



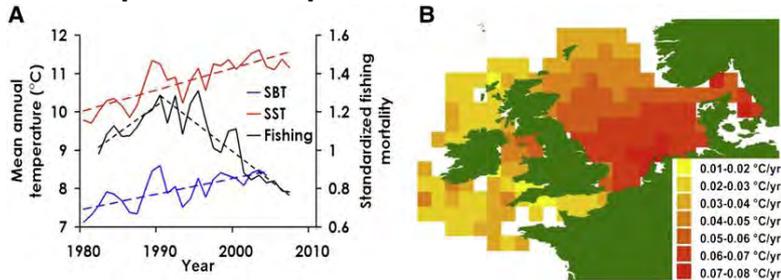
Answering the “so what” question: communicating with policy makers, members of the public and the media

John K. Pinnegar

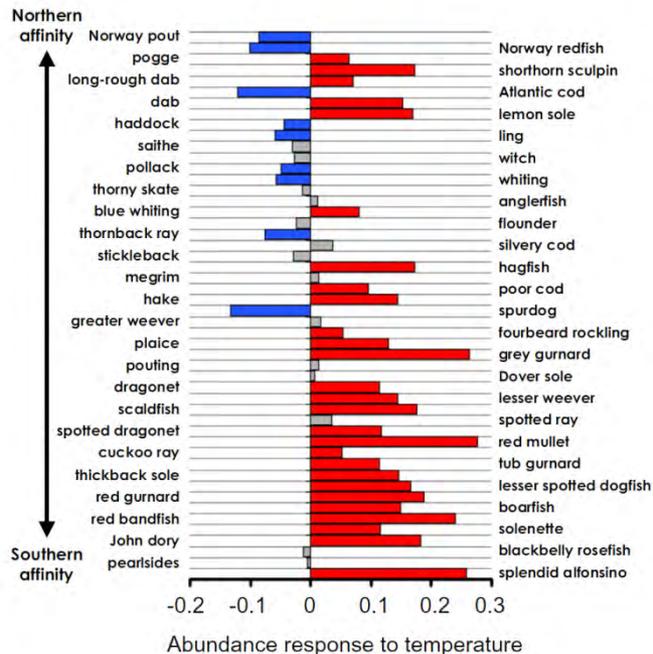
Session 6: Workshop on Global Assessment of the Implications of Climate Change on the Spatial Distribution of Fish & Fisheries (WKSICCME-Spatial), 24th May 2013

Observed 'northward' distribution shifts

Temperature response



Winners & Losers



70% 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).

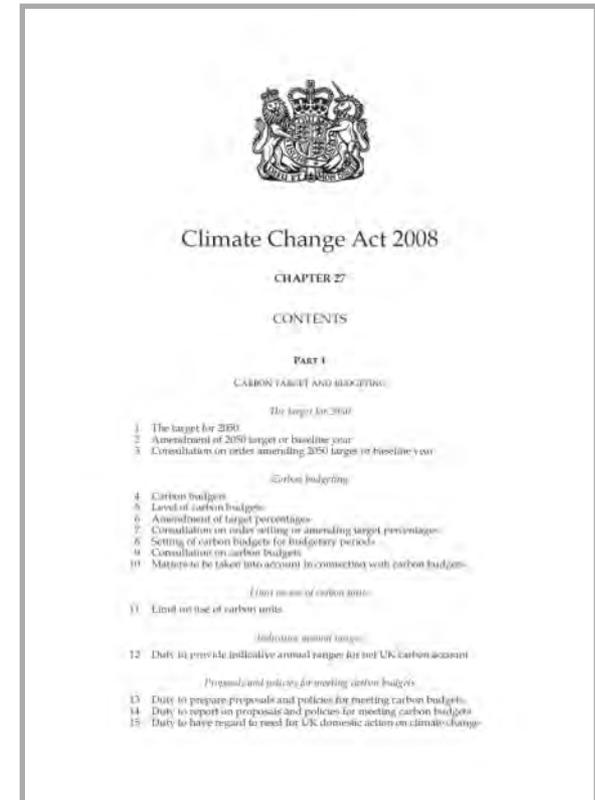
Catches (1913–2007) of cod, haddock, plaice and sole have all shifted distribution albeit **not in a consistent way** (Engelhard et al. 2011).

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.



UK Climate Change Risk Assessment



The CCRA (published in Jan 2012) reviewed evidence for over 700 potential impacts.

