you discern responsiveness from volatility?

Keywords: Fisheries management, Fisheries indicators, United Kingdom, Sensitivity and volatility assessment.

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Comparison of Fisheries Value Chain dynamics; a case study of the herring

Guðmundur Stefánsson

Abstract: Research of value chains in fish industries indicates that there is a great difference in the dynamic of the value chains. This study analyses the performance of the value chain of the North Atlantic herring in Norway, Iceland, Denmark, and Newfoundland. This study explores the underlying elements that are behind the different dynamics and performance of the value chain of herring in those countries. It is very interesting to see the difference in structure and functionality of the value chains between Norway, Iceland, Denmark, and Newfoundland. The structure of the industries is different as seen in the degree of vertical integration and the limits that governments put on the industries. It is though surprising how homogeneous the industry is between those nations. The nature of pelagic species that is, seasonality and high catch volumes in short periods, makes the product a global commodity for further processing from one season to the next. The main markets are Business to Business (B2B).

The comparison also reveals that the value chains differ in the ability to return profits and value creation and that this difference can partly be traced to the structure of the value chains in each country, not least as regards relationships between actors and in trust. Disparities in the flow of information and knowledge within the value-chains are also an important factor in explaining the dissimilarity as well as different strategic positioning, investment opportunities, and fishery policies. The research leading to these results has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation (H2020/2014-2020) under grant agreement no. 635761 – PrimeFish.

Keywords: Fisheries value chain, North Atlantic Herring, Governance, Pelagic species, Fish commodities.

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3.45-5.15 pm Room: **Paraninfo Hall**
Poster session 1 – *IUU and fisheries economic indicators*

Empirical evidence for poaching management: Combining normative and instrumental measures to combat shellfish poaching in Galicia

Hugo M. Ballesteros, Gonzalo Rodríguez, Pierre Failler

Abstract: Compliance with fishing laws is one of the fundamental objectives in the regulation of marine resources in small-scale fisheries, marine protected areas, recreational fishing, and the general management of fishery resources. Concerning IUU activities, compliance among the users is promoted based on two main theoretical approaches, the instrumental and normative approaches. These different perspectives suggest a dichotomy in the political action, while the instrumental approach is based on the application of coercive measures based on the detection and punishment of the non-compliance individuals, the normative approach promotes adherence to the norms as a voluntary act.

The aim of this poster is setting up policies in the fight against shellfish poaching in a co-management scenario. Adapted solutions for the Galician Poaching Scenario (19 different types of poachers) will be proposed.

The study case developed at the Galician Cofradias was based on the perception of users of resources (55 surveys + 48 in-depth interviews) which brought up information useful to identify measures to combat illegal shell-fishing, but also pointed out the relevance of the combination of multiple deterrent mechanisms

(instrumental + normative) and formal and informal institutional arrangements to fight against poaching.

Keywords: IUU, Poaching, Shellfish, Galicia, Compliance, Social communities.

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Performance of raised estimators in fisheries economics reporting

Cóilín Minto, Emmet Jackson, Brian Burke, Timo Staeudle

Abstract: Economic reporting often requires raising sample values to the total population. A key question is therefore how do various raising approaches perform? In particular, should some measure of central tendency be scaled to the total population or if there is a relationship with a known covariate should this be used to raise the sample? Here we develop a theoretical and empirical framework to evaluate the performance of various raising procedures in the applied context of fisheries reporting for the Annual Economic Report (AER) of the European Union (EU). Theoretical developments here focus on the derivation of analytical forms for the mean squared error (MSE) of raised estimators when there is or is not a relationship with a known covariate (e.g., fishing effort). Theoretical results show that where an economic variable is independent of the covariate, it is better to raise the average to the population level, as the inclusion of unrelated covariates simply adds additional variance to the estimator. In contrast, when an economic variable is proportional to the covariate, raising based on the covariate provides an improved estimator over the average raised as long as the residual variance of the relationship between the economic variable and the covariate is comparatively small and the strength of the proportionality constant comparatively large. An inequality indicator is derived to guide the choice of raising approach. Empirical application concerns selected reporting variables for the AER. Samples are treated as the total population and sub-sampled to emulate the situation of the real data. Empirical results largely corroborate the theoretical results showing that where there is a strong relationship with the known covariate, raising based on that covariate re-

sults in improvement. Sensitivity of the results to anomalies in the data is, however, highlighted. We suggest an operating procedure for reporting and continually critiquing raised estimators.

Keywords: Fisheries economics, Modelling, Fisheries economic sampling, Sensitivity.

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Day 2 - Wednesday 3 April 2019
9.45-11.15 am Room: **Room 11**
(7) parallel session – *Markets and marketing of fish products*
chair **NATACHA CARVALHO**

Atypical market behaviour of a sustainable fish stock: the case of plaice from the German North Sea fleets

Leyre Goti, Ralf Döring

Abstract: According to economic theory a scarce resource would have a higher price, and higher availability of the resource would push the prices down. We will present a case study where this is not the case, as prices remained low when the resource was scarce, and the recovery of the stock did not lead to a fall in the prices.

As part of the European research project SUCCESS, we explored the market behavior of plaice in the North Sea, as targeted by the German fleets. We first looked at the prices in relation to the evolution of the stock by looking at different databases. Then we interviewed stakeholders from the main German fleets catching plaice, to try to shed light on the causes of this atypical behavior of prices.

Moving further, the recovery of the stock did not present the expected improvement in economic sustainability, that is, that larger stocks provide for lower catch costs and higher catches. We studied the lack of incentives to exhaust the place quota through the information obtained from the same stakeholders. Given this situation, we explored current initiatives for the marketing of plaice, through further interviews with processing industry and promotion stakeholders, as well as

web and specialised literature research and observation at sale points and a consumer fair.

This case study shows the multifaceted aspects involved in the marketing of a sustainable stock and can serve as a warning to pay special attention to these issues when planning the recovery of a stock.

Keywords: Fish markets, North Sea, Fishing fleet, Sustainability, Quotas.

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The way the wind blows – tracing out the demand for Norway lobster using instrumental variables

Cecilia Hammarlund, Johan Blomquist, Staffan Waldo

Abstract: Estimating demand functions using prices that are observed on the market is difficult since prices are normally determined by demand and supply simultaneously. One solution is to use instrumental weather variables to shift the supply function and thus trace out the demand function. The fish market is somewhat of an ideal setting for estimating demand functions in this manner since the weather is an important factor shifting supply and it can be assumed not to affect the demand directly. We argue that winds are of particular importance to the supply of Norway lobster (Nephrops norvegicus) on the Swedish market and that winds are unlikely to directly affect demand. Using instrumental weather variables, we estimate daily aggregated demand for two varieties of Nephrops (creel-fished and trawled), separately, and in a system where both varieties are included. Using the fact that creel and trawl fishers have different patterns of fishing we can calculate wind variables that are specific to each type of fishing and use them as instrumental variables for two separate demand functions. We show that using instrumental variables increases the estimates of the elasticity of demand significantly compared to using standard OLS techniques. The results also show that the demand elasticity is larger for trawled Nephrops than for creel-fished and that the two varieties of Nephrops are close substitutes.

Keywords: Traceability, Norway lobster, Weather, Bioeconomic modelling, Fish demand.

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What factors explain ex-vessel price formation in fish auction markets?

Antonio Álvarez

Abstract: The fish price is a key variable for captains to choose a port for landing. At the same time, fish markets are also interested in this topic since they charge a commission on the fish auctioned and therefore, they benefit from both more landings and higher prices. Understanding the factors that affect price formation at fish auction markets is, therefore, an important research topic.

The objective of this paper is to explain ex-vessel price variability across boats and overtime in one of the most important wholesale fish auction markets in Spain.

The data were provided by Nueva Rula de Avilés, a society that runs an electronic daily auction. We have recorded at the bid level the characteristics of the fish being auctioned, the boat, and the market. The dataset is for all transactions that took place in 2016 and comprise 201,120 observations.

The auction is a dutch auction and the boats are auctioned by order of arrival to port. One of the contributions of this paper is to study the effect of the rank of the boat in the auction on the equilibrium price.

Many papers study the effect of product characteristics on the market price. In this empirical literature, the price of a product is modelled as a function of the product characteristics, giving rise to the so-called hedonic regression. Hedonic price analysis has its origins in agricultural economics. This literature originates with the seminal work of Waugh (1928) who published his pioneering paper on quality factors influencing vegetable prices. Waugh regressed the price per a lot of asparagus on three dimensions of quality: colour, size of stalks, and uniformity of spears.

The basic model is a hedonic regression where the price per kilo is the dependent variable while the explanatory variables are a set of quality attributes of the fish, plus other control variables, such as characteristics of boats and buyers.

The basic equation to be estimated is the following:

$$P_{ijt} = \alpha_j + \beta x_{it} + \beta y_{it} + \nu_{it}$$

where the price of each fish lot (*i* from each boat) in a given day, *t* is explained by fish characteristics ($X_{i,j,t}$), and other control variables ($Y_{i,t}$) such as buyers' and sellers' characteristics.

The number of species auctioned at the Aviles port is very large (over 200) and we have selected the 5 main species for our empirical analysis, namely, hake, mackerel, tuna, blue whiting, and horse mackerel. These species make up for more than 80% of all the landings at the Aviles fish market in 2016.

The model was estimated separately for each of the selected species using two estimators: pooled OLS and (boat) fixed effects.

Keywords: Fish auction, Vessel prices, Bioeconomic modelling, Fishmarket.

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The impact of price variations on seafood consumption on the sustainability of fisheries?

Lucas Sterenn, Louis-Georges Soler, Xavier Irz, Didier Gascuel

Abstract: Concerns over the environmental impact of seafood consumption are rising among consumers and public authorities. Previous research has established the lower impact of seafood-based diets compared to meat-based diets, but little is known about the impact of substitutions within the seafood category. Thus, we merged consumption data for species with environmental indicators of fisheries: primary production required (PPR), maximum length (ML), process (farmed; type of gear), and origin (France, EU, outside EU). Elasticities of demand for seafood in France were estimated and used to calibrate a model of adjustment in seafood consumption to variations in price or expenditure. We simulate four scenarios: an increase in seafood expenditure, and increase in the prices of salmon and small pelagic (SP), and a decrease in the price of monkfish. A decrease in PPR, ML, percentage of towed and percentage of import improves fisheries sustainability. Higher seafood expenditure raises the average PPR as well as the average ML, and affects positively the share of fish consumption originating from France and the EU. An increase in price, for salmon and SP, decreases the average PPR and has no impact on the consumption share of aquaculture. Average ML decreases from rises in salmon price, but increases when the price of SP increases or the price of monkfish decreases. The percentage of fish from towed gears increases with salmon prices (coupled with an increase in the share of bottom-towed) but decreases with the price of SP (despite an increase in the share of bottom-towed). Concerning origin, higher salmon prices play in favor of seafood from France, while it is a production

from outside the EU that benefits when the price of SP increases. Monkfish prices variation does not affect the origin of seafood. This preliminary work focuses on indicators for fisheries but will be extended to include other indicators.

Keywords: Seafood prices, Fish consumption, Demand elasticities, Salmon, Small pelagics.

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Price flexibilities for high valued fish species in the Port of Vigo

Gonzalo Rodríguez, Roberto Bande

Abstract: The objective of this work is to assess the formation of prices in fishing products and its impact on the strategies followed by shipowners. Research focuses on the case of the Port of Vigo, the largest in Spain in terms of the volume of fresh fish unloaded.

Perishable product prices (such as fish) configuration, in the first sale, shows a set of features that must be weighed when defining the strategies that may affect a better result for the fishing companies. These features include short-term inflexible production (this means that the quantity supplied is given at the time the ship stores its last set), seasonality and the need to deliver the product quickly, as well as the influence on the prices of the remaining agents located along the value chain; what of the place to that, unlike the markets of conventional final goods, the prices adjust so that the available quantity is bought.

That is, the resulting prices will be those that cause the quantity supplied to be sold so that in these cases the estimations are made through inverse demand functions, this being the approach adopted for this study.

Regarding the stated question, obtained econometric results show that short-term prices for assessed species are elastic. It implicates that the reaction of prices to changes in the quantity discharged is less than proportional. Consequently, decreases in production are not fully offset by the price increase.

Additionally, the substitution relationships between species have been identified, observing that there are complementary relationships between the ray and the pollock. Likewise, it is verified that the main substitute for monkfish is a rooster, which would also have a weak substitute in ling.

Keywords: Price flexibilities, Vigo fish market, Econometry, Substitution relationships, Fish demand.

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11.15-11.45 am Room: **Paraninfo Hall**
Poster session 2 – *Markets and marketing of fish products*

Competitiveness of the main producing countries of sea bass and sea bream

Lamprakis Avdelas

Abstract: Market share is used in this paper as a measure of competitiveness for the major sea bass and sea bream production countries, Greece and Turkey. The market is defined at the world level and also at the country level. The case of Italy, a net importing country and the largest market for sea bass and sea bream are used for country-level estimations.

