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Í SJÁVARÚTVEGI



United Under One Cod: a research program on complexities of cod fishing and their utility for fisheries management

PIs: Pamela J. Woods, Daði Már Kristofferson

Contributors: Sandra Rybicki, Elzbieta Baranowska, Sveinn Agnarsson, Bjarki P. Elvarsson

The Icelandic Research Fund 2020



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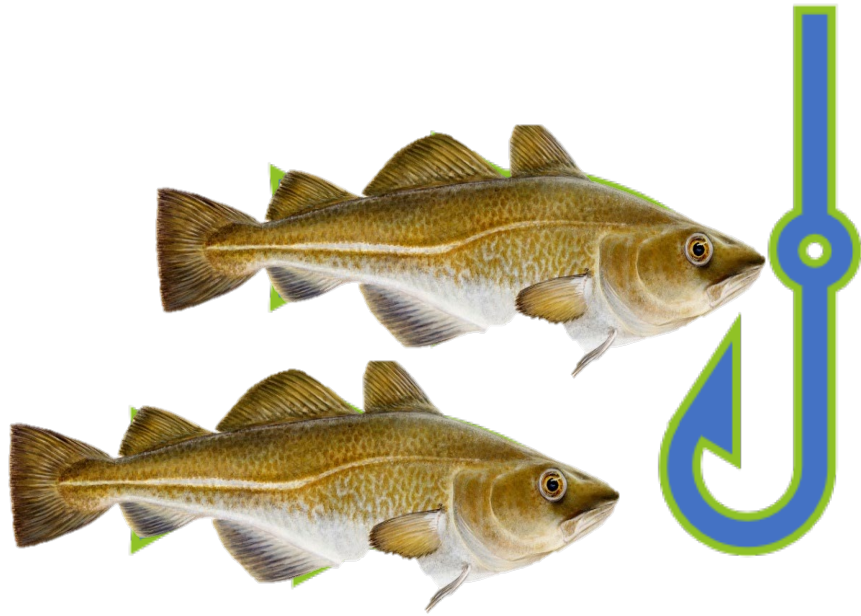
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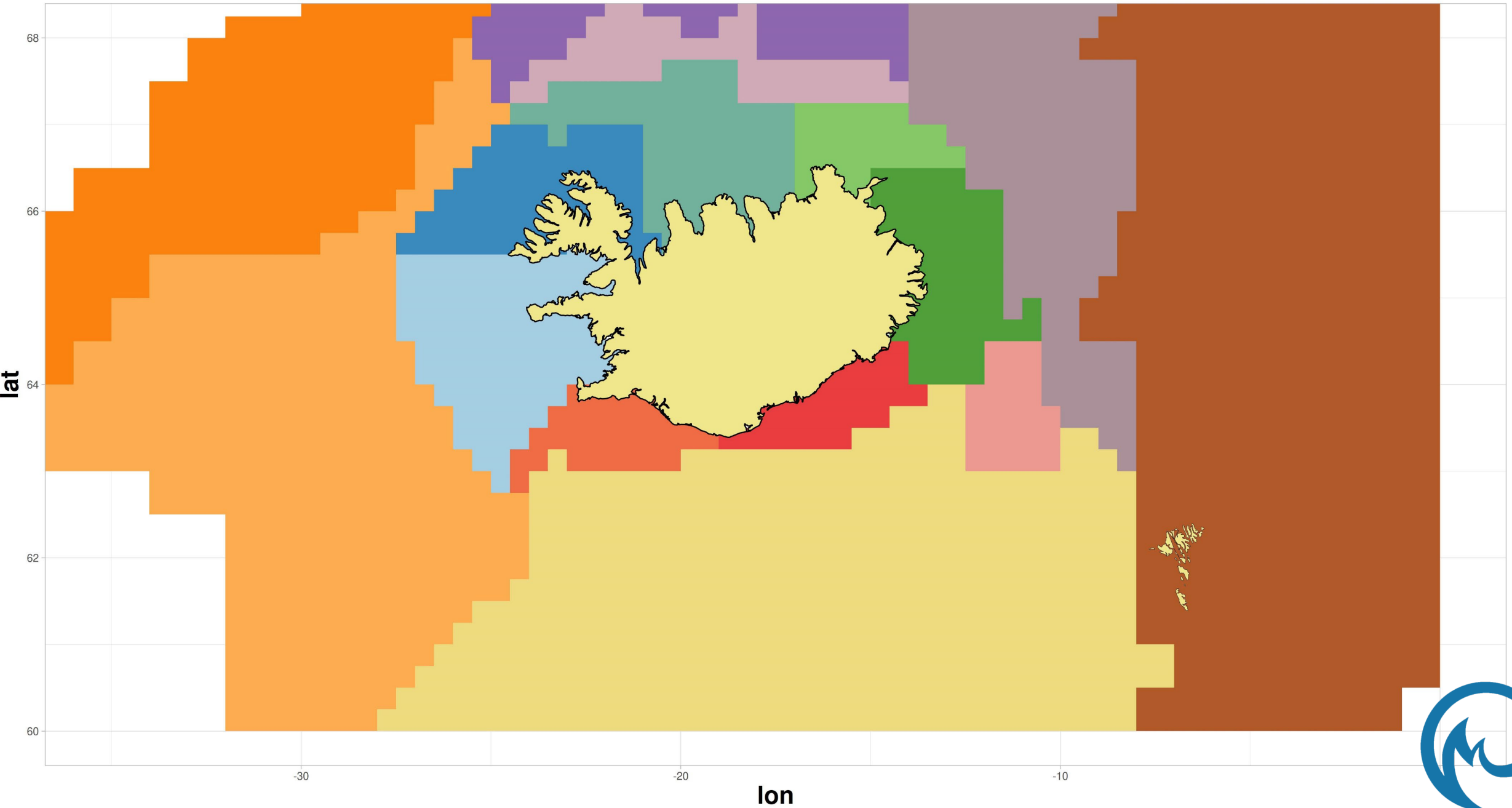