Detailed analysis was undertaken for over 100 of these impacts across the 11 key sectors:

Agriculture, biodiversity, business, built environment, energy, flooding, forestry, health, **marine**, transport and water.

Cefas were lead authors on 'marine and fisheries'

11 Marine & Fisheries Response Metrics



- Harmful algal blooms
- Sewer overflows and associated human health risks
- Water borne pathogens & warmer temperatures
- Ocean acidification and dependent species
- **Shifting distribution of commercial fish species**
- Melting arctic sea ice
- **Spread of alien and invasive species**
- Disruption to ferry services and shipping
- **Impacts on marine biodiversity**
- **Year class strength in commercial fish and shellfish**
- Nutrient cycling and ecosystem function.



CCRA - Messages

Metric MA4 – Shifting distribution of commercial species

Some species will shift their distribution away from the UK and this may mean **greater fuel costs** for vessels that continue to target these resources, other shifts may offer **new fishing opportunities**.

Metric MA6 – Spread of invasive non-native species

ALL assessed invasive non-native species will be able to **expand their range by the 2080s** to encompass the entire UK.

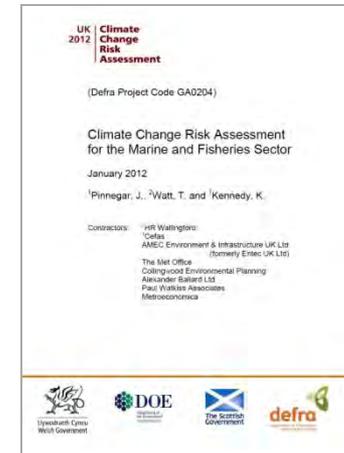
Metric MA8 – Impacts on marine biodiversity

Seabird species will vacate sites in England, Wales and Northern Ireland over the next 100 years, in particular spectacular and visitor-friendly species such as Puffin, and Gannet.

16 inter-tidal invertebrate species were projected to expand their range in the British Isles

Metric MA9 – Year class strength in commercial fish

Spawning stock biomass will be greatly impacted by climate change, but this effect will be **negative for some species and positive for others**.



ECR (Economics of Climate Resilience)

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.

Economics of Climate Resilience
Natural Environment Theme: Sea Fish
CA0401

A REPORT PREPARED FOR DEFRA AND THE DEVOLVED
ADMINISTRATIONS

February 2013

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ECR (Economics of Climate Resilience)

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.

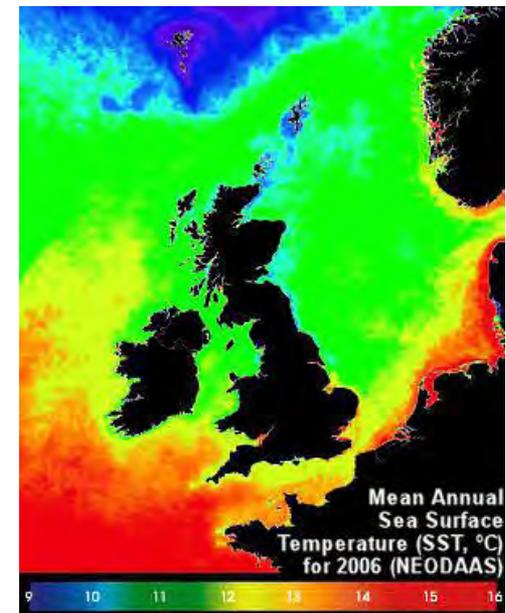


The UK & Ireland Marine Climate Change Impacts Partnership (MCCIP)

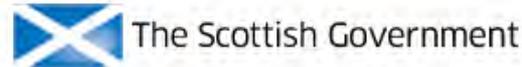
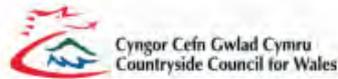
MCCIP jointly funded by Defra, the Crown Dependencies and the Devolved Administrations (as well as the Republic of Ireland)

The primary aim of the MCCIP is to provide **transfer high quality evidence on marine climate change impacts, and guidance on adaptation**, to policy advisors and decision-makers.

