

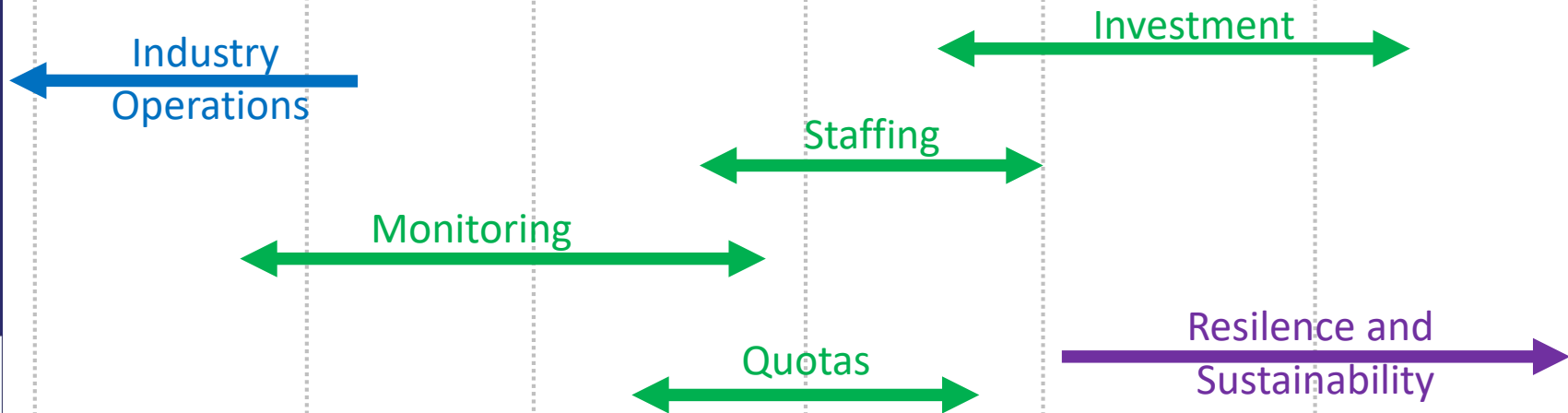
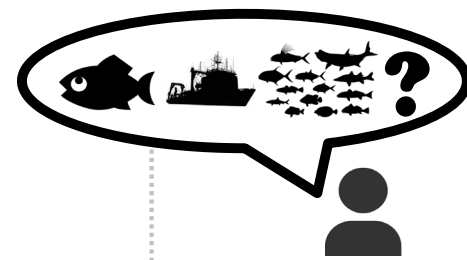
Blue-Action Arctic Impact on Weather and Climate Climate Services for Marine Fisheries