Motivation

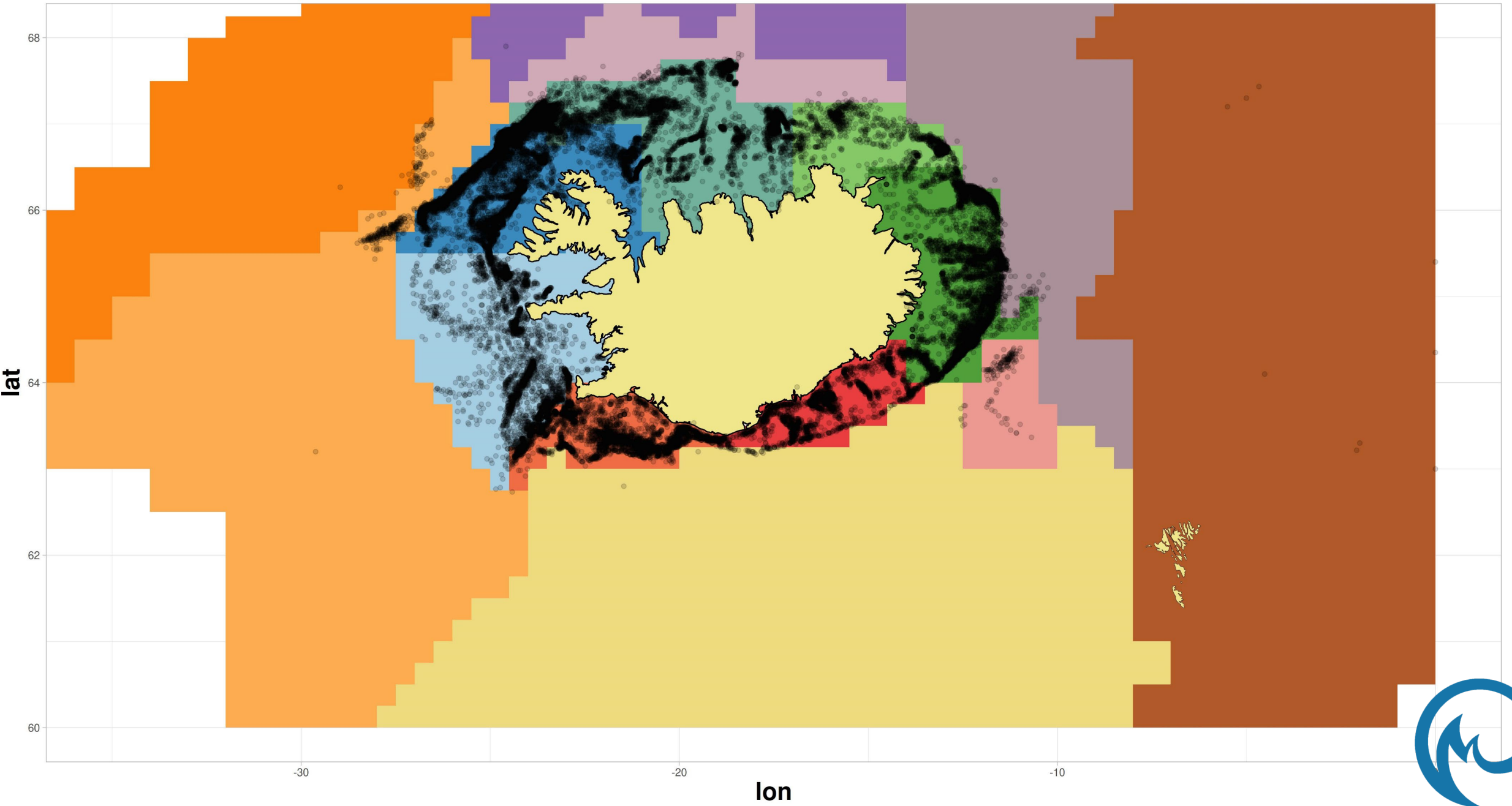
- ▶ What are economic drivers of spatial variation in fishing activities?
- ▶ Often ignored in stock assessment in fisheries management:
 - ▶ Spatial variation in biological information
 - ▶ Spatial variation in fishing activities