Short-listed **in the top 3, out of 80+ UK science initiatives** in the UK Civil Service Awards (ceremony at Buckingham Palace)



MCCIP partners



Marine Environmental Change Network



MCCIP Annual Report Card 2010-11



- Latest report published mid-July 2010
- 100 scientists from 40 institutes contributed on 30 topics
- 12 page-summary card with headline messages
- Communicates uncertainty on each topic
- The 2010/2011 launch event (in July 2010) received media attention all around the world, and was attended by 7 ministers.

Imitation is the best form of flattery (the Australian ARC card launched in 2009)

MCCIP Fish, Fisheries & Aquaculture Card 2012

2012



Marine Climate Change Impacts Partnership

Marine climate change impacts

Fish, Fisheries & Aquaculture

Understanding how climate change will have an impact on fish and shellfish around the UK and Ireland is fundamental to managing activities in our seas. MCCIP therefore commissioned three groups of scientists to consider how climate change is affecting marine fish, fisheries and aquaculture and what the social and economic consequences could be.





DISTRIBUTIONS

There are clear changes in the depth and latitudinal distributions, and migration and spawning behaviours of fish, many of which can be related to warming sea temperatures.

MANAGEMENT

Cultivated shellfish and finfish are susceptible to climate change, although fish farming technologies offer good potential for adaptation.

Controlled or closed fishing areas (a type of protected area) that can be adapted in response to climate change have the potential to help protect commercial and vulnerable fish stocks.

SOCIO-ECONOMICS

Marine recreational fishing is an important socio-economic activity that could be positively affected by climate change because of the increasing abundance of species that are of interest to anglers.

WIDER IMPLICATIONS

Shifting distributions of fish have led to a series of international disagreements and will continue to have implications for fisheries management across international boundaries.



www.mccip.org.uk/ffa

In May 2012 MCCIP launched a 'special topic' report card on fish, fisheries and aquaculture

REVISED (REVISED 2012) MARINE AND FISHERIES IMPACTS PARTNERSHIP
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Review of climate change impacts on marine fisheries in the UK and Ireland

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Review of climate change impacts on marine fish and shellfish around the UK and Ireland

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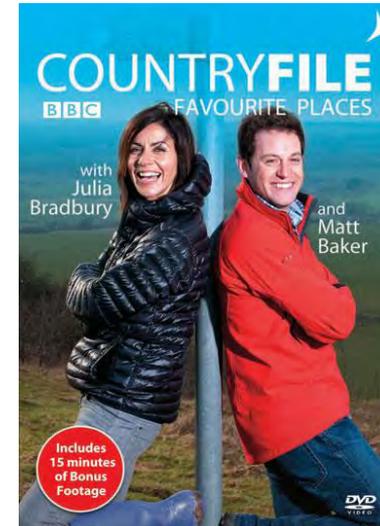
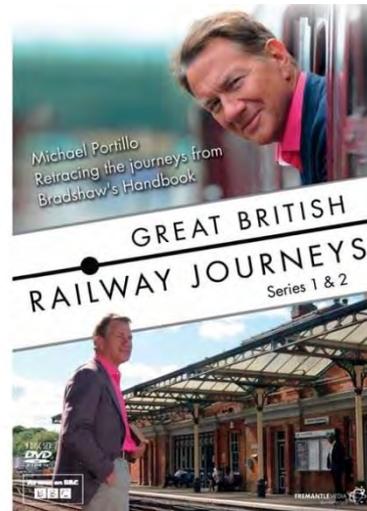
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Review of climate change impacts on marine aquaculture in the UK and Ireland

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Media Coverage:



BBC Wildlife, August 2012

The Guardian, 9th May 2012

Scientific American, 2nd July 2012

Conflicts between nations....

Species **distributions may migrate across the boundaries** where quotas belong to different nations.

A notable example has arisen recently as a result of **quota allocations between Norway and the EU, and between Iceland, Faroe Islands and the EU.**



In October 2009 Mackerel moved away from the Norwegian Sector, resulting in **disagreements over permissible catches by Norwegian boats in EU waters.**

Norwegian **vessels were forcibly evicted** from Scottish waters, once they had caught their allotted

The current debate about North Atlantic Mackerel.....

Iceland and the Faeroe Islands unilaterally 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 (and potentially the **loss of MSC accreditation**).

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

Mackerel battle heats up

Special report by Quentin Bates

FOR a species that 25 years ago was a fairly marginal fishery, North Atlantic mackerel is now a vital element in the pelagic complex. The EU Pacific Regional Advisory Council (BRAC) estimates that the fishery is a whole worth around \$500m-£300m annually, based on 2009 prices. The figure is likely to have been higher if the previous year's boom had been used as a basis.