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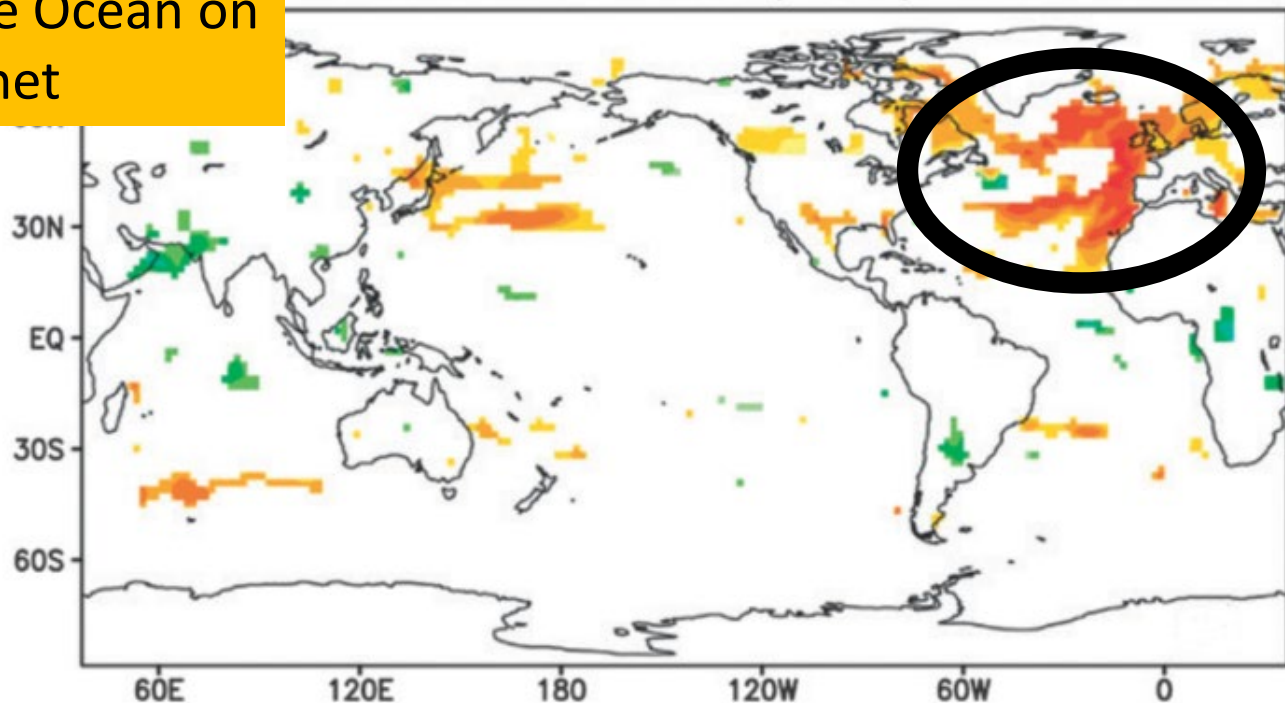
Time-scales of Fisheries Decisions



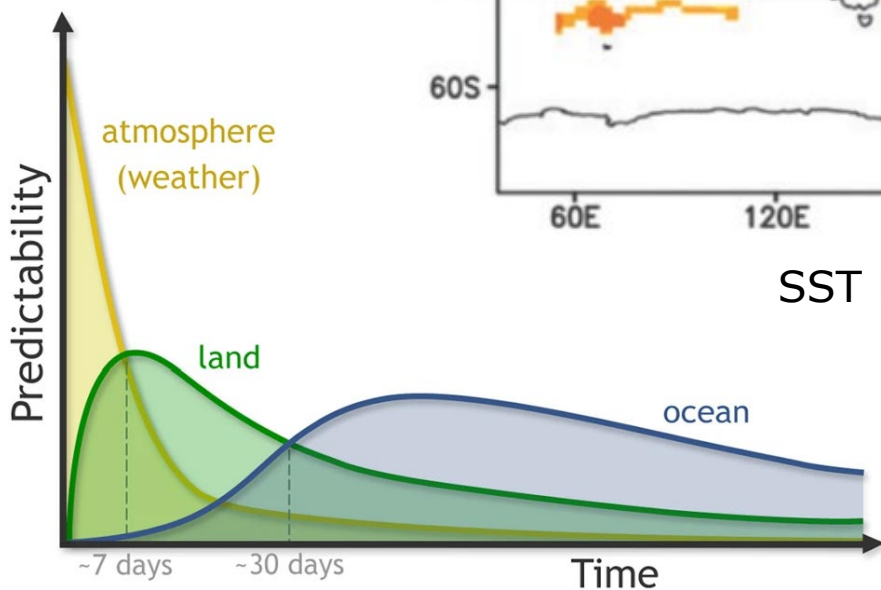
Day Week Month Season Year Decade 2050/2100