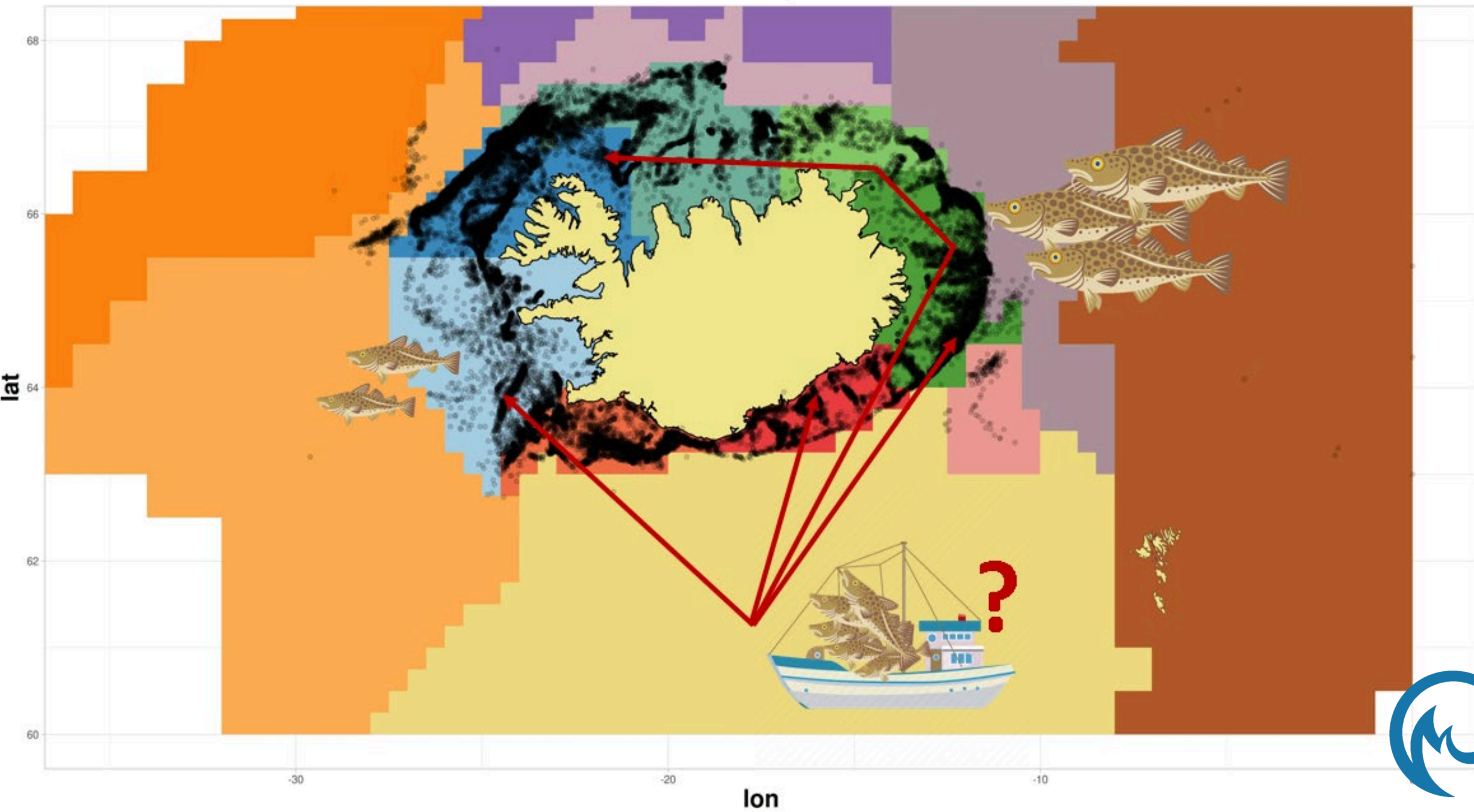
Cod fishery 2019



Cod fishery 2019



Cod fishery 2019



Solution

Build a location-choice model that predicts spatial variation in fishing activities and its relationship with

- ▶ exogenous factors such as prices of inputs and outputs
- ▶ fishing characteristics such as vessel type, season
- ▶ biological attributes of the cod itself, which varies from fish to fish and depends on stock properties, season, gear and location



Extensions

- ▶ Link location-choice model with stock assessment framework: can fishing incentives be optimized to more efficiently manage cod utilization?
- ▶ Does this include increasing / decreasing multi-species targeting?



Partners

University of Iceland

WP2:
Daði Kristófersson
Sveinn Agnarsson

MFRI

WP1:
Pamela J. Woods
Bjarki Þ. Elvarsson

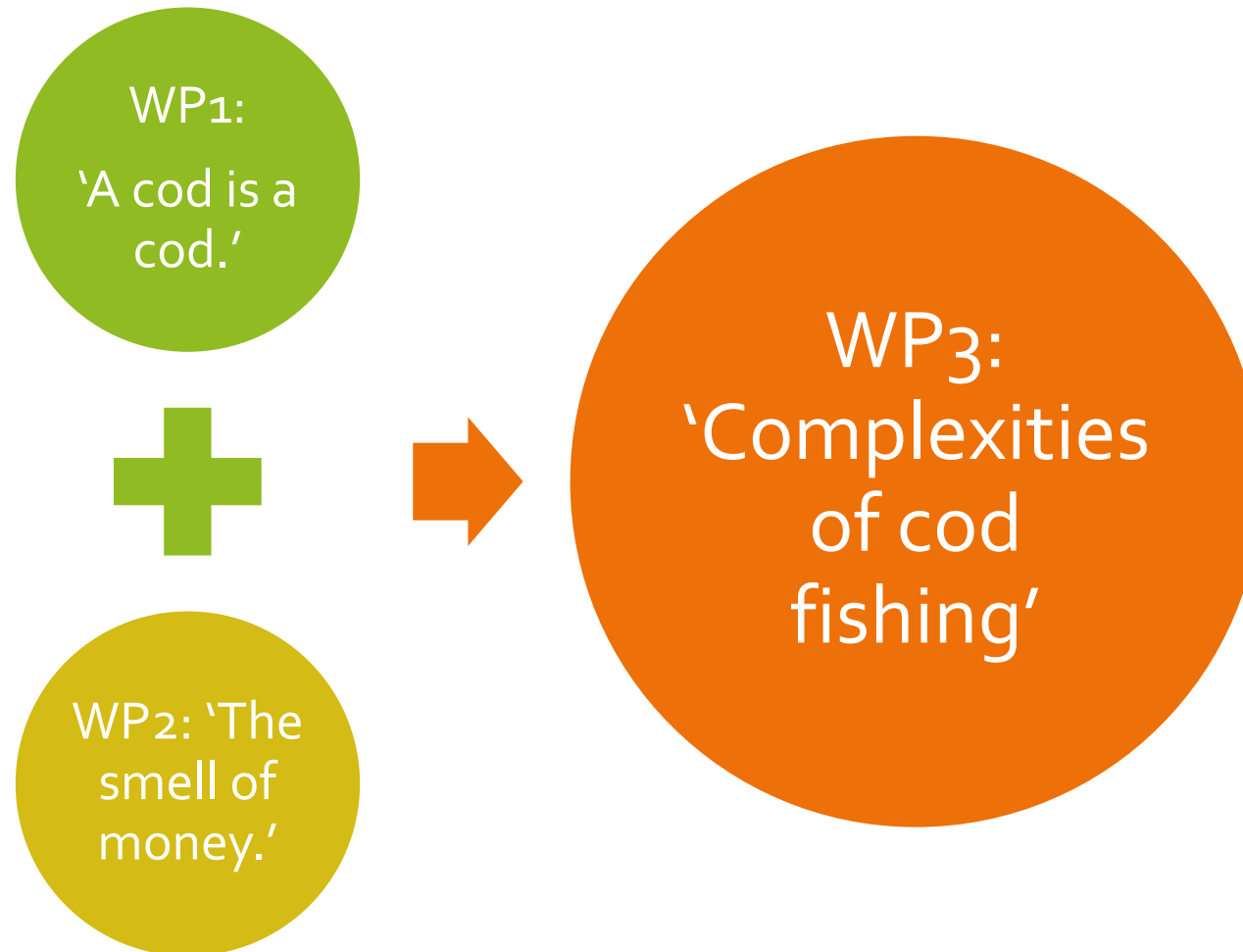
WP3:
Sandra Rybicki
Elzbieta Baranowska (from
Fishing into the Future)