Negotiations over access to the stock is becoming increasingly fierce. Traditionally fished by Norway, the Faeroe Islands and EU nations, including the UK, Ireland, Denmark and Iceland,

...where yields have appeared on the scene. These locally sourced vessels, which now fish mackerel in its home waters for the first time, and Russia which sees a valuable resource in international waters.

A major problem is the lack of a common position in the mackerel sector, as that the present allocations are largely based on distribution of the stock as it was in the mid 1970s, before the mackerel area had moved over a wide area out further along the coast, both east and west of the British Isles.

If the UK, Denmark started opening up Faeroe waters and shifted gradually northwards, spreading more fish to Norwegian waters and in the last few years, into the Atlantic EU.

...The EU Pacific BRAC estimates that the North Atlantic mackerel fishery is a whole worth around \$500m-£300m annually.

Denmark expresses concern over stock's health

History has shown that those who join keep on fishing are the winners in the long term," said Christian Olsen of Hirtsholm-based Pelagisk RO of Danish pelagic operators.

"North, the Faeroe and Iceland had a free fishery on fish whiting while the EU had limits on what is caught each - and who has the largest blue whiting stock here."

He said that Iceland has no history in ever fishing mackerel and how long it thinks it can stay outside against its reputation as a responsible fishing nation.

He also adds that although he hopes to see an agreement this year that includes Iceland, this is by no means certain and that if Iceland has seen a run of the year's of 100,000 per year landings by the time concrete negotiations are a possibility, they may feel that there is a strong case.

"But it is worrying for the stock. Although there will be an agreement between the coastal states on mackerel that includes Iceland. In the short term the stock should be able to absorb this fishing effort - including Iceland - but not in the long term," he said and pointed out other concerns.

"We are seeing a decline in mackerel now. The larger individuals appear to have migrated north and west so it is a possibility that Iceland has taken a big part of this population of the older mackerel."

"Now that we are seeing average lower weights, there is a likelihood that Iceland's activities have influenced not just the size of the stock but its overall composition."

"If it is the older mackerel that migrates longer distances, there is the possibility that they won't return and there could be less abundance over the past. In the case it would be an embolism for Iceland if it can't catch its quotas," he speculates.

Norway sees EU access

Mr Olsen said that talks on a bilateral agreement between Norway and the EU have almost been through these plans - but mackerel is a key topic in the negotiations. He believes that Norway had pointed itself into a corner, putting itself into a position in which it could hardly go back immediately on its own terms.

"But I think they will agree this time," he said. "Access to EU waters is important for Norway. Although it would be difficult to call Norway's half and as if they can catch their 2010 mackerel quota, the full-over remainder of the 2009 quota they said their fishermen they could have without access to the EU zone."

Norwegian hypothesis

"The Norwegian hypothesis. Over the years, Norway has always been willing to find a position that benefits its own industry, but will change that position when they benefit isn't there," said Mr Olsen.

"It is one point Norway had free fishery on blue whiting in international waters, but it's a half a century ago that we had a half a century to EU waters."

"What Norway says, the Icelanders are now doing with mackerel, they [Norway] are doing themselves with haddock. This is a stock that occasionally has a tendency. Norwegian waters and while the EU has had some restrictions on haddock for many years, in Norway this was uncontrolled."

"Last year, when Norway had caught the haddock mackerel quota of 34,000t, about 30% of the 825 mackerel quotas - they increased it, twice. First to 75,000 and then to 120,000 - this is important to 60% of the allowed catch. Even Iceland does not ask for 60% of the mackerel TAC, but Norway finds this acceptable."

"He said there is a real need to move away from the appropriate way of working. "Norway has to take a step back and be realistic," he said.

Faeroes push for a higher share as abundance grows

Fisheries minister Jacob Vestergaard indicated last year in an interview with Fishing News Norwegian leader paper Fiske-Nytt that the Faeroes are looking for a larger share of mackerel for 2010, based on the year's greater abundance in their waters.

"It is common knowledge that the mackerel have moved considerably to recent years. Mackerel are significantly more abundant in the Faeroe waters and vessels did not fish mackerel in our zone last autumn," he said.

The minister also commented that there are talks in the Faeroe Islands possibly not being included in a mackerel agreement, in which case a Faeroe quota would have to be set. This could bring sanctions by Norway and the EU.

