2025

NAAFE LA JOLLA

The NAAFE Forum in La Jolla, CA

March 24–27, 2025

North American Association of Fisheries Economists (NAAFE) is an international group of industry, government, and academic practitioners of fisheries economics. The purposes of NAAFE are to facilitate communication among North American fisheries and aquaculture economists in industry, academia, government, and other areas, to promote dialogue between economists and stakeholders interested in fisheries and aquaculture, and to advance fisheries and aquaculture economics and its useful applications.

Scripps Institution of Oceanography at UC San Diego is one of the most important centers for global earth science research and education in the world. Scripps scientists work to understand and protect the planet by investigating our oceans, Earth, and atmosphere to find solutions to our greatest environmental challenges. Scripps leads research in climate change impacts and adaptation, resilience to hazards, conservation and biodiversity, oceans and human health, national security, and innovative technology to observe the planet.

The Center for Marine Biodiversity and Conservation (CMBC) at Scripps Institution of Oceanography, UC San Diego integrates biological, physical, and social science with educational approaches to maintain the integrity of ocean ecosystems and manage their use in the face of rapid and inevitable global change.

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- **Barbara (Basia) Hutniczak**, International Pacific Halibut Commission
- **Rebecca Lent**, Consultant
- **Matthew Reimer**, University of California, Davis
- **Andrew Ropicki,** University of Florida
- **Andrew Scheld**, Virginia Institute of Marine Sciences
- **Martin Smith**, Duke University
- **Kanae Tokunaga**, Gulf of Maine Research Institute
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Plenary I

March 25, 2025, 8:30 AM - 10:00 AM
Room A, Auditorium, Scripps Seaside Forum

Andres Cisneros-Montemayor

Andrés Cisneros-Montemayor is a resource economist specializing on ocean and coastal social-ecological systems. Andrés is from the fishing port of Guaymas, Sonora, México, and has always been deeply involved with fisheries. His work aims to support equitable development and combat inequitable systems by melding qualitative and quantitative evidence. This includes the first global estimates of the economic value of marine ecotourism, seafood consumption by coastal Indigenous Peoples, and countries' capacity to establish an equitable Blue Economy. He is Deputy Director of the Nippon Foundation Ocean Nexus Center, one of the largest interdisciplinary collaborative research networks focused on social equity, well-being, and public health in coastal and marine contexts throughout the world. Andrés is very actively engaged in negotiations and debates on equity and sustainable development internationally and in Canada, where he is currently on the scientific advisory committee for the Pacific Integrated Commercial Fisheries Initiative (which aims to increase First Nations' access and capacity for fisheries and aquaculture). He has published over 90 peer-reviewed articles, 20 book chapters, a textbook, and many technical reports and science communication articles. His lab aims to support students from everywhere in the world that are passionate about learning how to best support coastal communities.

Plenary II

March 27, 2025, 1:30 PM - 2:30 PM
Room A, Auditorium, Scripps Seaside Forum

Richard Carson

Richard Carson is a Distinguished Professor of Economics at the University of California, San Diego, where he has been since receiving his Ph.D. from UC Berkeley in 1985. He is past President of the Association of Environmental and Resource Economists. Carson was elected a Fellow of the American Association for the Advancement of Science for his work on climate change and environmental valuation. He has worked on environmental projects ranging from arsenic contamination of ground water in Bangladesh and forecasting CO2 emissions in China to conducting the benefit assessments for the U.S. Clean Water Act and its British equivalent. Carson was a principal investigator for the economic component of the government's damage assessments for the Exxon Valdez and BP Deepwater Horizon oil spills.

Program

By: Day and Time

Times are listed in: Pacific Time

Monday, March 24, 2025

09:00 - 15:00

Invitation only: NAAFE Board Meeting
Side event
MCTF 202 (Marine Conservation & Technology Facility)

12:00 - 13:30

NOAA SWFSC Tour (RSVP)
Side event

14:00 - 15:00

Early Career Meet-Up - All are welcome!
Side event
Brick & Bell, La Jolla Shores

15:00 - 15:40

Scripps Pier Tour (RSVP)
Side event

Scripps Vertebrate Collection Tour (RSVP)
Side event

15:00 - 16:30

NOAA SWFSC Tour (RSVP)
Side event

16:00 - 16:40

Scripps Pier Tour (RSVP)
Side event

Scripps Vertebrate Collection Tour (RSVP)
Side event

17:00 - 19:00

Welcome Reception - Door prizes available!

Ted & Jean Scripps Marine Conservation & Technology Facility (MCTF), Outdoor Deck (Marine Conservation & Technology Facility)

Tuesday, March 25, 2025

07:30 - 08:30

Coffee Meet-up - All are welcome!
Side event
Brick & Bell, La Jolla Shores

08:30 - 10:00

Opening Session + Plenary I
Plenary
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

10:00 - 10:30

Coffee Break - Seaside Forum
Coffee break

10:30 - 12:00

Causal Inference Methods in Fisheries Evaluation
Concurrent session
Scripps Vaughan Hall, Room C (Room 100, Vaughan Hall)

Equity in Fisheries, Aquaculture, & Seafood Systems
Concurrent session
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

Responses to Climate & Ocean Conditions
Concurrent session
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

12:00 - 13:30

Early Career Meet-Up - All are welcome!
Side event
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

Invitation only: Future NAAFE Forums Meeting
Side event
Scripps Vaughan Hall, Room C (Room 100, Vaughan Hall)

Lunch - Seaside Forum
Lunch

13:30 - 15:00

Economics of Marine Debris & Ghost Gear Management
Special session
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

Market Failures & Policy Objectives
Concurrent session
Scripps Vaughan Hall, Room C (Room 100, Vaughan Hall)

Rights-based Management
Concurrent session
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

15:00 - 16:00

Poster Session & Coffee Break - Seaside Forum
Special session

Wednesday, March 26, 2025

07:30 - 08:30

Coffee Meet-Up - All are welcome!
Side event
Brick & Bell, La Jolla Shores

09:00 - 10:30

Elicitation Frameworks & Primary Data Collection in Fisheries & Aquaculture
Concurrent session
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

Policy Interventions & Outcomes
Concurrent session
Scripps Vaughan Hall, Room C (Room 100, Vaughan Hall)

Seafood Labeling & Consumer Preferences
Concurrent session
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

10:30 - 11:00

Coffee Break - Seaside Forum
Coffee break

11:00 - 12:00

Bioeconomics I
Concurrent session
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

Integrating Social Science into Fisheries Management
Special session
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

Price Dynamics
Concurrent session
Scripps Vaughan Hall, Room C (Room 100, Vaughan Hall)

12:00 - 13:30

Lunch - Seaside Forum
Lunch

Mid-Career Meet-Up - All are welcome!
Side event
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

13:30 - 14:30

Plenary II
Plenary
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

14:30 - 15:00

Coffee Break - Seaside Forum
Coffee break

15:00 - 16:00

Ecosystem Services Valuation
Concurrent session
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

Network Analysis in Fisheries Evaluation
Concurrent session
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

Overlapping Ocean & Coastal Uses
Concurrent session
Scripps Vaughan Hall, Room C (Room 100, Vaughan Hall)

16:45 - 17:45

4:45 pm & 5:45 pm ONLY: Shuttle Buses to Banquet
Reception
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

18:00 - 20:00

Banquet

Reception
La Jolla Woman's Club

Thursday, March 27, 2025

07:30 - 08:30

Coffee Meet-Up - All are welcome!
Side event
Pinpoint Coffee, Biological Grade

09:00 - 10:30

Climate Impacts to Fisheries & Aquaculture
Concurrent session
Scripps Vaughan Hall, Room C (Room 100, Vaughan Hall)

More than Four Fish I: Changing the seafood consumption landscape from niche and small-scale market
Special session
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

Seafood Markets & Trade
Concurrent session
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

10:30 - 11:00

Coffee Break - Seaside Forum
Coffee break

11:00 - 12:00

Bioeconomics II
Concurrent session
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

More than Four Fish II: Changing the seafood consumption landscape from niche and small-scale market
Special session
Scripps Seaside Forum , Room B (Conference Room 155, Scripps Seaside Forum)

Recreational Fishing
Concurrent session
Scripps Vaughan Hall, Room C (Room 100, Vaughan Hall)

12:00 - 12:20

Closing Session - See you at NAAFE 2027!
Plenary
Scripps Seaside Forum , Room A (Auditorium, Scripps Seaside Forum)

12:30 - 14:00

Invitation only: NAAFE Mentoring Lunch
Side event

15:00 - 17:00

Invitation only: IIFET ExComm Meeting
Side event
MCTF 202 (Marine Conservation & Technology Facility)

Friday, March 28, 2025

6:30 - 12:30

Recreational Fishing Charter (RSVP)
Side event

10:00 - 13:00

Legacy Whale Watch (RSVP)
Side event

Saturday, March 29, 2025

08:00 - 14:00

Unofficial NAAFE Meet-Up @ 9 AM - Tuna Harbor Dockside Market
Side event

Program

By: Date, Time, & Conference Room

Concurrent Sessions

Equity in Fisheries, Aquaculture, & Seafood Systems

Tuesday, March 25 (10:30 AM to 12:00 PM), Room A (Auditorium, Scripps Seaside Forum)

9	Ayodele Oloko	Gender and Climate Change Impact on Fisher Folk Livelihoods: Evidence from Nigeria and Cameroon, Sub-Saharan Africa
17	Quanli Wang	Sustainable intensification of small-scale aquaculture production through diversification and better management practices
35	Andrés Cisneros-Montemayor	Indicators for an equitable Blue Economy: Total output, distribution, and equity actions
75	Taryn Garlock	Participation and influence of women in global seafood systems: Perspectives from the Fishery and Aquaculture Performance Indicators
86	Kanae Tokunaga	Equity and wellbeing implications of catch share programs in the United States
117	Michael De Alessi	Triple-Bottom Line Performance Assessment and the UNDP Coastal Fisheries Initiative: A Novel Approach to Identifying an Evidence-Based Theory of Change

Responses to Climate & Ocean Conditions

Tuesday, March 25 (10:30 AM to 12:00 PM), Room B (Conference Room 155, Scripps Seaside Forum)

22	Catherine Courtier	Using vessel monitoring systems data to analyze the spatial distribution of the Pacific Salmon ocean troll fishery to changing ocean Conditions on the West Coast
41	Kyumin Kim	Strategies for Balancing Long-Run Tradeoffs in Kelp Forest Restoration under Environmental Uncertainty
116	Sunny Jardine	Evisceration orders and harvester participation

118	Bijeta Bijen Saha	Crabs, Communities, and Challenges: Economic and Social Impacts of Harmful Algal Blooms on the West Coast Fishery

Casual Inference Methods in Fisheries Evaluation

Tuesday, March 25 (10:30 AM to 12:00 PM), Room C (Room 110, Vaughan Hall)

33	Jordan Moor	Identifying Treatment and Spillover Effects in Connected Markets: Impact of ITQ Management on Fish Prices.
38	Adams Ceballos	The Causal Impact of Ecological Disturbances: A Machine Learning Approach to the Case of Harmful Algal Blooms in Florida
47	Andres de Loera	Pay Thy Fisher, Beggar Thy Neighbor: China's Fishing Subsidies in the 21st Century
103	Juan Carlos Villasenor-Derbez	Empirical evidence that fuel subsidies modify fishing behavior and drive overfishing
127	Xiurou Wu	The value of public catch information
154	Joshua Abbott	Estimating the Community Economic Impacts of Catch Shares

Economics of Marine Debris & Ghost Gear Management
(Special Session)

Tuesday, March 25 (1:30 AM to 3:00 PM), Room A (Auditorium, Scripps Seaside Forum)

31	Huu-Luat Do	A bio-economic model of ghost fishing with an application to the Norwegian snow crab fishery
58	Andrew Scheld	The social costs of plastic pollution – derelict crab fishing gear in the Chesapeake Bay
90	Jingting Chang	Canada’s Ghost Gear Management
157	Vishwanie Maharaj	Can biodegradable fishing gear components be an economically viable solution to address ghost fishing ?

Right-based Management

Tuesday, March 25 (1:30 AM to 3:00 PM), Room B (Conference Room 155, Scripps Seaside Forum)

83	Abby Schamp	An experimental analysis of rent splitting after rationalization: cooperatives and processor-allocated quota
106	Andrew Ropicki	Evaluating quota ownership changes in a fishery with limited regulations on quota trading and ownership
121	Ralph Townsend	Using Deemed Values to Increase Resiliency of Adaptive Management of Low-knowledge Bycatch Fisheries
135	Hordur Saevaldsson	Utilization of fishing gears within the Icelandic demersal ITQ system – A Case study
156	Tigist Woldetsadik Sommeno	Disentangling Persistent and Transient Technical Inefficiency and Input Misallocation in the Quota-Regulated Norwegian Purse Seine Fishery.

Market Failures & Policy Objectives

Tuesday, March 25 (1:30 AM to 3:00 PM), Room C (Room 110, Vaughan Hall)

15	Erica Chuang	Stock-Generated Externalities: The Principle of Targeting and Foregone Environmental Benefits
16	Maria B. Battaglia	Casting a wider net: Opening a conversation about the complexity of fisher behavior
34	Andrés Cisneros-Montemayor	Lessons from an Impromptu National-scale Fishery Subsidy Reform in Mexico
42	Carlos Chávez	Exclusion and common pool resource management: Experimental evidence
123	Håkan Eggert	What drives sustainable fisheries? An empirical analysis using Fisheries Performance Indicators
144	Thomas Anderson	Towards cost-effective reductions of antibiotic use in salmon aquaculture

Elicitation Framework & Primary Data Collection in Fisheries & Aquaculture

Wednesday, March 26 (9:00 AM to 10:30 AM), Room A (Auditorium, Scripps Seaside Forum)

73	Brandon McFadden	Consumer Perceptions of Hemp-Fed Aquaculture
53	Caela Gilsinan	Addressing Labor Demand and Production Efficiency in Shellfish Aquaculture
88	Yixin Yang	Overconfidence and Angler Behavior
132	Kinsey Fikes	Understanding Barriers to Participation in Recreational Harvest Incentive Programs for Invasive Species Control
134	Daniel Harris	Fishing for Solutions: Compensation for Bycatch Reduction in the Gulf of Mexico Shrimp Fishery

Seafood Labeling & Consumer Preferences

Wednesday, March 26 (9:00 AM to 10:30 AM), Room B (Conference Room 155, Scripps Seaside Forum)

85	Sterenn Lucas	Moving toward more environmental and ethical motivations: food choices and the role of generations.
108	Andreas Tsakiridis	Association between MSC certified products and economic performance of the EU seafood processing industries: A country-level investigation
120	Yutaro Sakai	Enhancing Willingness to Pay for Carbon Footprint Labels: Evidence from a Real Choice Experiment
137	Roberto Cardenas	Sustainable seafood consumption: A hedonic analysis of eco-labeling in the U.S. market
99	Kevin Ray	A Random Coefficients Model of Seafood Demand: Implications for Consumer Preferences and Substitution Patterns

Policy Intervention & Outcomes

Wednesday, March 26 (9:00 AM to 10:30 AM), Room C (Room 110, Vaughan Hall)

56	Tannaz Alizadeh Ashrafi	System dynamics modelling of CO2 emissions of trawl fishery
63	Manuel Estay	An empirical evaluation of production quotas in a strategic location and entry setting
70	Francisco Cordova-Zavaleta	Economic and Social features of the elasmobranch gillnet fishery in northern Peru. Is it still profitable?
130	Kristin Helen Roll	What drives intertemporal changes in energy efficiencies of fishing vessel operations in Norway? An index number approach
102	Barbara Hutniczak	A hundred years of Pacific halibut management in the context of global events and trends in fisheries management
54	Andrew Scheld	Introducing uncertainty into the Input-Output model for Pacific Coast Fisheries

Integrating Social Science into Fisheries Management
(Special Session)

Wednesday, March 26 (11:00 AM to 12:00 AM), Room A (Auditorium, Scripps Seaside Forum)

59	Hirotsugu Uchida	Implementing Social Science Methods for Fisheries Decision-Making: The Case of New England in the U.S.
74	Kimberly Bastille	Recreational Fisheries Decision Support Tool: A management tool built with Fisheries Managers
95	Elizabeth Conley	High Costs and Low Trust: Insights from Qualitative Commercial Fishing Cost Data in the Northeast U.S.
161	Bishal Neupane	Water Supply, Habitat, and Agricultural Production: Integrating Economics into Fishery Habitat Evaluation Processes

Bioeconomics I

Wednesday, March 26 (11:00 AM to 12:00 AM), Room B (Conference Room 155, Scripps Seaside Forum)

23	Fernando Aranceta-Garza	Bioeconomics of a regime shift by invasive epibiont species affecting a bivalve small-scale fishery
27	Quinn Weninger	Identification of resource extraction technologies when the resource stock is unobservable
29	Chris Hachtman	Environmental Federalism in Recreational Fisheries Management: A Bioeconomic Approach

Price Dynamics

Wednesday, March 26 (11:00 AM to 12:00 AM), Room C (Room 110, Vaughan Hall)

100	Elanur Ural	Impact of Sea Surface Temperature on Individual Fish Species Prices
124	Keita Abe	The Price of Coordination: Evaluating Welfare Effects of Landing Timing in Offshore Longline Fishery
125	Kaitlyn Malakoff	Tailoring retail food price forecasts to specific markets: lessons from U.S. seafood
107	Ryan Kueber	Catch method, quality and price formation in the Japanese swordfish fishery

Network Analysis in Fisheries Economics

Wednesday, March 26 3:00 AM to 4:00 AM), Room A (Auditorium, Scripps Seaside Forum)

12	Lorena Haber Feria	Analysis of the governance structure of artisanal shrimp fisheries in the southeastern Gulf of California.
13	Claudia Fumero	Resilience of the governance systems of two MSC certified fisheries in northwestern Mexico
64	Kanae Tokunaga	Diversification and Cross-fishery Spillovers in Coastal Fisheries: Evidence from Climate Change-induced Northern Shrimp Fishery Collapse
115	Gal Koss	Network Topology of Fishing Decisions: Simulations of Climate Resilience

Ecosystem Services Valuation

Wednesday, March 26 (3:00 AM to 4:00 AM), Room B (Conference Room 155, Scripps Seaside Forum)

112	Richard Woodward	The Potential for Mobility Data for the Valuation of Ecosystem Services
122	Elanur Ural	Using SEEA EA in Valuing Fisheries: Deriving Exchange Values of Nearshore Fisheries for the Main Hawaiian Islands
129	Hans Ellefsen	The Economics of Natural Capital: Clarifying Resource Rent

Overlapping Ocean & Coastal Users

Wednesday, March 26 (3:00 AM to 4:00 AM), Room C (Room 110, Vaughan Hall)

52	Reid Calhoun	Vulnerability of Seafood Capital to Offshore Wind Energy Development
62	Molly Murphey	Developing an Environmental Concern Framework for Offshore Wind in the Gulf of Maine through Public Comment Analysis
96	Angela Muench	Fisheries Sensitivity Mapping
126	Xiurou Wu	Distributional Impacts of Offshore Wind Farms on Commercial Fisheries: An Analysis of the Gulf of Mexico Reef Fish Fishery

Seafood Markets & Trade

Thursday, March 27 (9:00 AM to 10:30 AM), Room A (Auditorium, Scripps Seaside Forum)

87	Allison Kellum	Power Sits in the Middle - Working with Retailers and Seafood Buyers: A Case Study
131	Rune Nygaard	Commercialization barriers for spotted wolffish
136	Hordur Saevaldsson	Maximizing value with fresh products - Case study from Icelandic cod fisheries
143	Martin Smith	Evidence of Community-level Seafood Consumption in Wastewater
153	Joshua Abbott	Double Entry Deception: The Seafood Trade Misreporting Gap

159	Sharon Hutchinson	How valuable are fish imports and local catch in supporting food security goals? The case of Caribbean Countries.