Duke University

advisory:
Martin Smith



Project structure

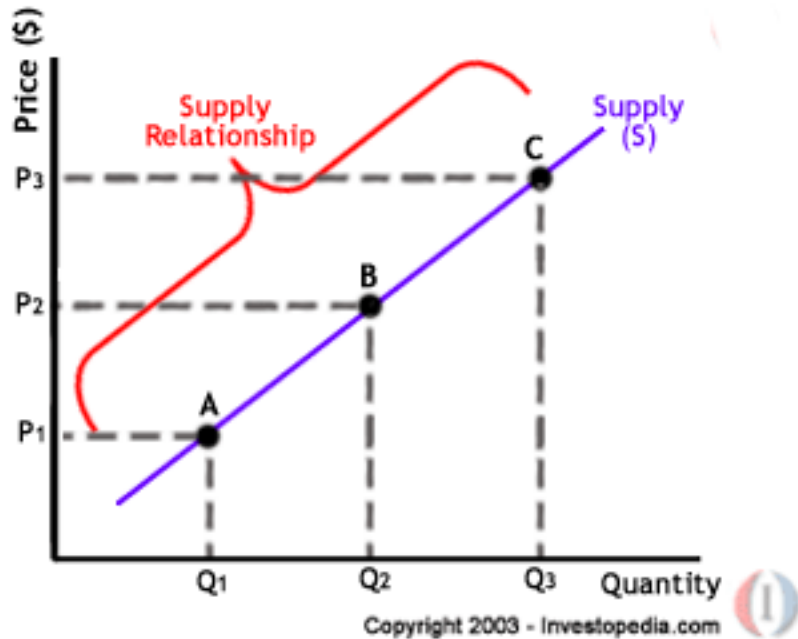


WP2 - ‘The smell of money’: exploring how cod markets function by linking cod ex-vessel prices with size and quality attributes in a hedonic price model*

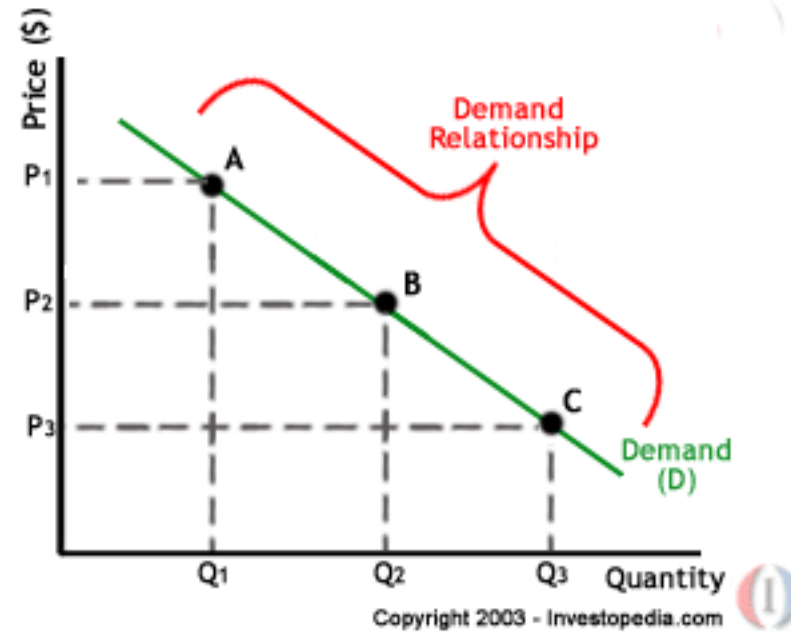
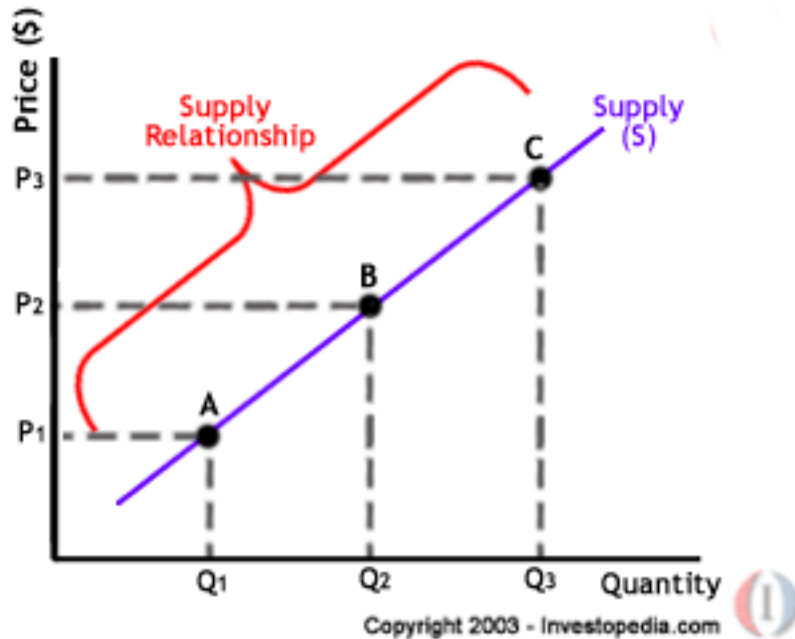
- ❖ Hedonic pricing is a model that identifies price factors according to the premise that price is determined both by internal characteristics of the good being sold and external factors affecting it (www.investopedia.com)