At the world level, the point estimates of competitiveness suggest that the competitiveness of the Greek production has been diminishing both in the case of sea bass and in the case of sea bream. Only non-European countries managed to increase production and market shares during the past decade.

At the country level, for Italy, the main European market for both species, data suggest that Greece has been regaining part of the market share lost during the previous years.

Since 2016, the Turkish export data suggest that Greece is becoming a major importer of sea bass and sea bream from Turkey. Acknowledgment: This paper is part of the MedAID project which has received funding from the European Union's H2020 program under grant agreement No 727315.

Keywords: Sea bass, Sea bream, Mediterranean, Fish marketing, Market behaviour.

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BluFish: Italian fisheries toward sustainability. Fisheries mapping phase

Loreta Malvarosa, Giussepe Scarcella, M. C. Mangano, I. Vielmini

Abstract: Fisheries mapping is a useful tool to get a comprehensive overview of the fishing activities, their contribution to the total catches, fishing effort, and landing value. In 2018, Marine Stewardship Council (MSC) launched the Blufish project: a project pre-assessment aimed at engaging multiple fisheries at the same time assessing where this set-in relation to the MSC sustainable fisheries standard.

BluFish aims to involve not only the fisheries and NGO stakeholders, but notably also the management Authorities, scientific advisory bodies, and the supply chain interested in sourcing from these fisheries. The fisheries mapping is the first stage of BluFish project pre-assessment and it has two main goals: i) To obtain information about the central and southern Italian fisheries; ii) To provide the necessary data and information for the stakeholders involved and interested in the project to select fisheries as to identify units of assessments (UoAs) defined as species & stocks x gear x fishing group of vessels, that will be pre-assessed based on the MSC standards.

The mapping exercise includes two steps: i) a fast scan, aiming at gathering information about fisheries or commercial species in the area that fit within the scope of the project; and ii) the deeper mapping, focused on gathering more in-deep information on the fisheries, in order to identify UoAs that will be pre-assessed. As part of the deeper mapping, it is essential to consult and engage stakeholders in the selection of the UoA.

Keywords: Spatial representation, Stock assessment, UoA, Fisheries, Fisheries information.

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9.45-11.15 am Room: **Room 11**
(8) parallel session – *Aquaculture*
chair **BERTRAND LE GALLIC**

Barriers of Growth – experts' views on the stagnating aquaculture sector in Germany

Tobias Lasner, Antje Gimpel

Abstract: Aquaculture can be seen as an international success story. Indeed, within the EU strategy "Blue Growth" high expectations towards aquaculture are formulated. In Germany, the sector is comparable small, and diverse. Moreover, the development of the German sector has been stagnating for many years. Within the scope of the international EU projects SUCCESS and AquaSpace, a quoted sample of stakeholders from the fields of nature conservation, politics, economy, science, and administration was brought together. Following an open design of qualitative research, recorded discussions aimed to identify the key issues linked to a (non-)expansion of the aquaculture sector in Germany. A combination of sequence analysis (Grounded Theory open coding) and structuring text analysis was used to code and interpret 2,496 paragraphs related to the thematic field of aquaculture. Following a qualitative explanatory approach, our study argues, why the first economic power of Europe fails in a quantitative growth in aquaculture. One dominating theme discussed was the role of German entrepreneurship. A storyline of argumentation characterizes the theme: i) German aquaculture is characterized by the peasant, small-scale family businesses, which produce and distribute their products locally. ii) The seafood market rate should be lowered as (regional) fish production is

perceived as most sustainable. iii) The peasant structure leads to a high potential of development in a niche market (high quality, sustainable, and assumed as highly demanded). iv) At the same time the peasant structure is seen as a barrier for essential growth of the sector (low innovativeness and a lack of capital for investments). Like other barriers identified (bureaucracy, nature protection) the central players (fish farmers) are described as imposed passive observers rather than risk-takers in a struggle of economic and conservational societal paradigm.

Keywords: Aquaculture, Germany, Sequence analysis, Fishing sector, Fish production.

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Profit and resource rent in the Norwegian farmed salmon industry

Anders Skonhoft

Abstract: The farmed salmon industry in Norway started as a government-supported activity in the end of the 1960s. During the 1970s many breakthroughs concerning biological and technological bottlenecks, such that smolt rearing and the development of dry feed, fundamentally advanced the industry while the real large commercial breakthrough took place in the 1980s. Since then, the farmed salmon industry in Norway has experienced remarkable growth through the expansion of new cultured locations, improved productivity, and growing global markets. In the very beginning, it was few if any regulations of the industry, but a concession system was imposed in1973. Today there about 1000 concessions, a number that has been quite stable during the last decade due to diseases and the sea lice problem. Because of the concession system, the Norwegian farmed salmon industry earns a resource (scarcity) rent, in addition to the Ricardian (intramarginal) rent. As the international willingness to pay for farmed salmon has increased significantly during the last few years in a situation with a fixed number of concessions and stable production, the profitability has been grown dramatically. This paper analysis profitability and evolvement of the resource rent in the Norwegian farmed salmon industry theoretically and empirically by using microdata. The paper also analyses various ways to impose a resource rent tax on the industry.

Keywords: Salmon industry, Aquaculture, Local markets, Productivity, Bioeconomy.

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Adapt or lose: how to manage the socioeconomic impact of climate change in Spanish aquaculture, the case of blue mussel

José L. Santiago, Mariola Norte, Rosa Chapela

Abstract: In the context of the ecosystem approach for aquaculture, climate change is gaining relevance because its direct effects on primary productivity but also for its indirect effects on the livelihoods of the communities related. In this paper, we propose a stepwise framework to improve the understanding of these effects in a community dependent on mussel cultivation (i.e., aquaculture) and how it supports the decision-making of management and production strategies. Climate change affects the flesh yield and harvesting time of mussels as well as the occurrence of harmful algal blooms, which impact their output. These effects have a direct influence on the mussel sector but also on the stakeholders who provide inputs to this aquaculture sector (backward) as well as to those who use mussels as an input for their production (forward). These spillover effects can be traced and estimated based on the input-output analysis but also involving the stakeholders related. The preliminary results show how this analytical framework provides an accurate assessment of the socioeconomic impacts caused by climate change by considering the backward and forward effects simultaneously. The proposed framework improves the decision-making process, in particular its capacity to anticipate the effects of climate change by comparing in advance different scenarios. Therefore, the sectors and communities can react and propose adaptation and mitigation strategies in a participatory way, enhancing more holistic and sustainable management systems.

Keywords: Aquaculture, Mussel, Coastal livelihoods, Socioeconomic assessment, Climate change.

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Economic feasibility and acceptance of insect meal in aquaculture products: a survey of the Italian supply chain

Luca Mulazzani, Giulio Malorgio, Fabio Madau, Pietro Pulina, Laura Gasco, Marco Saroglia

Abstract: Plant proteins are used in an increasing percentage of diets for carnivorous fish to replace a fish meal to reduce costs. However, different studies report that fish respond to such replacements by reducing growth rate, feed conversion, and fillet quality. This study focuses on rainbow trout and European sea bass and aims to test the economic feasibility and the acceptance by the different actors of the supply chain of alternative sources of protein, in particular insect's meal.

The research intends to compare the costs of raw material and products along the supply chain, analyzing if insect's meal, feed that use insect products, and fish nourished with feed including insect meal can economically compete with the traditional products. Furthermore, it is necessary to verify if the insect-based products can be accepted by both final consumers and large-scale retailers, which have strict procedural guidelines for branded fish products.

The study includes several growth trials and interviews with several actors of the supply chain. Preliminary results, focusing on the interviews with fish farmers (rainbow trout and European sea bass) and feed producers, will be presented. These results allow establishing the economic framework, made of feed costs, growth performance, and fish price, inside which the new insect-based supply chain needs to be positioned to result competitive.

Furthermore, fish farmers indicate other aspects and objectives that have to be considered besides feed conversion ratios and economic margins. Interviews reveal that, depending on the farming structure, size and technology, fish farmers

may have different production and marketing strategies, choosing to produce specific fish products for consumers' niches. These choices, depending on consumers and marketing channels, may also affect the decision to use insect-based feeds.

Keywords: Aquaculture, Fish nutrition, Insects, Economic accounting, Animal protein.

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Economic impact of the decline in mussel aquaculture production in the EU

Jordi Guillen, Natacha Carvalho

Abstract: Contrary to the increasing production worldwide, the European Union's (EU) production has decreased over the past few years. Mussel production in the EU peaked in the late 1990s, reaching more than 600 000 tonnes; in 2016, production levels were at almost 480 000 tonnes, valued at EUR 420 million.

As mussel production represents more than 1/3 of the total EU aquaculture production, this decrease is an important factor behind the stagnation of the aquaculture sector in the EU.

Diseases, lack of mussel seed, and low profitability have often been put forward as the main causes of the EU mussel production decrease.

In this study, we investigate to what extent economic causes are responsible for the decline in EU mussel production, and its impact on the economic performance of the sector.

Keywords: Fish production, Europe, Economic assessment, Bioeconomy, Mussel.

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9.45-11.15 am Room: **Room 12**
(9) parallel session – *Economics of climate change*
chair **RAÚL PRELLEZO**

Climate change, backwardness, and fisheries: The economic history of Iceland from settlement until the present time

Stefán B. Gunnlaugsson

Abstract: Immigrants mostly from Norway and Ireland settled in Iceland during the 9th and 10th centuries. The population of the country was estimated to have reached 50 thousand by the middle of the 10th century. However, there was no growth in the Icelandic population for the next nine centuries. The reason for that was mostly the climate and its change. The climate was favourable when the country was settled, but became unfavourable especially from the 16th to the 19th century. Volcanic eruptions were also important as major and minor eruptions made the country unsuitable for agriculture. Overgrazing was also a big contributor to no growth in population and various plagues devastated the population like in other European countries. Fisheries were primitive in Iceland until the end of the 19th century. It is by adopting commercial fisheries that Iceland manages to gain prosperity. In 1880, Iceland was one of the poorest countries in Europe. However, in 1950, living standards in the country were on par or above the European average. Fisheries were the driving force in the Icelandic economic development the whole 20th century. Iceland manages to increase fisheries exponentially, by adopting new modern vessels and technologies. Foreign fleets were phased out

of the EEZ from 1950 to 1976 thus enabling the Icelandic fishing fleet to increase its landings. Fisheries were the main export earner of the country all of the 20th century until 2014 when tourism became the biggest export industry in the country.

Keywords: Fisheries, Climate change, Iceland, Fisheries management, Local growth.

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The role of non-fishing and household income diversification in managing an economic shock in fisheries

Sanmitra Gokhale, Johan Blomquistb, Staffan Waldob, and Andries Richtera

Abstract: Managing economic risk is a challenging endeavour for fishers. They face high-income volatility due to changes in regulations, market prices and catches. One of the ways to mitigate this risk, has been to diversify income within fisheries across various stocks and regions as well as outside of fisheries into other income sources. While the role of fishing income diversification has been widely examined, the role of non-fishing income and household income in fishers' economic risk management has been poorly studied. To the best of our knowledge, we are the first to empirically analyse the portfolio risk of fishers' incomes from fishing, non-fishing, and household income sources. We use Swedish fishers' data from 2003 to 2015. We also examine the impact of the Baltic Sea cod crisis and see whether fishers with non-fishing and household income had lower risk levels under the crisis. Our preliminary findings indicate that fishers with non-fishing income have lower portfolio risk levels than those without any non-fishing income. We also find that under the cod crisis cod fishers with secondary incomes had lower portfolio risk than cod fishers without any non-fishing income. This research shed light on the entire risk portfolio of fishers (including their non-fishing and household incomes) and the role it plays in managing economic risk under a crisis. It has clear policy implications, as income diversification is one of the key avenues fishers use to manage their risk, and understanding their entire income risk portfolio can allow policymakers to design policies that can take their non-fishing and household income activities into account. As non-fishing income and household income can

also play a role in reducing the impact of a fisheries-wide systemic shock, findings from our study can be applied to policies that deal with disaster risk management in fisheries as well.

Keywords: Risk management, adaptation, non-fishing income, climate change.