More than Four Fish I: Changing the seafood consumption landscape from niche and small-scall market
(Special Session)

Thursday, March 27 (9:00 AM to 10:30 AM), Room B (Conference Room 155, Scripps Seaside Forum)

60	Kate Masury	Celebrating Place-Based Seafood: Ecosystems, Communities, Cultural Significance
139	Emily Miller	Fishful Future: A Case Study in Strategic Communication
94	Hirotsugu Uchida	Bringing ikejime seafood to the Rhode Island market
84	Sterenn Lucas	Social acceptance of new marine proteins in Europe: the case of holothuria and seaweed.
140	Jennifer Meredith	THE CAPACITY OF SEAWEED AQUACULTURE TO DIVERSIFY COASTAL MAINE LIVELIHOODS

Climate Impacts to Fisheries & Aquaculture

Thursday, March 27 (9:00 AM to 10:30 AM), Room C (Room 110, Vaughan Hall)

8	Kyumin Kim	The Role of Fisheries Diversification in Stabilizing Local Fishing Economies: Evidence from Alaska
19	Lawrence Oparinde	Do Cooperation and Adaptation to Climate Change Affect Conflicts Among Artisanal Fisherfolks in Nigeria?
21	Seleni Cruz	Climate variability and labor allocation: Evidence from Mexican small-scale fisheries
138	Carlos Chávez	Linking climate conditions with fish farming performance: The case of salmon production in northwestern Patagonia
119	Anthony Rogers	Adaptive Systems for Climate-Ready Fisheries Management
148	Lijun Liu	Beyond the Catch: The Role of Climate Risks in Fish Trade

Bioeconomics II

Thursday, March 27 (11:00 AM to 12:00 AM), Room A (Auditorium, Scripps Seaside Forum)

113	Sturla Kvamsdal	An instrumental variable approach to the generalized fishery model
114	Chris Anderson	Bioeconomics of Capital Investment and Managing for Maximum Economic Yield
141	Amanda Lindsay	Marine Reserves in Rural Economies and Climate Resiliency
146	Kaiwen Wang	Climate change impacts on global distant-water fisheries: insights from a spatial equilibrium model

More than Four Fish II: Changing the seafood consumption landscape from niche and small-scale market

Thursday, March 27 (11:00 AM to 12:00 AM), Room B (Conference Room 155, Scripps Seaside Forum)

Panel discussion and Q&A

Recreational Fishing

Thursday, March 27 (11:00 AM to 12:00 AM), Room C (Room 110, Vaughan Hall)

6	Braeden Van Deynze	Gone Fishin': Shifts in Recreational Angling Effort Between Weekends and Weekdays under Temporal Restrictions in Puget Sound
111	Richard Woodward	The Economic Value of Offshore Structures to Recreational Anglers: A Nested Demand Model Using Mobility Data
128	Alexander Gordan	An Analysis of the Southeastern Headboat Market Using Novel Price Data

Session Chairs

NAAFE 2025- Session Title	Day	Room	Time	Session Chair
Equity in Fisheries, Aquaculture, and Seafood Systems	25-Mar	Room A	10:30 AM	Andres Cisneros-Montemayor
Responses to Climate and Ocean Conditions	25-Mar	Room B	10:30 AM	Sunny Jardine
Causal Inference Methods in Fishery Evaluation	25-Mar	Room C	10:30 AM	Josh Abbott
Rights Based Management	25-Mar	Room B	1:30 PM	Andrew Ropicki
Market Failures and Policy Objectives	25-Mar	Room C	1:30 PM	Thomas Anderson
Elicitation Frameworks & Primary Data Collection in Fisheries & Aquaculture	26-Mar	Room A	9:00 AM	Brandon McFadden
Seafood Labeling and Consumer Preferences	26-Mar	Room B	9:00 AM	Kevin Ray
Policy Interventions and Outcomes	26-Mar	Room C	9:00 AM	Andrew Scheld
Bioeconomics I	26-Mar	Room B	11:00 AM	Fernando Aranceta-Garza
Price Dynamics	26-Mar	Room C	11:00 AM	Keita Abe
Network Analysis in Fisheries Evaluation	26-Mar	Room A	3:00 PM	Claudia Fumero
Ecosystem Service Valuation	26-Mar	Room B	3:00 PM	Richard Woodward
Overlapping Oceans and Coastal Uses	26-Mar	Room C	3:00 PM	Reid Calhoun
Seafood Markets and Trade	27-Mar	Room A	9:00 AM	Marty Smith
Bioeconomics II	27-Mar	Room A	11:00 AM	Chris Anderson
Recreational Fishing	27-Mar	Room C	11:00 AM	Alexander Gordan

Abstracts

NAAFE Forum 2025 in La Jolla Poster Session

Poster Session

Tuesday, March 25 (3:00 PM to 4:00 PM), Room A (Auditorium, Scripps Seaside Forum)

Projecting the Economic Performance of Alternative Commercial Gears for Lower Columbia River Salmon Fisheries

Braeden Van Deynze, Washington Department of Fish and Wildlife, braeden.vandeynze@dfw.wa.gov

Abstract: The lower Columbia River hosts several limited-entry commercial salmon fisheries, with most non-treaty harvest occurring in mainstem gillnet fisheries below Bonneville Dam. These mixed-stock fisheries, which include both healthy and Endangered Species Act listed stocks, are regulated by sector-specific ESA impacts and catch-share agreements. To balance conservation and equitable harvest access priorities, Washington Department of Fish and Wildlife began rulemaking in 2021 to allow a limited use of alternative commercial gears with different selectivity properties, specifically beach and purse seines and pound nets, a fixed net gear that funnels fish into a trap. The introduction of these gears aims to help managers and fishers meet economic and conservation objectives. However, fishers are unlikely to adopt new gears without harvest opportunities that offer equal or greater private net benefits compared to other options. This research proposes gear-specific economic performance indicators for fisheries managers to consider in season planning and policy discussions over whether and how to permit novel gears in an established fishery. We define financial (net revenue) and economic (economic profit) viability indicators and outline data and modeling needs for measurement. Using landings data from 2007-2022, we model within-season price dynamics by product and pair these models with cost data to compare expected benefits across gears under different regulations. Finally, we discuss plans for additional data collection following the 2025 season and the broader institutional context of this mixed-stock fishery.

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Making the Case for Gender-Inclusive Fisheries Governance, Policies and Climate Adaptation

Ayodele Oloko, UBC, a.oloko@oceans.ubc.ca

Abstract: The University of Victoria, School of Environmental Science, Victoria, BC, Canada Abstract Gender equality has been a key consideration for policymakers and natural resource managers in assessing climate risk and developing effective adaptation strategies. However, the interests and concerns of women in relation to climate-related planning and fisheries policies are often neglected. This underrepresentation of women, particularly from developing countries, poses a risk of overlooking opportunities to support vulnerable fishing communities. Additionally, it inadvertently increases the vulnerability of marginalized women fisherfolk. This paper reviews 122 refereed publications on the empowerment of local fishing communities, gender participation in fisheries governance, development, and the need to consider gender dimensions in climate adaptation programs worldwide. It highlights the socio-economic impacts of climate change on livelihood and discusses potential adaptation measures. The findings support the adoption of frameworks and policies that provide alternative metrics for women's empowerment, inclusion in fisheries governance, and climate adaptation strategies. The study also offers recommendations for governments, non-governmental organizations, and development agencies responsible for fisheries governance and climate adaptation initiatives. Keywords: Climate Change, Gender, Policies, Fisheries Governance, Vulnerability.

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Evaluating the impact of fish finder on productivity in Japan's fixed-net fisheries

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Abstract: "Fixed-net fishing" is a major fishery in Japan, taking 40% of the coastal landings. Since it is a passive fishing method that captures fish schools entering the nets fixed in the sea, fishers face a large uncertainty in landings and revenues. To mitigate this issue, the Japanese government is promoting the employment of fish finders inside the nets to visualize fish schools inside the nets. This allows for operations at optimal timings, potentially increasing catch volumes and improving productivity. This study aims to examine whether introducing fish finders has led to changes in catch volumes and productivity by using synthetic control methods (SCM). This study focuses on fixed-net fishing operations in Shizuoka Prefecture, Japan. The treated unit is the one fixed net operator who introduced a fish finder in 2021. The other eight nets in the same prefecture are used as donor pool. Monthly catch volume and revenue data from 2015 to 2023 were used as outcomes, and covariates included net-specific data and environmental data. The analysis revealed no significant effect of the fish finder. The introduction of the fish finder alone does not necessarily lead to increased catch volumes or improved productivity. Interviews conducted on-site revealed that the functional limitations of the fish finder have not significantly influenced fishers' behavior, aligning with the analytical results. The reason why behavioral changes did not occur, and which types of equipment could contribute to enhancing productivity in fisheries will be discussed.

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A screening model for estimating the net benefits of ghost fishing gear retrieval programs

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Abstract: With growing concerns about ghost gear impacts in commercial fisheries, managers are considering retrieval programs to recover lost gear annually after the fishing season. We develop a screening model with minimal data requirements, relying on conventional biological and economic assumptions, to evaluate the potential net benefits of such programs. The model uses fishery statistics from stock assessments, along with auxiliary data on gear use, loss rates, and bycatch efficiencies. Applied to the Norwegian snow crab and red king crab fisheries, the model estimates a net benefit of approximately NOK 0.14 million per year for the snow crab retrieval program, equivalent to 0.05 percent of average harvest revenues, and a negative net benefit for the red king crab fishery. Sensitivity analysis identifies the fishing pressure index—measured as the ratio of fishing mortality to fishing mortality at MSY—and the ghost gear decay rate as the key drivers of variability in net benefits. Monte Carlo simulations reveal highly skewed net benefit distributions. For the snow crab fishery, the mode, median, and mean are estimated at NOK -0.5 million, NOK -0.52 million, and NOK 8.6 million per year, respectively. For the red king crab fishery, the mode, median, and mean are estimated at NOK -0.4 million, NOK -0.5 million, and NOK 1.6 million per year, respectively. The model serves as a practical tool for evaluating early-stage retrieval programs and identifying critical data gaps, enabling researchers to refine estimates and guide policy decisions with more detailed analyses.

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Examining the Economic and Entanglement Impacts of California's Risk Assessment and Mitigation Program

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Abstract: The California Department of Fish and Wildlife's Risk Assessment and Mitigation Program (RAMP) has been instrumental in reducing whale entanglements in fishing gear since its inception in 2017. RAMP employs a collaborative approach involving commercial and recreational fishermen, environmental organizations, and state and federal agencies to assess and mitigate entanglement risks. Using real-time data on whale sightings, oceanographic conditions, and fishing efforts to evaluate the risk of entanglements has led to a reduction in whale entanglements since RAMP's implementation. The economic effects of RAMP for whale entanglement prevention have been multifaceted. The program has led to increased compliance costs for affected parties with investments in new gear and modified fishing practices to reduce the risk of whale entanglements, resulting in additional operational expenses and, in some cases, reduced catch rates. However, reducing whale entanglements helps maintain healthy whale populations, which are crucial for ecotourism (a significant economic driver in California) and promoting a more sustainable fishing industry. While RAMPS implementation in 2020 makes it relatively early to begin evaluation, a regression model approach with a dummy variable for RAMP may eventually yield insights about the program's effects. In the meantime, this study examines the immediately observable trends in the fishery pre- and post-RAMP.

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A SYSTEMATIC REVIEW OF APPROACHES TO MEASURING CLIMATE CHANGE VULNERABILITY OF COASTAL FISHING COMMUNITIES

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Abstract: There is little to no denial that climate change and its potential impacts poses a threat to life and livelihood. In coastal fishing communities, persons' livelihoods are inextricably bound to marine resources. Studies emanating from the Intergovernmental Panel on Climate Change (IPCC) and other authoritative sources report that climate change impacts are becoming more virulent. Researchers assert that fisheries should be viewed as a social ecological system, and more social themes embedded into the research agenda have produced nascent area such as the climate change-poverty nexus. The objectives for this systematic review are: to identify the methods used to assess coastal fishing communities' climate change contextual vulnerability, to determine the key drivers of climate change contextual vulnerability in coastal fishing communities, and to determine how poverty is characterized in approaches to measuring climate change contextual vulnerability. The systematic review follows the guidelines from the PRISMA 2020 Protocol. Studies searched in the period of October 2024 were obtained from three databases: Web of Science, Google Scholar and the University of the West Indies' research portal "UWIIinC". The eligibility criteria for the studies was partly determined by using the SPIDER framework for systematic reviews, where studies assessing only coastal fishing communities were eligible as well as contextual vulnerability was assessed. To assess risk of bias the CASP checklist for descriptive/cross-sectional studies was used. Finally, the results were synthesized using content analysis, particularly with Microsoft Excel and QDA Miner.

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Abstracts

NAAFE Forum 2025 in La Jolla

Concurrent Sessions

Equity in Fisheries, Aquaculture, & Seafood Systems

Tuesday, March 25 (10:30 AM to 12:00 PM), Room A (Auditorium, Scripps Seaside Forum)

9
Gender and Climate Change Impact on Fisher Folk Livelihoods: Evidence from Nigeria and Cameroon, Sub-Saharan Africa

Ayodele Oloko, UBC, a.oloko@oceans.ubc.ca

Abstract: Fishing is among the most prominent and accessible economic activities for people in inland and coastal fishing communities around the world, but particularly in sub-Saharan Africa, where it provides livelihoods and essential nutrition to over 200 million people. However, numerous compounding threats limit ocean ecosystem services along the west African coast. In particular, the combination of climate related stressors exacerbates challenges to livelihoods, food security, and wellbeing of millions of fishers and women fisherfolk. This study aims to enhance the resilience of marine ecosystem services for sustainable livelihoods under climate change scenarios; it investigates the socio-economic attributes of small-scale fishing communities in Nigeria and Cameroon, with detailed references to their vulnerability to climate change stressors, gender roles and strategies adopted for resilience to multidimensional poverty to attain sustainable livelihoods. Data will be sourced utilizing a mixed-method approach and secondary data, drawing on poverty and sustainable livelihood frameworks and employing participatory research approaches to make recommendations for reducing vulnerability. The findings will provide key information for policies and programs to build resilience to climate change in sub-Saharan Africa, address major challenges, and empower fishing communities in Nigeria and Cameroon. Keywords: Gender, Climate Change, Livelihoods, Fisherfolk, Resilience

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17
Sustainable intensification of small-scale aquaculture production through diversification and better management practices

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Abstract: Small-scale aquaculture systems can contribute significantly to food and nutritional security, poverty alleviation, and rural development, especially in developing countries. However, the intensification of aquaculture systems often has negative environmental outcomes. The adoption of diversification practices and better management practices (BMPs) has been identified as a possible approach to intensify sustainably small-scale aquaculture production. This study assesses the sustainability outcomes of the adoption of diversification practices and BMPs in small-scale production models. We focus on Myanmar, a developing country characterized by a rapidly expanding small-scale aquaculture sector. We analyze 624 household surveys with small-scale aquaculture producers in central and northern Myanmar. We estimate the effects of diversification practices and BMPs on different sustainability outcomes, namely economic outcomes (i.e. aquaculture yield and benefit-cost ratio), environmental outcomes (i.e. nitrogen and phosphorus use efficiency), and food security outcomes (i.e. fish self-consumption and household dietary diversity) through linear mixed-effects models. Our results reveal that diversified production models could have significant positive effects on economic and food security outcomes, as well as phosphorus use efficiency, compared to unimproved monoculture. However, such production models do not seem to have any major effect on nitrogen use efficiency. The adoption of BMPs on diversified production models seems to have little added effect on any of the studied sustainability outcomes, which suggests the need to improve existing BMPs or even develop new BMPs fit for Myanmar's context. These findings highlight the possible contribution of diversification practices and BMPs for enabling sustainable intensification in developing countries.

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35
Indicators for an equitable Blue Economy: Total output, distribution, and equity actions

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Abstract: Social equity goals are now specifically stated in most new ocean management and development plans, notably those aligned with a Blue Economy. This is a very positive trend given the significant inequities across ocean spaces and sectors, but the concept of social equity has still not been integrated into fisheries and ocean management, that commonly ask how this new goal is to be measured in ways comparable to more familiar economic and ecological indicators. We propose a practical framework and examples of indicators, presented in three categories that build towards meaningfully evaluating social equity goals: total outputs (what and how much do ocean sectors contribute), disaggregated impacts (who shares in specific benefits and costs), and equity actions (what actions are being taken to implement equitable processes and outcomes). The rationale for these indicators is grounded on environmental justice and related scholarships, but they should always consider local contexts to support the interests of frontline and marginalized populations.

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75
Participation and influence of women in global seafood systems: Perspectives from the Fishery and Aquaculture Performance Indicators

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Abstract: Women play diverse roles within the global seafood system, and organizations globally have called for improved understanding of their contribution and influence to support gender-explicit policy. This paper uses a unique dataset of 153 fishery and 69 aquaculture case studies to compare gender participation and influence in global seafood systems and examine the relationship between gender participation and socioeconomic outcomes. The results show that women are underrepresented across most sectors, and participation of women was highest in sectors providing the lowest benefits. The results also show that aquaculture has facilitated greater participation of women in the seafood sector; however, greater participation did not translate to greater influence in decision-making, indicative of low participation in leadership and high-ranking positions. The findings highlight that collection of participation data alone is not sufficient and support calls for more adaptive and inclusive management of global fisheries and aquaculture sectors.