"It is difficult to assess the consequences if we do not have agreements with Norway and the EU. We have tried to put a date on these consequences, and the question remains whether or not, we could recover some of what we lose by fishing several lines in the current quota in our own waters," he stated.

"Fish prices change constantly, so that the calculations are not easy. But there could be disadvantages for some fleet groups, but possibly benefits for others."

Norway plays cards close to chest on agreement

It's a very difficult situation," said Audun Mark, the director of Norwegian fishing vessel operators association Fiskebåt. "We don't have an agreement with the EU, we don't have an agreement within MSAC, and we don't have an agreement with the Faeroe Islands and the EU, we also have Russia there with its history on mackerel."

He does not appear to see agreement at the coastal state meeting in March.

...know how long there may be mackerel in Icelandic waters. Iceland had blue whiting in its waters for a few years and that gave them a 10% to 17% share of the TAC. But the last few years haven't seen any blue whiting in Icelandic waters - and the same could happen with mackerel," Mr Mark said.

"The stock becomes smaller and the water temperature and the scientists are telling us to likely, then we would see that stock shift again. This is very difficult to predict and we have to take into consideration the possibility of the same occurrence as happened with blue whiting in which Iceland would no longer have a claim and the Faeroe claim would equally be void."

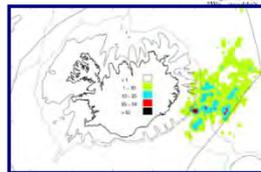
"If the situation is such as come as that there is mackerel in quantities present in Icelandic waters, then they will be invited to become a coastal state. But they have to document their landings in a better way and also be less provocative, it said, adding to the presence of Russia with its interest in the fishery and its history of catching mackerel as another influence on the situation," he concluded.

Mr Mark said that the more complex by the lack of agreement - however coastal state - although Norway and the EU could reach agreement soon.

"The bilateral negotiations use so much energy that this will make the more difficult meetings and meetings at MSAC level more difficult to predict and says that the EU put Norwegian fishermen in a very difficult position at the end of 2009."

"It needs to be more constructive than it has been. If not, we can live without an agreement - although, we would prefer to have a signed agreement in place," he concluded.

■ The EU and Faeroe reached agreement on shared stocks on 15 January. See page 3



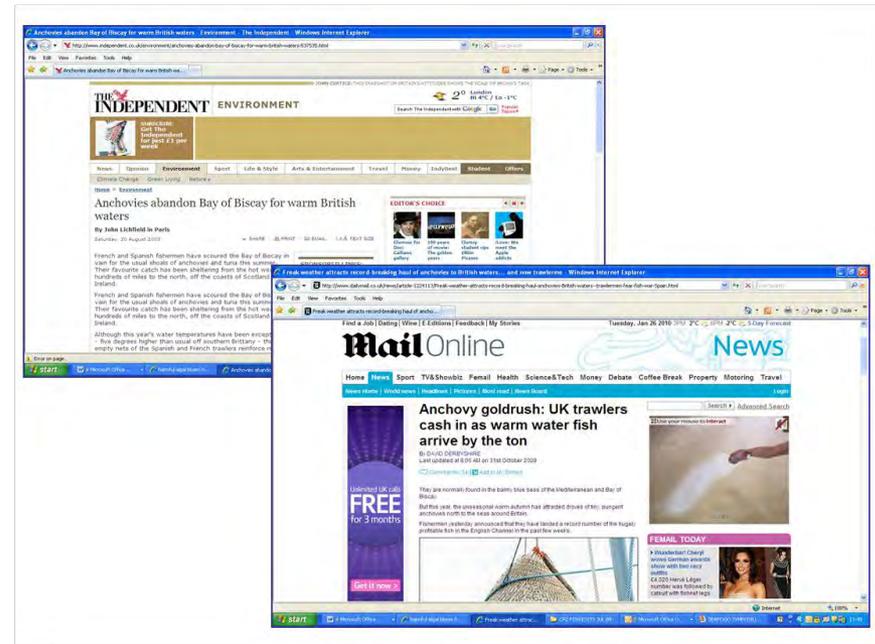
Anchovy – who should be granted access?