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Managing a natural asset that is both a value and a pest. Cooperation vs. competition: The Barents Sea Red King Crab

Melina Kourantidou, Anders Skonhoft

Abstract: Climate-induced changes along with anthropogenic intervention are driving marine invasions worldwide, with the Arctic being a particularly vulnerable area with lots of unknowns. In this paper, we examine the Red King Crab invasion in the Barents Sea which originates from an intentional introduction in the late 1960s and whose management remains controversial over the past two decades, both nationally and across borders that share the stock (Russia and Norway). We focus on the most interesting feature of the fishery which is the dual role of the crab as a nuisance and a valuable economic resource. Specifically, we explore the fishery's management using a bioeconomic model, both in a cooperative and a non-cooperative setting. We follow the conventions and assumptions of many analytical fishery models and add to that the nuisance from the crab stock as well as the spatial externality associated with the migration of the crab from the Russian to the Norwegian zone. We derive and discuss the analytical solutions and seek to understand the gain from cooperation as well as the impact of management decisions over-harvesting taken independently by Russia and Norway. We also present a numerical analysis of the crab management for a clearer illustration of harvest policies by the two countries; we run basic scenarios where the effort cost in the Norwegian fleet exceeds that of the Russian effort cost, and the opposite for the harvesting productivity. The data scarcity, especially for the cost of the nuisance as well as for the characteristics of the Russian fishery and fleet, restricts our ability to provide precise estimates. Notwithstanding these data limitations, the paper

provides useful insights that can be used in better understanding the incentives for cooperation across countries and the trade-offs involved in managing such species that are simultaneously a value and a pest.

Keywords: Barents Sea, Red king crab, Fishing fleet, Bioeconomic modelling, International cooperation.

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Economic and socioecological indicators for marine resource use and management in the Arctic

Melina Kourantidou, Megan Bailey

Abstract: This work seeks to explore ways to contribute to the governance of marine resources in the Canadian Arctic, especially those of importance to the Inuit in the self-governing Nunatsiavut region of Labrador. The future of Labrador Inuit communities is entwined tightly with both tangible and intangible ecosystem services and functions and poised between opportunity and uncertainty. Stakeholders, policy-makers, and resource managers are just beginning to consider how an accelerating pace of Arctic environmental transformations could affect ecosystems and traditional livelihoods. Living marine resources are critical to Canada's natural wealth, supporting a wide range of subsistence values that contribute to Indigenous livelihoods. As the cornerstone of Labrador's local economies, fisheries have always drawn the most attention. But fisheries do not exist outside of social-ecological services, cultural norms and traditions, which are centrally important too, but which have received little attention in the formal resource economics literature. We propose the development and use of Inuit-led interdisciplinary indicators to investigate the potential benefits of the implementation of integrated Ecosystem-Based Management (EBM) for the Labrador Inuit. Community consultations and data from a recent Traditional Ecological Knowledge (TEK) survey, in progress by the Nunatsiavut Government, will serve as critical inputs for building a better understanding of the socio-ecological system, as well as for identifying existing governance gaps. Specifically, through this work, we attempt to develop indicators that link ecological change with benefit creation and distribution for Labrador Inuit and assess to what

extent EBM can contribute to Inuit self-governance of the marine space in this context.

Keywords: Fisheries socioeconomics, Arctic, Fisheries management, Canada, Climate change.

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3.00-4.30 pm Room: **Room 16**
(10) parallel session – *Legal aspects of fisheries management*
chair **GONZALO RODRÍGUEZ**

The role of Producers' Organisations in EU fisheries: a potential case of conflict between management and commercial regulations?

Celestina Caccianiga, Bertrand Le Gallic, Loretta Malvarosa, Fabienne Daures

Abstract: The paper aims to investigate the functioning and the juridical framework of Fish Producer Organisations (and more in general of cooperatives in fisheries) within the EU countries – namely in Italy and in France – through a comparison between two specific case studies, both concerning a PO involved in shellfish fisheries management and regarded as successful: the smooth clams fishery in Northern Adriatic and the scallop fishery in the English Channel (French side – St. Brieuc bay).

At first, the analysis focuses on the historical development of fishery cooperatives in France and Italy. It is to say that understanding the actual structure of fishery cooperatives – as well as the legal, social, and economic processes that shaped it across the times – is a fundamental operation in order to better evaluate the single PO's action and the rules addressing it.

Then, the paper more precisely analyses the role in the resource management of the two abovementioned POs, and especially the legal structure of a cooperative firm within a given co-management framework that is as a combination of TURFs and pooling arrangements. Moreover, the extent of the pooling arrangements provided by the single cooperative/PO might affect the actual structure of

the cooperative/PO itself under the classification developed within the agricultural sector (US mainly) between *bargaining cooperatives* and *marketing cooperatives*.

Furthermore, on that basis, to the paper investigates the implications that might arise in regard to competition law issues when (and if) crossing the activity of such management systems. In fact, it is dramatically important to understand how far POs can go with their actions, especially to what concerns pooling arrangements. And here, it is important to stress that under EU laws Fish POs – and, more generally, the agricultural and fisheries sector – are covered by a specific and favourable regime, as an exception to some of the general competition rules. On this matter, it is useful to examine the (few) recent case-law by ECJ or by the National Competition Authorities, as well as to compare it with similar cases in US/non-EU countries' experiences.

Keywords: Fisheries, Producers organization, Cooperatives, Marketing, Stakeholder conflicts.

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An alternative, fisheries-based approach for the segmentation of the fishing fleet

Joerg Berkenhagen, Steffi Meyer

Abstract: In the Data Collection Framework (DCF) of the EU Fishing Fleet vessels are classified by fleet segments, a combination of length class and dominant gear class. These technical criteria are clear and allow an unambiguous assignment of vessels to different groups. However, except for the case of the Annual Economic Report the resolution at fleet segment level does not fully meet the requirements for any other use of fleet economic data.

In most cases fleet economic data are needed regarding a certain fishery, e.g., beam trawling on flatfish or demersal trawling on saithe. In the case of the German fleet, the DCF fleet segments merge flatfish beam trawlers with shrimp beam trawlers and demersal trawlers targeting saithe with demersal trawlers targeting halibut. Thus, any effect of one specific fishery on the economic performance of a segment is biased by the figures from other fisheries.

We present an alternative approach for grouping vessels by using similarities between annual fishing patterns. The method is based on the monthly revenues at the species level and combines two different clustering techniques, including a sequence comparison, to achieve annual fishing patterns for every active vessel of the fleet and thereupon group the vessels. Consequences on economic figures as well as potential difficulties when following this approach will be discussed.

Keywords: Fleet segmentation, Germany, Fisheries, Fisheries economics.

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The fisheries case in the light of a new binding agreement on the conservation of biodiversity in the areas beyond national jurisdiction

Manuel Pacheco Coelho, Rui Junqueira Lopes, André Estrela Pires

Abstract: In 2015, the United Nations' delegates took a historic step towards the management of international commons: they agreed to launch a formal preparatory process for a global and legally binding instrument for the management and conservation of the oceans' resources beyond national jurisdiction and to address the fundamental question of marine governance.

Our perspective highlights the fisheries case. The "unfinished business" of UNCLOS (1982), that is, the imprecise definition of use rights in the areas of High Seas adjacent to the Exclusive Economic Zones (EEZs) were in the root-causes of a lot of "fish wars", in the 90s. The U. N. Agreement (1995) on Transboundary Stocks and Highly Migratory Species pretended to be a formula of cooperation among interested states but, although some interesting results, continues to be the motive of discussion.

The purpose of this paper is to notice and discuss the steps that were made to achieve this new global binding agreement and to stress, by using Game Theory, a critical perspective about the rationale and the results of the negotiations in what respect to fisheries.

A Portuguese controversial related issue is highlighted: the possible enlargement of EEZs and the rehabilitation of the juridical and economical statute of the Continental Platform, and the potential impacts on the Portuguese long-distance fisheries.

Keywords: Biodiversity, Marine governance, High Sea fisheries, Game Theory.

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Universidade de Santiago de Compostela, 2021
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Do subsidies to firms increase investments? – An analysis of the investment support to aquaculture and the fish processing industry in Sweden

Johan Blomquist

Abstract: The European Maritime and Fisheries Fund (EMFF) provides investment support to firms in aquaculture and the fish processing industry. The investment support constitutes an important part of the funds in the EMFF. The support aims to stimulate investments in efficient and sustainable production processes and investments that have the potential to generate new and/or more valuable fish products, which in the long-run may increase competitiveness and profitability in these sectors.

It is, however, not obvious that the investment support will generate more investments. Profit maximizing firms have an incentive to invest also without the support if the investment increases profitability. Therefore, there is a risk that the support will fund investments that would have been undertaken anyway. This effect is often referred to as the deadweight loss (DWL) of the investment support.

In this paper, we analyse the effects of the investment support to Swedish firms in aquaculture and the fish processing industry. The main purpose is to investigate whether or not the support has increased firm investments and to quantify potential DWL. The paper also estimates the effects on production and value-added for supported firms. The empirical analysis is based on panel data including all firms in these sectors in Sweden over the period 2007-2015. The availability of panel data makes it possible to address the selection problem inherent in program evaluation studies.

Keywords: Aquaculture, Fishing firms, Fishing subsidies, Sweden.

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3.00-4.30 pm Room: **Paraninfo**
(11) parallel session – *The role of small-scale fisheries*
chair **ARANTZA MURILLAS**

Small-Scale Fisheries, Communities and Cultural Heritage

Juan J. García del Hoyo, Celeste Jiménez de Madariaga, David Castilla Espino

Abstract: Fishing is defined not only as the act of obtaining fish for consumption, but also as a way of understanding life, interacting with one another, and co-habiting with one's natural environment. When we speak of fishing societies and the culture of fishing, we speak of Cultural Fishing Heritage.

In 2003, UNESCO adopted the "Convention for the Safeguarding of the Intangible Cultural Heritage", which has the characteristics of an international treaty. At this time, a register was generated, called the "Representative List of the Intangible Cultural Heritage", which includes the elements considered to be heritage. Although there are very few examples of fishing culture included in UNESCO's Listings of Intangible Heritage—only six so far—their presence can be observed in the three types of registers, and different parts of the world.

Thus, fishing heritage includes identity markers common to all fishing villages, as well as markers that are unique to each village, but it is the latter that stands out especially. Heritage markers have an interweaving effect on people's lifestyles and daily activities regardless of their heritage, and they, in and of themselves, can become not only cultural but economic resources.

The vision of cultural heritage from the perspective of the economic profitability it may generate has an impact on the increased attention paid to this heritage as a resource capable of developing local economies. Tourism and its new demands are presented as an alternative to reactivate fishing, through its reinterpretation as

a cultural heritage. The heritage of fishing, even with new uses and benefits, new meanings and pretexts, and old and new participants (fishing communities and tourists, respectively), can become a tremendously effective means of safeguarding the fishing culture.

This work describes the results obtained in the PCI and the CABFishMAN projects, about SSF.

Keywords: Small-scale fisheries, Cultural heritage, Local communities, Fishing Culture.

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A participatory-based mapping of the small-scale inshore fisheries: Towards holistic management in the Bay of Biscay

Arantza Murillas, Estanis Mugerza, Esti Díaz, Luis Arregi

Abstract: Understanding the spatial distribution and pressure of the small-scale inshore fisheries (SSF), generally representing vessels under 15 meters in this study, at the Bay of Biscay (BOB) to help when defining spatial management measures, represents the main goal of this paper. This research will contribute to increasing the opportunity of developing holistic management of the SSF at local-regional levels, through increasing available good-quality multidisciplinary geospatial data. Good quality spatial fishing effort is usually available for larger vessels, but it is rarely available for SSF. This paper illustrates the method followed in the BOB based on a participatory process, in which fishermen, regional administration, and researchers are involved to get spatially distributed data. Based on a 1 km2 grid, a description of effort, catch composition, economic value, and costs at each site show the spatial pattern in the distribution of main metiers' activity. This paper also provides examples of the usefulness of such spatial information given the multiuse character of the BOB, to manage the activity itself - effort limitation measures, trade-off distant grounds, and costs, or to manage conflicts between SSF and other large-scale fishing activities. In the end, this work aims to enhance the artisanal sector´s participation in decision-making.

Keywords: Small-scale fisheries, Bay of Biscay, Geospatial analysis, Management participation.

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Is there an optimal number of days-at-sea? An application to small scale fisheries

Antonio Alvarez, David Roibás

Abstract: One of the main problems of the fishing sector is the reduced profitability of the fishing activity, which leads to a decrease in the number of fishers and a reduction in the income of fishing villages. The solution to the problem of reduced fishers' income is not an easy one. Gross revenue is the product of catches times the price of fish. Since catches are regulated to stop the exhaustion of the stocks due to overfishing, the increase in incomes appears to depend on prices. The recent evolution of fish prices shows a small increasing trend, but not enough to compensate for the decrease in catches.

However, fishers' net income, also depends on costs. In this regard, fishing is a rather peculiar economic activity since most of the costs are fixed. That is, once a boat decides where to go fishing, the inputs are set and there are almost no managerial decisions that allow fishers to reduce costs. Therefore, the main decision for an artisanal boat is whether to go fishing or not. For this reason, the objective of our research is to analyze the effect on catch landings of the number of days spent fishing.

This paper uses a panel data set of fishing boats in Asturias, a region in Northern Spain. The fleet consists mainly of small and fishing trips are daily. The data are aggregated on a monthly basis, forming an unbalanced panel dataset from 195 vessels during the period 2002-2016.

