Bergen Fisheries Economics Workshop 2025

SNF – Centre for Applied Research at NHH

Full program

Thursday, Nov. 6, Aud. Karl Borch

9am	Sturla Kvamsdal	Welcome & introduction
	Frank Asche	Quantity versus Quality: Trade in Perishable Products and Economics of Scale
	Hans-Martin Straume	From Fjords to Factories: International Processing of Norwegian Salmon Exports

While policy priorities often focus on the impact of the seafood industry in coastal communities, efficient supply chains is more important for the competitiveness of an industry. With improved logistics, this increasingly involves third-countries with a comparative advantage in seafood processing. This paper examines the importance of the foreign processing industry in Norwegian salmon export over the period 2016-2020. Using highly disaggregated firm-level data we document the importance of the foreign processing industry, as well as how processors differ from foreign importers that are primarily engaged in trading activities. The results reveal interesting and distinct patterns across importer groups. Exports involving processors are more concentrated geographically, with large importers clustered in processing hubs, primarily within the EU. We find that Norwegian ownership of processors significantly increases trade volumes and average shipment size. Foreign traders are the largest and most geographically diverse buyer group. Our findings confirm that much value-added activities in the salmon aquaculture value chain occurs downstream through foreign processing.

Coffee break

10:30am	Sigbjørn L. Tveteraas	The effect of spatial farm concentration on mortality in Norwegian salmon farming (with Nils Petter Håberg)

Salmon mortality in Norwegian aquaculture represents a challenge, with delousing treatments identified as a major contributing factor. This study examines the effects of medical and non-medical delousing treatments on Atlantic salmon (*Salmo salar*) mortality, with particular emphasis on spatial farm density and their interactions. Using monthly farm level observations from Norwegian production zones in 2017 to 2022 from the Norwegian Directorate of Fisheries and BarentsWatch, we employed Poisson regression, Negative Binomial (NB) regression, and Generalized Additive Models (GAM) to analyze mortality patterns. Results showed that medical delousing treatments were associated with reduced mortality, while non-medical treatments showed

positive associations with increased mortality across all models. Higher spatial farm density increased mortality rates. These findings demonstrate that delousing treatment selection and spatial aquaculture planning influence salmon mortality. Results support evidence-based policies for treatment protocols and spatial management in salmon aquaculture.

Yuanhao Li — Calculating mortality under fish movements in aquaculture

Mortality in aquaculture is important for efficiency, economics, and animal welfare, and is a target for government policies. When fish are added to a pen during a period, there is no precise calculating accumulative mortality in percent for the entire period. There are several options in practice, but they all create different kind of biases under different situations. I propose a method based on the daily survival rate.

12pm Lunch

1pm Martin Smith — Climate Change, Multispecies Fisheries, and Mixed Management Institutions

Climate change is causing fishery range shifts relative to historic fishing grounds, but the effects are highly variable across fisheries. At the same time, fishers exploit multiple fisheries within a region that are subject to different management institutions with some fisheries still being effectively unmanaged. This multispecies and multi-institutional context creates ambiguity about what will happen as some stocks cross jurisdictional boundaries while others remain geographically stable. The combination of heterogenous range shifts, heterogeneous management, and heterogeneity in fisher skill and opportunity costs ultimately raises questions about the extent that management can mediate the impacts of climate change. Here I build a bioeconomic simulation model that accounts for multiple species with heterogeneous management, heterogeneous climate-induced range shifts, and heterogeneous fishers to understand impacts of climate change and management reform. I find 1) climate change always decreases total infra-marginal rents substantially; 2) fishery rents are trivially small (effectively zero) under regulated open access (ROA) and pure open access compared to infra-marginal rents, which are substantial in both institutional settings with and without climate change; and 3) management under ROA does almost nothing to mediate impacts of climate change despite what previous literature implies.

Yuanming Ni — Fishing trips compiled from ERS data for Norwegian fisheries and some preliminary analysis using random forest

The increasing availability of detailed microdata presents new opportunities to study fisheries at the fishing-trip level, offering insights into fishers' behavior and catch dynamics that are not possible to study using aggregate data. In this study, we process data from the Norwegian Electronic Reporting System

(ERS)—a mandatory system through which fishers report their activities—to construct a trip-level dataset for Norwegian fisheries. We explore various factors influencing catch per trip and conduct preliminary analyses employing Random Forest models to identify key predictors of trip-level catch outcomes. The initial results highlight the potential of ERS-based trip data for enhancing our understanding of fishing patterns and informing data-driven fisheries management.

	Xiurou Wu	Validating Global Fishing Watch AIS Data: A Norwegian Case Study
	Coffee break	
3pm	Margrethe Aanesen	Managing marine invasive alien species that provide both threats and benefits: Stakeholder perceptions of the Red King Crab in Arctic Norway

The red king crab (RKC) is an invasive alien species in the Barents Sea that poses both threats and benefits to existing ecosystem services and socioeconomic systems. To address both, the Norwegian government has set up a dual management regime, where the area east of North Cape (NC) is quota-regulated, aiming at profitable harvesting for local fishers, and to the west is open access, aiming at control of spread. The rationale for the quota-regulated fishery in the east is to compensate whitefish fishers for damages to their equipment (nets) caused by the RKC. Time-series data demonstrates a continuous increase in the number of vessels participating in the quota-regulated fishery, but no corresponding increase in the stock, and the management body is concerned about the profitability of the fishery. On the other hand, decades of scientific investigations are rather inconclusive regarding ecological threats to marine ecosystems from the RKC. In this situation, one could argue that more emphasis on the benefit part and less on the threat part of the management could be in place. As the RKC is a common, societal property to be managed to the best of the population, it is in place to elicit various stakeholder groups' viewpoints on threats and benefits of the RKC in Norwegian waters. We implemented a survey among the three stakeholder groups; scientists, fishers, and the general public. The results are ambiguous and do not support relaxing the focus on threats and prioritizing securing benefits. Both fishers and the public are more concerned than the scientists about harm to commercial fish species from the RKC, and the public thinks it is more likely that the RKC moves westward and establishes in new areas compared to scientists and fishers, which represents a worry. On the other hand, both the scientists and fishers see more potential benefits of the RKC compared to the public. While scientists assess that the RKC may be beneficial for other marine ecosystem services like kelp and some larger fish species, fishers assess the crab to be beneficial to commercial sectors like fisheries and tourism.