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

According to rules of 'relative stability' in the **EU Common Fisheries Policy**, Spanish and French vessels would **not be granted access.**



Useful Stuff:



In 2011 Link et al. wrote a review paper that provided **guidelines for incorporating climate-associated fish distribution shifts into fisheries management.**

The management response will be different, depending on whether:

- (1) a cohesive stock has simply **moved from one locality to another,**
- (2) a stock is simply **expanding its distribution** – but not necessarily declining anywhere,
- (3) a stock moves into **the area already occupied by another stock** but remains behaviourally or genetically distinct;
- (4) an existing **stock that splits** into two new sub-populations;
- (5) two previously distinct **stocks merge**, e.g. as a result of mixing due to sea ice melting

Triggerfish:



Triggerfish are **now occurring in greater numbers** off the southern coast of the UK.

Recreational anglers are increasingly targeting them on inshore wrecks.

There have been several **stories in recreational angling magazines** over the past year



Sea Academy
Nine pages of unmissable advice

35 Catch More... Triggerfish	43 Kneels How to use them to fish triggerfish	46 Hottspots The best places to find triggerfish
38 TSP's Hugs How to use them to catch triggerfish	44 Tackle The best tackle for triggerfish	

Catch More TRIGGERFISH

Learn how to target triggerfish from the shore by following TSP's definitive guide full of top tips and tricks...

Triggerfish Facts
The triggerfish is an unmistakable fish to UK waters, as it's possibly the most tropical-looking fish we have! It sports a deep, oval body and small eyes set high up on the head, which are well away from the mouth. The mouth is small, slightly beak-shaped, with fucose-like teeth. The dorsal fin sports three spines, with the first one strong and sharp, which is used to lock the fish into cracks in the reef and rocks when required, and also acts as a deterrent to potential predators. If you push down on the second spine of the dorsal with your finger, it acts like a trigger and depresses the first strong spine, literally unlocking it, hence the name. There are no pelvic fins, just a sharp spine, and it also carries two or three large bony plates at the rear of the gill opening. The coloration varies little. It's usually olive-brown to greyish with the dorsal and anal fins fringed with blue lines. The skin is rough and gives the triggerfish the appearance of 'bark' in some parts of the world. The triggerfish is usually an open-sea species, but

sometimes makes firm shallow-water during high summer. It's thought that it spends its early years in deeper water withouth, and offshore of the Bay of Biscay. The young live among floating vegetation used in the tropical Atlantic, and the adults are often found in intertidal areas with floating wreckage and living in and under large, floating wood accumulations. The triggerfish is geographically distributed by following ocean currents that flow towards land. The diet of the adult includes crustaceans, shrimp and marine mollusks. However, its biology and habits are inhumanly personal. The triggerfish is becoming more common in UK waters and is now a regular summer catch, whereas pre-1980 it was classed as merely caught on road and time - though, in truth, few anglers tried to

about the triggerfish is supposedly successful, and suggests that the species is more widely spread than previously thought.

Where And When To Fish
The triggerfish is found mainly on the south and west coasts of the UK, but is common around the

Shore Record
5lb 10oz from C. L. G. (Llandudno, North Wales), 1999

Specimen Target Weight: 10lb 6oz

Boarfish



Landings have grown from **<120 t in 2001, to >139 000 t in 2010.**

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

In 2012, the Irish Minister began **negotiations with Chinese seafood companies** with regard to exporting for human consumption