The empirical model to be estimated is a trans-log production function.

$$\ln y_a = \beta_0 + \sum_{i=1}^{L} \beta_l \ln x_{lit} + \frac{1}{2} \sum_{l=1}^{L} \sum_{k=1}^{L} \beta_{lk} \ln x_{lit} \ln x_{kit} + \sum_{t=2003}^{t=2016} \lambda D_t + DPort_i + D_{quarter_t} + D_t + v_{it}$$

where subscript indicates vessel and subscript represents time. The dependent variable is aggregate output. We will estimate two models, one using aggregate catch by weight and the other using aggregate catch in terms of value.

Some control variables are also included to account for the heterogeneity in the data: is the number of days at sea each month. The Port dummies try to account for possible unobserved differences among fishing areas. Finally, Quarter and Year are fixed time-effects.

We compare the marginal product of days at sea for two different gears: longline and purse seine. We find that boats using long-line should spend more days at sea to maximize profits.

In the last part of the paper, we develop a model to compute the optimal number of days to be spent fishing.

Keywords: Fisheries management, artisanal fisheries, Fishing days, Optimality.

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The operational and financial performance of the British inshore fleet in the Eastern Channel: a mixed-methods analysis

Marta Quintana, Kirsten Milliken, Hazel Curtis

Abstract: The UK area of the Eastern Channel is home to approximately 150 inshore fishing vessels targeting a mix of fish and shellfish species. This inshore fleet is an important feature of the coastal community, providing income, employment, and attracting tourism. In recent years owners of inshore vessels in the area have reported facing increasingly difficult financial conditions, prompting Seafish to undertake a detailed study of their operational and financial performance. The analysis was carried out using quantitative and qualitative methods. Quantitative analysis of landings and financial performance data was based on data from the Marine Management Organization and Seafish, subsetting vessels under 14m in length by their main port of landing in the Eastern Channel area. Vessels were segmented into four length groups to analyse potential differences between them. Qualitative data were collected through three focus groups and investigated using thematic analysis.

Two major themes arose from the qualitative analysis: the existence of challenges to run an inshore fishing business in the area and concerns with the current inshore fisheries management regime. Participants reported working in a particularly challenging physical environment, feeling constrained by management measures that give little room for flexibility and expressed concerns about competition between different types of inshore vessels and overexploitation of certain species driven by a lack of other options. Quantitative analysis found that the average profit of under 8m vessels fell by 30% between 2014 and 2017 driven by decreasing landings. Bycatch and net damage in the sole fishery and the smaller fishing capacity of these vessels (compared to larger inshore vessels) were mentioned by fishers

as factors behind this decrease. Vessels over 8m did not experience this decline in landings or profit. Results showed decreasing landings of certain species subject to landing restrictions and increased landings of less regulated species.

Keywords: English Channel, Small-scale fisheries, Fisheries management, Bioeconomic assessment.

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3.00-4.30 pm Rom: **Teacher's room**
(12) parallel session – *Social dimensions*
chair **LEYRE GOTI**

Measuring fishers' perspectives on the socio-economic barriers for the UK under 10m fishery fleet to integrate with aquaculture: A Q methodological study

Heather Conejo-Watt, Keith Jeffery, Stephen Mangi, Angela Muench, Kieran Hyder

Abstract: Due to increasing population and consumption growth, global demand for food will continue to rise, as such, a comprehensive and sustainable approach to global food security is needed (H. C. J. Godfray et al., 2010). Harmonization between the capture fisheries and aquaculture sub-sectors should be formulated and capitalised on to facilitate the sustainable increase in global quantity and quality of fish supply, while also promoting nutrition and health gains (Thilsted et al., 2016). This study aims to investigate the feasibility of the UK inshore under 10m fleet to integrate or diversify into aquaculture – creating a more holistic approach to the seafood production chain. By using Q-methodology, this paper explores the potential social and economic barriers of achieving this, from fishers' perspectives in different locations of the U.K. This methodology is an innovative data-gathering technique that provides quantitative structure to fishers' opinions, via factor analysis, that can be interpreted as viewpoints in relation to the integration of capture fisheries and aquaculture. We hope these perspectives will help inform policymakers to provide an "enabling environment" for integration and shape the future of the industry. Preliminary results show that a strong sense of fishing

identity is an important barrier to integration – fishing is more than just a career choice – rather a self-identification. Hence, there are several obstacles to overcome to encourage integration, among others such as financial capacity, information about appropriate technology for the area and concerns over the environmental impact of aquaculture. This study shows that future work needs to focus on the dialogue between fisheries and aquaculture to overcome stereotypes and to foster a holistic seafood chain. Actively including fishermen in the short-term into the consultation process for aquaculture sites would already be a first step to foster communications between these sectors and allow for integration.

Keywords: Small-scale fisheries, Aquaculture, Bioeconomic assessment, United Kingdom, Policymaking.

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Supporting small-scale fishers by increasing the market values of Lessepsian invasive species: A case of Akyaka Fishery Cooperative, Turkey

Vahdet Ünal, İnci Tüney-Kizilkaya, Zafer Kizilkaya

Abstract: Small-scale fishery is one of the major livelihoods in Gökova Bay, Eastern Mediterranean, Turkey. Akyaka Fishery Cooperative is the most active cooperative in the region. The fishery in the bay is very dynamic in terms of many factors including Lessepsian migrants. Four Lessepsian invasive species Randall's threadfin bream (*Nemipterus randalli*), Brushtooth lizardfish (*Saurida undosquamis*), Marbled spinefoot (*Siganus rivulatus*), Goldband goatfish (*Upeneus moluccensis*) held important percentage among the catches of the fishing community. As the public did not know the species well enough there was limited demand on those species resulting in loss of potential income. The cooperative discarded them when there was no demand at all. A project implemented by the Mediterranean Conservation Society in 2015 promoted those species and increased the demand for them. The objective of the project was to increase the fishing income of the fishery cooperative. Recipes were prepared by a chef. The recipe cards have been published for consumers. A fish tasting festival with invasive species was organized for over 400 people. The A-minute-long promotional film was prepared and displayed on a screen on the wall of the cooperative during the day and night. The results of this activity are remarkable: demand for invasive species has increased by 400% according to the landing data; the price of invasive species has increased by at least 20%; fishermen's incomes of the cooperative increased particularly through the invasive species. Many fishers modified their fishing gears and strategies. In conclusion, considering factors that affect the capacity of small-scale fishers to sell their fish,

receive fair prices, and to add value to their catches, we believe that there is still something to do. This study showed us that activities related to promotion and advertisements not only have a great impact on fish price and consumer preferences but also behaviour of fishers.

Keywords: Small-scale fisheries, Invasive species, Revalorization, Fishing communities, Marketing of fishing products, Turkey.

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Socio-demographic profile of fishers employed in the Italian small-scale coastal fishing sector: characteristics of the employed and historical prevalence of family contribution

Maria Cozzolino, D.Pinello C.Paolucci

Abstract: To make an appraisal of the socio-demographic context a preliminary step of conducting a pilot study was completed along with the identification of the most suitable statistical methodology for the collection of target variables for this study. The area selected for the pilot study was the North Adriatic (GSA17), as it was considered to best represent the average characteristics of the sector. Interviews were conducted through direct interviews with single fishers and focus group discussions (FGD) and in both cases, information was collected through questionnaires. The target of the FGD were fishers, however, representatives of fishers' unions were also interviewed to further investigate labour contracts.

The research was conducted to describe the demographic profile of the fishers, highlighting differences in terms of age, educational qualifications, capacity for continuous training (long-life learning), marketing skills, autonomy in boat maintenance, and fishing equipment. There was a large gap in the professional profiles found in harbours of the same areas and for vessels under 12m. Regarding the actual contribution of work, a strong similarity was emphasized about the work input of family members. It was found that there was a significant presence of women and retired fishermen all conducting both paid and unpaid work. The results of the pilot study were used to structure the questionnaires used to collect primary data on the fishers, in accordance with the collection of fishery data for Italian fishing. The first Italian data collection for the variables was carried out in the last quarter of 2018 and concerned all the production segments of professional fishing.

Keywords: Socio-demography, Small-scale fisheries, Adriatic Sea, Italy, Social fisheries research.

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Social data collection in the EUMAP: first steps towards EU fisheries social profiles?

Arina Motova, Alyne Delaney

Abstract: After many years of investigation and debate, the first steps for including a social dimension to EU fisheries and aquaculture to the EU data collection framework were taken during last review of the EUMAP. Coming into force in 2017, the social indicators included in the new data collection system were employment– by gender, by nationality, by age and education level as well as employment status. The indicators should be collected each third year starting from 2018 and are expected to contribute to social analyses of the EU fishing sector, fish processing, and aquaculture.

In this presentation, we summarise work from WP6 of the SECFISH project. Funded by the European Commission, the project explores the use of social indicators, possible sources of social data and data collection methods.

SECFISH work included both EU and MS level case study work. In the UK, pilot data collection of social indicators was begun in 2017 with introduction of full social data collection to the economic survey in 2018. The results of both exercises showed an increased interest in the data both from sector and government.

The aim of this presentation is threefold: to highlight the availability of the social data at the EU level based on UK experience; to start discussions on the potential use of social data in developing policy objectives; and, to expand on future needs.

Keywords: Social analysis, Data collection, Fishing sector, United Kingdom.

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The overlooked role of women in fisheries: the case of the Greek fishing sector

Liontakis Angelos, Stamatis Mantziaris, George Valakas, Alexandra Sintori, Irene Tzouramani

Abstract: Traditionally, fishing activity is dominated by men, as the term "fisherman" implies. However, women are largely engaged in many fishing activities, especially in small-scale fisheries. Nevertheless, their contribution is frequently ignored and continues to be under-acknowledged in marine and fisheries management and in policy design (Weeratunge, Snyder, and Sze 2010; Harper et al. 2013; Frangoudes 2013). As in many family businesses, women in fisheries are responsible for many tasks, mainly off-shore, such as selling and processing of landings, preparation of nets and lines, vessel cleaning as well as paperwork (Frangoudes 2013).

According to the Commission Implementing Decision (EU) 2016/1251 of 12 July 2016, Member States should collect social variables for the fishing fleet, such as employment by gender, unpaid labour by gender, education level, age, and nationality. Following this Decision, the Greek Work Plan has incorporated the social data collection scheme into the economic data collection scheme, which allows for the extraction of information on combined social variables (e.g., man and women by education level and age) and their association with other economic or activity variables.

This research aims to investigate the role of women in the Greek fishing sector and to reveal their contribution to the fishing enterprises. The data used in the analysis were gathered in 2018 (reference year 2017) from 788 Greek fishing vessels, under the aforementioned Data Collection Framework.

Keywords: Fishing sector, Gender issues, Greece, Socioeconomic research, Fishing sector interactions.

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5.00-7.00 pm Room: **Teacher's room**
(13) parallel session – *ICES WGECOM World Café session*
chair **RAÚL PRELLEZO**

Integrating economics into ICES science and advice: a survey of existing work and future needs

Olivier Thebaud, Hazel Curtis, Bertrand Le Gallic, Leyre Goti, Arina Motova, J. Rasmus Nielsen

Abstract: Although the demand for marine science and advice to address economic considerations is increasing globally, organisations such as the International Council for the Exploration of the Sea (ICES) have not engaged many economists or integrated economic issues in their core activities. The Working Group on Economics of ICES was established in 2018 to address the need to better incorporate fisheries economics into ICES science and advice. Its tasks include mapping current work and identifying future needs, connecting with related international organizations, reporting on information needed for trade-off analysis of fishing impacts and ecosystem services, and measuring the economic value of fishing.

The Working Group recently initiated a survey of existing work and future needs for economic science in ICES. This session will consist in the presentation of both the Working Group and preliminary results of the survey circulated to EAFE Members. Participants at the EAFE conference will also be encouraged to contribute to this mapping exercise, including through a World Café.

Keywords: Scientific advice, Fisheries, Fishing surveys, ICES working group, WGECON.

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Fishery Management with Poorly Known Dynamics

Patrice Guillotreau, J.R. do Val, T. Vallée

Abstract: Adapting fishing capacity to a highly variable environment remains a complex challenge for managers who have to deal with non-linear dynamics of fish population and harvest levels. In this paper, a recent method of stochastic control is adapted to deal with a general fishery management problem under multiples sources of uncertainty. The question is about adjusting permanently the management rule or holding a fixed policy to avoid additional noise. The mathematical problem developed here, though oversimplified, represents an original approach to the fishery management issue inspired by the monetary policy challenge of a central bank (Brainard principle). It assumes that Control Variation Increases the level of Uncertainty (namely CVIU approach) under particular conditions, resulting in preferable inaction regions for managers. We specify these conditions to show that the management of a poorly known fishery is still possible by using a CVIU approach.