The Ocean can be forecast months and years ahead

The North Atlantic is the most predictable Ocean on the planet



SST Forecast skill, 2-5 years ahead



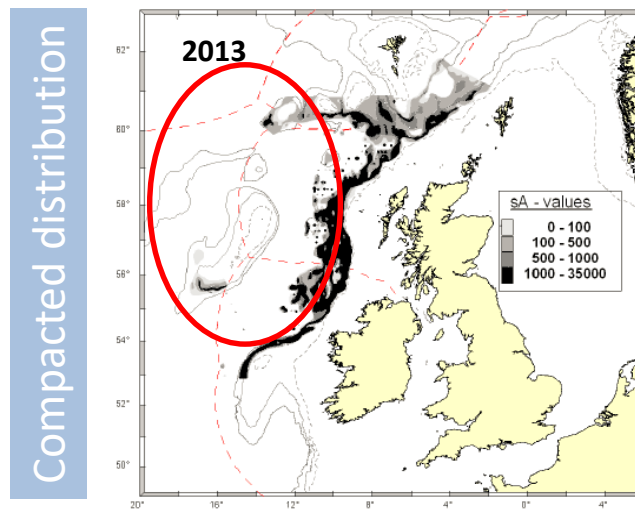
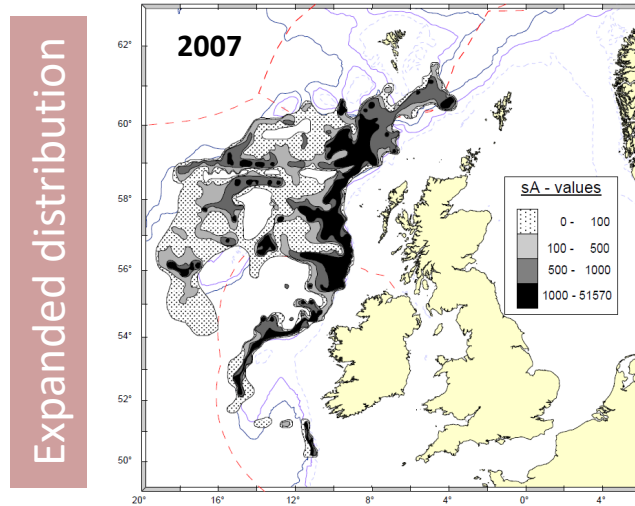
Forecasting Shifts in Fish Stocks

User: Management and Monitoring of Fish Stocks (ICES)