Rögnvaldur Hannesson Fifty years of fisheries economics

This is a personal story of fisheries economics since the early 1970s. What was this sub-discipline like when I first engaged with it? What was the canonical literature, and what were the issues it dealt with?
What were my own contributions and how did they fit in? I'll touch upon the following topics:

- The economics of extended fishing limits
- Periodic versus sustained fishing
- Multi-species models
- ITQ's
- Norway's fisheries policy from the early 1970s to now
- Game theory and its applications to fisheries

7pm Dinner at Enhjørningen

Friday, Nov. 7, Aud. Karl Borch

9am Sturla Kvamsdal Invasive crabs in a random forest—A study of prices for crabs from the Barents Sea (with Anne-Sophie Crépin, Arnt O. Hopland, Yuanming Ni, Xiurou Wu)

Snow and red king crabs are established invasive species in the Barents Sea that support significant commercial fisheries. Invasive species have ecological impacts but represent opportunities for value creation as climate change may undermine more traditional fisheries. However, climate change could also have negative impacts on the crabs. Landing or ex-vessel prices exhibit large variations over short time spans, suggesting a non-standard or complicated market structure, and we consider regression trees in random forests to identfy important factors for prediction of these prices. The most important variables for snow crab prices are landing site and prices of other landings the same day. We find little evidence of impact on snow crab prices from landed volumes and prices of red king crab, suggesting limited substitution in the market. An index of marine heatwaves, a phenomenon correlated with climate change, is the last variable on the ranking of importance for price determination. Transition to quota regulation, however, shifted the price up with 17% on average.

Nils-Arne Ekerhovd Shifting alliances in the management of mackerel in the Northeast Atlantic

The mackerel stock in the northeast Atlantic has not been sustainably managed for 15 years, with catches far beyond scientific advice. An analysis of negotiations, agreements and catch patterns from 2001 to 2024 describes the challenges associated with the joint management of straddling stocks. The development can be explained by changes in the size and distribution of the stock, which has led to more countries participating in the fishery and disagreements over zonal attachment and quota rights. Fisheries negotiations have a distinctly distributive character, but the analysis also shows more

integrative aspects where alliances have been entered into. Nevertheless, an agreement including all parties fishing for the mackerel has not yet been reached.

Coffee break

10:30am Leif K. Sandal — An algorithm for the optimal feedback policy (resource extraction) based on dynamic and potential rents

Dynamic optimization encompasses a wide range of research questions in both theoretical and applied economics. This paper presents a simple iterative scheme with fast convergence, capable of generating high-quality analytic (closed form) approximations—including explicit error bounds—for a class of nonlinear problems. The algorithm is also well-suited for producing numerical solutions. We define and operationalize the concepts of dynamic rents and potential rents and show how our approach leverages a balancing relation between these rents to derive optimal policies. A powerful result emerges in the case of zero discounting, where the exact Catching-up optimal policy is obtained in a single iteration.
By applying a specific initial seed within our general framework, it recovers known results from the bioeconomic literature, thereby illustrating the constructive nature of our theorem and the versatility of the procedure. It provides error bounds for these formulas—bounds that were previously unavailable—enhancing both their theoretical robustness and practical applicability.

James Wilen — Artisanal Fisheries Reform Under the Specter of Climate Change

Progress towards eliminating global poverty has stalled recently. Many of the global poor rely on smallholder agricultural plots supplemented with natural resources utilized under open access conditions. For example, millions of coastal and freshwater lake residents in underdeveloped countries grow crops and engage in small scale artisanal fishing, shifting labor effort between sectors as conditions change. The recent past has witnessed more severe shocks in agriculture due to climate change. This raises the question: is it becoming more or less imperative to rationalize open access resource exploitation under the specter of climate change? We develop a two sector ag/fishery model with stochastic shocks to explore this question under various parametric scenarios.

12pm Lunch

Participants:

Margrethe Aanesen	SNF – Centre for Applied Research at NHH
Frank Asche	University of Florida, Gainsville
Nils-Arne Ekerhovd	SNF – Centre for Applied Research at NHH

Gunnar Eskeland	Norwegian School of Economics (NHH)
Mahsa Gorji	Norwegian School of Economics (NHH)
Rögnvaldur Hannesson	Norwegian School of Economics (NHH)
Arnt Ove Hopland	SNF – Centre for Applied Research at NHH
Sturla Kvamsdal	SNF – Centre for Applied Research at NHH
Yuanhao Li	Mowi
Yuanmin Ni	SNF – Centre for Applied Research at NHH
Leif K. Sandal	Norwegian School of Economics (NHH)
Martin Smith	Duke University
Hans-Martin Straume	Norwegian Business School (BI)
Sigbjørn Tveteraas	University of Stavanger
James Wilen	University of California, Davis
Xiurou Wu	University of Hawai'i, Mānoa