Keywords: Fisheries management, Data-poor fisheries, Uncertainty, CVIU methods.

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5.00-7.00 pm Room: **Paraninfo**
Special session – *Galician small-scale fisheries: learning from local experiences*
chair **GONZALO RODRÍGUEZ**

The cockle fishery in the fishing community of Noia

Juan M. González Blanco

Abstract: The "Cofradía de Pescadores" of Noia is allocated in the Ría of Muros-Noia. It generates a stuary that is managed in a private regime of administrative authorization for shellfishing (both by foot and boat).

This fishery, which is managed by the fishermen's organization (the Noia fishermen's association together with the regional fisheries administration) is also attended by shellfish from other neighboring organizations, which gives it a peculiar character of solidarity.

Main target species are cockle (*Cerastoderma edule*) (70% of national catches) fine clam (*Tapes decusatus*, slimy clam (*Venerupis corrugata*) and Japanese clam (*Ruditapes philippinarum*). 1,547 people attend the fishery between shellfish on foot (without boat) and shellfish. afloat (with boat) of which about 400-500 people are women.

The fishery is managed under a management plan where artisanal fishers and/or shellfish fishers actively participate with scientific advice. This management plan is approved annually by the regional government.

It should be noted that the management plan is the main generator of income in the area where, by indicating a figure this same year, around 20 million Euros have been invoiced in this fishery and that these economic incomes have

an equitable redistribution generating wealth in the area and being of vital importance for shellfish communities that have a high dependence on it.

Keywords: Shellfisheries, Galicia, Noia, Fisheries management, Economics, Fisheries management.

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5.00-7.00 pm Room: **Teacher's room**
(14) parallel session – *Implementation of the Common Fisheries Policy (CFP)*
chair **ARANTZA MURILLAS**

Overcoming economic barriers to selective gear uptake: a framework to increase data available for analysis and advice

Ana Witteveen, Hazel Curtis, Andrew F Johnson, Alfredo Giron Nava

Abstract: Fishing gear modifications are often the most straightforward, practical, and common way for fishers to increase gear selectivity and fishing efficiency. Uncertainty surrounding the costs and benefits of changing gear use may, however, deter vessel owners from trialing or implementing such changes. Before new technical regulations are implemented or gear changes are adopted, it is, therefore, important to assess the financial consequences of their use compared to the financial performance of the standard gear. While there has been significant investment in new gear design and research related to gear selectivity, comparatively little work has been undertaken to understand the financial implications of gear changes. In response to the European Union's appeal to address socioeconomic data deficiencies in scientific advice, policy decisions, and fisheries management, we have developed a financial assessment toolkit, including a best practice guidance framework, for the financial assessment of fishing gear changes. This framework provides a useful way for individuals and agencies to collect and analyse financial data from gear trials, and engage fishers in the data collection process and subsequent management decisions. The framework is designed systematically and quantitatively to ensure replicability and comparability between gear trials. Economic tools, like

this framework, will play an important role in future management and policy debates related to fisheries bycatch, discarding, and technical regulation. Economic analyses of gear trials can then be used to model the wider economic impacts of the landing obligation on European fleets, help fishers to meet the requirements of the landing obligation while maintaining profitable businesses, and support the realization of the socioeconomic and ecological objectives enshrined in the CFP.

Keywords: Fishing gears, Scientific advice, Fisheries management, Economic analysis, Common fisheries policy.

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A framework for quantifying the economic effects of quota allocation in mixed fisheries, the case of Galicia

Jose L. Santiago, Juan C. Surís-Regueiro

Abstract: In the context of the ecosystem-based approach for fisheries management, there is a recognized need for methods and tools to facilitate the decision-making and balance the socioeconomic and environmental aspects of sustainability. The goal of this presentation consists of providing an assessment tool of the possible socio-economic impacts arising from the variation in the fishing opportunities linked to different management scenarios (e.g., total allowable catches, efforts of different fishing gears or multi-species stock advice). This new methodology has been tested in one of the most important fishing regions of Europe, Galicia (NW Spain). It permits to assess the impacts on sectors directly subjected to the management measures (or exogenous supply shocks) as well as the other related sectors; in particular, those that provide inputs to fishing activity (backward effects) as well as those who use seafood as an input for their production (forward effects). The results show that this method can prove itself to be a very useful management tool for mixed fisheries. On the one hand, it provides more accurate estimations of the possible socio-economic impacts of several management scenarios and, on the other hand, it gives detailed information on the sectoral and spatial distribution of the socio-economic impacts. As a consequence, this method can provide support for better decision-making to the fishery regulators and other decision-makers by ex-ante assessing and comparing different management scenarios, and therefore facilitating the implementation of more holistic management frameworks.

Keywords: Fisheries economics, Quotas, Mixed fisheries, Galicia, Economic assessment., Socioeconomics.

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Auctions as a way to allocate fish stocks-experiences from the Faroe Islands

Hans Ellefsen, Daniel Bromley, Þórólfur Geir Matthíasson

Abstract: In this paper, we demonstrate the results of a series of auctions for specific landings of selective stocks from 2016 to 2019 administered by the Ministry of Fisheries of the Faroe Islands. These auctions were a part of an on-going reform of Faroese fishery policy driven by the need to abandon the flawed policy in which ITQs had become political gifts with little or no capture of resource value for the citizens of the Faroe Islands. The Faroese near-shore demersal fishery has been in decline for years and local processors have been unable to acquire the fresh product. Processor closings and rural unemployment are serious problems demanding reform of the current fishery policy. The experimental auctions show considerable promise in gradually opening up fishing livelihood prospects for new firms. The resource revenue recovered from these auctions amounts to DKK 60 million (US$ 9,600,000) in 2016, DKK 135 million in 2017 (US$ 21,600,000), and DKK 142 million in 2018 (US$ 22,720,000).

Keywords: Faroe Islands, Fisheries, Fishing processor sector, ITQs.

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Measuring capital of the Italian fishing fleet: reviewing the application of the Perpetual Inventory Method

Monica Gambino, Gianluigi Coppola

Abstract: Regulation (EU) 2013/1380 includes the requirements to adapt exploitation rates to ensure that, within a reasonable time-frame, the exploitation of marine biological resources restores and maintains populations of harvested stocks above levels that can produce the Maximum Sustainable Yield (MSY).

MSY is the Maximum of the Catch-Effort Curve and MSY refers to the largest average yield, or catch, that can theoretically be taken from stock without having an impact on the long-term stability of the population. The Catch-Effort model is a set of infinite stable equilibrium levels each of them associated with each level of effort (Gordon Shaefer Model). The model is named biological because the main variables, the intrinsic growth rate, and the carrying capacity, are biological parameters. By adding costs and revenues, it becomes a bioeconomic model.

The Catch Effort model is a static and long-term model. Anyway, the biological model is characterized by the absence of technological change, that by contrast affects the catchability coefficient in the economic model. In this paper, we consider an alternative approach for estimating MSY, based on a "Biotechnological function" and including the effect of the technological change on the population dynamics.

Keywords: Fisheries, Italy, Stock assessment, Socioeconomic evaluation, Bioeconomic modelling, MSY.

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Day 3 - Thursday 4 April 2019
9.45-11.15 am Room: **Room 11**
(15) parallel session – *IUU Fishing*
chair **HUGO M. BALLESTEROS**

Spatially explicit risk assessment of fisheries bycatch in data-scarce situations

Gregory Verutes, E. Hines, M. Caillat, L. Ponnampalam, V. Long, C. Peter, C. Junchompoo, R.L. Lewison., A.F. Johnson

Abstract: Fisheries bycatch is the greatest threat to marine mammals globally and one that also poses significant risks to seabirds, sea turtles, and sharks. Characterizing the effects of marine bycatch through space and time can be compared to finding a needle in a haystack – small populations having, often isolated interactions with fisheries vessels varying over space and time. Furthermore, the behaviors of both the fishers and the bycatch species are often unpredictable and therefore a challenge for researchers to collect data and advise managers effectively and in a timely manner. We describe the build of a management-friendly bycatch toolbox for spatiotemporal risk assessment of marine megafauna bycatch that utilizes data of animal distributions, fisheries effort, and their estimated interaction rates. This new methodology combines community engagement with spatial analysis to visualize the risk of marine megafaunal bycatch using marine mammals in SE Asia as a test case. We assessed the individual and cumulative risk posed by five different fishing gear types (hook and line, nets, longlines, pots and traps, and trawls) in small-scale fisheries to two species of cetaceans (*Orcaella brevirostris* and *Dugong dugon*). Toolbox outputs pinpoint areas of highest bycatch concern with confiden-

ce and identify management, monitoring, and conservation actions that are likely to mitigate risk. This work highlights the feasibility of the bycatch toolbox in elucidating marine megafauna bycatch in small-scale fisheries, often with limited input data.

Keywords: Risk assessment, Fisheries management, Bycatch, Data-poor fisheries, Spatial analysis.

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Overview of EFCA activities in relation to the fight against IUU fishing

Pedro Galache, Alexandre Kempff

Abstract: The internationally accepted definition of illegal, unreported, and unregulated fishing stems from the FAO International Plan of Action against IUU fishing from 2001. It covers a wide range of actions from fishing without a license to fishing, to not reporting catches, and to fish in contravention of conservation and management measures.

It is estimated that IUU fishing practices worldwide, i) amount to about EUR 10 billion every year; ii) represents 19% of the worldwide reported value of catches

Following its mandate, the European Fisheries Control Agency assists Member States to fulfill their obligations by organizing workshops and seminars for national administrations on the implementation of the IUU Regulation.

The European Fisheries Control Agency also supports the European Commission as requested in evaluation missions to third countries in the framework of the IUU Regulation.

At the international level, EFCA is supporting the implementation of the PESCAO project in West Africa. One of the expected results is the prevention of and responses to IUU fishing are strengthened through improved monitoring, control, and surveillance (MCS) at national and regional levels.

EFCA supports the Sub-Regional Commission on Fisheries (SRCF/CSRP) and the Fisheries Committee for the West Central of Gulf of Guinea (FCWC/CPCO) in attaining this specific result.

Keywords: EFCA, IUU fishing, Governance, Bioeconomy.

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Understanding progress in combatting illegal, unreported, and unregulated fishing

Barbara Hutniczak

Abstract: Illegal, unreported, and unregulated (IUU) fishing represents one of the greatest threats to marine ecosystems and fishing communities as it undermines efforts to manage fisheries sustainably. IUU fishing reduces the resources available to all stakeholders involved in legal fishing activities, creating unfair competition that reduces profitability and legal employment opportunities. This in turn has an important impact on the social cohesion of fishing communities and negative implications for food security in countries that depend on fishery resources.

The OECD is working on a methodology for setting-up a long-term mechanism for monitoring progress in the development of policies against IUU fishing. The project establishes a basis for assessments of the adoption and implementation of recognized best policies and practices to deter IUU fishing over the last decade at the national level, as well as among regional fisheries management organisations (RFMOs). It also seeks to identify which policies and practices are widely adopted, and which areas of IUU fishing prevention are lacking behind on a global scale. The detailed evaluation includes the use of market measures and economic tools against IUU fishing, including harmful subsidies, and the use of trade information for better detection of illegal products along the seafood value chain. With respect to RFMOs, the focus is also on improvement in cooperation and progress towards transparency in dealing with IUU fishing offences. Indicators are built based on communication with over thirty countries and secretariats of thirteen RFMOs.

Keywords: IUU fishing, Governance, Social cohesion, Fisheries management, Cooperation.

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More ice? Overreporting ice percentage in Icelandic landings

Dadi Kristofersson, Birgir Runolfsson

Abstract: The accurate measurement of catch quantity is essential for a well-functioning ITQ system. The Icelandic ITQ system relies on a network of certified harbour weighing stations that monitor landed quantity. Estimating catch from landed quantity, however, may not be as simple as just weighing it since many product forms are landed. Raw weights may require adjustment to account e.g., gutting, heading, filleting, and the use of ice to chill catch. Both the Icelandic government and the fishing industry have long advocated the use of ice to preserve quality. Adjusting landed quantity for ice is difficult at the harbour weighing stations. A system of producer reweighing was therefore established that allows producers to separate ice and fish and report net weight, maintaining an incentive to use ice. About 45% of all Icelandic catches go through reweighing. There have long been rumours that vertically integrated firms abuse this system by overreporting ice in the catch, effectively underreporting catches. Although the Icelandic directorate of fisheries monitors reweighing, their ability to detect fraud is limited.

We perform a case-control analysis of monitored landings versus unmonitored landings to access the extent of overreporting of ice. The results show that this is a substantial problem but the vast majority of cheating is limited to a small group of firms. We then provide an analysis of the effects of such factors as vessel type, location, season, and firm type on the level of cheating. Further, we test the effectiveness of initiatives implemented by the Directorate of fisheries to reduce cheating. The results have clear policy implications about how best to combat this problem while maintaining the reweighing system and the positive effects it has on ice use and catch quality.

