Climate Change and UK Fisheries – perceptions of risk and possible adaptation options

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The North Sea – a ‘hot spot’ of climate change.....

One of 20 sites identified by Hobday & Pecl (2013) as having warmed the fastest
72% of the fish species have responded to warming by changing distribution and abundance (Simpson et al. 2011).

Centres of distribution have generally shifted by distances ranging from 48 to 403 km (Perry et al. 2005).

The North Sea demersal fish assemblage deepened by ~3.6 m per decade between 1980 and 2004 (Dulvy et al. 2008).

Catches (1913–2007) of cod, haddock, plaice and sole have all shifted distribution albeit not in a consistent way (Engelhard et al. 2011).

In the UK we have witnessed both “winners” and “losers”
The UK Climate Change Act (2008)

A legally binding long-term framework to cut carbon emissions.

It also created a framework for building the UK’s ability to adapt to climate change, including:

1. **a UK wide climate change risk assessment** that must take place every five years

2. **a national adaptation programme** which must be put in place every five years to address the most pressing climate change risks to England

3. **Powers to direct “reporting authorities”** to prepare reports on how they are acting on the risks and opportunities from a changing climate.
This study included a detailed assessment of whether or not the UK fish catching sector can adapt to the opportunities (and threats) associated with future climate change.

Used the analyses of Jones et al. (2012, 2013)

The ECR focussed on species increasing in the UK EEZ, such as anchovy, squid, seabass, scallops, boarfish, and hake.

"is there a case for further intervention to deliver effective adaptation given the current context"?
Projected changes in fish distribution...

Projected change (in km) in latitudinal centroids from 1985 to 2050 across species distribution models and climatic datasets for a) pelagic species and b) demeral species (from Defra 2013).

The ensemble projections suggested northward shifts at an average rate of 27 km per decade (the current rate is around 20km per decade for common fish in the North Sea, Dulvy et al. 2008).

The species predicted to move the furthest and fastest were squid, red mullet, seabass, anchovy and sardine.

UK waters will become more hospitable for these species

(based on analyses by Miranda Jones)
Expanding fisheries in recent years......
Emerging seabass & squid fisheries

In 1984 only 210 tonnes of seabass were landed by countries surrounding the North Sea and English Channel, compared to 2243 tonnes in 2013.

Recent evidence (ICES 2012) suggests that the increase may have slowed slightly over the past 3 years, as a result of successive cold winters with resulting poor recruitment.

International landings of squid have risen from 375 tonnes in 1980 to 4527 tonnes in 2013.

Off north-east Scotland, more boats are now trawling for squid than they do for the region’s traditional target species, such as haddock and cod (Hastie et al., 2009).
The key adaptation actions the UK fishing industry is likely to make include:

1. **Travelling further** to fish for current species, if stocks move away from UK ports.
2. **Diversifying the livelihoods** of port communities, this may include recreational fishing.
3. **Increasing vessel capacity** if stocks of currently fished species increase.
4. **Changing gear** to fish for different species, if new or more profitable opportunities are available.
5. **Developing routes to export markets** to match the changes in catch supplied.
6. **Stimulating domestic demand** through joined up retailer and media campaigns.
Consumer tastes and preferences

Most of the fish we eat in the UK we import and most of the fish we catch we export.

There is clear maladaptation, in that consumers continue to demand ‘traditional species’ (e.g. cod) and we obtain these from countries further North (Iceland and Norway).

We sell the fish/shellfish we catch (e.g. Nephrops and mackerel) to countries further south who have a tradition of eating these species.

In 2011 the supermarket Sainsbury’s ran a campaign “switch the fish”. This initiative challenged the supermarket’s customers to try an “alternative” fin-fish species.

Sainsbury’s reported an annual increase of sea bass sales of 57%.

People also often chose sea bass when they eat out as it is seen as more exclusive than cod. However, it is not seen as an everyday food.
Recommended interventions

A. Enhance the capability to monitor new and more abundant species, involving collaborative working of fishing vessel operators with the scientific community.

B. Use appropriate existing communication channels to engage with vessel operators and embed learning in relation to best-practice fishing behaviours for new, or more abundant, species.

C. Examine methods to increase the flexibility with which vessels can adapt, for example by trading quota across operators of all sizes of vessel (large and small).

D. Proactively support the diversification of consumer demand through the provision of information to consumers about a wider range of fish species and through marketing.
• 27 countries are part of the EU and are subject to the EU Common Fisheries Policy (CFP)
• Fisheries agreements also exist with neighbouring countries e.g. Norway, Iceland and Russia
• The CFP allows common access to all EU waters, but quotas are set according to ‘relative stability’
• TACs vary each year but proportions allocated to each country are fixed in perpetuity!
The current debate about North Atlantic Mackerel……

In 2011 Iceland and the Faeroe Islands claimed quota for mackerel (46%), since the species had suddenly attained high abundance in their territorial waters.

EU countries accusing Iceland and the Faeroe Islands of threatening stock sustainability.

There has also been a threatened retaliatory embargo on imports of all fish products from these countries.

Such disagreements may become more common place in the future

(see talk by Leif Nøttestad, day 1)
Anchovy – who should be granted access?

Anchovy stocks are depleted in the Bay of Biscay, but are increasing further north.

Political negotiations are underway to determine whether Spanish and French vessels should be allowed to operate in areas where previously they had no quota.