Species: Blue whiting

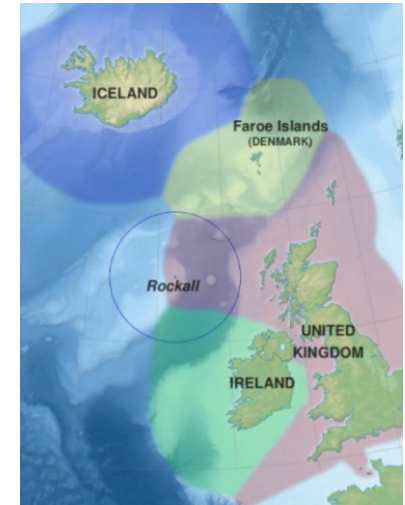


Shifts



Relevance

- Potential point of contention post-Brexit



Blue-Action issuing 6 month Forecasts

Forecast Habitat, 2019

Habitat compacted against shelf edge

Little / no spawning on Rockall plateau

Blue Whiting Forecast, 2019

Blue Whiting Spawning Habitat Forecast

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Forecast for 2019

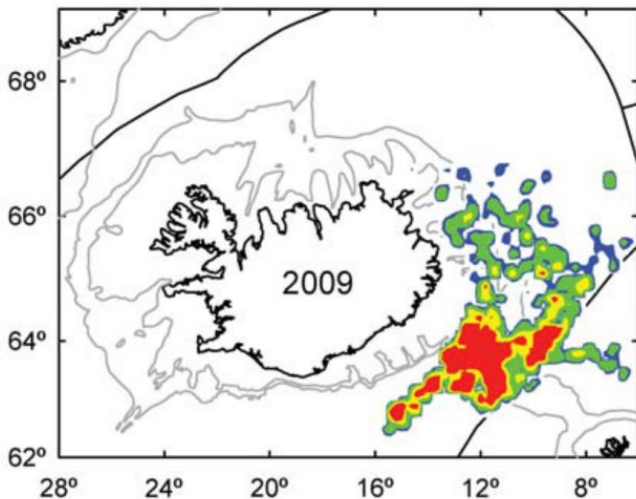
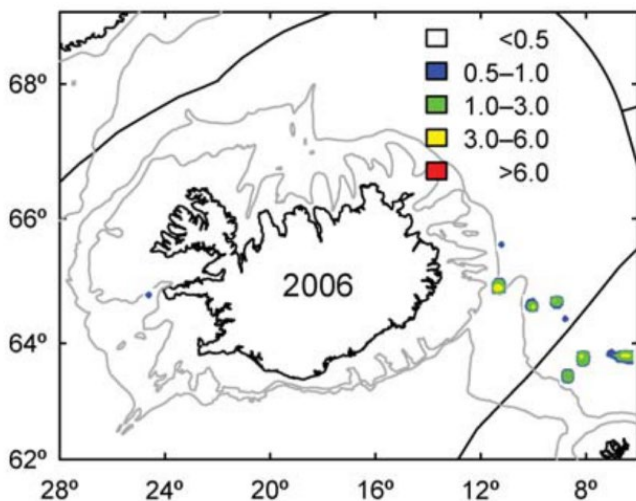
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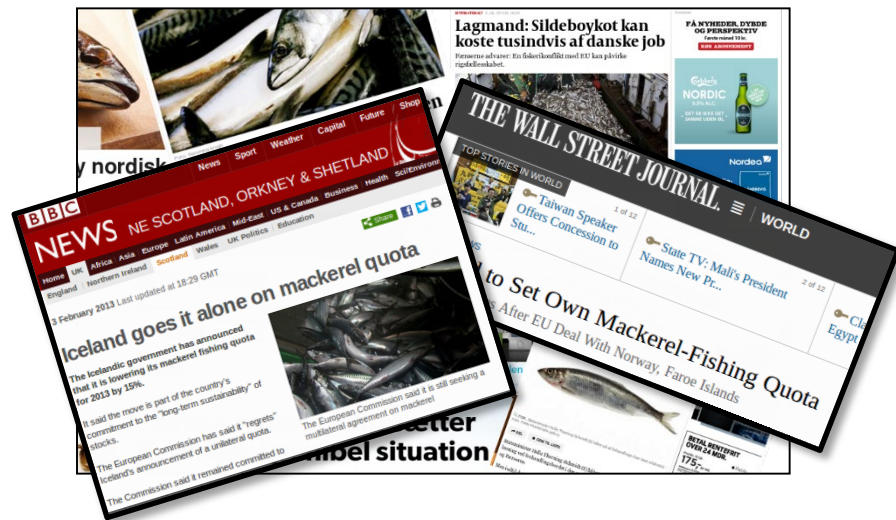
Species: Mackerel



Shifts



Relevance



Forecasts Under Development

- Habitat predictable up to 10 years into the future
- Shifts in 2007 could have been foreseen
- Potential to foresee changes in the next 10 years

Fish forecasts have an impact

European Green Deal elements

Mobilising research and fostering innovation

Fish forecasts closely linked development of a very high precision **digital model of the Earth**

From 'Farm to Fork': a fair, healthy and environmentally friendly food system

Fishery is key to managing the transition to a fair, **healthy and environmental friendly food system**, strengthen efforts to tackle climate change, protect the environment and preserve biodiversity

Preserving and restoring ecosystems and biodiversity

Healthy and resilient seas and oceans as part of the solution to climate change, in mitigating and adapting to climate change



Blue-economy: Improving the use of marine resources, promoting the production and use of new sources of protein, alleviating the demand on EU land resources

Common Fisheries Policy: reducing the adverse impacts that fishing can have on ecosystems especially in sensitive areas

What we still need: Research Gaps->Opportunities

Gap 1: Scalability of forecasting

Apply the tool generally across European fisheries

Move from open-ocean to regional seas and coasts



North Sea



Mediterranean Sea



Baltic Sea

Broaden applications



Aquaculture



Inland Fisheries

Gap 2: Exploiting this Technology

- Incorporation into existing European management
- Quantification of value of forecasts



Gap 3: Transferability

e.g via UN Decade of Ocean Science for Sustainable Development

“A predicted ocean” is one of six themes

Where can forecasting improve sustainability?