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86

Equity and wellbeing implications of catch share programs in the United States

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Abstract: Catch shares have been shown to have many benefits, including eliminating the race to fish, increasing profitability, and stock sustainability. However, without express measures to prevent inequities, catch shares may set up a paradigm where inequitable fishing privileges are generated. This study explores and evaluate management options to improve distributive equity and associated wellbeing outcomes in the U.S. catch share. We first reviewed all US catch share programs to identify major equity issues and management tools -- or interventions -- used to counter them. Currently, 16 types of interventions are implemented to maintain or restore equity. But, specific measures to evaluate equity and wellbeing outcomes are lacking. To address this, we apply Bayesian Network Influence Diagrams (ID) to evaluate outcomes of interventions on six distributive equity-related metrics (e.g., quota concentration) and seven wellbeing-related metrics (e.g., occupational mobility), using the Atlantic sea scallop individual fishing quota program as a case study. The ID model and the policy intervention scenarios are developed and evaluated by interviewing fishery management and industry stakeholders and by using a combination of existing data and new data obtained from a harvester survey. Among the 16 types of interventions, community ownership of quota was identified as a plausible intervention to improve distributive equity and related wellbeing of in the fishery. Findings suggest possible improvements in equity through community quota ownership within a community where such ownership exists. However, community ownership, unless this approach is used by diverse and multiple communities, can worsen the cross-community distribution of quotas.

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117

Triple-Bottom Line Performance Assessment and the UNDP Coastal Fisheries Initiative: A Novel Approach to Identifying an Evidence-Based Theory of Change

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Abstract: Across the developing world fisheries are generally data-poor and capacity for management and enforcement is low. This leads to circumstances where major stakeholder groups – scientists, managers, and industry (harvesting and processing) – have different perspectives on the problems facing their fisheries that create a barrier to policy changes and investments to improve outcomes. Under the auspices of UNDP's Coastal Fisheries Initiative (CFI), a process was developed that leverages available data and expert knowledge on stock dynamics, stock health, economic outcomes, and the community contributions of small-scale fisheries to assess the triple-bottom line performance of data-poor fisheries and to develop a theory of change. A series of workshops used an expanded version of the Fishery Performance Indicator (FPI) assessment that allowed different constituent groups to express their perspectives, identify needed improvements, and to establish a common baseline, goals, and theory of change for small scale fishery investments. Then a stock simulation application based on OpenMSE known as FPAT (Fisheries Performance Assessment Toolkit) allowed participants to model the effects of alternate biological management programs on rates of recovery and production. This paper describes the components of the Fishery Performance Assessment Toolkit (FPAT) and the lessons learned from the series of CFI workshops for small-scale fisheries in West Africa, Latin America, and Indonesia, highlighting how stakeholder processes can lead to an evidence-based theory of change, even in data poor contexts.

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Responses to Climate & Ocean Conditions

Tuesday, March 25 (10:30 AM to 12:00 PM), Room B (Conference Room 155, Scripps Seaside Forum)

22
Using vessel monitoring systems data to analyze the spatial distribution of the Pacific Salmon ocean troll fishery to changing ocean Conditions on the West Coast

Catherine Courtier, University of California Davis, cacourtier@ucdavis.edu

Abstract: This study uses historical data on the spatial distribution of fishing vessels from 2007 – 2022 to develop models of spatial distribution and behavior of the Pacific Salmon Ocean Troll Fishery on the West Coast of the United States. This period is characterized by highly irregular oceanographic conditions, most notable of which was a severe marine heatwave (MHW) that persisted from 2013-2016. Previous studies have primarily investigated the biological impacts of this MHW, but less is known about the economic and social consequences among port communities. We analyze oceanographic variables, Vessel Monitoring Systems data, and landings receipts to understand the spatial redistribution of fishing effort in response to environmental shocks (e.g., MHWs) by evaluating changes in the location of salmon fishing effort in relation to port-level distribution of landings and revenue. Preliminary results indicate that during the MHW: 1) Landings were much lower than in previous years; 2) Fishing locations shifted northward; and 3) Fishing trips were longer both in terms of distance from port and number of days at sea per trip. Results from this study will be used to link the spatial distribution of fishing effort to port-level landings to assess community impacts and economic consequences of fleet responses to climate-induced changes and create a production and technical efficiency analysis which will examine the productivity of the commercial salmon fishery, particularly addressing increases in some measures of catch per unit effort amid low abundance in recent years

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41

Strategies for Balancing Long-Run Tradeoffs in Kelp Forest Restoration under Environmental Uncertainty

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Abstract: The dramatic decline of Northern California's kelp forests, driven by marine heatwaves (MHWs) and a surge in purple sea urchin populations, has led to severe ecological and economic impacts, transforming kelp forests into urchin barrens. Our research addresses this crisis by developing the first economic model to evaluate kelp forest restoration strategies, focusing on two key questions: (1) What is the optimal intensity of kelp restoration and urchin removal to balance short-term costs with long-term economic benefits under environmental uncertainty? and (2) What does the expected restoration trajectory look like over time? Our dynamic bioeconomic model uniquely integrates (i) the biological dynamics of kelp forests, (ii) costs of kelp out-planting and urchin removal, incorporating both fishery benefits and non-market values, and (iii) uncertainty from MHWs and regime shifts (e.g., high, medium, or low MHW frequencies). We find that while kelp outplanting is critical when kelp biomass is low, it works in tandem with urchin removal, which requires broader but more gradual application across various kelp forest states. This study advances restoration literature by modeling unique kelp dynamics within a comprehensive framework that includes economic costs, benefits, and environmental uncertainty. In particular, we address two layers of uncertainty: stochastic MHW occurrences and regime uncertainty in MHW frequency. Additionally, we apply Approximate Bayesian Computation (ABC) to improve parameterization for complex bioeconomic models in data-limited environments. Our findings offer actionable insights for prioritizing restoration efforts and resource allocation in large-scale restoration projects.

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Evisceration orders and harvester participation

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Abstract: Over the last decade, the Dungeness crab fishery on the West Coast of the U.S. has from chronic exposure to harmful algal blooms (HABs) of the species Pseudo-nitzschia. Because these algae favor warm ocean water, HABs are likely to become more common in a future with climate change. Pseudo-nitzschia algae produce domoic acid, a neurotoxin that accumulates in shellfish. To protect human health, managers can either close a fishery for the duration of the period when crabs are toxic to human consumption, or issue evisceration orders where crab are harvested but the toxic viscera are removed before bringing crabs to market. Importantly, evisceration orders decrease the value of Dungeness crabs, leading to lower ex-vessel prices in the affected areas and creating a disparity in ex-vessel prices between different zones during the period of the evisceration order. This study focuses on the impact of an evisceration order declared in the 2021 fishing season in Washington state. Specifically, we estimate a structural location choice model which is a function of endogenous congestion costs and use the model to simulate the harvesters' choices in a hypothetical scenario if there was no evisceration order. We find that the overall participation in the fishery would be higher by 10.4% in the absence of the evisceration order, 17.6% higher in the area that was under the evisceration order, 6.3% lower in the area with no evisceration order.

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118

Crabs, Communities, and Challenges: Economic and Social Impacts of Harmful Algal Blooms on the West Coast Fishery

Bijeta Bijen Saha, University of California, Santa Cruz, bisaha@ucsc.edu

Abstract: Social Vulnerability Indexes (SVIs) have become crucial tools for assessing the resilience of fishing communities and are commonly used by U.S. fisheries managers to inform policy decisions. However, the precise link between social vulnerability and observable community-level fishing outcomes has yet to be rigorously tested. This study seeks to validate the effectiveness of SVIs by empirically examining how vulnerability characteristics influence fishing activity in the aftermath of a significant economic disruption to a major West Coast commercial fishery. The Dungeness crab fishery is the most valuable fishery on the West Coast of the United States. During the 2014–2016 Northeast Pacific Marine Heatwave, a harmful algal bloom (HAB) caused a prolonged delay in the start of the Dungeness crab season which was declared a federal fisheries disaster. Our study examines the role of SVI values in predicting community-level responses to this disruption, using data on commercial fishing landings, revenue, and participation from California communities. The regulatory response to the HAB varied across coastal communities, leading to differences in fishing opportunities during the 2016 season. We leverage variation in regulatory responses to HABs across coastal communities during the 2016 Dungeness crab season within a quasi-experimental research design. Utilizing data on West Coast commercial fishing landings from 2006 to 2023, we employ a fixed-effects model to analyze within-county revenue changes and exogenous variation in domoic acid events. This framework enables us to estimate the economic impacts of HAB-induced disruptions and explore heterogeneity in community responses, with a particular focus on SVI rankings.

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Casual Inference Methods in Fisheries Evaluation

Tuesday, March 25 (10:30 AM to 12:00 PM), Room C (Room 110, Vaughan Hall)

33
Identifying Treatment and Spillover Effects in Connected Markets: Impact of ITQ Management on Fish Prices.

Jordan Moor, University of Florida, Jordanmoor@ufl.edu

Abstract: Synthetic control has become an increasingly valuable tool for estimating causal effects, particularly in cases with few treated units; a situation where many alternative approaches to investigate causal effects are not viable. The method's accuracy depends on the selection of donor units, which affects bias, variance, and the risk of type II errors. Certain biases such as those arising from spillover effects under the 'No Interference' assumption are not well explored in the literature. Spillover bias occurs when a treatment indirectly impacts units in the donor pool. We propose using market integration as a criteria for donor selection to minimize donor contamination. To illustrate the practical application of this approach, we apply this method to both simulated and empirical datasets. Our empirical case study estimates the treatment effect of a change in management policy for Gulf of Mexico reef fisheries on ex-vessel prices. We applied three synthetic control methods, including Bayesian Structural Time Series, a novel approach in this context. Our empirical findings support our simulation results, revealing systematic differences in estimated treatment effects based on the inclusion of spillover units in the donor pool. Notably, when integrated markets (contaminated units) were included, treatment effects were diminished to the point of insignificance. However, when spillover units were excluded, significant positive treatment effects were observed across all treated species. Finally, positive treatment effects were also observed on spillover units, as defined by market integration.

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38
The Causal Impact of Ecological Disturbances: A Machine Learning Approach to the Case of Harmful Algal Blooms in Florida

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Abstract: Due to complex and often nonlinear dynamics, it is challenging to investigate the impact of ecological disturbances on human activities. This paper applies the causal forest algorithm, informed by the R-learner approach, to assess the impact of Harmful Algal Blooms (HAB) on Florida's stone crab fishery. HABs are ecological disturbances that occur with varying intensity and at different geographical locations. This approach overcomes the limitations of traditional analyses by accommodating the heterogeneity and complexity inherent in Coupled Human and Natural Systems without imposing restrictive assumptions on the functional form of relationships between variables. Results demonstrate a significant decrease in stone crab landings associated with HAB presence, with diminishing impact as distance from the bloom increases. Additionally, our analysis found that these ecological disturbances lead to differential effects across fishers and HAB events. The study exemplifies the utility of machine learning in environmental economics, providing credible causal inferences for policy formulation.

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47
Pay Thy Fisher, Beggar Thy Neighbor: China's Fishing Subsidies in the 21st Century

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Abstract: We present novel theory and evidence on fishing subsidies as means of reducing domestic overfishing. Countries facing overexploitation of domestic waters may find it politically and economically advantageous to offer subsidies as a way of "decongesting" their domestic fisheries.
Fuel subsidies, the single largest form of fisheries subsidies, may play such a role if they induce distant water fishing. We characterize the conditions under which fuel subsidies are decongesting, and then estimate their empirical effects using a triple-difference design exploiting a change in Chinese subsidy policy. Using vessel position data from Global Fishing Watch, we show that China's fuel subsides increased fishing in its domestic waters and did not drive distant water fishing. We also show that non-Chinese vessels in spatial competition with China subsituted away in response to China's subsidies. However, we demonstrate that the evolution of China's subsidy policy away from fuel subsidies and towards spatially specific subsidies does achieve the goal of domestic decongestion. On net, the changes also reduce total fishing. This implies a tradeoff between managing the environmental and global distributional consequences of disciplining fisheries subsidies.

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103

Empirical evidence that fuel subsidies modify fishing behavior and drive overfishing

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Abstract: Fuel subsidies in fisheries are regarded as a leading cause of overfishing, but there is little empirical evidence to substantiate this claim. Here, we assembled and analyzed nine years of high-resolution data on fisher-level fuel subsidy allocations, fishing activity, and fisheries production in Mexico's shrimp trawl fleet to empirically test whether fuel subsidies drive overfishing. We exploit variations in vessel-level subsidy allocations and variations in the subsidy amounts allocated to vessels to casually identify the effect of fuel subsidies on fishing behavior and catch. We find that when an economic unit receives a fuel subsidy, it increases fishing effort by 31.4%, fished area by 11.2%, and landings by 59.5%. Moreover, a 1% increase in the subsidy amount causes a 0.1% increase in fishing hours, a 0.04% expansion of fishing grounds, and a 0.15% increase in landings. Overall, fuel subsidies explain 23.7-30.34% of historical annual fishing time, 7.9%-10.8% of fished area, and 47-58% of reported landings in Mexico's industrial shrimp trawl fleet. We also identify fishing grounds that are disproportionately exploited as a result of the subsidy program, showcasing the spatial implications of a non-spatial policy. Our results lend support to calls to eliminate fuel and other input subsidies in fisheries worldwide.

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127

The value of public catch information

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Abstract: Government agencies collect data from individuals and organizations to monitor activities and inform management decisions. These datasets can become publicly accessible under transparent management. These public data sources create opportunities for innovative digital platforms providing information services in the private sector. This potential is exemplified in Norway’s fishing industry, where public access to fishing data has driven the development of digital platforms that aim for both sustainable fishing practices and energy efficiency — critical objectives in the fishing industry’s efforts to adapt to and mitigate climate change. However, the value of information accessibility remains ambiguous, as better information may lead to increased fleet congestion in productive fishing grounds. Using natural experiments in Norwegian fisheries that altered the accessibility of public catch data, this paper analyzes how information availability affects fishing profit, fishing efficiency, and fleet congestion, focusing specifically on Norwegian bottom trawlers—the largest vessels in groundfish fisheries that face particular scrutiny for their carbon emissions and seabed impacts. This paper examines key sustainability metrics including bycatch rates, fuel consumption, carbon emissions, and seabed disturbance. This research provides insights into the trade-offs inherent in data transparency policies, particularly in natural resource management where public sector data accessibility can drive private sector innovation while potentially affecting competitive dynamics.

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154

Estimating the Community Economic Impacts of Catch Shares

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Abstract: Catch shares are now a ubiquitous form of governance in US fisheries, with many well-documented benefits in terms of improving economic efficiency, slowing down the race to fish, improving fisher safety, and, potentially, reducing biological overfishing. On the other hand, catch shares may have important distributional effects that are not well-understood. Among these are the possibility of spillovers, both positive and negative, to employment and economic activity in fishing communities. To date, there has been very little empirical work to attempt to estimate these effects. We utilize a highly detailed spatial dataset on establishment level employment – the National Establishment Time Series (NETS) – to estimate the effects of multiple US catch share programs on the number of establishments and employment in both the fisheries sector and in other related sectors. In particular, our design utilizes a difference-in-differences design where communities identified by NOAA as dependent on a particular catch share fishery are considered 'treated' in comparison to multiple alternative definitions of 'untreated' control communities. We estimate treatment effects for each individual catch share program, making allowances that some communities will be treated multiple times by sequential catch share programs. We estimate effects for overall establishments and employment, fisheries specific outcomes, and particular fisheries-related sectors. Finally, we estimate heterogeneous effects by community to allow for the possibility that some communities may see positive treatment effects, while others may be affected negatively.

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Economics of Marine Debris & Ghost Gear Management
(Special Session)

Tuesday, March 25 (1:30 AM to 3:00 PM), Room A (Auditorium, Scripps Seaside Forum)

Brief Description:

Marine debris, as defined by the U.S. National Oceanic and Atmospheric Administration as any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment, has become a significant global concern. Ghost gear, in particular, is one of the most harmful types of debris found in our oceans and can be fatal to fish, marine mammals and other marine life, and also breaks down into other forms of pollution such as micro-plastics. It represents a navigational hazard to fish harvesters and reduces catch efficiency posing negative socio-economic impacts on the fishing industry and coastal communities.

In this broadly focused session we invite papers that explore economic aspects of marine debris such as the damages caused by plastics, micro-plastics, and derelict fishing gear, as well as papers that address the opportunities and challenges of assessing and reducing marine debris. We also invite papers that illuminate other aspects of marine debris such as plastic production processes, entry pathways, and other areas that will facilitate a more comprehensive understanding of marine debris as a local, regional, and global problem. Additionally, we invite papers on ghost gear management, such as studies on the effectiveness of the existing prevention and mitigation measures, the current gaps and challenges faced in addressing the ghost gear problem, lessons learned so far and recommendations on the development of potential management measures and options, such as cost recovery options, financing instruments for ghost gear initiatives, and measures to incentivize ghost gear life-cycle management.

31
A bio-economic model of ghost fishing with an application to the Norwegian snow crab fishery

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Abstract: Ghost fishing occurs when abandoned, lost, or discarded fishing gear---also known as ``ghost gear"---continues to catch and kill valued species. Previous studies of ghost fishing used field surveys or statistical analysis of harvest and retrieval effort data to estimate the effect of gear retrieval on fishery profitability. We developed a bio-economic model of a fishery that produces ghost gear, and we used the model to evaluate harvest management strategies and ghost fishing in the Norwegian snow crab fishery. The model combines a Beverton-Holt stock-recruitment function with profit-maximizing vessels operating in a derby fishery. We calibrated the model using biological parameters from previous studies, aggregate fishery statistics from recent stock assessments, and 2020 data on vessel-level harvest, days at sea, and operating costs. We then simulated counterfactual steady-state conditions, holding the 2020 fleet capacity fixed, under both quantity and price controls, with and without a ghost gear retrieval program. Our results suggest that the total allowable catch (TAC) in 2020 was below the optimal level but still would maintain double the rents of an unregulated fishery. We also found that an optimized TAC would perform nearly as well as an optimized harvest tax. Unlike previous studies in other fisheries, we found that the cost of the ghost gear retrieval program in the Norwegian snow crab fishery exceeds the additional resource rents it provides to harvesters. Finally, we assessed the robustness of our findings by identifying the parameter values under which the current ghost gear retrieval program would be efficient.

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58
The social costs of plastic pollution – derelict crab fishing gear in the Chesapeake Bay

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Abstract: Blue crab (Callinectes sapidus) is a commercially important species targeted throughout its native range along the US Atlantic and Gulf Coasts. In the Chesapeake Bay and surrounding areas, wire mesh traps are the dominant gear type used. Gear loss and abandonment are frequent and can cause economic damages, primarily due to bycatch mortality and reductions in active gear efficiency. Plastic coating is commonly used to extend the life of traps, which can exacerbate damages from derelict gear. Here we rely on prior work estimating the stock of derelict gear, economic damages, and potential abatement policies to develop an integrated assessment model. The social costs of plastic pollution in this context are estimated as arising due to incremental damages by extending the life of fishing gear. The integrated assessment model allows exploration of tradeoffs across alternative pollution control scenarios. This analysis highlights the potential heterogeneity in plastic pollution damages and their management, while also putting forth a modeling framework that can accommodate this variation.