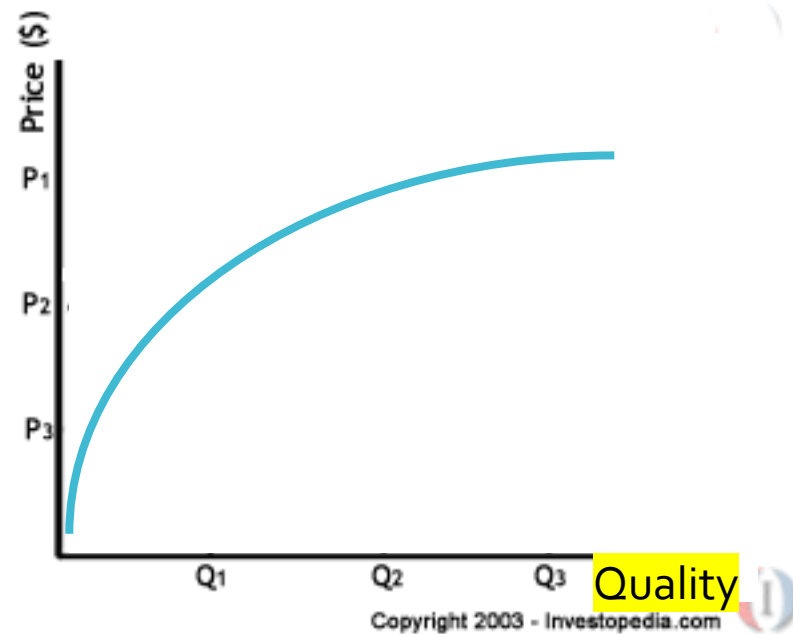
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WP2 -known quality effects on price:

- ▶ **Size** - Buyers pay more for larger fish, but
 - ▶ Premiums paid for increased size were reduced when supply of large fish increased
- ▶ **Gut ratio**
 - ▶ Overall negative effect on price for size
 - ▶ Marginal price of size increased at an increasing rate as more gutted cod became available: buyers became more quality conscious as supply increased
 - ▶ More recent analyses show it as a dominating factor, interacting with other attribute prices

(Rickertsen & Kristófersson, 2007)



WP1 - 'A cod is a cod': do these factors vary spatially? Yes.

- ▶ **Fish size varies**, possibly due growth, maturity, or environment
- ▶ Body condition and **gut ratio vary**, possibly due to growth, etc.
- ▶ **Density varies**, affecting cost
- ▶ All factors can vary through time



WP3: 'Complexities of cod fishing' draws together WP1 & WP2 to form an economic behavioural model to describe fishing location choice as it varies spatially and temporally within Iceland



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- ▶ Choices are made according to expected rent gained from cod fished in certain locations with preferred biological attributes as well as travel costs, exogenous factors, or fishing attributes
- ▶ Fit using logbook data; consideration of métier choice



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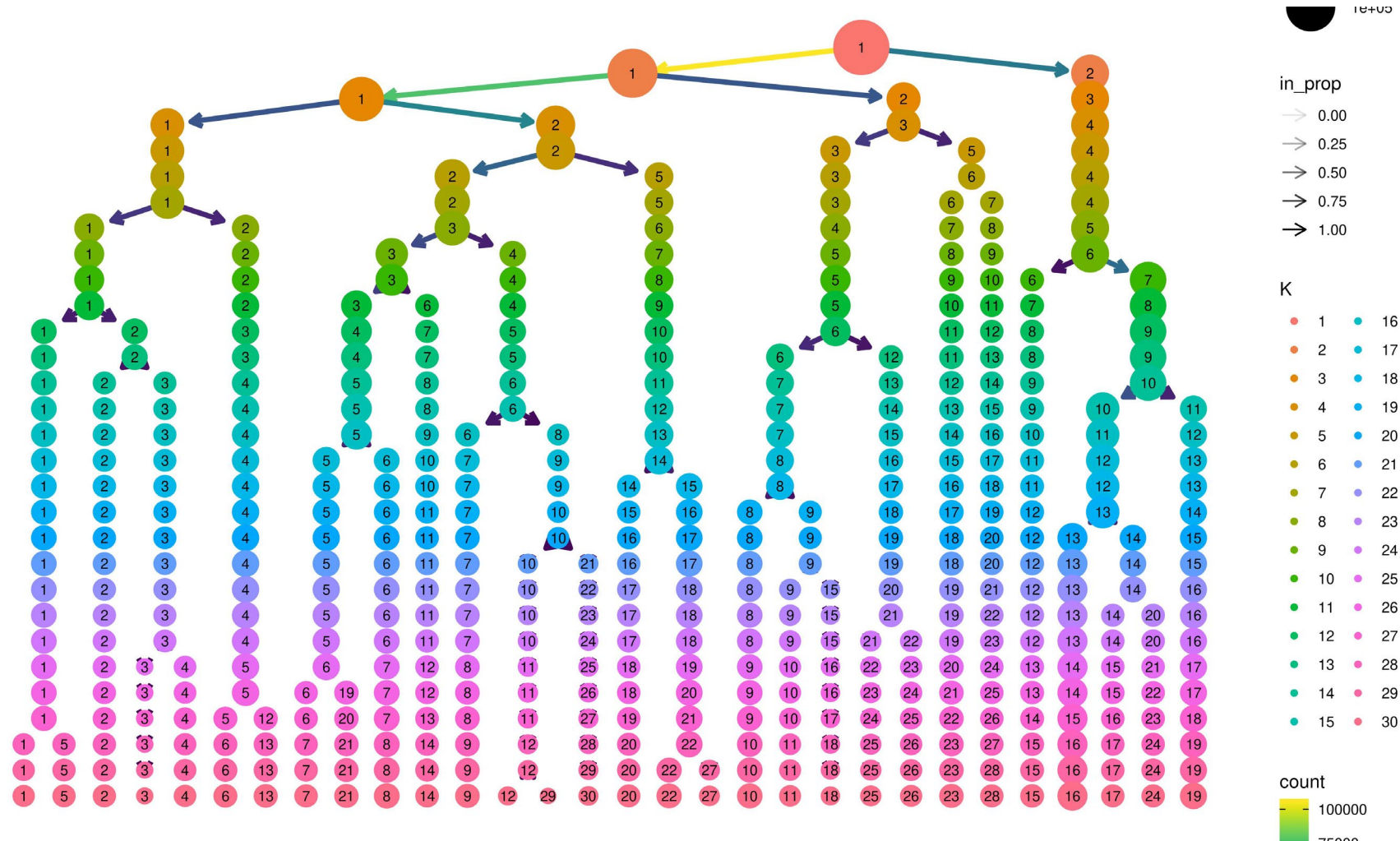
- ▶ Choices are made according to expected rent gained from cod fished in certain locations with preferred biological attributes as well as travel costs, exogenous factors, or fishing attributes
- ▶ Fit using logbook data; consideration of métier choice
- ▶ Model will be more detailed than similar models that sometimes ignore:
 - ▶ diversity biological attributes of the resource,
 - ▶ heterogeneity in resource users, and
 - ▶ spatio-temporal dynamics