Petigas et al. (2012) carried out an analysis to determine “is it the same anchovy or something different”?

Concluded that these anchovy are a distinct remnant sub-stock rather than an invasion of animals from the south.

According to the rules, Spanish and French vessels have no ‘track record’ and so would not necessarily be granted access.
Boarfish (Capros aper) appeared in very large numbers throughout the NE Atlantic in 1989/1990.

In the past boarfish outbreaks had been linked to storms and variability in offshore climate (Cooper 1952).

Fishery landings have grown from <120 t in 2001, to >139 000 t in 2010.

The fishery has been described as an ‘Olympic Fishery’ as countries race to develop a track record.

In 2012, Irish Ministers began negotiations with Chinese seafood companies with regard to exporting for human consumption.
Industry perceptions about CC risk and exposure……

Aims to “support the UK seafood industry to develop a managed adaptive approach to climate change”

Comprised a literature review, substantive collaboration with the industry, 15 semi-structured interviews and 3 workshops

Considered all aspects of climate change (temperature, storminess, sea level rise, ocean acidification etc.)

Covered both domestic and international

Priority risks were identified in terms of: (1) confidence, (2) proximity, (3) severity, (4) possible adaptation actions
“The governance systems we have are too rigid. Governance is not well placed to provide routes for the industry to adapt – it’s adding to the problems”
Robert Stevenson - Fish Producers Organisation

“In the long term the processing sector needs to find new markets that will absorb the changing product”
Will Clark, Fish Merchants Association

“We’re fortunate just now as there’s a large share of valuable stock in UK waters. However if this were to change, then this would require changes to access rights if the fish shifted (back) to the Norwegian sector”.
Ian Gatt – Pelagic Fishermen's Association
In October 2014 the EU introduced a ban on discarding and thus a requirement to land all fish caught. Once the least plentiful quota - the “choke species”—is exhausted, the whole fishery must cease operation.

Hake, a warm-water species, has witnessed a dramatic increase in biomass between 2004 and 2011, and has recolonized the North Sea where it had largely been absent for over 50 years.

Low quota for hake in the North Sea will become a limiting factor, that may result in premature closure of the entire demersal mixed fishery.

Baudron and Fernandez (in press)
Climate change is not just about temperature......

Projections of future storminess are very uncertain, but generally for the UK we expect more frequent, severe storms.

During the winter of 2013/2014 strong storm events had devastating consequences for the inshore fishing industry.

Many vessels were tied up in port for more than 5 months, with implications for revenues, profits and local economies and damage to both onshore infrastructure and to the fishing vessels themselves.

The winter of 2013/14 was the stormiest in the last 66 years (Matthews et al. 2014)
## Some Conclusions...

**Table 7. Summary of organisational adaptive capacity**

<table>
<thead>
<tr>
<th>Fleet</th>
<th>Enablers to adaptation</th>
<th>Barriers to adaptation</th>
<th>Policy barriers</th>
<th>Overall capacity to adapt</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-shore</td>
<td>• Currently fish mixed species.</td>
<td>• Cannot travel far.</td>
<td>• Cannot trade quotas between themselves.</td>
<td>Are versatile and opportunistic, yet restricted to opportunities that come to them.</td>
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<td></td>
<td>• Low operating costs.</td>
<td>• Decisions can be dominated by short-term considerations.</td>
<td>• Threat of losing shellfish licence if change away from shellfish.</td>
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<td></td>
<td>• Supply niche markets in the UK (restaurants and local fishmongers).</td>
<td>• Generally not represented by producer organisations (may be part of associations).</td>
<td>• More easily displaced by MPZs.</td>
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<td></td>
<td>• Net replacements rates for investments.</td>
<td>• Many based in small ports where access to export markets can be an issue.</td>
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<td>Demersal and beam</td>
<td>• Currently fish mixed species.</td>
<td>• Northern fleets fishing cod have low profitability.</td>
<td></td>
<td>Incentivised not to travel further for current species but will face strongest policy and capacity barriers to changing species.</td>
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<td>trawlers</td>
<td>• Will need to have replaced nets within the next 20 years of species change.</td>
<td>• High operating and fuel costs restrict ability to travel further or invest in new gear.</td>
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<td>• May have more incentive to change if current fishing low profit species.</td>
<td>• Vessels only suitable for demersal species.</td>
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<td>• Fishing for species all year round.</td>
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<td>Pelagic</td>
<td>• Profitable so likely to have investment finance options.</td>
<td>• Tend to target one species at a time.</td>
<td>• Typically profitable species, limited by quota allocations to the UK.</td>
<td>Currently the vessels are profitable so have capacity but lack incentive.</td>
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<td></td>
<td>• Fish seasonally, so may have off-season underutilised capacity.</td>
<td>• Pelagic species can move and change quickly.</td>
<td>• Large ships which need enough quota allocation to make the industry viable.</td>
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<td>• Larger vessels and ability to travel further.</td>
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<td>• No time at sea restrictions.</td>
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<td>• Currently export a large amount of stock – not reliant on the UK market for demand.</td>
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<td>• Their supply chain also work seasonally so may have underutilised capacity.</td>
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</tbody>
</table>
In May 2012 MCCIP launched a ‘special topic’ report card on fish, fisheries and aquaculture.
Lots of media coverage:

- BBC Wildlife, August 2012
- The Guardian, 9th May 2012
- Scientific American, 2nd July 2012
Fin……

Acknowledgements:

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