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90
Canada’s Ghost Gear Management

Jingting Chang, Fisheries and Oceans Canada, Jingting.Chang@dfo-mpo.gc.ca

Abstract: As the co-chair of the special session titled “Economics of Marine Debris and Ghost Gear Management”, I am proposing to deliver a presentation on Canada's efforts in managing ghost gear and an overview of the Ghost Gear Fund. Specifically, this presentation will consist of approximately 5-10 slides, offering insights into Canada’s Ghost Gear Fund, allocations across the key pillars and regions, the newly developed Fishing Gear Reporting System, and the type and number of gear units that have been lost and retrieved to date. The objective of this presentation is to stimulate a conversation about the current and potential actions being undertaken in ghost gear management and explore global best practices, which in turn will inform policy analysts and regulators in the development of prevention and mitigation measures, as well as market-based management options. The insights and feedback gathered during this session will be instrumental in shaping strategies to address the global ghost gear issue.

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157

Can biodegradable fishing gear components be an economically viable solution to address ghost fishing ?

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Abstract: Abandoned, lost or otherwise discarded fishing gear (ALDFG) is estimated to account for at least ten percent of marine litter. This roughly translates to between 500,000 and 1 million tons of fishing gear abandoned in the ocean each year. Apart from the costs of plastic pollution, ALDFG poses other environmental threats such as damage to sensitive habitats and mortality to marine life that often includes endangered and threatened species through continuous “glost fishing.” While these damages can have high economic costs, the economic costs of retrieval, collection, recycling or other reuse of plastic fishing gear components and “safe disposal” can also be significant. This paper addresses the theoretical benefits, costs and barriers to addressing the ALDFG problem that draws upon research work the World Wildlife Fund (WWF-US) carried out to understand the economics of reuse and recycling of retired or lost fishing nets. Our paper also qualitatively analyzes whether substitution of biodegradable components could offer a solution by drawing on insights from studies WWF-US carried out on scaling use of biodegradable fish aggregating devices (bioFADs) in the industrial tuna purse seine sector. Due to the concerns about an estimated 107,000 traditional FADs being released annually by the tuna industry to aggregate schools of tuna, the industry, nongovernmental organizations and government agencies have invested time and resources into design and testing bioFADs, with promising results on technical effectiveness and voluntary use by some vessels.

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Right-based Management

Tuesday, March 25 (1:30 AM to 3:00 PM), Room B (Conference Room 155, Scripps Seaside Forum)

83
An experimental analysis of rent splitting after rationalization: cooperatives and processor-allocated quota

Abby Schamp, University of Washington, schampaskis@gmail.com

Abstract: Fisheries rationalization through individual harvest rights increases overall industry rents while also redistributing rents both between the harvesting and processing sectors and within the sectors. We analyze market share using a paid market behavioral experiment with undergraduate students acting as harvesters and processors. Participants played a set of games, including: total allowable catch, individual fishing quotas, rationalization with processor-centered cooperatives, rationalization with a one-pie processor-allocated quota model, and both cooperatives and processor-allocated quota. Fishing cooperatives and processor-allocated quota result in a lower ex-vessel price than individual fishing quotas alone, and transfer market rent from the processing to the harvesting sector. Higher-cost, vulnerable processors, gain additional market share from both fishing cooperatives and processor-allocated quota as compared to individual fishing quotas, though not as much market share as a total allowable catch. Protecting vulnerable processing plant market share and community jobs can be important for many higher-cost, rural communities, though such protections transfer rent from the harvesting to the processing sector, so understanding the comparable magnitude of such impacts can help inform managers.

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106
Evaluating quota ownership changes in a fishery with limited regulations on quota trading and ownership

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Abstract: Traditional fisheries management often incentivizes maximizing catch, leading to overcapacity, shortened seasons, and rent dissipation. In contrast, catch shares encourage profit maximization resulting in rent generation, longer seasons, and reduced capacity. Catch shares programs provide firms flexibility regarding when and how they harvest fish. Without having to compete in a 'race to fish' firms are, in theory, able to lower their costs through improved efficiency and increase revenue for their catch by improving product quality or selling into higher value markets, leading to rent generation which is capitalized in the value of quota share and collected through the leasing of quota allocation. While rent generation is a positive outcome for the fishery, socioeconomic concerns have been raised, often in the popular press, on whether fishermen or outsiders are capturing those rents. While a great deal of research has studied the effect of catch shares on fish prices, fishing costs and rent generation, research on who captures those rents is less common. This study examines quota ownership in catch share managed fisheries, namely the Gulf of Mexico Red Snapper and Grouper/Tilefish ITQ programs, to examine who is capturing rent and how it has changed since inception. These ITQ programs have limited regulations related to who can participate in quota markets, leading to non-fisher investors trading and owning quota. Our analysis will examine quota ownership across different groups (active fishermen, retired fishermen, and investors) since the programs were started in 2007 (red snapper) and 2010 (grouper-tilefish).

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121
Using Deemed Values to Increase Resiliency of Adaptive Management of Low-knowledge Bycatch Fisheries

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Abstract: New Zealand developed the concept of deemed values to simplify quota administration. This paper explores how deemed values can be integrated into adaptive management, particularly for low-knowledge bycatch fisheries. Although New Zealand does not explicitly use deemed values as part of an adaptive management approach, the experience in New Zealand does illustrate how deemed values could be part of an adaptive management system.

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135
Utilization of fishing gears within the Icelandic demersal ITQ system – A Case study

Hordur Saevaldsson, University of Akureyri, hordurs@unak.is

Abstract: The demersal fishing industry has been one of the major sources of export revenue for Iceland for centuries, currently producing 60-70% of seafood export value. Icelandic demersal fisheries increased considerably with stern trawlers in the 1970s. Within a few years their proportion of the total demersal catch surpassed 50%. The demersal fisheries peaked in the 1980s. The initial quotas were allocated in 1984, with quotas being partly transferable by authority of the Ministry of Fisheries. In 1990 a uniform system of ITQ covering almost all fisheries in Iceland was established, allowing the majority of ITQs to be almost freely transferable; a move which has motivated the consolidation of fishing rights. Since then, the number of vessels and companies has gradually decreased. Substantial change has as well been on fishing gear utilization in the demersal fisheries with the IQ system. From early 1990s the demersal catch has decreased by 35% in terms of quantity, remaining at around 450 thousand tons. Bottom trawl is still the optimal fishing gear in Icelandic water as vessels can target the demersal species year-round with the bottom trawl. With smaller quotas, the focus has shifted from catch quantity to value maximization of the catch which forces operators to shift fishing gears. The development is partly driven by market trends and consumers awareness and partly due to fishing gears restrictions to quota groups. In the presentation utilization of fishing gears from the 1984 demersal IQ system will be analysed with focus on policy implication.

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156

Disentangling Persistent and Transient Technical Inefficiency and Input Misallocation in the Quota-Regulated Norwegian Purse Seine Fishery.

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Abstract: The Norwegian purse seine fishery, targeting multiple species, operates under a rights-based management system and has developed into a highly profitable industry. Using a vessel-year panel dataset from the Norwegian Directorate of Fisheries (2001-2022, 163 vessels), this study examines whether this development aligns with resource optimization by analyzing input-oriented short-run (transient) and long-run (persistent) technical inefficiency, input misallocation, and the associated costs. We adopt a system-based modeling approach that integrates the production function with the first-order conditions for cost minimization. Additionally, by deriving the cost function within a multi-output separable production framework, we estimate the costs associated with technical inefficiency and input misallocation. Our findings indicate a high level of resource optimization, reflected by low transient and persistent technical inefficiency in the fleet. However, the persistent technical inefficiency varies among vessel subgroups, with the blue whiting vessel group exhibiting the highest inefficiency and the pelagic trawler group the lowest. We also observe that an increase in a vessel's annual quota holding capacity slightly reduces transient technical inefficiency. Moreover, input misallocation costs are substantial, primarily driven by underutilization of labor relative to material inputs. These findings suggest policy measures targeting persistent technical inefficiency reduction in the blue whiting vessel group and revisions to crew remuneration systems to incentivize labor employment more efficiently. Keywords: Technical inefficiency, Input misallocation, Quota Regulations, Cost Minimization, Input-Distance Function, Norwegian purse seine fishery

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Market Failures & Policy Objectives

Tuesday, March 25 (1:30 AM to 3:00 PM), Room C (Room 110, Vaughan Hall)

15
Stock-Generated Externalities: The Principle of Targeting and Foregone Environmental Benefits

Erica Chuang, UCSD, erchuang@ucsd.edu

Abstract: There are an emerging set of programs and policies aimed at internalizing the environmental benefits from privately-owned living natural resources. Under conventional wisdom, targeting either stocks or flows could have equivalent effects on externalities correction under appropriate transformations. However, this may not hold when externalities are generated from stocks that exhibit exogenous growth. I present a dynamic partial equilibrium model of renewable resource extraction to explore how different incentive targets may affect external benefits provision over time. I find that while stock-targeted policies that yield socially-optimal outcomes are feasible, flow targeting does not across time. Further, policies that target flows may yield levels of environmental benefits that are no different than business-as-usual (BAU) under certain assumptions. I further explore how time variation, signs and scale of the policies play a role in natural resource stock accumulation by calibrating the model using scientific parameters from the Chesapeake Bay, where private Eastern oyster (C. virginica) production produces water purification benefits. I find that the primary driver of firm biomass conservation is whether the policy is a subsidy or a tax conditional on target -- in the presence of environmental benefits provision, a subsidy on stocks or a tax on harvest both incentivize conservation. However, a tax does little to change firm behavior even at larger per unit values relative to a similarly scaled subsidy on stocks, which suggests that the costs of a flow-targeted policy may outweigh its potential benefits.

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16

Casting a wider net: Opening a conversation about the complexity of fisher behavior

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Abstract:.The study of human behaviour is increasingly recognized as relevant for policy development (e.g., Challenge 10 of the United Nations Decade of Ocean Science) because of its potential to provide insights into people's actions, or inactions, and the reasons behind them. However, fisher behaviour is complex and not well understood.

In this manuscript we advance the emergent field of fisher behaviour. We achieve this aim by first critically engaging with historically predominant approaches (i.e., *Fisher Economicus*) that have informed, and that sometimes continue to inform, fisheries and oceans policy. Then, we provide a suite of selected conceptual and empirical behavioural perspectives that have emerged to provide alternatives to understand fisher behaviour. These approaches stem from Critical Social Theory, Systems Approaches, Development Scholarship, and Institutional Scholarship.

Knowledge on fisher behaviour can be operationalized in policy to make instruments (e.g., regulations) more efficient, by increasing 'fit' between policy and the social and ecological context within which policy operates. Fisher behaviour knowledge can also make policy more equitable, by bringing recognition to the diverse range of factors that simultaneously determine fishers' choices.

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34

Lessons from an Impromptu National-scale Fishery Subsidy Reform in Mexico

Andrés Cisneros-Montemayor, Ocean Nexus, Simon Fraser University, a_cisneros@sfu.ca

Abstract: Mexico recently reoriented almost all capacity-enhancing subsidies into yearly cash transfers to fishers, with few bioeconomic rationalizations and no plans to monitor effects. We discuss early observed bioeconomic effects, which suggest declining effort and increasing catch per vessel. When effects of policy change are not observable, researchers should ask whether this is due to a lack of reliable data, to unconsidered mitigating factors that are offsetting expected effects, or because the original subsidy program was not having an effect in the first place. These reasons can have potentially quite different implications for subsequent policies, and this must be determined through context-specific research. Key opportunities for future research include collecting data disaggregated by social groups and critically examining each step of a policy cycle (goals, options, decisions, implementation, evaluation), always grounding research on specific contexts for different social groups and sectors.

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42

Exclusion and common pool resource management: Experimental evidence

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Abstract: This work presents the results of lab experiments designed to study the problem of managing harvests from a common pool resource (CPR) under the possibility of exclusion and poaching. The study is motivated by naturally occurring CPRs in Chile, where groups of local fishers can apply to the government for exclusive harvest rights to the benthic resources within a given geographic area. The endogenous evolution of these groups by excluding members may create a group of “insiders” and “outsiders” who may be incentivized to poach. We have four treatments that vary the possibility of ostracizing insiders, the possibility of encroaching, and deterrence. Each round includes two main stages. First stage: insiders make their withdrawal decisions simultaneously. Second stage: insiders vote for exclusion; each insider can vote to remove at most one insider from the group. We conducted our experiments in the lab with Chilean university students. A total of 288 students participated in the experiment. Our work has produced several new results: 1) Insiders could not coordinate their harvest in the absence of exclusion; 2) insiders voted to exclude; 3) ostracism was used to punish non-cooperators; consequently, group size reduced over time; 4) extractions were higher in the absence of the exclusion threat and also under uncontrolled poaching; 5) enforcement did reduce poaching, but did not eliminate it, and 6) welfare of the group of insiders was larger under the threat of ostracism without poaching or under enforcement to deter poaching.

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123

What drives sustainable fisheries? An empirical analysis using Fisheries Performance Indicators

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Abstract: Overexploitation of global fish stocks has increased from 18 to 38 percent during 1990-2021 (FAO, 2024). The traditional explanation is lack of well-defined property rights (Gordon, 1954; Ostrom, 1990). An implicit effect from these important contributions is a focus on either open-access or perfect property rights. However, in many countries, conditions are somewhere in between these two polar cases. Here we follow Copeland and Taylor's model (2009) where property rights are endogenous. They outline three major forces that determine fisheries management success. These are the extent of overcapacity in the resource sector, the level of enforcement power a government possess and the ability of the resource to generate competitive returns without being extinguished. We test this hypothesis empirically using independent assessments of relevant variables in fisheries around the world from the fisheries performance indicators (FPI) data base (Anderson et al., 2015) and additional relevant variables. Our focus is on the status of the fish stocks, which we evaluate against overcapacity, enforcement ability and species growth rate. In addition, we include controls for type of fisheries being artisanal, industrial or mixed, whether it focuses on demersal or pelagic species and its' level of rights-based management. Our results indicate that stock health improves with increasing enforcement capability, lack of excess capacity and the proportion of rights-based management. We also find that pelagic species are more well managed compared to demersal species, while the growth rate by species is not explaining the status of fish stocks for our sample.

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144

Towards cost-effective reductions of antibiotic use in salmon aquaculture

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Abstract: In recent years, many firms in Chile's salmon aquaculture industry have committed to reducing their use of antibiotics. While national data suggests substantial progress, achieving these targets is likely to be both challenging and expensive. The key driver of antibiotic use in the industry is Piscirickettsiosis, a bacterial infection that is believed to be transmissible over long distances and is currently the most important source of disease-related mortality on Chile's salmon farms. In this paper, we explore how the design of antibiotic-use restrictions is likely to impact the productivity of fish farms exposed to a communicable disease. We develop a stylized model of a salmon farm that responds to on-farm disease dynamics by applying treatment with temporary effectiveness. Further, we assume that pathogens are transmissible between individuals on the farm and between farms in a region, such that the disease management choices of one farm impact its neighbors. We solve the model as a finite-horizon, deterministic optimal control problem and simulate a selection of restrictions that are parameterized to achieve a targeted reduction level. Our model suggests that the optimal treatment strategy is a function of both on-farm disease dynamics and ambient disease levels. However, in many scenarios, a reduction in ambient disease pressure does little to reduce optimal antibiotic-use.

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Elicitation Framework & Primary Data Collection in Fisheries & Aquaculture

Wednesday, March 26 (9:00 AM to 10:30 AM), Room A (Auditorium, Scripps Seaside Forum)

73

Consumer Perceptions of Hemp-Fed Aquaculture

Brandon McFadden, University of Arkansas, mcfadden@uark.edu

Abstract: Hemp can potentially provide a cost-effective and nutritious feed ingredient for aquaculture while also meeting the requirements for the final product to carry a “High Omega” claim. However, whether consumers would accept hemp-fed fish when purchasing food at retailers is unclear. Global demand for seafood has increased significantly in recent decades and is projected to continue rising. Aquaculture production has increased in the U.S. and globally to meet this demand; however, increased production further strains natural populations of pelagic species used to make fishmeal and fish oil into feedstocks, raising production costs and introducing safety concerns associated with fish consumption. This study aimed to determine the level of consumer acceptance for hemp-fed fish and whether acceptance varied by the type of hemp used as feed (i.e., hemp hearts versus spent biomass). Data were collected from 2,398 U.S. consumers via a web-based survey. Consumers were randomized to one of three groups to complete a discrete choice experiment and prompted to select from salmon products varying in feed type, omega-3 concentration, and price. Results from the random parameter logistic regression model confirmed that respondents showed a positive preference for both hemp feed and high omega concentration. However, the positive effect on the omega attribute was significantly larger than that of the hemp-fed attribute, suggesting that the omega concentration was a more impactful driver of consumer preferences. Hurdle models were also estimated to determine the characteristics of consumers more accepting of hemp-fed fish.

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53

Addressing Labor Demand and Production Efficiency in Shellfish Aquaculture

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Abstract: The bivalve shellfish aquaculture industry has rapidly developed over the last two decades, becoming influential to the economies of several rural US coastal communities. Shellfish aquaculture has a high potential to fulfill global food demands because it is a sustainable practice that generates nutrient dense product. However, the expansion of shellfish aquaculture is limited by labor constraints –including labor shortages, high labor costs, and variable working conditions across farms. Hard clam (Mercenaria mercenaria) and Eastern oyster (Crassostrea virginica) aquaculture has high labor requirements due to biofouling control, gear maintenance and cleaning, and splitting and grading product. Data on labor demands for various shellfish production processes and culture methods are limited. This research measures labor demands in Virginia and Florida shellfish aquaculture to assess production efficiencies, evaluate potential technological substitutions, and determine optimal workforce development. Biweekly surveys will be implemented to document labor demands, harvest practices, workforce management, and day-to-day challenges of shellfish farmers. Interviews will be conducted to evaluate views on labor availability, job satisfaction, stressors on productivity, technological substitutions, and industry growth among commercial shellfish employers and employees. Current data processing includes a comparison of factors affecting labor demands, transcribing completed employer and employee interviews, and beginning to identify key themes among the data provided from the biweekly surveys and the interviews. A technoeconomic production model will be refined from the results. By improving our understanding of labor constraints in shellfish aquaculture, expansion can proceed while facilitating economic development and improving sustainability in the sector.

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88

Overconfidence and Angler Behavior

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Abstract: This study explores recreational anglers' behavior using data from discrete choice experiments conducted during the 2018 Sport Fishing Surveys on the U.S. West Coast. The survey incorporates probabilistic outcomes for the catch of the target species. We specify both linear and non-linear preferences and estimate conditional and rank-ordered logit models to analyze anglers' utility rankings for choice alternatives across three fisheries: salmon, tuna, and bottom fish. The estimated results align with existing literature, and anglers exhibit risk-averse attitudes toward stochastic variations in catch outcomes. Recognizing the possible influence of overconfidence on angler behaviors, we incorporate rank-dependent weighting functions and uncover an inverse S-shaped probability weighting function. This suggests, as has been uncovered in other domains like finance, that individuals systematically overestimate small tail probabilities such as those of favorable catch outcomes, reflecting anglers' tendency for overconfidence. There is significant heterogeneity in these biases: older anglers display higher levels of overconfidence compared to younger anglers, and anglers who engage in only one or two types of fisheries exhibit greater overconfidence than those involved in all three types of trips. More specialized anglers seem to assume that their skills are transferable to other fisheries. Our results highlight the need to consider anglers' cognitive biases in survey design and recreational fishery management.