Keywords: Iceland, Fisheries, Fishing sector, Economic indicators, ITQ, Ice.

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9.45-11.15 am Room: **Paraninfo**
(16) parallel session – *Social dimensions*
chair **ANTONIO ÁLVAREZ**

Fisherman by motivation or situation? Social data collection on education for the fishing fleet in Croatia

Svjetlana Višnić

Abstract: Social data collection in the Republic of Croatia during 2018/2019 for the first time included a more detailed analysis of the education of crew and other employees on board and onshore involved in fishing activities. For the purposes of this research, the data for the fleet segment for 2017 were analysed. Apart from basic data on education level, data collection has revealed a wide range of fishermen qualifications and a low level of specialization to carry out fishing activities. Are you becoming a fisherman by motivation or situation? Interviews with a selected sample of participants in social data collection provided additional insight for qualitative analysis of the acquired knowledge and skills in the fishing industry, as well as in attitudes about the need for specialization to conduct fishing. Based on the collected economic data, the relationship between the level of qualification and attitude towards the education of crew and captain and the performance of the vessel in the segment of the fishing fleet was analysed.

Keywords: Fisheries, Socioeconomics, Croatia, Education, Socioeconomics.

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A comparative study of the effects of change in the fishing industry on settlement patterns in The Faroese Islands, Iceland, and Norway

E.dgar Henriksen, Audun Iversen, M. Laksafoss, J. Vidarsson

Abstract: Coastal communities face declining populations in most countries. Increased productivity in fishing, the concentration of fishing rights, and economics of scale lead to fewer fishing vessels and fewer fishermen needed to catch the same quantity. At the same time, employment in land-based processing is often reduced, as well as in other related activities. Reduced activity in fisheries is generally considered to have negative effects on employment and population in coastal communities, as well as reducing ripple effects to other sectors.

Nordic countries employ different fisheries policies, with differing focus on development for coastal communities. Policies are reflected in different fleet composition and harvest patterns.

We discuss the importance of social objectives in fisheries policy by asking: Can differential development in coastal societies be explained by different fisheries policies?

In this article, we show that activity level in the fisheries industry (fishing and processing) explains little of the population development in general and that fisheries policy explains even less.

Fisheries policy often has several, and sometimes conflicting, goals, as it takes into account both environmental, economic, and social sustainability. This article discusses different policy goals and implications of our findings for fisheries policy, including what policies are suitable to reach what goals.

Keywords: Northern countries, Fishing industry, Coastal communities, Fisheries governance.

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The Dynamics of the Italian Maritime districts

Carlo Paolucci, Gianluigi Coppola, Monica Gambino, Marialuisa Restaino

Abstract: In Italy with around 7,500 km of coastline fishing activity is carried out along the entire coast of the Peninsula. Taking into account the biological and economic complexity and diversity of the Italian fishery sector, the objectives of this paper were i) a description of the geography of the Italian marines and ii) to explain the relationship between national fleet and production trends and changes recorded at the local level.

Firstly, a spatial comparison was made in the sense of geographic boundaries, between the maritime districts, the territorial units in which the Italian coast is subdivided, and the other administrative-territorial unit: provinces, regions, municipalities, and local labour systems.

Secondly, the evolution of production and fleet at the national level was analysed in the period from 2004 to 2013, a period characterized by a sharp reduction in production and fishing effort.

To this end, indicators of the production structure were calculated, i.e., the concentration and specialization indices of the fleet and their trend over the period considered.

In the second part of the paper, the fleet structure and the economic social characteristics of the maritime districts were studied on the basis of indicators relating to the fishing fleet from 2004 to 2013 and indicators concerning the demographic features of the labour market and the production structure of the maritime districts, using information from the ISTAT Population Census and Industry Census for the period 2001-2011. The overlap between the two periods, 2001-2011 for the production structure and 2004-2013 for the fleet, made it possible to compare

the changes in local economies and the dynamics recorded in the structure of the fleet and in the fish production.

In this phase, static multivariate statistical methods (Factor Analysis, cluster analysis) and dynamics (Multiple factor Analysis) were applied to the data set. The results obtained from this analysis mainly refer the marked differences between the maritime districts in terms of specialization in fishing systems and the size of the fleet, differences measured through the indices of production specialization and concentration.

Other relevant result is that the substantial reduction in fishing activity at the national level does not seem to have involved significant changes in the structure of the fleet of compartments: the production specializations of the individual compartments remained, at the medium level, substantially the same. A further aspect that emerged from the analysis was a dichotomy between the Southern and Northern districts, in particular as regards the performance of the labour market and the different degree of integration between the fishing industry and related activities.

Keywords: Fishing fleet behaviour, Fishing industry, Italy, Marine production.

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An Economic Analysis of the Turkish Fisheries Sector 2001-2017

Sezgin Tunca, Marko Lindroos, Vahdet Ünal

Abstract: This study conducted an economic analysis of the Turkish fisheries sector for the period 2001-2017. In this period, a huge positive transformation has occurred in the Turkish economy since the Republic was established. These include dramatically rising gross domestic product, rapid transition to improved industry and service-based economy, increased jobs, etc. Our study targeted the question "How was the Turkish fishery sector evolved in this period?". Mean annual capture is around 500,000 t measured as domestic landings with an average market value of 761 Million Euros. On the other side, aquaculture production sharply increased in this period.

Due to anthropogenic impacts such as overfishing, pollution, climate change, and transformation of the fishing fleet, the annual capture showed fluctuations over years whereas aquaculture was constantly growing. This study mainly illustrated benefits by jobs, wages, market value, and costs by fisheries production as well as managing it. The study also highlighted the role of the fisheries sector in the Turkish economy as well as demonstrated pathways for future potential into the economy.

Keywords: Bioeconomic analysis, Fisheries, Turkey, Climate change, Economic potential.

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Spatial challenges for the Dutch Fisheries, an economic approach

Van Oostenbrugge, J.A.E, A. Mol, N.T. Hintzen

Abstract: During the last decades an increasing area on EU waters has been claimed by specific "users" (e.g., shipping, wind energy, nature) and this development seems to accelerate with the development of offshore wind energy. All of these claims limit the fishing area and affect its economic position. For the Dutch part of the North Sea, the locations of extended wind parks are currently being discussed and decided and might ultimately (2050) cover around 25% of the Dutch continental shelf area.

In this study, the value of the existing and planned wind farm areas (up to 2030) in the Dutch part of the North Sea for fishing was determined using the historical fishing patterns in the period 2010-2017. Also, we also take into account the cumulative effects of other spatial claims on the North Sea. The fishing activities in the planned wind farm areas contributed an average of 1.52 million euros per year in the period 2010-2017 to the gross added value of the Dutch cutter fishery. Although this effect is small the cumulative effect of the various future closures might affect up to 50% of the fishing revenue for the dominant gear types used in the Netherlands. For individual ships, the variation of the contribution from the planned closures to the income is much higher. It can be concluded that the fishing patterns of the sector will change considerably over the coming decades. The economic effects of the closure of the fishing areas are uncertain. Further analysis of the effects of the behavioral changes in the fisheries when closing the areas and the effects on the costs and income can provide an answer. Given all the area restrictions and their influence on foreign fisheries, it is important to keep in mind the international perspective.

Keywords: Spatial analysis, Fisheries, Netherlands, Fish interactions, Windmills.

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Relative effects of fisheries support policies

Roger Martini, James Innes

Abstract: The effects of six common forms of fisheries support are estimated using a bioeconomic model of the global fishery. The results show that all have the potential to provoke overfishing, to lead to fish stocks being overfished, to encourage illegal, unreported, or unregulated (IUU) fishing, and to increase fleet capacity, but that their effects can vary significantly both in scale and how they are distributed at the fleet level. The fisheries management system can mitigate, though not eliminate, these impacts. Supports based on reducing the cost of inputs purchased by fishers provoke the greatest increase in fishing effort, with associated risks of overfishing. This includes fuel subsidies, which are also shown to deliver less than 10% of their value in actual benefits to fishers in some cases, making them the least effective means of transferring income to fishers of those evaluated. Payments based on improving fishers' business operations provided the greatest benefit to fishers and had relatively less tendency to increase fishing effort. If only USD 5 billion in fuel support was converted into the support of this type, fishers would see the increased income of more than USD 2 billion, while at the same time reducing effort and improving fish stocks. Such a change would also provide relatively more benefit to smaller fishers.

Keywords: Fisheries governance, Fishing fleet, Subsidies, Small-scale fisheries, Fuel subsidies.

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9.45-11.15 am Room: **Room 16**
(17) parallel session – *Recreational fisheries*
chair **GONZALO RODRÍGUEZ**

Willingness-to-pay of anglers for catch-and-release: results from a choice experiment in Britany

Carole Ropars-Collet, Philippe Le Goffe

Abstract: Catch-and-release can be regarded as an interesting management tool in recreational fisheries, on the condition that the survival rate of the released fish is low and the well-being of anglers is maintained. We used a choice experiment to examine the potential of catch-and-release angling as a monitoring and management tool for the salmon recreational fishery in Brittany. A survey was conducted in 2017 among salmon anglers in three departments of western Brittany in France. The aim was to reveal their willingness to pay for different harvest regulation tools used to manage angling: season, total allowable catch (TAC), fishing method, catch-and-release, the number of anglers. The Anglers were asked to choose between hypothetical fishing destinations that differed in the combination of these attributes and the distance to the fishing destination (defined as one of the attributes). Then we analysed the trade-off between all these attributes to estimate willingness to pay. Our results show that anglers prefer unrestrictive regulations of fishing. On average, we observe that catch-and-release as a management tool has a depressive effect on the value of the fishing day, with 25 €/day if catch-and-keeping is authorized and 15 €/day if catch-and-release is compulsory. However, some individuals (the most highly qualified) value catch-and-release positively. In total, the majority of anglers nevertheless maintain a positive valuation of the fishing day of catching and releasing salmon, which would therefore make it possible to value

the river after the closure of the TAC. Finally, the fishing season and especially the number of visitors have a greater impact on the value of recreational fishing than a catch-and-release restriction. These results suggested that the economic effects of angling regulations can be misstated if congestion is not considered.

Keywords: Fish marketing, Anglerfish, Brittany, TACs, Governance, Fish marketing.

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Measuring the social value of sea angling: combining revealed and stated preference approaches for the UK

Angela Muench, Barnaby Andrews, Gaetano Grilli, Kieran Hyder

Abstract: Recreational sea angling is a high participation sport, with a significant impact on the economy as well as on some fish stocks. However, little is known about the utility of sea anglers, making policy and management a challenge. In this study, revealed and stated preference methods are used to estimate the utility of sea anglers. Data on their sea angling activity, catch and spending is collected on an annual basis in the UK. A revealed preference model (i.e., travel cost approach) was developed to evaluate the preferences of the sea anglers with regards to expected catch and environmental parameters. The travel cost model showed that shore anglers avoid congested areas whilst maximizing their catch of, for example, dogfish or bass. While this approach reveals the value sea anglers derived from the provisioning services of current opportunities, a stated preference choice experiment approach was developed in order to estimate how future changes in catch regulations impact these values. The outcome from the travel cost approach gave information on sea anglers preferences in terms of species with declining stocks necessitate the management of recreational sea angling activities. The choice experiment allowed exploration of how changes in management impact anglers preferences for recreational angling opportunities. Finally, the influence of sense of place on angler preferences was explored with the same respondents using subjective indicators of place attachment and place identity. Combining anglers' sense of place with our stated preference models allowed us to better account for anglers' individual heterogeneity and provides further insights into angler preferences and motivations. Combining these approaches promised to increase understanding of

the heterogeneity of recreational sea angling preferences and how management measures can be designed to effectively manage stocks whilst maintaining the benefits that recreational sea angling opportunities provide.

Keywords: Economic assessment, Fisheries, United Kingdom, Anglerfish, Recreational fisheries.

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Managing marine natural capital: assessing the impact of fisheries management on the utility of recreational sea anglers

Barnaby Andrews, Kieran Hyder, Gaetano Grilli, Angela Muench

Abstract: Recreational sea angling is a popular activity that generates significant socio-economic benefits. Despite these benefits, recreational angling accounts for a significant proportion of global fish catches. While fisheries management has generally focused on regulating commercial catches, the monitoring and management of recreational fisheries is receiving increasing attention both in the UK and globally. The motivations of recreational anglers typically go beyond catch maximisation, with many anglers citing relaxation and socialising as their main motives for recreational sea angling. As a result, many recreational seas anglers practice catches and release. Thus, applying the same management goals of maximum sustainable yield used in commercial fisheries to a recreational fishery risks a loss of participation and subsequent market and non-market benefits. In order to inform the effective management of recreational sea angling in the UK, a stated preference choice experiment was conducted to measure the impact of changes in catch management measures in terms of angler preferences for catching, keeping, and releasing fish due to bag limits and minimum landing sizes. Besides, this study explicitly considers the influence of individual heterogeneity on angling management preferences through the inclusion of measures of angler motivation, attitudes, and sense of place. Accounting for individual heterogeneity in management preferences allows us to better understand and conserve the diverse wants of anglers in the context of increasing management, shifting patterns of angler demographics, and participation.

