# Using projections and perceptions to explore climate change impacts in south west UK fisheries



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# REPORT CARD 2020

THE 2020 REPORT CARD PROVIDES AN UPDATE ON SCIENTIFIC UNDERSTANDING OF CLIMATE CHANGE IMPACTS ON UK COASTS AND SEAS



#### **KEY MESSAGES**

There is clear evidence that warming seas, reduced oxygen, ocean acidification and sea-level rise are already affecting UK coasts and seas. Increasingly, these changes are having an impact on food webs, with effects seen in seabed-dwelling species, as well as plankton, fish, birds and mammals.

The upper range for the latest UK sea-level rise projections is higher than previous estimates, implying increased coastal-flood risk. The likelihood of compound effects from tidal flooding and extreme rainfall is increasing, which can greatly exacerbate flood impacts.

Oxygen concentrations in UK seas are projected to decline more than the global average, especially in the North Sea.

Fisheries productivity in some UK waters has been negatively impacted by ocean warming and historical overexploitation.

Impacts of climate change have already been observed at a range of heritage sites. Coastal assets will be subjected to enhanced rates of erosion, inundation and weathering or decay. A comprehensive, community view on the range and scale of physical, ecological and societal impacts of climate change on UK seas and coasts



#### Impacts of climate change on fish, relevant to the coastal and marine environment around the UK

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#### The impacts of climate change on fisheries, relevant to the coastal and marine environment around the UK

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## Ecological impacts of climate change within south-west UK seas







Increasingly blurred boundary between cooler northern waters and warmer southern waters

Already experienced ecological impacts on fish species e.g. spawning times, altered species richness



Rapidly warming sea area



Tinker et al. 2016



# Ecological impacts of climate change within south-west UK seas

### 8 species

Anglerfish

Sole

Solea solea



John dory Zeus faber



Plaice Pleuronectes platessa



Atlantic cod Gadus morhua



Megrim Lepidorhombus whiffiagonis



Red mullet

Mullus

surmuletus

Lemon Sole Microstomus kitt



What impacts on abundances and distributions can we expect in the future?



13 climate scenarios



## Relative abundance trends

Declines in cold adapted species incl. Anglerfish, Atlantic cod & megrim



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# Relative abundance trends

Declines in cold adapted species incl. Anglerfish, Atlantic cod & megrim

- Increases in john dory, lemon sole and red mullet, marginal for Dover sole
- European plaice relatively stable
- Most climate projections suggest similar trends, but increasing divergence after 2040s





Spatial abundance trends – Difference 2040s-2000s



Region-wide increases in abundance of John dory & red mullet. Dover sole projected to increase in most parts of the study area

Anglerfish (with the exception of RCP 4.5) and megrim projected to decline across their range, some localised increases for megrim to the west

Lemon sole projected to decline in the northern extent but increase towards the south

European plaice showed increases to the east of the region but decreases to the west



Backtransformed

Index of Abundance -

CPUE

-60





Expansions may provide new or further fishing opportunities (e.g. red mullet, john dory, Dover sole) but depends on access, markets, adaptability etc...



Future declines in anglerfish, Atlantic cod and megrim likely

• Further management measures to enable them to buffer further warming may be required



Most projected responses were comparable among climate projections, but uncertainty in the rate and magnitude of changes often increased substantially beyond 2040

Maltby et al. 2020 Journal of Applied Ecology





Weather extremes and storminess have fundamental roles in shaping fishers' behaviour

- Affect physical risk, discomfort and trip profitability and ultimately whether fishers choose to fish or not
  - Role of weather in participation decisions depends on technical fishing factors (gear, vessel characteristics), individual fisher characteristics (economic need, age) and social processes (behaviour of other fishers, dynamic with crew)

Storminess often missing from fisheries climate vulnerability assessments

Sainsbury et al. 2020



# Exploring perceptions of future change







# Exploring perceptions of future change – do impacts pose a risk?



Fishers identify numerous non-climate risks for the future





Overall climate change regarded as a low risk but fishers differ in their perceptions



*'I don't see it making any difference. Nothing, you know?'* 

'Things are happening and they're happening at an alarming rate'

Scepticism & perceived ability to adapt influence low risk perceptions. Age also important.

Maltby et al. 2020 in review



# Exploring perceptions of future change – ability to adapt



Fishers differ in key aspects of their adaptive capacity. Those with lowest AC had commonalities:



Felt less connected



Focused on short term planning



'Stuck' in fishing



Older than other fishers



# Exploring perceptions of future change



Awareness of impacts may not necessarily translate into perceived need or willingness to prepare for and adapt to future impacts



Climate change not seen as a major risk to fisheries by many fishers in Brixham

Multiple other non climate risks identified which fishers will also be responding to



Low risk perceptions and scepticism suggest potential issues regarding perceived legitimacy of future climate-orientated fisheries management measures



Further work is needed to understand perceptions of multiple stakeholders



What do projections and perceptions tell us about climate change in south-west UK fisheries?



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Fisheries within the south-west UK will continue to be impacted by climate change, facing both opportunities and risks to important fish stocks

However, fishers' future responses depend on both their perceptions of change & their capacity to change

Incentivising adaptation through awareness raising will likely be insufficient; fisheries adaptation planning should also tackle wider constraints and future non-climate risks

Thank you for listening!