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132

Understanding Barriers to Participation in Recreational Harvest Incentive Programs for Invasive Species Control

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Abstract: Invasive species pose a growing challenge for managers of public land and water, often requiring costly control measures to protect local ecosystems. Recreational Harvest Incentives (RHIs) are one of the tools resource managers can use to control invasive species. RHIs are a type of “green subsidy” where resource managers pay recreational hunters or anglers a reward for harvesting additional invasive specimens and thus privately providing the public good of invasive species control. Existing literature on RHIs has primarily focused on ex post program evaluations, summarizing participation trends, and using bioeconomic models to simulate prospective or observed relationships between reward payments and removals. We are not aware of any studies that examine ex ante barriers to participation in these RHIs. This study fills this gap by using stated preference data from a survey of anglers who have fished in the northern Arizona Lees Ferry fishery from the inception of the Lees Ferry Brown Trout Incentivized Harvest Program (November 2020) through the end of 2023. Some, but not all, survey respondents have participated in the Lees Ferry RHI. We examine how factors such as angler identities, beliefs about non-native species management, and experience at Lees Ferry influence willingness to accept payment for retaining invasive brown trout. The findings will provide valuable insights into which angler groups or fisheries are well-suited for RHI programs and help identify addressable barriers to participation. This information is crucial for resource managers seeking to optimize program participation and minimize implementation costs while effectively managing invasive species.

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134

Fishing for Solutions: Compensation for Bycatch Reduction in the Gulf of Mexico Shrimp Fishery

Daniel Harris, Louisiana State University, brdwh22@gmail.com

Abstract: Bycatch, unintentionally caught non-target species, harms the profitability of commercial fishing operations and leads to death and injury of hundreds of thousands of marine animals per year, including charismatic megafauna like birds, dolphins, and turtles. In the Gulf of Mexico, commercial shrimpers are required to use a bycatch reduction device (BRD). Better BRDs are being tested to further reduce bycatch. Because their use will not be mandatory, it is important to measure shrimper willingness to voluntarily adopt this conservation technology to predict potential fleet participation. This study uses contingent valuation to elicit commercial shrimpers' willingness to accept compensation for using these new devices. We employ an incentivized payment card elicitation framed as a modified Becker-DeGroot-Marschak auction of federally permitted commercial shrimpers in the Gulf of Mexico to estimate compensation required to adopt new BRDs and the main drivers or barriers to adoption. Based on 108 responses collected in early summer, we find that shrimpers require a minimum payment of $263-282 per day to pull the device. This work also provides a detailed analysis of a diffuse industry that is important to the Gulf Coast and has implications for ensuring bycatch reduction goals are efficiently met in the Gulf of Mexico. Ultimately, our results will be used by the NOAA Restoration Center to inform program and payment design once the new BRDs are approved.

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Seafood Labeling & Consumer Preferences

Wednesday, March 26 (9:00 AM to 10:30 AM), Room B (Conference Room 155, Scripps Seaside Forum)

85
Moving toward more environmental and ethical motivations: food choices and the role of generations.

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Abstract: The FAPs sector faces environmental, health and social challenges. Labels have been developed to promote sustainability and enable consumers to take these dimensions into account. However, research shows that consumer preferences for labelled products vary according to age. In 2023, a survey of 2,000 French consumers was conducted to gather information on their perceptions, preferences and knowledge of FAPs. Participants were asked to choose their preferred label from among Ecolabel, animal welfare, no health risks, French origin and no label. The survey revealed generational differences in perceptions, preferences and knowledge of FAPs. We used a multinomial model to examine the ranking and determine whether the factors influencing label ranking, such as level of knowledge, consumption habits and perception of FAPs, are similar across generations. French origin remains the most preferred label across all generations. However, the second most preferred option tends to be the animal welfare or eco label for the youngest, while the health risk-free label is clearly preferred by the oldest. Preliminary results suggest that the value of universalism has a negative effect on the likelihood of the youngest participants choosing the French origin label, while it has a positive effect on the likelihood of the oldest participants choosing the animal welfare label. A preference for artisanal fishing increases the likelihood of the youngest choosing any label, while it only affects the oldest for the French origin label. Knowledge of existing labels increases the likelihood of choosing each label option for all generations.

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108

Association between MSC certified products and economic performance of the EU seafood processing industries: A country-level investigation

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Abstract: Public concerns about maintaining healthy oceans and fish populations drive demand for eco-labelled seafood products, with retailers and food services playing a key role. The Marine Stewardship Council (MSC) is a leading global organization setting standards for sustainable fishing and traceability. Certification programs rely on effectively transmitting consumer demand for sustainability benefits to supply chain actors through coordinated markets. While previous studies have explored price premiums in retail or fishery markets, less attention has been given to how environmental certification impacts the economic performance of seafood processors and other supply chain actors. This study examines the relationship between the value of MSC-certified products and three economic performance indicators—gross value added (GVA), operating profit, and return on investment—within EU seafood processing industries from 2009 to 2021. Using annual country-level socio-economic data and turnover per tonne of four MSC product categories (chilled, frozen, preserved and canned, and retail food products), the analysis suggests that the value of preserved and canned MSC products is positively associated with operating profit in both the short and long term. These findings highlight economic incentives for the preserved and canned seafood industry to invest in ecolabelling while reducing environmental impacts during manufacturing. The results offer valuable insights for market strategists and industry professionals, enabling them to better communicate the economic benefits of sustainable seafood to coastal communities and stakeholders across the value chain. This alignment of competitive and supply chain strategies underscores the potential of ecolabelling to enhance both climate change mitigation and economic outcomes.

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120

Enhancing Willingness to Pay for Carbon Footprint Labels: Evidence from a Real Choice Experiment

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Abstract: Reducing CO2 emissions is a critical global challenge, and displaying carbon footprint (CFP) information on products is a promising approach. CFP quantifies the total greenhouse gas emissions, expressed in CO2 equivalents, produced throughout a product's life cycle. Providing this information empowers consumers to make environmentally conscious decisions and prioritize products with lower emissions. This study evaluates marginal willingness to pay (MWTP) for CFP labels using a real-choice experiment. The experiment, conducted from March 7 to 9, 2024, at the University of Tokyo's Faculty of Agriculture, involved 233 participants. The product was packaged sea bream sashimi with CFP values (1.0 kg-CO2/pack). Product attributes included price, expiration date, and the presence or absence of Aquaculture Stewardship Council (ASC) and CFP labels.Participants completed 24 choice tasks, choosing between two products or none, with one task randomly selected to determine their actual purchase. They were divided into six groups: (1) Control, (2) No-payment, (3) Inconspicuous pen use, (4) Smiley-face nudge, (5) Norm treatment, and (6) Web search for CFP information. Preliminary results show that the control group's MWTP was 67 yen and statistically significant. The highest MWTP was in Group 2 at 110 yen, indicating hypothetical bias. Group 4 ranked second at 102 yen, demonstrating the effectiveness of the smiley-face nudge. Group 3 had the lowest MWTP at 37 yen, possibly due to reduced social pressure from inconspicuous pen use. These findings suggest that strategies such as nudges and visible cues can effectively promote CFP labels and encourage eco-friendly purchasing.

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137
Sustainable seafood consumption: A hedonic analysis of eco-labeling in the U.S. market

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Abstract: Ecolabels are an attribute that provides important information to consumers about the sustainability of the production process, contributing to reducing the information gap between consumers and producers. Although the price premiums for ecolabels in the seafood market are well-studied in Europe, this is not the case for the U.S. an important market in the global seafood markets, despite the concerns concerning environmental sustainability. In this article we explored the price premium for sustainable labeling in the seafood market in the United States, using the NielsenIQ Consumer Panel data from the 2010-2020 period, we extracted the price of the seafood products, as well as their attributes and we connected this dataset with the ecolabel of the Marine Stewardship Council (MSC) obtained from the MSC. We worked with cod, haddock, and tuna data, and we tested the ecolabel variable using a hedonic prices approach and some spatial models. Our results show that households pay a premium for seafood with a sustainable label, as well as a number of attributes, such as brands and product form.

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99
A Random Coefficients Model of Seafood Demand: Implications for Consumer Preferences and Substitution Patterns

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Abstract: Discrete choice models of demand are growing in popularity for understanding markets for seafood, but have thus far been limited to applications using individual-level choice data. The random coefficients logit model is a discrete choice demand model designed for aggregate sales data and imparts a number of theoretical and empirical advantages. Instrumental variables account for price endogeneity, which can arise when there are unobserved product characteristics. Furthermore, correlated preferences can be accommodated in the random coefficients as well as through demographic interactions, which is especially important for seafood where product characteristics are primarily qualitative. We estimate this model for salmon fillets using four years of county-level seafood sales in California, and demonstrate the insights that can be drawn regarding consumer preferences and substitution patterns. Although the model is computationally burdensome, it offers considerable potential for further seafood demand analysis.

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Policy Intervention & Outcomes

Wednesday, March 26 (9:00 AM to 10:30 AM), Room C (Room 110, Vaughan Hall)

56

System dynamics modelling of CO2 emissions of trawl fishery

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Abstract: Bottom trawling is highly reliant on fossil fuel combustion due to the energy demands of towing heavy nets across the seabed and long-distance steaming. Consequently, it significantly contributes to greenhouse gas emissions and global warming. The volume of CO2 emissions released is influenced by fishers' harvesting behaviors, shaped by the bioeconomic conditions of the fishery, including fish availability at various locations, distances to home ports, market dynamics, fishing quotas, and regulatory frameworks. In response to increasing concerns over climate change, regulators have proposed fuel taxation as a mitigation strategy. This policy is expected to drive trawlers to adopt new fishing strategies to maintain maximum expected profits while operating under quota management constraints. To explore this dynamic, we developed a system dynamics model to examine how fuel taxation impacts the profit-maximizing harvest patterns of the Norwegian cod trawl fleet. Specifically, we investigate how decisions regarding when, where, and how much cod to fish per trip are influenced by such taxation. Our analysis utilizes haul-by-haul fishing data from 32 Norwegian cod trawlers, spanning the period 2011–2023. Additionally, we assess the effectiveness of fuel taxation in reducing CO2 emissions from the trawl fleet. The findings provide valuable insights into the interplay between regulatory measures and fishers' behavior, with detailed discussions on relevant policy implications.

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63
An empirical evaluation of production quotas in a strategic location and entry setting

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Abstract: Farmed aquatic products are projected to become the primary fish source by 2030. As aquaculture production has grown, more attention has been paid to its negative impact. Several studies summarize salmon aquaculture's negative impacts in salmon aquaculture, but the literature has little research on instruments to regulate this economic activity. Salmon aquaculture in Chile has three externality sources that make it difficult to establish an efficient policy to reduce its impact: spatially differentiated pollution, endogenous location, and an endogenous number of firms. This paper empirically evaluates the economic efficiency of the current zoning rule and production standards affecting Chilean salmon aquaculture. Here, the economic efficiency of regulations is understood as the property of maximizing the total welfare coming from the industry.

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70
Economic and Social features of the elasmobranch gillnet fishery in northern Peru. Is it still profitable?

Francisco Cordova-Zavaleta, CICIMAR-IPN, francisco1454@gmail.com

Abstract: Sharks and batoids are targeted by artisanal gillnet fisheries in northern Peru as they are part of their gastronomy and cultural heritage. In recent years this fishery is facing challenges due to strengthening of fishing regulations. Annual reproductive closures and Total Allowance Catch for hammerhead (Sphyrna zygaena), banning for Mobulids, and ordinance measures for shark fishery are some of the latest regulations fishers were forced to adopt in order to contribute to the management of these resources. Nevertheless, national efforts affect fishermen in their daily activities and the subsequent rentability of their activity. Based on field work and questionary surveys made between 2015 and 2024, fishers declared changes on their captures and a reduction on their benefits due to fishing. In addition, they mentioned that sale pricing has decreased around 20% when trading captures at major markets, attributable to current ordinances and national inflation. One of the concerns we found is that the fishing effort that were exerted upon hammerheads have been reassigned to other species such as blue sharks (Prionace glauca) and eagle rays (Myliobatis spp.), species with low sale prices. Consequently, we found that fishers are forced to either capture higher quantities of alternative species, changing fishing gears or move to other fishery to compensate economical losses derived by ordinance restrictios. This is crucial as it represents not only a risk on populations (main and alternative) but also in a disbalance on the marine ecosystem. Therefore, this study aims to comphehend how fishing communiting react when governance actions take place.

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130

What drives intertemporal changes in energy efficiencies of fishing vessel operations in Norway? An index number approach

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Abstract: While the Norwegian government requests clean fishing vessel operations, the inherent heterogeneity of the Norwegian fishing industry presents significant challenges to decarbonization. Diversity arises from technology choice, inequality in regulation, energy use and abatement costs for different species, vessel, and gear types. Addressing these challenges requires a nuanced and tailored approach that accounts for the industry's structural complexities while promoting equitable and effective pathways toward decarbonization. To provide decision support on green enablers and interventions, this paper offers a novel investigation into the historical trends and drivers of intertemporal changes in the energy efficiencies of the Norwegian fishing industry and its associated vessel groups. Using production theory, an index number approach is proposed to decompose intertemporal changes in energy efficiencies. The methodology is implemented using Convex Nonparametric Least Squares on data from the Norwegian Directorate of Fisheries. The results show that coastal shrimp vessels exhibit an inferior energy efficiency development compared to other vessel groups, thereby significantly affecting energy efficiency change at the industry level. Capital deepening is the key enabler of productivity growth, while technical and efficiency changes are moderate in most vessel groups. Hence, while structural changes have positively impacted energy efficiency in the intermediate term, long run improvement of energy efficiency is unlikely.

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102

A hundred years of Pacific halibut management in the context of global events and trends in fisheries management

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Abstract: The Convention for the Preservation of the Halibut Fisheries of the Northern Pacific Ocean, signed between Canada and the United States of America on 2 March 1923 and ratified on 21 October 1924, established the International Fisheries Commission, renamed in 1953 to the International Pacific Halibut Commission (IPHC). It was the first international agreement for joint management of a marine fishery resource and a major milestone for development of modern standards for marine conservation. The IPHC's centennial year is an opportunity to celebrate a remarkable history of the Commission, but also reflect on challenges that shaped its mission. Born from alarms about overfishing during World War I, the Commission gradually gained authority to implement a wide range of conservation measures through established public confidence in its basis for decisions. This paper explores the evolution of management measures applied to Pacific halibut commercial fishing shaped not only by the changing stock conditions and growing demand for seafood, but also global events and trends in fisheries management. It examines the impact of rapid commercialization of fisheries driven by population growth and technological improvements, establishment of exclusive economic zones and altered access to fishing grounds, and adoption of Agenda 21, which highlighted the importance of balancing environmental, economic, and social aspects in fisheries management. It concludes by discussing the lessons learned over the past century and their implications for future fisheries management, emphasizing the importance of international cooperation, adaptive strategies, and science-based policies in sustaining transboundary fish stocks like the Pacific halibut.

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54

Introducing uncertainty into the Input-Output model for Pacific Coast Fisheries

Andrew Scheld, Virginia Institute of Marine Science, William & Mary, scheld@vims.edu

Abstract: Economic contributions are commonly considered benchmarks used in fisheries management, policy development, and public communication. Often, these estimates are produced from Leontief input-output models, which are typically deterministic. Contribution estimates are thus provided as point values, lacking measures of uncertainty arising due to variability in cost structures, production amounts and flows. In this analysis, we use a Monte Carlo approach to explore the effects of introducing uncertainty in production costs on estimates from the Input-Output model for Pacific Coast Fisheries (IOPAC). A variety of distributions potentially characterizing costs are explored and hypothesis testing for output, income, and employment impacts is considered.

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Integrating Social Science into Fisheries Management
(Special Session)

Wednesday, March 26 (11:00 AM to 12:00 AM), Room A (Auditorium, Scripps Seaside Forum)

Brief Description:

While it is widely recognized that robust economic and social analyses can improve fisheries management, the actual integration of social science information into the decision-making process remains limited. This session invites social scientists to share research and analyses that have informed fisheries management, including but not limited to: bio-economic modeling, statistical analyses that measure values and perceptions, human dimensions research, and ecosystem and socioeconomic profiles.

59

Implementing Social Science Methods for Fisheries Decision-Making: The Case of New England in the U.S.

Hirotsugu Uchida, University of Rhode Island, huchida@uri.edu

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Abstract: Adoption of social science data and methods in fisheries management is increasingly critical in light of renewed focus on socioeconomic dimensions including clarifying fishery management goals and risk tolerance; increased calls at the local, regional and national level to enhance consideration of equity and environmental justice in fisheries management; potential revisions of the Magnuson–Stevens Fishery Conservation and Management Act's National Standards; ongoing climate and industry shifts; and other developments. The CINAR-funded workshop, "Implementing Social Science Methods for Fisheries Decision-Making," was held May 2024 in Woods Hole, MA to explore barriers to the use of social science in fisheries management decision processes and consider approaches to overcome these barriers. Building on previous efforts, this workshop focused on identifying: (1) specific barriers; (2) particular nuances of the New England region; and (3) concrete steps to operationalize solutions. Workshop participants with advisory roles in the fisheries management process discussed challenges related to data infrastructures, data formats, understanding, communication, multi-objective management, and process/institutions. The discussions and ideas presented are summarized into three non-mutually exclusive approaches: (1) enhance the use of social science in existing tasks, processes, and working groups within and beyond Scientific and Statistical Committee (SSC); (2) establish a SSC subgroup dedicated to developing social science advice for management; and (3) build a more connected social science ecosystem. Our initial conclusion is that all of these approaches merit further exploration and, together, would go a long way toward advancing the role of social science in fisheries decision-making in New England.

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74
Recreational Fisheries Decision Support Tool: A management tool built with Fisheries Managers

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Abstract: Predicting the impact of proposed recreational fishing regulations on harvest and catch is a critical element of many fisheries management plans in the United States. Doing so remains challenging and current methods typically fail to account for shifts in fishing effort that occur as new regulations alter the economic incentives faced by anglers. In 2022, a bio-economic model that accounts for angler effort responses was adopted by the Mid-Atlantic Fisheries Management Council for use in setting regulations for summer flounder, black sea bass, and scup. The model incorporates historical recreational catch data, projected population-at-length data, and information about angler preferences to predict harvest under proposed regulations. The model also provides estimates of economic values of proposed regulations, allowing managers to consider both biological and socioeconomic objectives of fisheries management. To make the model more accessible to fishery managers, the Northeast Fisheries Science Center developed an R shiny application that allows users to run the model and gather output data in familiar formats. As this decision support tool is the first of its kind, it was developed in close consultation with fishery managers themselves. In this talk, I briefly describe the bio-economic model and the development of the decision support tool R shiny app, including challenges to implementation and the expansion of last year's version. I also discuss our approach to garner support and work collaboratively with managers in the face of this new approach to fisheries management.