Keywords: Recreational fisheries, Natural capital, United Kingdom, English Channel, Fishing communities.

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The economic activity of recreational fishing charters in the North Atlantic: the cases of Galicia (Spain) and Madeira (Portugal)

Pablo Pita, Manel Antelo, Lidia Gouveia, Roi Martínez-Escauriaza, Sebastián Villasante

Abstract: Recreational charter (RC) fisheries are thriving businesses widely distributed in warm coastal waters worldwide, although there are some relevant RC fishing in temperate waters, e.g., in Australia and North America. In Europe, RC fishing is a relatively important activity in the Spanish Mediterranean, the south of the continental Portuguese coastline and in the Atlantic archipelagos of Canaries, Madeira and Azores. However, in the Spanish Atlantic, there are few companies dedicated to RC fishing. To date, RC fishing has been little studied in the European Atlantic and the factors that trigger its potential development are unknown. The European Parliament of the European Union (EU) has recently encouraged further development of RC fishing initiatives to improve local economic development, particularly in rural areas and in outer regions of the EU. To facilitate this process, it is necessary to understand the mechanisms that incentive the creation of RC fishing opportunities and their survival over time. In this paper, we perform an economic comparative analysis of two Atlantic RC fisheries to evaluate the possibility of favouring RC fishing-based local initiatives and improve the well-being of coastal communities. To illustrate, we chose two case studies located in the Eastern North Atlantic, namely Galicia (NW Spain) and Madeira Islands (Portugal). The two cases differ greatly in the socio-ecological attributes in which RC fishing is developed (e.g., the relevance of commercial fishing and tourism and targeted species), thus these attributes were included in the analyses. Companies dedicated to RC fishing were identified through a snowball sampling in Galicia and Madeira, and information on the costs and benefits of the activity was collected by a questionnai-

re answered by company managers. This methodology has been combined with a travel-cost method to identify the demand function of the RC fisheries based on a questionnaire answered by the clients.

Keywords: Recreational fisheries, Spain, Portugal, Fisheries management, Governance.

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12.45-1.15 pm Room: **Room 11**
Special session – *MedAid*
chair **HUGO M. BALLESTEROS**

Overview of the economic situation of seabream and seabass companies in the Mediterranean area

Elisa Baraibar Díez, María Odriozola Zamanillo, Ignacio Llorente García, José Manuel Fernández Polanco, José Luis Fernández Sánchez, Manuel Luna García, Ladislao Luna Sotorrio

Abstract: This contribution aims to provide an economic assessment of the sea bream and seabass industry in the Mediterranean, in order to describe the recent development and current situation of the economy and markets of this industry. The contribution focuses on analysing the economic and financial structure at different levels of aggregation (industry, company, and farms). The study is carried out through a descriptive analysis of information obtained from primary and secondary sources.

The work starts with an analysis at the industry level that considers the productive structure, incomes and costs, and economic performance indicators. This analysis is carried out for the industry as a whole, but it is also disaggregated by production segments and countries. Moreover, it provides information about international trade and consumption. The data used come from secondary sources, mainly STECF, FAO, and Eurostat. Secondly, the work addresses the study of the economic and financial situation of farming companies in the Mediterranean area with data from primary and secondary sources. Again, the analysis is performed for the industry as a whole and disaggregated by countries, but also by company size. The analyses also provide a property map of the companies identified as seabream and seabass

farms. Finally, we use primary data obtained in the context of the MedAID project (Grant Agreement no. 727315) in which this work has been performed, to develop an economic analysis at the facility level.

Keywords: Commercialization, Bioeconomic analysis, Aquaculture, MedAID, Fishing industry.

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Demand and price dynamics in the seabass and seabream international market

José Fernández Polanco

Abstract: The market has evolved in a cyclical way since its beginning in 1980's. A period of increases in quantities and relatively stable price equilibrium persisted until the late 90's when uncontrolled increases in supply caused the fall of prices in the international market. The market for seabass and seabream is concentrated in the Mediterranean and surrounding countries. Turkey and Greece are the main producers and exporters. Spain and Italy have also relevant volumes of domestic production, but it is not enough for satisfying the internal demand. Other relevant markets in terms of demand are France, Portugal, the UK, and Germany. A cointegrating model using prices and quantities on external trade flows is used to explore the dynamics of competition across countries and substitution across products. The model is tested in 6 different countries considering demand and supply in external trade covering the last decade. Demand was found to be elastic, while supply is more inelastic. As a consequence, price volatility is high in a market in which Greece and Turkey dominate price competition.

Keywords: Seabass, Seabream, Fish marketing, Mediterranean, Cointegrating model.

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The Social Acceptability of aquaculture. Emergence, utility, and amalgams of a new framework to address an old social issue in policymaking

José A. Pérez Agúndez, Marianna Cavallo, Pascal Raux

Abstract: Social acceptability (SA) is a key issue that appears on the political agenda in many areas, including aquaculture. It emerges due to the increase in social opposition to public decisions in the context of greater demand for participation in decision-making processes by citizens. Thereby, SA becomes a means for decision-makers to move from an initial blocking situation related to a decision to an acceptable one. As in many other examples in the field of the management of common resources, and particularly in aquaculture, the political choice of developing this sector within the Blue Growth Strategy framework, is often facing the stakeholders' opposition. The factors leading to these bottlenecks are ecologic, economic, or social. Improving social acceptability is a relevant priority for high-level institutions (e.g., European Commission, FAO-GFCM). The construction of strategies, guidelines, and recommendations to enhance the SA are ongoing in order to accompany the development of aquaculture in a sustainable way.

This work questions the emergence and usefulness of this concept as well as its intellectual appropriation by the scientist, more concerned with explaining what constitutes the SA than with providing an operational vision in support of the decision-making processes. Since aquaculture development is not only a technical question but also a social issue, this presentation proposes to refocus the intellectual debate of the SA utility on the need to explore institutional innovation as a way to improve governance processes and hence reducing the risk of social opposition

Keywords: Aquaculture, Bioeconomy, Blue Growth, Social acceptability, Fisheries management.

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Perception and misperception of aquaculture in Italy: food for thought

María Cozzolino, C. Paolucci

Abstract: Knowledge has supported social evolution and characterizes the behaviour of entire generations. Starting from a tendency of Italians to collect information about food directly from Internet, the aim of the papers to investigate about the relationship between articles published online and perception about aquaculture products.

The ability of consumers to consult websites has been confirmed by the report "The Food Sector in Italy" which examines online trends and behavioural patterns that influence the food sector using multi-platform data from France, Germany, Italy, Spain and the UK (EU5). The report has shown that in September 2018, over 130 million people in EU have clicked at least once a site to receive information on food. In Italy, during September 2018, food preparation and cooking tutorials attracted 22 million users, while only 6 million users in the same month purchased food through e-commerce. The exercise was inspired by the methodology used in MedAid (Mediterranean Aquaculture Integrated Development) to measure the impact of Mass Media on trade of aquaculture fish. The application in Italy has been characterized by the evolution in Italians to consult less and less paper newspapers. In addition, the Italians very much consult the blogs of food and cooking specialties, as well as sites on physical well-being. In the web "mare magnum", there is the risk of giving inappropriate and untrue connotations to aquaculture products. The exercise was aimed, by observing the online articles that deal with aquaculture products, to record which are the most used attributes that connote a positive or negative image of farmed goods. There has been an evolution of the attributes that concerned aquaculture products, i.e., some have been "the crazy seabass" (2001-

2002) which caused the collapse of the sale of seabass and seabream, the use of "animal flours for aquaculture (2013), seabass and seabream contaminated by mercury (2015), farmed fish and shellfish contaminated with microplastics (2018), etc. Reports and experiences from stakeholders have been collected to interpret any boomerang effects for the competitiveness of Italian aquaculture.

Keywords: Aquaculture, Perception, Seabass, Seabream, Italy, Competitiveness.

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Measuring the impact of mass media on consumers purchase of aquaculture products

Angel Herrero, M.M., García-de-los-Salmones, J.M. Fernández, J. Collado, A. Pérez, H. San Martín

Abstract: This study focuses on the development of a methodology to measure the impact of mass media on consumers' purchase of aquaculture products and, specifically, the demand for sea bass and sea bream. Therefore, we aim to fill a relevant gap in the literature, as most previous research analyse media coverage about aquaculture, without considering its relation to demand, and they adopt a descriptive/explorative approach (Amberg and Hall, 2008; Feucht and Zander, 2017; Froehlich et al., 2017; Olsen and Osmundsen, 2017; Osmundsen and Olsen, 2017). Moreover, the scarce studies about the effect of mass media coverage on aquaculture demand are focused on the impact of negative events, such as health risks (Sha et al., 2015; Liu et al., 2016). Besides, they are based on linear Almost Ideal Demand System (LA/AIDS) (Deaton & Muellbauer, 1980), measuring media coverage as a simple index based only on the depth of discussion and prominence of placement within the newspaper (Smith et al. 1988; Wessells et al., 1995; Sha et al., 2015).

In this context, and based on previous literature, we propose an index to measure the online mass media coverage of aquaculture that integrates the following attributes of news: 1) Relation to aquaculture, 2) Tone/valence of the content, 3) Content/agenda, 4) Size, Depth of the content, 5) Picture / Video, 6) Geographical scope of the content.

To validate the index proposed we have identified a total of 3,391 news published in the 5 top newspapers in Spain containing keywords regarding aquaculture and fish species, although only 332 were found to have a medium or high

relationship to aquaculture. In the present stage of the research, we are working on in-depth content analysis of the news to categorize them and obtain quantitative values for the index developed.

Keywords: Aquaculture, Mass-media, Social impact, Perception.

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Substitution of seabass and seabream in the Greek market

Lamprakis Avdelas

Abstract: The substitution among farmed seabass and farmed seabream in the Greek market is analysed at production, wholesale, and exports level. Spatial market integration for the two species is also presented at the wholesale level. The monthly price series data employed for the analysis covers the six-year period from January 2012 to December 2017. The analysis employs ARDL models and Bunds test to test for cointegration among the species and markets in various levels of the value chain. The results suggest that the two species are substitutes and the Greek market is spatially integrated

Keywords: Seabass, Seabream, Substitution, Bounds test, Greece.

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12.45-1.15 pm Room: **Paraninfo**
(18) parallel session – *Markets and marketing of fish products*
chair **BERTRAND LE GALLIC**

How to revitalize the sale of fresh seafood? The sedentary fishmonger of tomorrow

Stéphane Gouin, Marie Lesueur, Déborah Roussel

Abstract: After an increase in the annual average consumption of seafood products of the French people, we observe since 2007 a stagnation even a light decrease. In parallel, the distribution of products modifies and the traditional actors of the seafood products sector see their market shares and their number decreasing in particular as for her Fishmonger's shop in sedentary store. However, the recent evolution of the modes of consumption promotes more convenience stores with attraction for the specialized and craft businesses of food (bread and pastry shops, butcher's shops-delicatessen …)

Even if the numbers of the last years are more positive, the professionals have to face many challenges (competition, recruitment, management of the company) and have to constantly adapt to the customers (changes of habits of consumption and trends of purchase).

This article presents the results of a study conducted in 2017 which aimed to deepen the expectations and needs of buyers in sedentary fishmongers, as well as to describe the sedentary fishmongers of tomorrow in line with the demands of customers to revitalize the sales.

Three axes of reflexion have been developed around the following questions: i) How is the sedentary fishmonger sector perceived by buyers in France? ii) What

will be the sedentary fishmonger of tomorrow? iii) what tools are available to revitalize this sector?

The results presented come from a national study based on 13 focus groups of buyers of fresh seafood in sedentary fishmongers.

Keywords: Fresh marine products marketing, fishmonger, France, Commercialization.

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Competition Elements in the Marine Aquaculture Industry: A Research on Turkey

Selçuk M. Uzmanoğlu, Fatma Muge Arslan

Abstract: In this study, competition elements of the marine fish culture industry in Turkey were investigated. Today, with the development of technology people's access to information has facilitated. People, with access to information, began to give importance to healthy nutrition. Therefore; as a source of healthy protein, the demand for fish is increasing day by day. Also, this increasing demand motivates the growth of the fish farming industry intensively. The production of fishery products is performing almost without any problem. Enterprises that are reaching higher levels in technical knowledge on aquaculture focus on the fierce competition with each other.