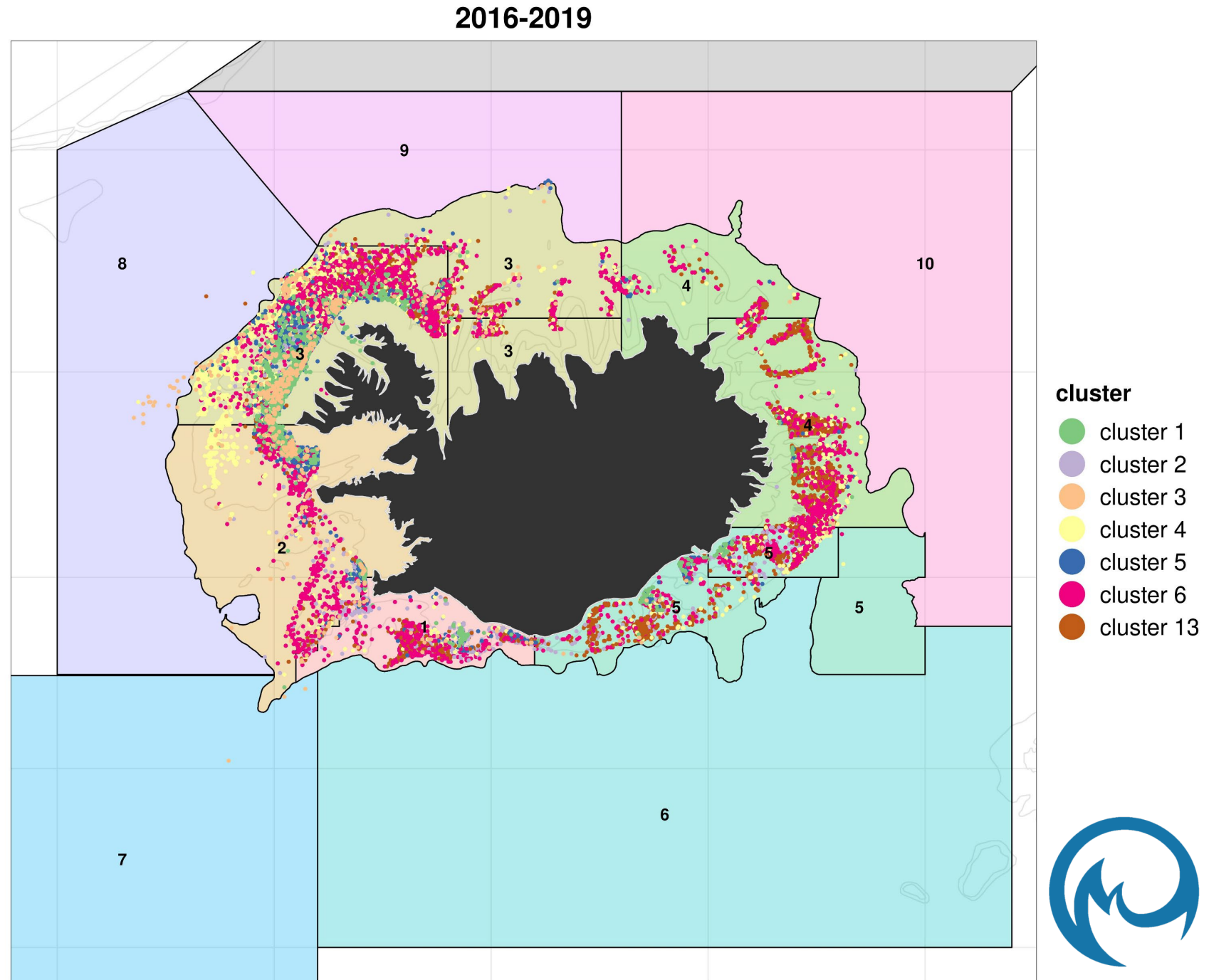
Some preliminary results



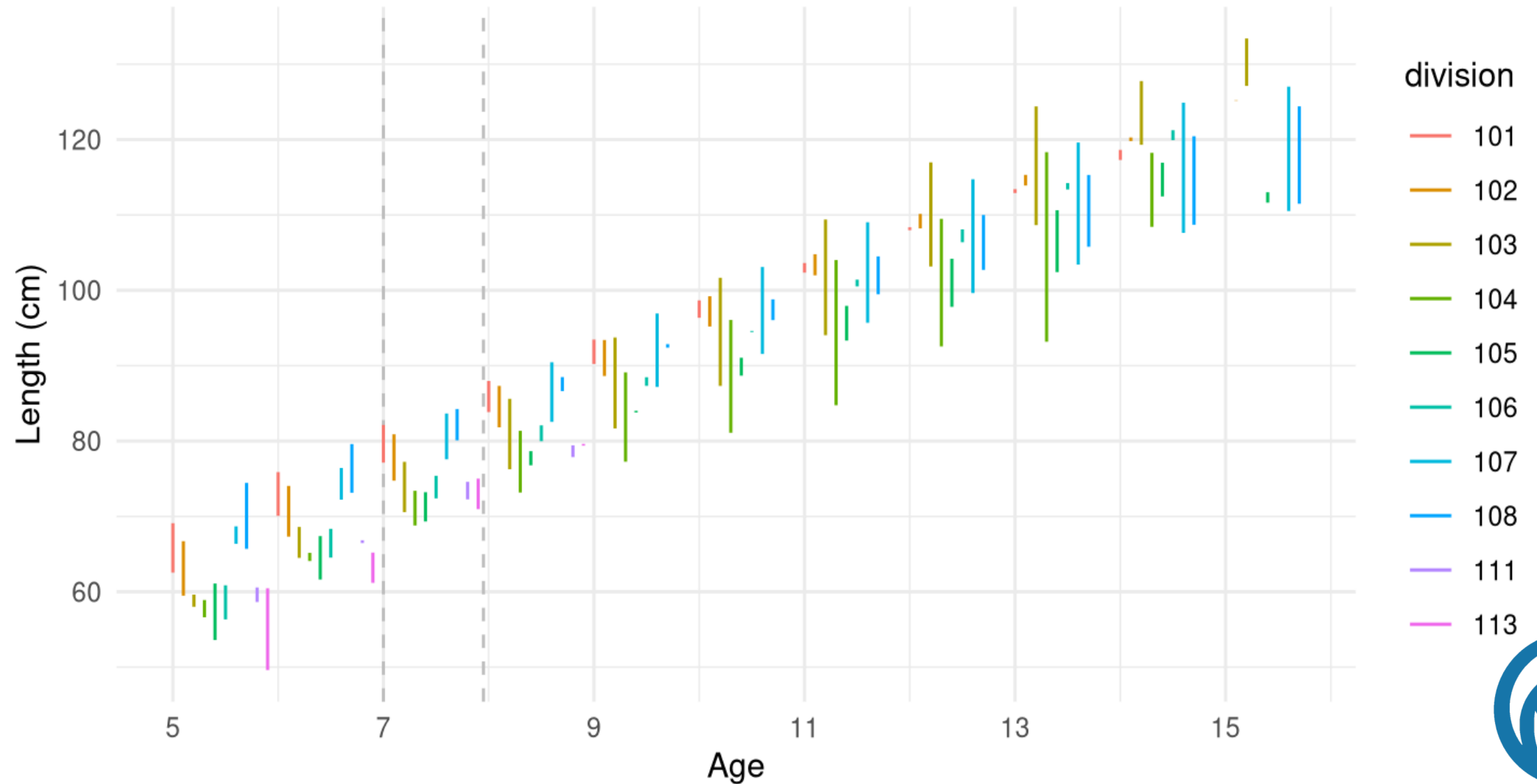
A greater understanding of logbook data gained through metiér analysis.