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95

High Costs and Low Trust: Insights from Qualitative Commercial Fishing Cost Data in the Northeast U.S.

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Abstract: In fisheries management, socioeconomic data are often underutilized, despite their role in federal mandates and national policies. Using mixed-methods in socioeconomic assessments can offer a more holistic understanding of complex systems, including fisheries. In particular, qualitative data analysis can provide valuable insights that are often overlooked, such as a deeper understanding of social dynamics and stakeholder perceptions. This research conducts qualitative analysis on a primary data collection effort in the Northeast United States: The Greater Atlantic Region Commercial Fishing Business Cost Survey. The main goal of the Cost Survey is to track economic trends and help inform fisheries managers of the economic impacts of policy decisions on fishing communities. Reaching this goal has traditionally been achieved through using quantitative data analysis, however qualitative data are also collected in the survey and can be used to contextualize our understanding of perceived and realized financial barriers facing fishing fleets over time. This analysis focuses on how commercial harvesters perceive costs, how economic hardships have persisted and evolved over the course of the survey's lifespan, and what influences low survey response rates. An in-depth evaluation of factors that have contributed to a lack of trust between harvesters and scientists in this region are also highlighted, along with potential pathways forward to bolster the effectiveness of fisheries policy and in reaching national policy initiatives. This research works to build a foundation of rich qualitative findings which can be used to close knowledge gaps and enhance relationships between managers, researchers, and fishing industry.

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161

Water Supply, Habitat, and Agricultural Production: Integrating Economics into Fishery Habitat Evaluation Processes

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Abstract: In this study we describe an agriculture production model for use in ecological-economic simulations of the effects of alternative habitat policies on fish productivity. Surface water can be allocated to irrigation for crop production or to instream flow for juvenile fish habitat. We estimate the effect of irrigation water deliveries on crop production in California's Sacramento Valley. We estimate region-scale acreage response models for multiple crops, including rice and nut orchards, as functions of surface water supply, input prices, and crop prices. Our results indicate that harvested acreage is inelastic with respect to surface water supply for all crops. Rice acreage is the most sensitive to water supply (Elasticity = 0.8, 1 AF reduction in water supply implies reduction of 0.2 acres of rice) and there is no relationship between nut acreage and surface water supply. We further evaluate the models predictive accuracy to validate its use in simulations. Finally, we discuss how the agricultural production model integrates with fishery life cycle models and the importance of integrating models across disciplines when evaluating policy tradeoffs in protected species and fishery management.

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Bioeconomics I

Wednesday, March 26 (11:00 AM to 12:00 AM), Room B (Conference Room 155, Scripps Seaside Forum)

23
Bioeconomics of a regime shift by invasive epibiont species affecting a bivalve small-scale fishery

Fernando Aranceta-Garza, Centro de Investigaciones Biológicas del Noroeste, faranceta@cibnor.mx

Abstract: The ecosystem regime shift caused by invasive species decreases the carrying capacity of commercial species, where fishing effort modifications will have no considerable effect. Few studies have addressed this problem since more frequent causes of regime shifts are driven by climate, fishing, disease, and pollution. This study examines the changes in the fishing regime caused by a tunicate epibiont invasion over a small-scale fishery of the pen shell Atrina maura analyzed by a bioeconomic spatial model. The results estimated a tunicate mortality vector that collapsed 80% of the population with a stabilization period at 40% of the initial biomass. An exploitation rate of 10% enabled sustainable exploitation (~2.5 scallop tons per year) and a positive present value of resource rent (PV = USD679,000), although at lower levels. However, dynamic projections of the operational bioeconomic model showed negative trends in these two performance variables (-11% and -37% respectively) related to the tunicate effect. Conversely, decreasing the tunicate mortality vector could result in short-term resource recovery, where future rebuilding strategies must consider invasive species control and density-dependent harvest strategies to minimize its effect. This study may contribute to a better understanding of a regimen shift by invasive species over sedentary fishing resources.

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27

Identification of resource extraction technologies when the resource stock is unobservable

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Abstract: This paper consistently estimates key structural properties of a multiple-species fishing technology. We overcome two ubiquitous features of fisheries data generating processes that invalidate classical estimation: unobservability by the researcher but partial observability of the fish stock by fishermen and endogenous production decisions that vary with fishermen's private knowledge of true stock abundance. Our identification strategy exploits timing and available information when production decision are made, technological constraints, and natural, exogenous variability of fish stock abundance. Consistency in estimation obtains under reasonable assumptions for fisheries data generating processes. An application to the U.S. Gulf of Mexico commercial reef fish fishery is presented to demonstrate our approach and reveal substantial bias under estimators that ignore the problem of omitted stock abundance. Implications for improved fisheries management are discussed.

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29

Environmental Federalism in Recreational Fisheries Management: A Bioeconomic Approach

Chris Hachtman, Duke University, Nicholas School of the Environment, chris.hachtman@gmail.com

Abstract: Recreational fishing is an important cultural and economic activity. Yet it can disproportionately impact certain fish stocks (Coleman, et al., 2004), and U.S. federalist recreational fisheries management (RFM) poses challenges. While states manage recreational fishing effort within their borders, heterogeneous management objectives can produce stock externalities that cross jurisdictional lines. And despite substantial literature on spatial-dynamic bioeconomic problems and some covering recreational fisheries bioeconomics, the structure of recreational fisheries under federalist management remains undescribed. Here we introduce a bioeconomic structural model of a private angler recreational fishery managed by a federalist system. We apply optimal control theory to explain the transitional and steady-state dynamics. Since licensure primarily dictates access to most U.S. recreational fisheries, we utilize license prices as the system's control variables and model biological stock and angler effort as state variables. In a stylized one-state scenario, we find that state managers are incentivized to maintain fish stocks below the maximum sustainable yield and, under specific parameterizations, drive the stock to extinction. Preliminary results indicate regulators are incentivized to escalate nonresident fishing license prices to exclude all but the most willing-to-pay nonresident anglers in a cooperative two-state model. We also plan to analyze a non-cooperative game-theoretic model and compare our results to historical license price data, including select case examples. By providing ex-ante predictions of angler behavior and stock externalities, our federalist RFM model offers valuable context for evaluating the potential merits and costs of proposed RFM innovations.

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Price Dynamics

Wednesday, March 26 (11:00 AM to 12:00 AM), Room C (Room 110, Vaughan Hall)

100

Impact of Sea Surface Temperature on Individual Fish Species Prices

Elanur Ural, Cooperative Institute of Marine & Atmospheric Research (CIMAR), University of Hawaii, Elanur.Ural@noaa.gov

Abstract: We conduct a price determinants analysis for individual species to examine differences across landing prices in Honolulu, one of the top ten ports in the United States in terms of revenue landed. This paper explores how fluctuation in market conditions and oceanic conditions in which fish are caught impact heterogeneity in willingness to pay for fish. Market conditions include landings and imports, while oceanic conditions include sea surface temperature over time and geographic location. The study could be used to predict its impact of market and oceanic conditions on final auction price across species at the Honolulu Fish Auction. We integrate Coral Reef Watch environmental data with spatially explicit NOAA logbook and dealer data from the Honolulu Fish Auction. Our findings will reveal how environmental factors, driven in part by climate change, shape market dynamics and economic behavior.

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124

The Price of Coordination: Evaluating Welfare Effects of Landing Timing in Offshore Longline Fishery

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Abstract: The ex-vessel price of fish is highly volatile, influenced by factors such as species and local market conditions, as well as the amount and timing of landings. Fishers are incentivized to land their catch ahead of others to secure higher average ex-vessel prices. This behavior creates a "race-for-landing," akin to the race-for-fish, which can oversaturate the market. While buyers benefit from lower prices in such scenarios, fishers' profits and overall welfare often suffer. One potential solution is a "cartel" arrangement, where fishers coordinate their landing timings to stabilize ex-vessel prices. This study investigates the impacts of such coordination by analyzing ex-vessel market data and operational records from Japan's longline offshore fishery sector, focusing on a case of coordination agreements among fishers. Evidence of price "mark-up" was observed in the output market as vessels aligned their landing schedules. Using a structural auction model to evaluate the welfare effects on buyers, the findings indicate that the rent-sharing between fishers and buyers remained largely unchanged before and after the implementation of coordination agreements.

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125

Tailoring retail food price forecasts to specific markets: lessons from U.S. seafood

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Abstract: In the United States, retail food price forecasts inform expectations and budgeting for stakeholders, including Federal nutritional assistance programs, consumer groups, and industry. Despite the importance of seafood in American diets and recent calls to integrate seafood in analyses of food systems, government forecasts of retail seafood prices remain limited. Furthermore, rapidly changing environmental conditions and international trade patterns present risks to many seafood supply chains. These supply-side price determinants differ from those faced by other retail food products, which warrants further investigation of fish price determinants and patterns to improve forecasts. In this paper, we focus on the United States Department of Agriculture's (USDA) "fish and seafood" price forecast. Following USDA's current practices, we use a time series seasonal autoregressive integrated moving average (SARIMA) modeling approach with model selection to determine how seafood forecasts can be improved using more refined retail price series. We find substantial reductions in expected SARIMA forecast error of up to 51% and 31% as measured by mean absolute error when disaggregating by product form and species, respectively, suggesting that the aggregate "fish and seafood" forecast does not appropriately proxy for more refined product prices. We then allow for the inclusion of exogenous price determinants in a SARIMAX model framework and compare forecast performance to the SARIMA approach for different types of seafood. Preliminary results suggest that models that minimize information loss include exogenous price determinants, that the selected covariates differ by species and product form, and that a SARIMAX approach can reduce forecast error.

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107

Catch method, quality and price formation in the Japanese swordfish fishery

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Abstract: Understanding the drivers of value in seafood markets is essential for fisheries managers and stakeholders seeking to balance economic returns with sustainability. This research utilizes a unique dataset of swordfish (Xiphias gladius) sold at auctions in Japan to investigate the role of catch method as a causal mechanism influencing ex-vessel prices through its indirect effect on fish quality characteristics. We leverage our dataset to isolate the effects of catch methods on price while accounting for additional variables such as freshness, fattiness, fish size, auction size, and shark damage. We are able to rule out the role of storage systems or vessel-specific handling characteristics as the primary drivers of fish quality at auction. Our findings reveal that catch methods influence prices indirectly through their direct impact on fish quality characteristics. Additionally, this research highlights the potential benefits of implementing auctions in fisheries with diverse catch methods. By enabling price-quality arbitrage, auctions can reward fishers utilizing methods that deliver higher quality fish, potentially improving their income. These results may offer valuable insights for policymakers and industry stakeholders seeking to enhance the economic value generated from managed fisheries.

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Network Analysis in Fisheries Economics

Wednesday, March 26 3:00 AM to 4:00 AM), Room A (Auditorium, Scripps Seaside Forum)

12
Analysis of the governance structure of artisanal shrimp fisheries in the southeastern Gulf of California.

Lorena Haber Feria, Interdisciplinary Center of Marine Sciences from the National Polytechnic Institute, haberferia@gmail.com

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Abstract: In Mexico, the sustainable management of shrimp fisheries continues to represent a challenge for decision makers influenced by the complex relationships among the actors involved. This study aims to model the relational structure of actors in the governance network of artisanal shrimp fisheries in the southeastern Gulf of California. From January to March 2020, key informant interviews were conducted to collect data in two zones, north-central and southern, based in Culiacán and Nayarit, respectively. With the information collected, network models were constructed to represent the interactions between the actors involved, which allowed us to study the role of the actors and the fisheries governance structure in both zones. Structural and centrality indicators were estimated using the network analysis methodological approach. In a comparative analysis, it was found that the networks have a similar number of actors in both zones, but in the southern zone the number of connections is greater, which may have a positive impact on governance efficiency. In addition, in the north-central zone it was found that a small number of actors concentrate most of the connections, which may increase the vulnerability of the network. In contrast, the southern zone network shows a more equitable distribution of connections, making it more robust compared to its counterpart. The centrality indicators showed that the actors with a preponderant role were those related to regulation and technical advice in the north-central zone, while in the southern zone it was the regulation actors and fishing social organizations that played the most important role.

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13

Resilience of the governance systems of two MSC certified fisheries in northwestern Mexico

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Abstract: Incentive-based management is an encouraging option in the quest for sustainability, and the Marine Stewardship Council (MSC) is the most prestigious certification standard. It implies sustainability and resilience, but the latter has yet to be explored. Accordingly, we selected two MSC-certified fisheries, the small-scale red lobster fishery (RL) in Baja California and the small pelagic industrial fishery in Sonora (SP), to prove whether the certification success is reflected in a resilient governance network structure. To do so, we identify structural patterns that drive the resilience of the governance network in two MSC-certified fisheries. Data obtained through stakeholder interviews on different types of stakeholder relationships were used to construct weighted communication matrices to model governance networks. We assessed the individual role of each actor using centrality indices. We also analyzed how stakeholders are integrated into cohesive subgroups of the network. To evaluate resilience, we compared changes in the structure of governance networks by analyzing how network properties change each time the loss of an actor and/or its functionality is simulated. For all centrality indices, the most relevant actors were similar or the same in both fisheries and belonged mainly to the regulatory and productive sectors. Cohesive subgroup analysis revealed that both networks are highly connected and collaborative systems. The simulations showed that in both fisheries, the decrease in the number of stakeholders did not cause abrupt changes in the structure of the governance systems. This approach reveals that, even in worst-case scenarios, the tolerance of governance systems to this severe loss of stakeholder diversity is high and suggests that following sustainable certification standards can lead to the promotion of effective and resilient governance networks.

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64
Diversification and Cross-fishery Spillovers in Coastal Fisheries: Evidence from Climate Change-induced Northern Shrimp Fishery Collapse

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Abstract: Climate resilience literature suggests flexibility, an ability to switch strategies or make adjustments, as a key adaptive capacity to mitigate the negative economic impacts of climate change. This study investigates historical changes in access to state-managed fisheries in Maine, USA, and examines the impacts of climate-induced Northern Shrimp Fishery closure on individual license holdings. Northern Shrimp fishery was an important source of income during the winter months, with on average 536 license holders generating 4.4 million USD (nominal) annually between 2009 and 2013. The stock collapsed in 2013, and the moratorium has been in place since 2014. By applying a sequential clustering approach to commercial harvester license data, we first identified three distinct management regimes between 1990 to 2023. Network analysis of license holdings shows a decline in edge density, indicating increasing adaptive capacity, and cyclical modularity metrics over this period. Difference-in-difference analysis showed that a loss of Northern Shrimp fishery has caused less than 1 to 1 decline in the number of licenses held by an individual harvester. While this study did not examine participation in federally-managed fisheries, given the high entry cost and ongoing consolidation in key federally-managed fisheries, our findings suggest limited flexibility in Maine's harvesters. In the absence of ecosystem-based management, increased flexibility to diversify target species, fishing areas, or gears requires managers to better monitor and consider spillover or ecosystem impacts. Our approach can contribute to an improved understanding of the ecosystem impacts of fishery adaptation.

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115

Network Topology of Fishing Decisions: Simulations of Climate Resilience

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Abstract: As climate change reconfigures ocean ecosystems, there is an urgency to develop a more complete understanding of the responses of commercial fishers reliant on those ecosystems and the resilience of the fishery and fishing communities. Research to date has demonstrated that fishers use diversification strategies to mitigate risk associated with both long-run climate change and short-run climate shocks. While network theory is a promising tool for measuring and understanding effort allocation between fisheries, which is the basis of fishery diversification, the economic foundations that explain network topology and their resilience to climate shocks are not fully understood. I use a simulation approach whereby a structural Random Utility Model (calibrated to fish landings data) determines individual fishing choices throughout the year, and their choices compose a network of the complex system's topology. I test how changes to input parameters of expected revenue, fishing costs, and switching costs between fisheries alter expected fishing decisions, and how these decisions map to the network outcomes used in fishery science to describe resilience: modularity, universal resilience function, and network centralization and fragmentation. I demonstrate how relationships between input parameters and network outcomes of resilience are dependent on network size and available fisheries. This research contributes to fishery science, economics, and policy by connecting the micro foundations of individual fishing decisions with the macro behavior of networks to improve our understanding of resilience and equity in commercial fishery systems.

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Ecosystem Services Valuation

Wednesday, March 26 (3:00 AM to 4:00 AM), Room B (Conference Room 155, Scripps Seaside Forum)

112

The Potential for Mobility Data for the Valuation of Ecosystem Services

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Abstract: The ability to value any ecosystem services is limited by the data that is available or can be collected. This significantly narrows the scope of the analysis that can be carried out. While surveys might be used to gather stated preference data for virtually any ecosystem of interest or recall data that might be used for a revealed-preference model, many important ecosystems lack the kind of administrative data that might be used to estimate a rich revealed preference model based on user behavior. Mobility data, passively gathered GPS data from cell phones, has the potential to dramatically expand the scope of ecosystems that might be studied. We will discuss the variety and relative advantages of different types of mobility data and providers of such data. We will then provide an example of how mobility data can be gathered for an ecosystem service where administrative data are entirely unavailable, allowing for ecosystem valuation using standard travel cost methods.

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122

Using SEEA EA in Valuing Fisheries: Deriving Exchange Values of Nearshore Fisheries for the Main Hawaiian Islands

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Abstract: Despite the importance of small-scale fisheries for subsistence, culture, and the economy, the sector is typically undervalued and omitted from decision-making. Natural capital accounting can be a useful approach in organizing such information, elevating their importance to the economy and human wellbeing. For compatibility with the broader System of National Accounts, the UN SEEA-EA statistical framework requires the exchange value (EV) of ecosystem services. Ours is the first-ever monetary account for the nearshore fisheries of the Main Hawaiian Islands (MHI), spatially distributed for years 2014-2022. This account provides an economic and ecologically-informed way for resource managers to spatially track status trends for fisheries, presented via a standardized framework that is familiar to policymakers. Here, fisheries EV is equivalent to aggregate net revenue. Catch data is sourced from the State of Hawai`i Division of Aquatic Resources Commercial Marine Landings and Marine Recreational Information Program. Prices are primarily informed by the Western Pacific Fisheries Information Network. We adjust any retail prices, or prices on processed fish, to whole-form landing-level prices. We apply the National Oceanic and Atmospheric Administration's Hawai`i Small Boat Survey 2021 to estimate costs. Preliminary results reveal an eight-year annual average EV of $3.1 million for commercial nearshore fisheries. Cost percent of revenue averaged at 52 percent for commercial fisheries, and 61 percent for non-commercial. We find a non-commercial eight-year average EV of $46.5 thousand; Maui county composes the highest county-level percent of EV. Our estimates exclusively incorporate direct use value, and are recognized as lower bound.