Which regions/countries?
Species? Responses?



2021 United Nations Decade
2030 of Ocean Science
for Sustainable Development



Conclusions

We can

- forecast the state of the ocean up to a decade ahead
- forecast biological responses in the ocean
- use these forecasts to increase sustainability and value of fisheries in Europe and around the world



The Blue-Action project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727852

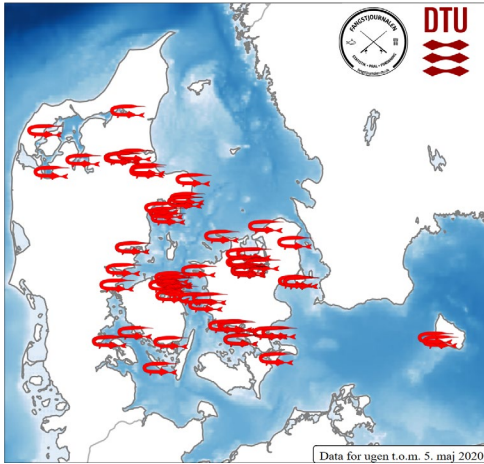
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Zenodo: <https://www.zenodo.org/communities/blue-actionh2020>

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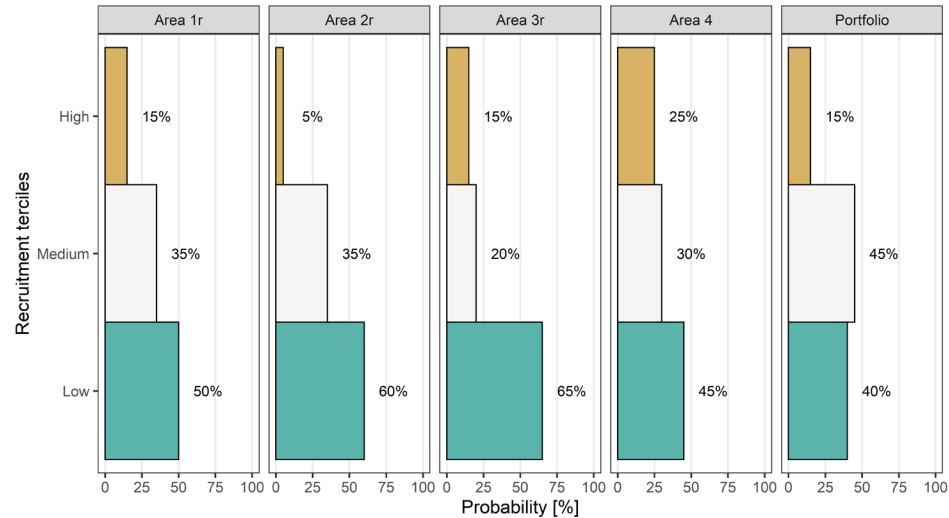
Other Climate Services

Timing of migrations (phenology)