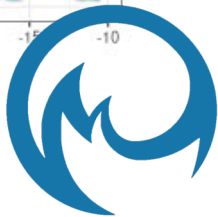
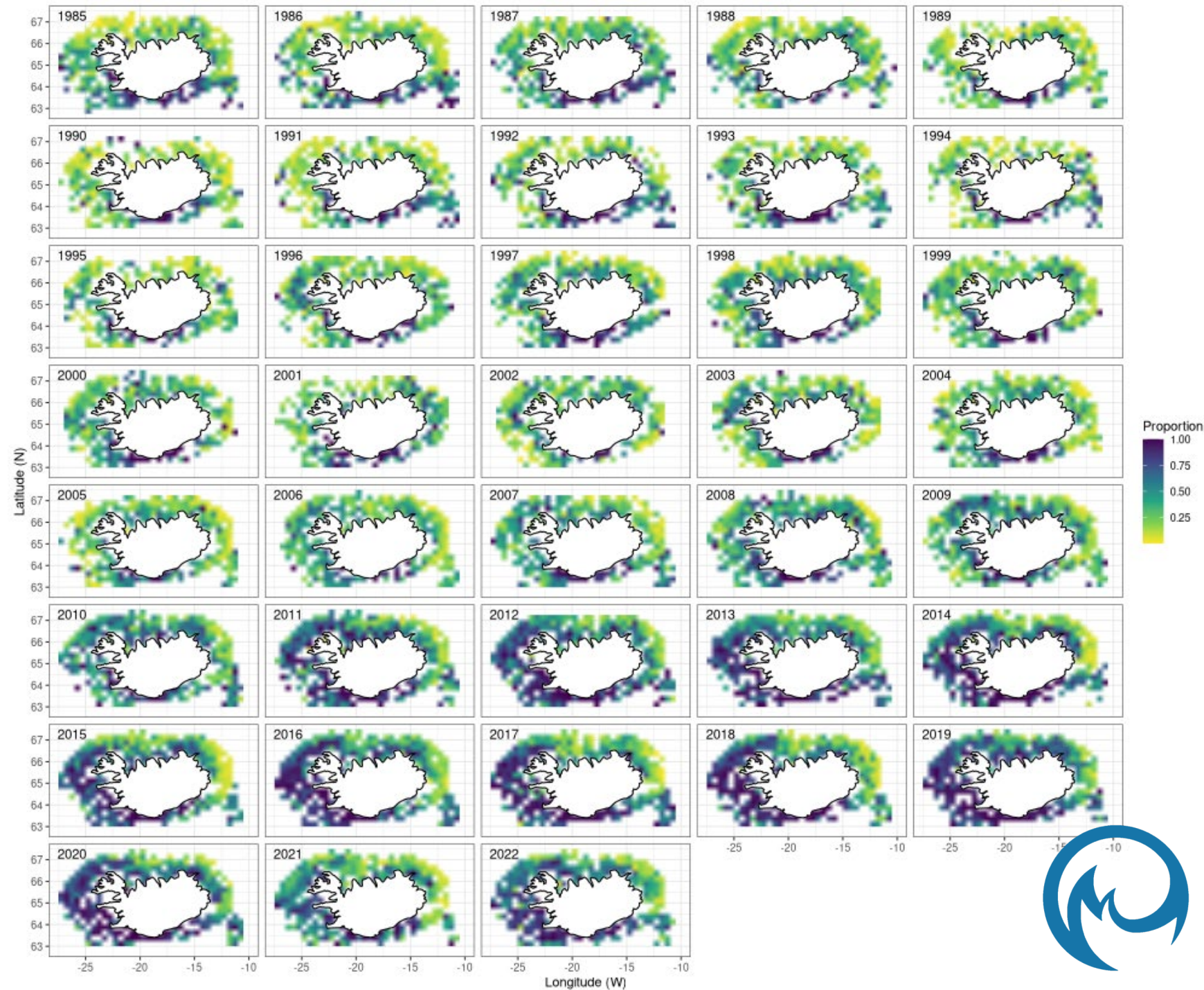
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Patterns in cod biology mapped: spatial differences in growth.