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129

The Economics of Natural Capital: Clarifying Resource Rent

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Abstract: The concept of resource rent, a cornerstone in fisheries economics, lacks clear definition, leading to widespread misinterpretation and inconsistent application in capture fisheries and aquaculture. Resource rent, intended to represent the economic value derived from natural resources, is often conflated with profit and other types of rent, such as scarcity or monopoly rent. This ambiguity has significant implications for policy. In capture fisheries, misinterpretations have underpinned the implementation of individual transferable quotas (ITQs), granting free access to valuable marine resources to select firms, resulting in inequitable outcomes and rent capture by a few. Similar issues emerge in coastal aquaculture, where governments face challenges in securing fair compensation for the commercial use of fjords and marine ecosystems, which represent critical natural capital assets. To address these challenges, we propose a systematic framework for pricing the use of marine ecosystems, drawing an analogy between the ocean surface and agricultural land. This pricing mechanism includes three components: (1) a base fee proportional to annual production value, (2) cost savings derived from sheltered production locations, and (3) avoided waste-disposal costs due to natural ecosystem services. This approach avoids the contentious reliance on profit-based calculations and offers a transparent, equitable, and economically sound method for nations to capture resource rent from the commercial exploitation of their marine natural capital. This framework holds promise for aligning economic incentives with sustainable and equitable resource management.

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Overlapping Ocean & Coastal Users

Wednesday, March 26 (3:00 AM to 4:00 AM), Room C (Room 110, Vaughan Hall)

52

Vulnerability of Seafood Capital to Offshore Wind Energy Development

Reid Calhoun, Virginia Institute of Marine Science, wrcalhoun@vims.edu

Abstract: This analysis explores physical capital and capital vulnerability in the commercial fishing sector of the Northeast and Mid-Atlantic US in the context of offshore wind development. Physical capital is vulnerable to abrupt technological, locational, regulatory, political, or market changes which can lead to unanticipated or premature capital write offs, devaluation, or conversion to liabilities. This research used industry interviews and modeling of fishing profits to explore capital vulnerability. Interviews with eight companies, representing ~$300 in total capital value, found that high capital vulnerability is a result of low adaptability and low business diversification, high capital intensity, and a limited geographic footprint of operations. Fishing vessel capital vulnerability was assessed by comparing estimates of fixed costs to operating margins for five fleets across seven ports including small and large trawl, small and large scallop dredge, and large clam dredge. Scallop fleets were found to have low capital vulnerability, while trawl and clam fleet fishing capital was considerably more vulnerable due to lower operating margins. The potential impacts of offshore wind energy development on fishing capital value were explored by reducing landings based on historical landings' overlap with offshore wind lease sites. Across ports and fleets, loss of landings in wind energy areas reduced operating margins by 0.84 to 7.48 percent, where ports in New Jersey exhibited the greatest risk. Assessing seafood capital values in the region, exposure to risk drivers, and connections between capital value, vulnerability, and fishing community resilience can help seafood businesses plan and adapt to exogenous drivers such as offshore wind energy development.

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62

Developing an Environmental Concern Framework for Offshore Wind in the Gulf of Maine through Public Comment Analysis

Molly Murphey, Scripps College, mollymurpheyy@gmail.com

Abstract: Since 2019, BOEM has collaborated with state and local governing bodies with the goal of developing offshore wind (OSW) resources in the Gulf of Maine (GoM). The GoM is culturally, economically, and symbolically important for coastal residents and is the host of the United States' most valuable fishery, the American Lobster. Consequently, conflicts between OSW and established marine spatial uses engender debates about the proper use of the GoM. In April 2023, BOEM solicited public comments on a draft wind energy area (WEA) (Docket ID: BOEM-2023-0054) and, in May 2024, on a Proposed Sale Notice (PSN) for eight lease areas in the GoM (Docket ID:BOEM-2024-0026).The purpose of this study was to quantify and categorize concerns expressed in public comments submitted to the federal register regarding the OSW siting process in the GoM and describe stakeholder attitudes. I first conducted a thematic analysis of comments submitted by individuals in response to dockets BOEM-2023-0054 (n=240) and BOEM-2024-0026 (n=207). I then applied a regression analysis to examine differences in attitudes by geographic and industry affiliations. Applying place attachment theory, social representations theory (SRT), and a values-beliefs-norms (VBN) framework, I found that high place attachment is correlated with anti-environmental behavior (i.e. opposition to wind farms) when OSW is perceived as a threat to local economic concerns. Additionally, the primary topics of concern changed significantly after the area under consideration for OSW changed, with fishery concerns decreasing and aesthetic and procedural concerns increasing.

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96

Fisheries Sensitivity Mapping

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Abstract: The UK government has high ambitions to expand offshore renewable energy production in the UK exclusive economic zone (EEZ) while at the same time aiming at profitable and sustainable fisheries (Fisheries Act2020) as well as to protect about 30% of their marine area (30by30). To achieve these goals, evidence is needed to avoid significant economic impact for the fisheries and allow space for fishing. Moreover, the process of developing offshore wind farms can be slowed by the agreements required between wind farm operators and fishing vessel operators, including generating and assessing evidence. In this project, indicators were developed to capture the economic importance of the fishing grounds and the wider economic consequences for the fishing industry if access to these grounds is restricted. It is highlighted that using fish landing value as a metric to assess the economic impact, is not capturing the actual consequences for the fishing industry. Indicators developed in this project, with input from representatives of fishing and offshore wind industry, as well as government, aim to overcome this issue and provide the evidence needed at the planning stage to avoid, as far as possible, locating offshore wind farm zones in important fishing grounds. To illustrate the indicators, Fisheries Sensitivity Indexes were generated and applied to the data produced in the project. Moreover, it is shown how these indices can be used to facilitate discussion on the economic impact of offshore wind on fishing activity, in particular, for the period of wind farm construction.

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126

Distributional Impacts of Offshore Wind Farms on Commercial Fisheries: An Analysis of the Gulf of Mexico Reef Fish Fishery

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Abstract: Offshore wind energy represents a crucial component of many nations' sustainable development strategies, yet its implementation presents significant challenges. Offshore wind farms (OWFs) typically occupy shallow continental shelf waters with strong winds, areas that often coincide with productive fishing grounds. OWF construction and safety zones create de facto no-fishing areas, leading to heterogeneous responses in fishing effort redistribution and associated welfare impacts. This research investigates the distributional impacts of OWFs on fishing vessels across both short and long-term horizons. The short-run analysis employs a spatial dynamic model of individual fishing trip decisions to examine how OWF-related spatial restrictions affect heterogeneous fishing operations. This model captures vessels' simultaneous decisions regarding location choice, fishing effort allocation, and travel routes, while accounting for technological constraints, varying degrees of forward-looking behavior, and route adjustments necessitated by OWF-restricted areas. The long-run analysis integrates this behavioral model with an ecological framework that accounts for OWFs' complex effects on marine species. This integration considers multiple impact pathways: the initial habitat disruption during construction, habitat creation through the reef effect (which differs between fixed and floating foundations), and the influence of turbine noise and electromagnetic fields on fish behavior, growth, and spawning patterns. The model additionally incorporates potential cumulative effects of multiple OWFs, and accounts for differential access policies between smaller and larger vessels. Using data from the Gulf of Mexico bottom longline reef fish fisheries, this study aims to understand these complex interactions in a region pursuing offshore wind development while supporting significant commercial fishing activities.

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Seafood Markets & Trade

Thursday, March 27 (9:00 AM to 10:30 AM), Room A (Auditorium, Scripps Seaside Forum)

87
Power Sits in the Middle - Working with Retailers and Seafood Buyers: A Case Study

Allison Kellum, University of California, San Diego, akellum@ucsd.edu

Abstract: From 2019-2024 the Center for Marine Biodiversity and Conservation at Scripps Institution of Oceanography, UC San Diego worked with seafood buyers from a multi-national wholesale retailer to increasing seafood sustainability literacy in their seafood buyers. This work has provided a model for corporate environmental and social responsibility as it relates to sustainable seafood procurement that can be scaled to other seafood purchasing groups. In this presentation we'll share about building trust, access, and exchange among key stakeholders, challenges and successes in developing buyer sustainability literacy, as well as take aways about the value of engaging with mid-supply chain actors.

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131

Commercialization barriers for spotted wolffish

Rune Nygaard, University of South-Eastern Norway, rune.nygard@gmail.com

Abstract: This project investigates the economic barriers to the commercialization of aquaculture for spotted wolffish (Anarhichas minor), a species known for its high market value and culinary appeal. Despite its potential, the industry participants faces significant challenges that hinder the successful cultivation and market integration of this fish. Through a case study approach, the project examines various stages of the value chain, from hatchery operations to processing and distribution, highlighting the economic obstacles encountered. Key barriers for commercialization have previously been argued to be related to most aspects of an early-stage aquaculture species. By quantitatively analyzing the very few participants in spotted wolffish aquaculture, the project aims to more precisely identify bottlenecks for commercialization. The findings are expected to provide valuable insights for stakeholders in the aquaculture sector, contributing to the development of more effective policies and practices that support the commercialization of this promising species. Ultimately, the study aspires to enhance the economic viability of spotted wolffish aquaculture, promoting its adoption as a sustainable seafood option in the marketplace.

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136

Maximizing value with fresh products - Case study from Icelandic cod fisheries

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Abstract: The Atlantic cod (Gadus morhua) is the single most important species in Icelandic fisheries. Cod products have been around 30-40% of the nation´s seafood export since the mid-1990s. The Icelandic demersal quota system (IQ), originating in 1984, turned stakeholders focus from quantity toward quality; i.e. maximizing value instead of quantity. Salting of cod products was the major preservation method in Icelandic fisheries until WWII, then replaced by frozen products. Fresh cod, i.e. preserved in ice, was available in Europe and N-America from the 1800´s. The supply was often governed the consuming nations (they were the major fishing nations), fishing in distant waters. With the general extensions of EEZ in the 1970´s and 1980´s the availability of cod became limited for the fishing fleets of the consuming countries, giving opportunity to Iceland with rich fishing ground to supply cod products, especially the valuable fresh products. The supply of fresh products from the remote country as Iceland can be challenging, due to distances and the limited shelf life of fresh cod. Iceland is far from main markets in W-Europe, 3 to 4 days in sea-freight, and the North-Atlantic Ocean can often be challenging during the winter season. Icelanders have overcome many of these obstacles the past 20 years; the focus has been clear; continuous improvement in product handling and year-round product supply. In this lecture, lessons learned from Iceland will be presented with several examples.

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143

Evidence of Community-level Seafood Consumption in Wastewater

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Abstract: Seafood contributes to human health and nutrition by providing key macronutrients and micronutrients to a large share of the world’s population. Underscoring this importance, the EAT-Lancet dietary guidelines include seafood as the main source of animal protein in a diet that balances human health and nutrition with environmental sustainability. However, data for understanding consumption, species diversity, geographic heterogeneity, and demographic drivers are limited even in high-income countries such as the U.S. There are three general approaches to data collection for seafood consumption: 1) apparent consumption based on production and trade statistics; 2) household surveys and interview-based data; and 3) supermarket scanner data. We propose a fourth approach that based DNA metabarcoding to identify seafood species consumed using samples from wastewater treatment plant intakes. These intakes have the potential to represent community-level seafood consumption. As a proof of concept, we explore associations of regional seafood consumption patterns as shown in DNA detected in wastewater with price, income, and regional differences in species availability across municipalities in North Carolina. Dietary DNA in wastewater reveals regional food patterns and socioeconomic associations, offering a scalable approach for surveying population-level nutrition and food security.

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153

Double Entry Deception: The Seafood Trade Misreporting Gap

Joshua Abbott, Arizona State University, joshua.k.abbott@asu.edu

Abstract: Misreporting of seafood trade poses a challenge for the sustainable governance of the globalized seafood market, as systematic misreporting may be indicative of deeper policy problems such as tariff evasion, mislabeling, or smuggling – especially of illegal, unregulated, or unreported (IUU) catch. While the magnitude of misreporting may be difficult to quantify, we examine what can be learned from the fact that official trade statistics report trade flows between any pair of countries twice: once from the perspective of the importer and once from the perspective of the exporter. In principle these numbers should be close, with the difference primarily reflecting transportation costs. However, we find that the reporting gap for seafood is often systematic and much larger than can be explained by trade costs alone. We merge an extensive panel of trade data with data on tariffs and trade agreements to estimate drivers of the value and volume-based trade reporting gap. We find that tariffs affect the value gap in ways that are consistent with an economic theory of smuggling or misreporting, while also finding evidence that the majority of this gap is reflected in reported volumes rather than in underreporting of unit values. We then perform disaggregate analysis to examine the evidence for malfeasance for particular importers and for particular species. Finally, we conduct targeted analyses to examine the evidence for tariff-induced mislabeling, where products are renamed from high to lower-valued products that may be difficult to tell apart in the customs process.

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159

How valuable are fish imports and local catch in supporting food security goals? The case of Caribbean Countries.

Sharon Hutchinson, The University of the West Indies, Sharon.Hutchinson@uwi.edu

Abstract: Many nations are experiencing increasing levels of food insecurity, which can be measured using various indicators of food availability, access, utilization and stability. However, with limited financial and other resources, countries need to identify the key strategies that can be used to improve food security. Increasing global fish consumption may be an indicator of healthier lifestyles. Many Caribbean countries, many of which are Small Island Developing States have traditionally relied on marine fish capture as a source of protein. The aim of this paper is to determine if marine fish capture, with fish imports have a significant impact on the level of food security. In addition, it also seeks to determine the impact of local marine catch and fish exports on national income. The paper will utilize a dynamic panel data Error Correction Model (ECM) for 14 Caribbean countries, which are a part of the Caribbean Community (CARICOM) trade block, for the years 2000-2022. Firstly, the panel data would be tested to establish the presence of long-run relationships, using tests of homogeneity, cross-sectional dependence, and stationarity. Then, the presence of cointegration is assessed using the panel Philip-Perron test and the panel Augmented Dickey-Fuller test. Food security, a dependent variable, is modelled using the Prevalence of Obesity in the Adult Population indicator. Estimates of model robustness (such as slope homogeneity cross-sectional dependence) are reported, along with the results of panel cointegration tests, the speed of adjustment coefficients and long-run estimates. Policy recommendations are provided based on the model results.

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More than Four Fish I: Changing the seafood consumption landscape from niche and small-scall market
(Special Session)

Thursday, March 27 (9:00 AM to 10:30 AM), Room B (Conference Room 155, Scripps Seaside Forum)

Brief Description:

This session will bring together various projects aimed to expand the diversity of seafood consumption beyond a typical set of mainstream species carried out by various stakeholders including researchers, industries, policy makers, NGOs, and private sectors. These projects include but are not limited to promoting place-based consumption, enhanced use of so-called underutilized fish, marketing of unfamiliar species in response to climate change, campaign for locally abundant species, and analyzing the availability of (or lack thereof) diverse seafood across markets. Diversifying the seafood and species being consumed could yield ecological benefits by relieving harvest pressure from the mainstream species, nutritional benefits among the marginalized communities via more affordable under-utilized species, increasing socioeconomic resilience of the fishing industry and waterfront communities they depend on, among other benefits. The session invites all works related to the topic ranging from consumer demand and market analysis to creative marketing campaigns and the development of novel tools (labels, value-adding methods). We seek presentations on completed projects as well as ongoing pilot programs, from rigorous analyses to case studies. All types of stakeholders are invited.

60
Celebrating Place-Based Seafood: Ecosystems, Communities, Cultural Significance

Kate Masury, Eating with the Ecosystem, kate@eatingwiththeecosystem.org

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Abstract: This presentation explores the intricacies of place-based seafood sustainability, focusing on the culinary exploration of local seafood diversity. Rooted in ecological principles and community engagement, Eating with the Ecosystem advocates for a holistic approach that transcends traditional species-centric conservation strategies. Central to our approach are the five anchors guiding our place-based philosophy: Proximity, Symmetry, Adaptability, Connectivity, and Community. These anchors underscore the importance of aligning consumption patterns with local ecosystem dynamics, celebrating seasonal changes in seafood availability, adapting to climate-induced shifts in species distributions, and fostering positive relationships between consumers, fishermen, and ecosystems. Our methods emphasize practical strategies to empower consumers and enhance their connection to local seafood. Through cooking demonstrations, tastings, and culinary education, we provide opportunities for individuals to engage with a diverse range of species, fostering appreciation and acceptance. Importantly, we promote the utilization of whole fish, minimizing waste and maximizing resource utilization in line with sustainable practices. Collaboration with chefs and fishermen plays a vital role in our approach. By leveraging their expertise, we bridge knowledge gaps and highlight the seasonal availability of seafood, creating meaningful connections between consumers and the marine environment. Additionally, our engagement extends to all stakeholders in the seafood supply chain, from harvesters to retailers, nurturing positive feedback loops that strengthen community ties and promote sustainability. Join us in this exploration of place-based sustainability, where culinary diversity intertwines with ecological stewardship and community engagement, envisioning a resilient seafood future.

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139

Fishful Future: A Case Study in Strategic Communication

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Abstract: Fishful Future is a not-for-profit educational outreach initiative with a mission of building awareness for San Diego's locally-landed seafood, helping regional consumers feel more confident in their seafood purchases and more connected to their unique coastal ecosystems and local seafood economy. Funded by Saltonstall-Kennedy awards in 2020 and 2023, Fishful Future employs strategic communication and community engagement over digital channels in an effort to democratize information relevant to the San Diego seafood system. Our multi-platform social media campaign across Instagram, Pinterest, and TikTok confronts fundamental challenges in San Diego seafood's perception by creating accessible, entertaining content that centers the importance, value, and benefits of diverse commercial fisheries. The stories and personalities of local fishers, culinary professionals, and everyday people on their personal learning journeys alternate with instructive visuals of how to identify, buy, and prepare diverse local seafoods at home. We will give a multimedia presentation on the communications strategy underpinning Fishful Future's activities. Our approach demonstrates that creative marketing strategies—featuring regional digital creators with large audiences, repetition of core messages, and prioritizing engaging narratives—are pathways to shrinking the gulf of understanding between diverse urban communities and the local seafood system. It offers a developing case study for reimagining discourse around sustainable seafood communication, demonstrating how strategic digital engagement can build interest and community around place-based seafood.