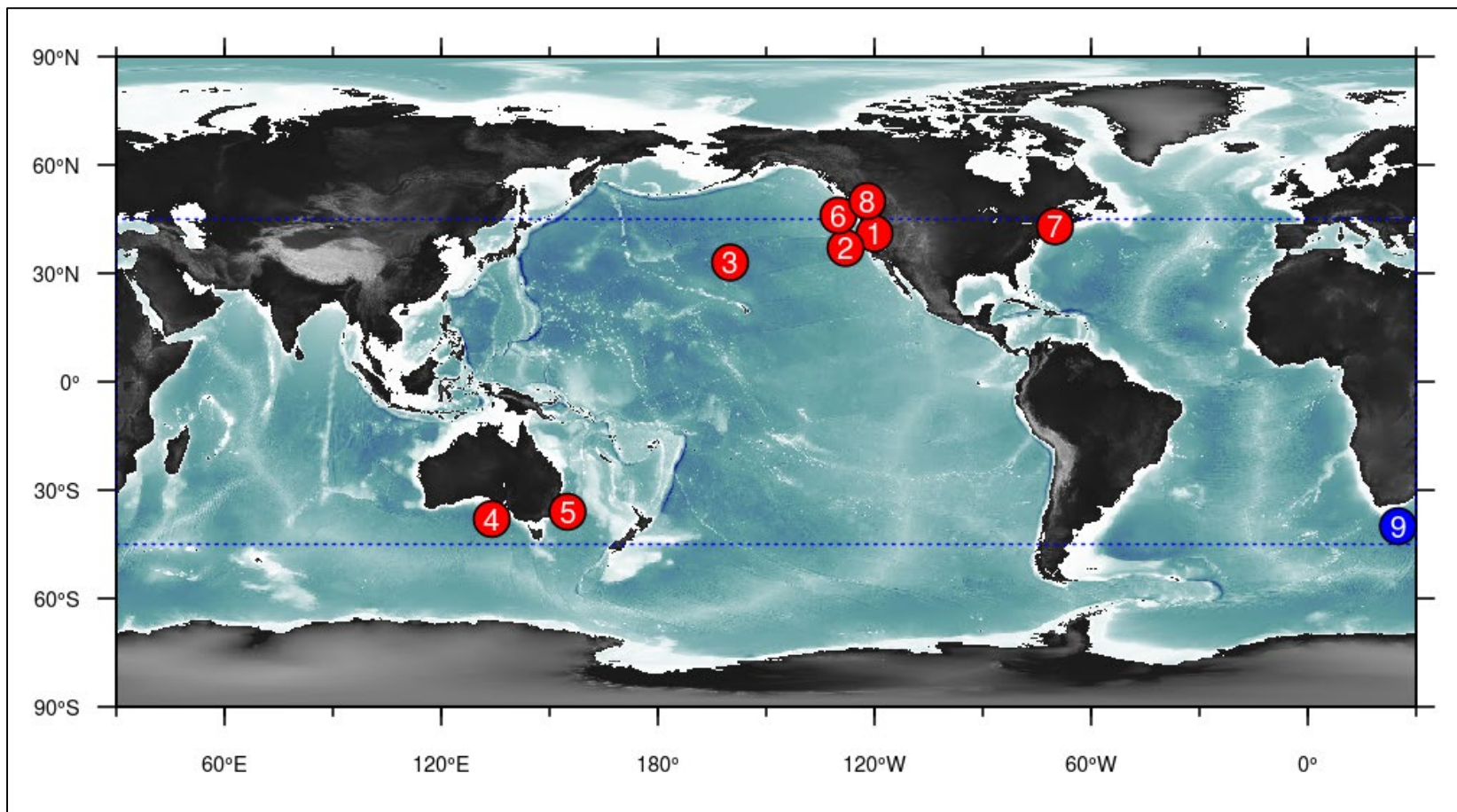
Users: Recreational fishers
Species: Garfish, Mackerel

Productivity (recruitment) forecasts



Users: Commercial fisheries
Species: Sandeel, (Cod, Sprat)

Review of existing marine climate services worldwide



Lessons from the First Generation of Marine Ecological Forecast Products

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Patrick D. Lynch¹⁰, Daniela Matei¹¹, Anna K. Miesner¹, Katherine E. Mills¹²,
Kjersti O. Strand¹³ and Ernesto Villarino¹⁴