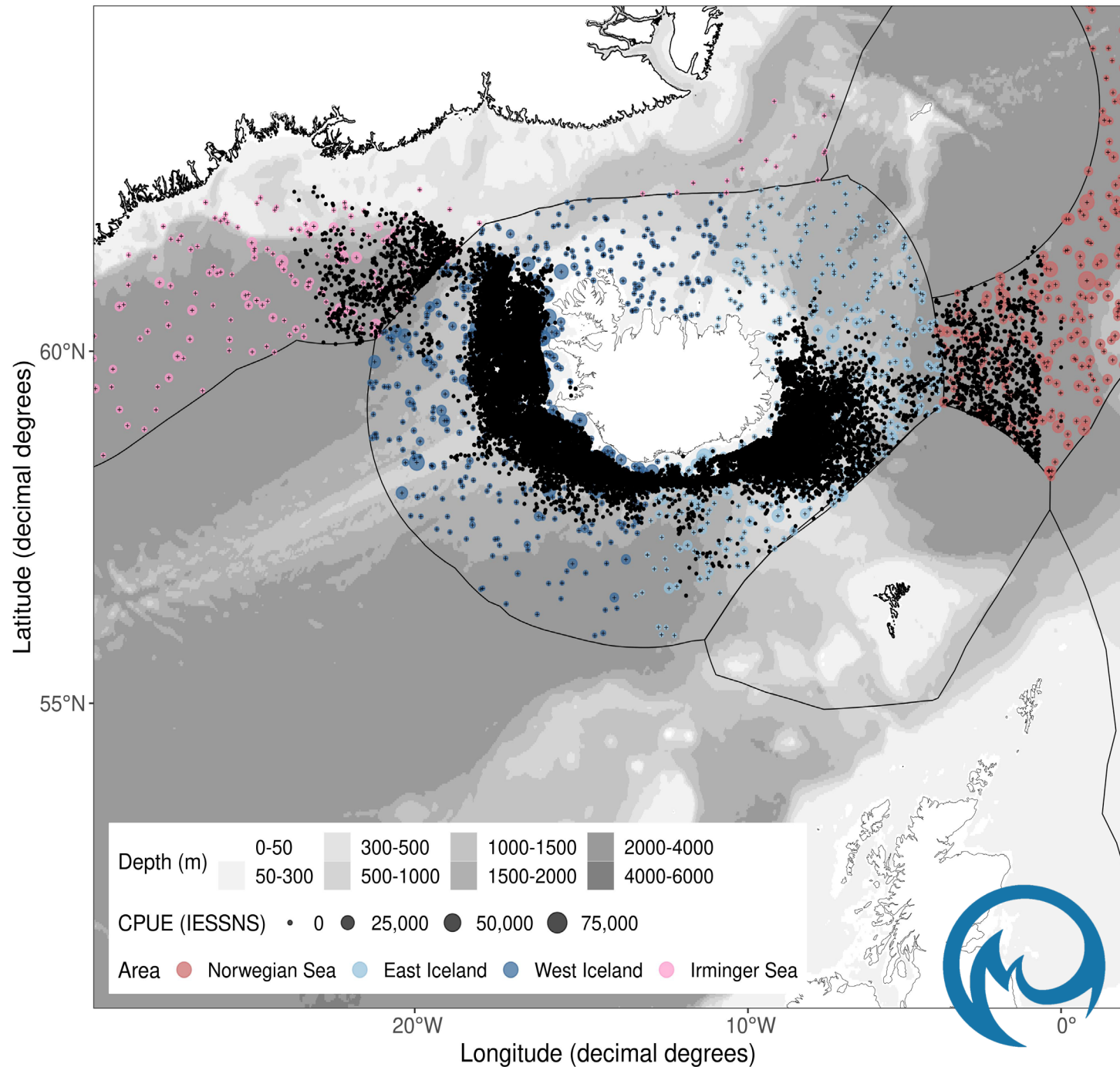


Spatial differences in availability of product quality analysed (here, proportion of 5kg or bigger cod)



‘Practice’ model of mackerel fishing completed

- ▶ 76% correct prediction
- ▶ Important predictors include price, vessel type/length, fish density, distance from port, previous expectations of catch (from previous 10 days or last year)





Mynd frá
Vísir/Vilhelm,
www.visir.is

Future

- ▶ Consult with industry on realism of results
- ▶ Connect spatial location choice model with simulations of the fishery to analyze management strategies that incentivize greater value generation from the cod fishery



Questions?

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