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94

Bringing ikejime seafood to the Rhode Island market

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Abstract: This study explores the potential for creating a new seafood market segment that utilizes the ikejime method, a Japanese fish slaughtering technique known for enhancing fish quality, shelf life, and flavor. This process involves euthanizing the fish by brain spike, followed by exsanguination, spinal cord destruction to ensure that electrical activity has ceased, and chilling in ice-water slurry. Despite these advantages, ikejime remains underutilized due to limited awareness overall and the additional effort required to perform it by fishers. This project aims to assess how integrating this method into Rhode Island's small-scale commercial fishing industry could improve its economic resiliency by catering to high-end markets and, more generally, by increasing product value. To address these challenges, this study has focused on training and surveying commercial fishermen and conducting consumer blind taste tests to measure the price premium that fishermen are willing to accept and that consumers are willing to pay. Our preliminary results show that, on average, fishermen require a 30-50% price premium (correlates to a $0.60-$2.60 per pound) above the current market price to incorporate ikejime into their practices, while a discrete choice experiment performed on consumers revealed that they are willing to pay on average $7 more per pound for ikejime fish compared to conventional fish (both figures based on black sea bass). These findings suggest that consumer’s WTP could compensate for the additional effort and price premium required by fishermen, even considering the middlemen along the supply chain, creating a viable market for ikejime-processed fish.

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84

Social acceptance of new marine proteins in Europe: the case of holothuria and seaweed.

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Abstract: Diversification of marine protein sources is an important challenge for sustainable blue food management. One of the ways to achieve dietary diversification is to increase the consumption of low trophic species, either animal or plant, especially if they are available locally. However, while the consumption of these species may be common in some countries, this is not the case in Europe, where the consumption of fishery and aquaculture products continues to be driven by a few main species. In the Aquafish0.0 project, we are investigating the social acceptance of two new marine protein sources for the European market: Holothuria (sea cucumbers) and seaweeds. Both species are by-products of Integrated Multi-Trophic Aquaculture in Europe. To study the barriers and levers of consumption of these species, we use a survey of 4000 people in four European countries (Ireland, Spain, Portugal and France) conducted in October 2024, half of whom were asked about holothuria and half about seaweeds. Specifically, we investigate the effect of information on social acceptance. After assessing acceptance in the absence of information, we randomly provided either a positive environmental benefit or a positive health benefit prior to a new assessment of acceptance. Using the treatment effect method, initial results suggest that health information seems to be more effective in increasing acceptance of sea cucumbers, while environmental information does not have a significant effect on the results. For seaweed, initial acceptance is higher than for holothuria, and the information provided does not seem to have a significant effect on acceptance.

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140

THE CAPACITY OF SEAWEED AQUACULTURE TO DIVERSIFY COASTAL MAINE LIVELIHOODS

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Abstract: As the Gulf of Maine warms, its fishing-dependent communities are vulnerable to increasing volatility in fisheries returns. Seaweed aquaculture is emerging as a potential income-smoothing strategy for residents of coastal communities where traditional wild-capture fisheries are declining or have already collapsed. Compared to other forms of aquaculture, seaweed may be a uniquely valuable addition to fishing portfolios due to secondary environmental benefits, harvest timing, and greater social acceptability. The rapid expansion of seaweed aquaculture in this region necessitates a better understanding of its capacity to diversify income streams. In our study, we first use state and federal data on landings by port to describe geographic and temporal trends in fisheries income diversification for coastal Maine. We show a decline in the diversity of wild harvest landings that has been offset by an increasing reliance on aquaculture. We also show that it is the coastal communities with the largest populations that have been best positioned with the infrastructure to take advantage of these diversification opportunities. Finally, we incorporate data on seaweed lease sites and the suitability of other offshore sites to forecast how seaweed aquaculture will expand over three different time horizons. We use our forecast of seaweed aquaculture's expansion capacity to quantify the reduction in rural income volatility. The stabilization of income is highly sensitive to assumptions about the market price of seaweed products and productivity of seaweed sites.

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Climate Impacts to Fisheries & Aquaculture

Thursday, March 27 (9:00 AM to 10:30 AM), Room C (Room 110, Vaughan Hall)

8
The Role of Fisheries Diversification in Stabilizing Local Fishing Economies: Evidence from Alaska

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Abstract: Climate change presents significant challenges to the economic growth and stability of fishing communities. The literature has established that a diverse portfolio of fisheries stabilizes fisheries income for individual fishers and communities, thereby claiming its importance for the resilience of fishing communities. However, empirical evidence that fisheries diversification also stabilizes local economies beyond the fishing sector is limited. This study addresses this gap by focusing on the role of fisheries diversification as a risk management tool for the local economies of Alaska's fishing communities. Specifically, we explore how fisheries diversification influences the growth and stability of employment across all sectors of a community's local economy. Using the Hyperbolic Distance Function (HDF) approach, commonly applied in production economics, we analyze 17 years of fisheries and economic data from 177 Alaska fishing communities to assess how diversification and other community factors affect economic growth (desirable outcome) and instability (undesirable outcome). Our findings show that fisheries diversification stabilizes employment, but less so than a community's industrial diversification across economic sectors. The stabilizing effect of fisheries and industrial diversification comes at the cost of reduced economic growth, illustrating the risk/return trade-off of diversification. We also find a complementary relationship between fisheries and industrial diversification, with industrial specialization benefiting from fisheries diversification and fisheries specialization benefiting from industrial diversification. Overall, our research demonstrates that fishing communities can achieve economic stability through either industrial or fisheries diversification, which has meaningful implications for fishing communities geographically constrained to a limited set of local fishing opportunities.

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19

Do Cooperation and Adaptation to Climate Change Affect Conflicts Among Artisanal Fisherfolks in Nigeria?

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Abstract: Fisheries conflicts resulting from the adverse effect of climate change on aquatic systems are now the concern of international community. Also, studies that empirically checked the impact of cooperation and climate change adaptation on conflicts among artisanal fisherfolks are not noticeable in the literature. To bridge this gap, this research investigates how cooperation and climate change adaptation affect conflicts among artisanal fisherfolks in Nigeria. This research used number of climate change adaptation strategies (CCAS) adopted instead of the dummy variable decision of CCAS adoption used in previous studies. Endogenous treatment poisson regression (ETPR) model and Unconditional Quantile Regression (UQR) model were applied to analyse cross-sectional data collected from 996 artisanal fisherfolks in the coastal area of Nigeria. The results show that cooperation plays significant role of increasing the number of CCAS adopted as majority of the sampled artisanal fisherfolks adopted multiple CCAS. Also, there are heterogenous effects of cooperation on conflict occurrence. The study empirically established that cooperation lessens the incidence of conflicts with the highest impact at the highest quantile of conflict. Hence, policy efforts should be geared towards strengthening and developing cooperatives among artisanal fisherfolks, especially fishing-based cooperatives. Keywords: Cooperation, adaptation, climate change, conflict, non-fishing strategies

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21

Climate variability and labor allocation: Evidence from Mexican small-scale fisheries

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Abstract: Fisheries are increasingly exposed to numerous natural and anthropogenic stressors, including climatic variability, that contribute to high interannual and seasonal variability of catch and income. Adaptive strategies, such as diversifying fish stocks harvested and reallocating labor between fishing and non-fishing activities, can reduce risk and stabilize income. However, the role of labor reallocation has received little empirical attention. This study examines the impact of the El Niño Southern Oscillation (ENSO) on labor allocation, income, and fishery production in small-scale fishing municipalities in Mexico from 2006 to 2022. Contrary to expectations, fishers reduce the diversity of catch and increase their reliance on fishing rather than reallocating labor to non-fishing sectors during ENSO events. This behavior is driven by the low cost of switching between fish species and the low opportunity cost of fishing, given factors such as limited alternative employment opportunities, low educational attainment, and the rural nature of these communities. While diversification is often seen as beneficial, specialization increases fishery production in this context, leading to negligible or positive impacts on household income. These findings highlight the role of specialization as an adaptive strategy that can buffer fishing communities from the economic impacts of climate variability.

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19

Linking climate conditions with fish farming performance: The case of salmon production in northwestern Patagonia

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Abstract: Climate change and climate variability are important challenges the salmon industry faces. This can directly affect the freshwater supply and, through that channel, key oceanographic conditions for salmon growth. In this paper, we study the effect of hydrological droughts on salmon farming production in Chilean Northwest Patagonia. We exploit the cross-sectional and over-time variations in salmon production and inputs and link changes in oceanographic conditions regarding water temperature and salinity due to climate variability to producers based on their locations. We use panel data of production and inputs (including temperature and salinity) from salmon farming sites in Northwest Patagonia. Our sample considers salmon production from a total of about 980 salmon farming sites during the period 2000-2020. Our methodological approach accounts for the selection process for farm operation and the link between climate variability and ocean temperature/salinity. The results indicated that a farming site is more likely to be chosen for operation if it is located in areas with higher salinity levels and higher water temperatures. After controlling for potential drivers of farming site selection, we did not find any significant effect from salinity and water temperature on salmon production volumes. Together, these results suggest that salmon producers may be already responding to changes in rainfall and hydrological conditions in the study area by selecting farming sites for production, revealing a potential adaptation to climate change.

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119

Adaptive Systems for Climate-Ready Fisheries Management

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Abstract: Climate change is expected to increase short-run shocks and extreme events in oceanic conditions. Fishery managers are considering how to design climate-ready systems that enable fishers and fishing communities to adapt to these events without jeopardizing the long-run sustainability of the ocean ecosystem. This paper highlights a suite of potential policy options already employed by fishery managers worldwide. Although these options have been designed to address unique conditions in particular settings, it is valuable to understand whether and how they might be extrapolated to other settings to increase fishers' adaptive capacity. We take a first-principles approach by considering what constitutes a fishery and then discussing how managers can increase adaptive capacity across internal and external margins conditional on the fishery definition. We contribute to the literature on climate-ready fisheries by expanding the discussion on adaptive capacity to include both internal and external margins, whereas the literature has focused on external margins for reducing barriers to entry. We also discuss the scientific and political economy challenges and trade-offs of introducing adaptive capacity into the US fishery management system. Ultimately, the benefits of doing so must be weighed against the risks of compromising a highly prescriptive system critical for achieving fishery sustainability.

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148

BEYOND THE CATCH: THE ROLE OF CLIMATE RISKS IN FISH TRADE

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Abstract: Fish and fishery products are the most widely traded food commodity globally. The production and trade of these products are influenced by the climate risks posed by extreme weather events. Meanwhile, trade can also soothe the impact of climate risks occurring in a country and increase its resilience to those risks. This study analyzes the impacts of extreme weather events, such as hurricanes, droughts, and heatwaves, on fish trade trends in the past decade at the country level. We utilize the yearly net export change in value and volume as indicators of fish trade trends and the global climate risk index as a measure of the impacts of weather-related loss events. We also include the Worldwide Governance Indicators and the Index of Trade Freedom as measures of the country's governance quality and level of involvement in open markets, respectively. This research aims to identify the potential pressures and opportunities of fish trade facing climate changes and highlights the regions with a high level of vulnerability.

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Bioeconomics II

Thursday, March 27 (11:00 AM to 12:00 AM), Room A (Auditorium, Scripps Seaside Forum)

113

An instrumental variable approach to the generalized fishery model

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Abstract: The generalized fishery model provides policy relevant measures such as an estimate of maximum sustainable yield. The model consists of two stages. The first stage considers panel data on trip-level harvest and inputs (stock and effort) and a Cobb-Douglas production function is estimated. Based on an index of the stock level from the first stage, bioeconomic parameters can be estimated in the second stage. A problem, in this model and in many similar approaches, is endogeneity of effort in the first stage. That is, there is potentially two-way causality between harvest and effort. Increased effort on a trip can surely be related to non-negative changes in the harvest level. However, a good harvest may lead to additional effort, but can also lead to less effort, for example under capacity constraints. That observations are made on the trip level and that gear and fishing area is controlled for may further undermine the harvest-effort (reverse) relationship. We consider an instrumental variable approach to consistently estimate the generalized fishery model for Norwegian groundfish. Results from the first stage with and without the instrumentation show notable differences in coefficient magnitudes, suggesting downward bias in the uncorrected model. The full model provides smaller values for maximum sustainable yield under the instrument. That is, one potentially overestimates stock growth if endogeneity of effort is not dealt with. These results have implications for sustainable fisheries management.

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114

Bioeconomics of Capital Investment and Managing for Maximum Economic Yield

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Abstract: Bioeconomic models capture the linkages between harvest profitability and fish stock health and show that, in the absence of regulation, new vessels enter the fishery—increasing effort and reducing stock sizes—until profit is dissipated. The effort and stock levels that yield the greatest steady state profit are attractive management targets. However, despite being labeled maximum economic yield (MEY), they do not represent the highest potential sustainable profit. Rather, harvesters will respond strategically to MEY targets by capitalizing in pursuit of incremental gains as permitted by prevailing regulation, eroding profits. Further, the cost structure on which MEY targets are based reflects the capitalization choices made under current regulations, which may not maximize profit across all management approaches. We illuminate the endogeneity of cost and revenue structures, and thus MEY, on management approaches by integrating capital investment along the intensive and extensive margins into the bioeconomic model. Following Smith's (1969) profit-proportional dynamic, fishers in the model invest in capital without internalizing the equilibrium effect of their actions, leading to new entry or capital stuffing among incumbents. We show that when taking into account individual responses to policies, MEY becomes a function of policy parameters and is, in most cases, unattainable. Only with individual property rights do fishers' incentives align with those of the social planner and the fishery achieves the first best outcome.

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141

Marine Reserves in Rural Economies and Climate Resiliency

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Abstract: In rural coastal economies where fisheries are undermanaged, fish stocks are often overexploited and inefficient. Climate change will likely alter biological processes of tropical marine fish, including recruitment, survival and growth rates, threatening the welfare of the households who depend on these fish. While marine reserves are able to improve fish stocks within their boundaries, their ability to improve stocks outside is less certain. Predicting economic impacts of reserves is further complicated when market failures in nearby rural economies lead to local input and output prices. We use a spatially explicit bioeconomic general equilibrium model to estimate the heterogeneous impacts of a reserve. Our model is parameterized using a unique microeconomic dataset, gathered from a small island in eastern Indonesia. We model poor and non-poor geographically distinct fishing households, and non-fishing households, as well as six economic sectors, including the spatially-explicit nearshore fishery. We illustrate the ability of a marine reserve to increase resiliency of some, quantifying the avoided climate-driven losses in real income, and explore why other households are negatively affected by a reserve. We demonstrate the importance of accounting for anticipated effects of climate change by calculating the “error” when baseline conditions are used as the counterfactual. We find that while a naïve analysis predicts changes to real income are near universally negative and close to zero, accounting for climate change leads to larger positive predicted changes in real income.

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146

Climate change impacts on global distant-water fisheries: insights from a spatial equilibrium model

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Abstract: Understanding the impact of climate change on the redistribution of global fishery stocks and fishing activities is crucial for designing effective climate or conservation policies. Traditional spatial models used to predict stock or effort responses to environmental changes often fail to consider the long-term dynamics and feedbacks between stock levels and fishing efforts. To address this, we developed a quantitative spatial model that simulates the distribution of fishing efforts across global industrial fisheries and integrates it with the population dynamics of fishery stocks. We modeled the effort-stock feedbacks as rational expectation equilibrium of the fleet and bioeconomic equilibrium of the stock for each location. We calibrated the model using satellite data on fishing effort distribution and biological stock assessments. By simulating various scenarios with the calibrated model, we examine the potential redistribution of fishing efforts due to climate change and evaluate the effectiveness of climate-adaptive strategies, such as spatial closures.

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Recreational Fishing

Thursday, March 27 (11:00 AM to 12:00 AM), Room C (Room 110, Vaughan Hall)

6
Gone Fishin': Shifts in Recreational Angling Effort Between Weekends and Weekdays under Temporal Restrictions in Puget Sound

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Abstract: Recreational fisheries managers often impose temporal restrictions to balance conservation goals with angler preferences. However, these restrictions may have limited effectiveness due to anglers redistributing effort across remaining open periods. Therefore, expected aggregate daily effort is likely to change under more stringent temporal restrictions, and the size of this change may differ between weekdays and weekends as committed anglers crowd into the limited remaining days. This study examines the impact of temporal restrictions on aggregate angler effort, focusing on the summer Chinook salmon fishery on Puget Sound, Washington state, USA. Using a simple theoretical model that accounts for diminishing returns from additional fishing trips and varying participation costs across days, we derive two hypotheses: (1) the effectiveness of temporal restrictions declines as the season becomes more limited, and (2) aggregate angler effort on weekends and weekdays converges as restrictions increase. Predictive models fit on aggregate effort estimates derived from on-water surveys conducted across four Marine Areas and eight years support both hypotheses, showing a significant reduction in effort elasticity as the number of openers decreases and no statistical difference in predicted effort between weekends and weekdays under stringent restrictions (20 openers or fewer). These findings provide valuable insights for fisheries managers, demonstrating the diminishing returns of stricter temporal closures and allowing for more efficient allocation of enforcement resources. Additionally, the simple empirical approach is easily portable to other fisheries, with potential extensions to address equity implications and the effects of policy uncertainty.

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111

The Economic Value of Offshore Structures to Recreational Anglers: A Nested Demand Model Using Mobility Data

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Abstract: Offshore structures—including operational and reefed energy platforms, sunken ships, and offshore wind turbines—not only strengthen marine habitats but also provide significant economic value, drawing interest from the public and policymakers aiming to quantify their net benefits. In this paper, we use a two-level (nested) Random Utility Model (RUM) to estimate the non-market value of offshore structures to recreational anglers, utilizing mobility data (e.g., GPS data passively collected from cellphones) from the Western Gulf of Mexico (2019–2022). By applying a machine learning classifier trained on Automatic Identification System (AIS) data to cellphone location data from Spectus Corporation, we identify recreational fishing trips, providing insights unavailable through traditional Creel Survey datasets. This first-of-its-kind application of mobility data in marine recreational demand literature allows us to estimate the economic value of both on-land launch sites and offshore fishing destinations, distinguishing between sites with and without structures, using willingness to pay (WTP) as a welfare measure. We evaluate hypothetical scenarios involving changes in the number and composition of offshore structures at identified sites and provide policy recommendations for state Rig-to-Reef (RtR) programs and the federal offshore wind development plan. Our results show that destinations further offshore are generally more desirable, with operating energy rigs at varying distances and water depths being highly valued by anglers. In contrast, the average effect of other artificial reefs is minimal and spatially variable, ranging from positive to negative benefits.

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128

An Analysis of the Southeastern Headboat Market Using Novel Price Data

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Abstract: The for-hire fishing industry is an important component of the recreational fishing sector and the broader fisheries management system. We present an analysis of the market structure of for-hire vessels that charge per person fees, or headboats, using the Southeast Region Headboat Survey (SRHS) administered by NOAA Fisheries. The SRHS is a rich trip-level dataset covering all headboat trips taken by registered vessels in the Southeastern US since the 1970s, with many characteristics of interest, however it has historically lacked data on the price charged to passengers due to administrative hurdles to collecting this information directly. To fill in this data gap, we have developed a webscraping system for collecting price information based on the prices publicly advertised by the vessel operators on their websites. Using the SRHS supplemented with our price data, we can examine how the product (trip) offerings of these vessels have changed over time, how prices vary with vessel characteristics such as catch rate, the degree of market concentration in this industry, and other factors of interest. These data can help inform fisheries management analyses or be used to calculate losses to the sector from fisheries disasters.

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