The aim of this study is to uncover how elements like; aquaculture enterprises, feed producers, processing enterprises, ministry employees, universities, retail businesses, research institutes, and employees working for suppliers determine the competition in the sector. Survey prepared for this purpose was conducted with 344 people. Results were evaluated and interpreted both separately and in total according to business types in the sector. In the industry, selling prices of products, quickly delivering products to the market, and financial power was determined to be important competitive factors.

Keywords: Aquaculture, Fish marketing, Turkey, Socioeconomic research, Fish farming industry.

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The PrimeFish Project or how to create shared value in the seafood sector by combining the competitiveness and the decision-making

Jose L. Santiago, Mercedes Fernández, Rosa Chapela

Abstract: The concept of shared value has been defined as those policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates. This concept has guided a coordinated process of stakeholders' engagement to consolidate the economic sustainability and competitiveness of European fisheries and aquaculture sectors through the PrimeFish project. This approach, framed in the social innovation, states that the creative use and combination of resources can pursue opportunities to catalyse social change and address social needs and challenges. In particular, the strengthening of competitiveness has been addressed through innovative choices and configurations by four keyways: reconceiving products and markets; redefining productivity in the value chain (e.g. energy use and logistics, resource use, distribution, labour productivity, location); enabling local cluster development, and a better understanding of the socio-economic realm. For this purpose, the PrimeFish project grouped several industrial organizations from sectors of catching fisheries, aquaculture, processors, trade and retailers of seafood who actively participate as an advisory board, communicating their interest and needs, and receiving the science and technology developed for evolving from the corporate social responsibility to the creation of shared value. The conclusions of PrimeFish contribute to the strengthening of seafood markets by several combinations of value proposals and thereby trigger positive feedback loops on the performance of the seafood markets and support the decision making of the stakeholders related.

Keywords: Fishing industry, Competitiveness, Governance, Marine policy, Value chain.

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Sustainable seafood from Europe – a consumer perspective

Katrin Zander, Yvonne Feucht

Abstract: Against the background of the strong international competition on European seafood markets, the question arises if a specific consumer segment exists whose members appreciate additional "values" of products and are willing to pay higher prices for sustainably produced European seafood. This contribution analyses consumer preferences and their willingness to pay (WTP) for different sustainability claims for seafood by using the contingent valuation method. Subsequently, it identifies consumer segments that would be most responsive for European seafood.

An online survey was conducted in 8 European countries with more than 4000 participants for eliciting consumers' preferences and their willingness to pay (WTP) for different seafood attributes – all related to sustainable and local/European production and fish welfare. In order to identify consumer segments, a cluster analysis on consumers' WTP for the different attributes was conducted.

The average WTP varied between seven and almost 20%, depending on attribute and country. The overall level of WTP was highest in Germany followed by Italy. By means of a cluster analysis different consumer segments based on their WTP were identified: A large group (47%) without any additional WTP, a slightly smaller group (44%) with a moderate additional WTP of plus 17%, and a small group (9%) with an additional WTP of more than 40%.

According to our results, there exists a small consumer segment that is willing to pay significantly higher prices for sustainably produced fish from Europe: Given those trustful standards are applied and well communicated. This gives perspective to European producers to differentiate in a premium segment.

Keywords: Sustainability, Fishing fleet, Europe, Contingent valuation, Fish pricing.

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Market integration and price transmission in the Finnish salmonids value chain

Virtanen Jarno, Leena Kalliovirta, Kaija Saarni, Jari Setälä

Abstract: This paper investigates the market integration and price transmission along the value chain in the Finnish salmonids markets using multivariate cointegration analysis. We examined the price series of domestic salmon trout and imported salmon and salmon trout with different product forms of fresh fish at different levels in the value chain.

We find that market of domestic salmon trout is fully integrated with the global salmon market. Our results show that salmon value chain is vertically integrated and the price information is transmitted from imports through wholesaling to retail prices. Salmon trout value chain is also vertically integrated along the value chain and horizontally integrated with the salmon prices at the different levels of the chain. The leading prices are the salmon prices and their stochastic trend is closely followed by the salmon trout prices.

Wholesalers play important role in the Finnish salmonids markets. The global salmon prices are transmitted to the Finnish markets through the wholesale prices of the imported salmon to salmon trout value chain – both downstream to production and upstream to the retail level. At the retail level, salmon and salmon trout prices are cointegrated. However, neither of the prices are found to be exogenous but both adjust to the equilibrium: the prices interact at the retail level indicating perfect substitution between these two products.

Keywords: Aquaculture, Fish markets, Finland, Fish pricing, Product substitution.

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Recent economic developments and market analysis for the Dutch mussel sector

M. Skirtun, J.A.E. van Oostenbrugge

Abstract: An analysis of the financial performance of the Dutch mussel sector reveals that profitability at the farm level depends strongly on the price received for mussels. To investigate the factors influencing price, a study was conducted to examine the relationship between the total volume of fresh mussel import into the largest market, Belgium, and the price paid for those coming from the Netherlands. Preliminary results provide no support for the existence of a long-run cointegrated relationship between price and volume of fresh mussel imports, both data series appear to simply fluctuate around their long-term mean. However, there is evidence for short-run correlations at the monthly and annual level, even if the direction of causality is less clear. Volume and price seem to be negatively correlated confirming previous analyses on Dutch auction prices. The study utilizes an autoregressive distributed lag (ARDL) and two-stage least squares (2SLS) model to explore the relationship at the monthly level, and a vector autoregressive (VAR) model for the annual data.

Keywords: Aquaculture, Mussel, Netherlands, Market analysis, Socioeconomic modelling.

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12.45-1.15 pm Room: **Room 16**
(19) parallel session – *Blue economy*
chair **GONZALO RODRÍGUEZ**

Operational instrument to assess the marine sectors activities' direct impacts on the marine environment

Arantza Murillas, Raúl Prellezo, Alberto Ansuategi, Marta Escapa, Mari Carmen Gallastegui

Abstract: The Blue Growth Agenda has placed the importance of marine resources for economic development in its forefront. Most of the reports on Blue Growth have focused on the potential value-added creation of the maritime sectors whose growth depends on healthy marine ecosystems. Following the implementation of the Marine Strategy Framework Directive (MSFD), the European Union (EU) member states started to assess the environmental status of their marine waters. The goal of the MSFD is to achieve Good Environmental Status (GES) of EU marine waters. The MSFD provides descriptors, associated criteria, and biological and physical-chemical indicators to interpret what GES means. However, following the initial assessments under the MSFD, the European Environment Agency (EEA) has highlighted the need to improve our understanding of the linkages between marine economic activities and the pressures and impacts exerted on the marine environment.

This work aims at making a modest contribution in this direction, by defining a set of activity-specific pressure indicators and, where appropriate, identifying cross-sectoral pressures that, in addition to the state indicators, can be used to implement a sustainable management regime. It will allow to implementation of an inter-regional comparative analysis of the environmental impact of the blue

economy across the Atlantic Arc and assess the pressures generated by the maritime sectors on the marine environment.

The work will provide an operational synthetic index to assess the economic activities' intensity and accumulative impacts, focusing on seven economic sectors (Blue Biotechnology, Aquaculture, Tourism, Blue Energy, Transport, Fishing, and Port Infrastructure) and four ecosystem services (Food provisioning, Waste assimilation, Migratory and nursery habitat and leisure and Recreation and tourism services).

Keywords: Blue growth, Marine sector, Marine environment, Economic activities, Marine environment.

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Fisheries and thriving harbours – is there a value for the tourism sector?

Staffan Waldo, Anna Anderson, Johan Blomquist

Abstract: The value of thriving regional fisheries is commonly put forward in the public debate on fisheries. Many countries also consider this in practical fisheries policies. But is there an economic justification for allocating resources to regional fisheries? One argument is that active fishing harbours have a positive externality by attracting tourists to the region. This article investigates the impact of coastal fishing activity on tourism demand in Sweden. Using municipal-level data for the period 1998-2015 we perform a panel data analysis that takes both unobserved heterogeneities between municipalities and the dynamics of tourism into account. On the aggregate (nationwide) level our results show no evidence of fishing activity affecting tourism demand measured as the number of overnight stays. However, tourism demand is positively affected by past tourism demand, GDP, and the number of bathing spots, and negatively affected by the oil price. Restricting the sample to the West and South coast of Sweden, where the fishing cultural heritage is particularly recognized, we find a positive correlation between tourism and three out of four variables measuring fishing activity.

Keywords: Tourism, Fishing sector, Marine policy, Fishing activity.

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Size and Shape of the blue economy in Europe

Jose L. Santiago, Juan C. Surís-Regueiro, Rosa Chapela

Abstract: After a long series of studies that have attempted to define and measure the blue economy in EU, a framework for processing and analyzing of maritime economic data in Europe was created in 2016. In this paper, we will introduce the framework and an example of its application at European level. It was developed following five tasks: defining a common delineation of the maritime activities; setting indicators to all activities (common and sector-specific); identifying endurable and robust data sources; collecting and processing the data; validating through a peer-review process. The results allow to measure the "blue" European economy in terms of its size (in Gross Value Added, and Employment terms) and its shape (the major trends of the blue sectors at the country level). This also allows to rank the countries and the activities according to their relevance but also in terms of their dependency on "blue" resources. Norway, Croatia, and Greece highlight in terms of GVA dependency, but this fact is expanded if employment is the variable under study. If so, Spain, Finland, or Denmark are also countries where this dependency is remarkable. Finally, the results of this study guided the European Commission to publish the first Annual report on Blue Economy in 2018, proving the relevance and usefulness of the framework.

Keywords: Blue economy, Bioeconomic modelling, European Commission, AER.

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(Blue) Growth accounting in small-scale European Union fleets

Raúl Prellezo, José María Da Rocha, Jordi Guillén

Abstract: Fisheries account for one-third of the total jobs in the world's ocean economies. In the European Union (EU), small-scale fleets account for over 40% of employment in the fisheries sector. Given this marine employment source, it is important to analyse SSF productivity growth. This is done here using Total Factor Productivity (TFP), defined as the portion of output not explained by the traditionally measured inputs of labour, energy, and capital used in production. Calculating TFP is relevant to understanding the development of technology in fisheries. It is calculated for SSF in two main EU sea areas: the Mediterranean (FAO area 37) and the North-East Atlantic (FAO area 27). Constant elasticity production functions are used to analyse the intensity of the use of production factors and how they are substituted or complemented when producing. Additionally, TFP is corrected by stock evolution indices to assess EU conservation policy. The results show that there is complementarity between capital and energy and external factors affecting them and that the productivity increase observed in the Atlantic can be attributed mainly to stock recovery and resource availability rather than to production factors. This suggests that technological development has been limited and that the use of production factors should be decreased in the coming years. It is concluded that in the North-East Atlantic the EU conservation policy is fulfilling the objective of restoring fish stocks and contributing to productivity growth of 4% per year. In the Mediterranean, stocks are not being restored, so they do not contribute to growth as a production factor. Finally, it is concluded that the conservation policy does not suffice in either area to provide positive productivity trends.

Keywords: Bioeconomic modelling, Fishing Fleet, Europe, Small-scale fisheries, Elasticity.

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2.30-15.15 pm Room: **Paraninfo**
Plenary session 7 – F*isheries and climate change*
chair **GONZALO RODRÍGUEZ**

Monitoring the compliance with landing obligation

Keynote Speaker Mario Lopes dos Santos, Cristina Morgado, Miguel Nuevo

Abstract: The support of the implementation of the landing obligation is a priority to the European Fisheries Control Agency (EFCA) by conducting several activities to deter possible non-compliance and assess and monitor the level of compliance with this important Common Fisheries Policy (CFP) provision.

In the context of its Joint Deployment Plans (JDP), EFCA has been coordinating a program of "last haul" (LH) inspections, where catch composition has been collected with the participation of Member State inspectors and assistance from EFCA staff in the field. LH catch composition data is verified by MS inspectors and can thus be used as reference data and compared with the catch composition declared in the logbook (not-verified). The methodologies used, assume that the verified data is representative of the fleet segment with the same gear, mesh size, and area of fishing activity. Three types of methods are used: a) estimation of BMS discards; b) estimation of LSC discards; c) estimation of discards independent of the size of the fish. The estimates of illegal discards based on the above-mentioned data have been crucial as input data for the annual risk assessment and evaluation of compliance with the LO.

EFCA cooperates and assists the MS in the different sea basins for the implementation of the landing obligation in the context of the regionalisation of the Common Fisheries Policy (CFP). The areas of cooperation relate mainly to risk

assessment, compliance evaluation, development of technical guidelines for the implementation of Remote Electronic Monitoring (REM), and common interpretation of the rules, promoting a level playing field in the LO implementation across EU waters.

This keynote provides an overview of EFCA activities in this domain, including methodologies, results of compliance evaluation and risk assessment, and an overview of the state play of the REM Working Group activities

Keywords: Landing obligation, Marine policy, EFCA, Last Haul program, Discards.

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