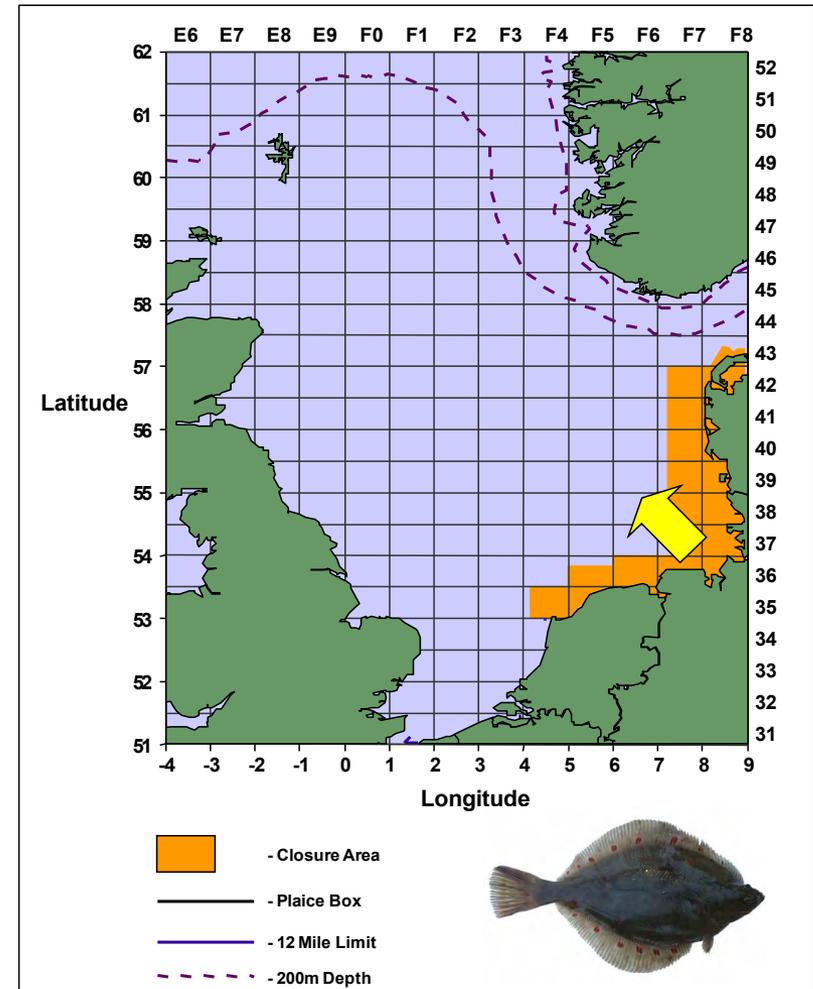
Species may move outside MPA boundaries

The **Plaice Box** was first established in 1989 to reduce discards of juvenile plaice (i.e. to protect nursery grounds).

Recent surveys in the Wadden Sea have shown that juvenile **plaice are absent from the area where it once was very abundant.**

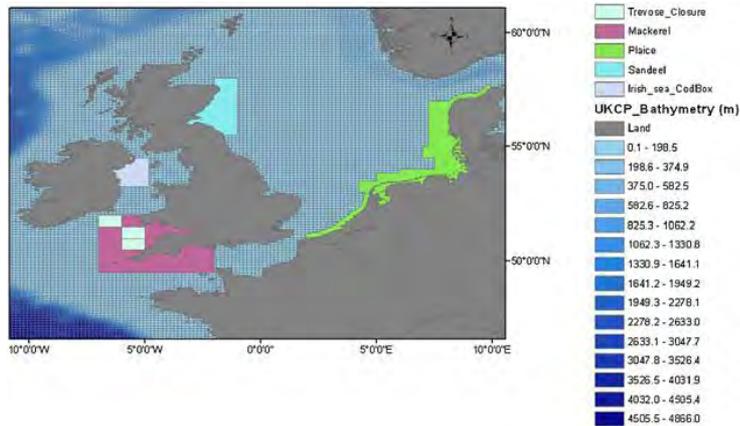
The 'Plaice Box' is now much less **effective** as a management measure in comparison with 10 or 15 years ago.

MPA boundaries may need to be 'adaptive' in the future.



[see van Keeken et al., 2007]

Fisheries Closure Areas under the EU Common Fisheries Policy



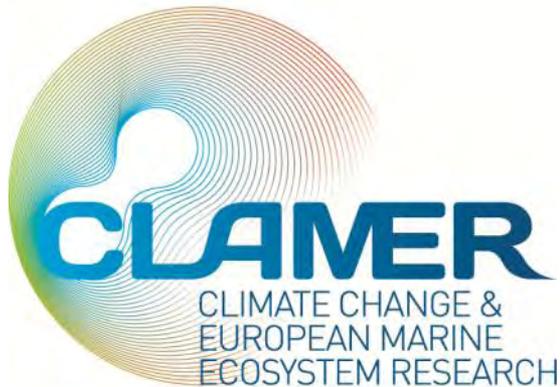
- The Plaice Box
- Celtic Sea Mackerel Box
- Sandeel Box
- Trevose Cod Box
- Irish Sea Cod Box

	Near sea bed temperature (°C)			
	Winter	Spring	Summer	Autumn
Celtic Sea Mackerel Box	2.4	2.5	2.5	2.7
North Sea Plaice Box	3.1	3.0	2.8	3.2
Firth of Forth Sandeel Box	2.5	2.5	2.2	2.3
Trevose Cod Box	2.4	2.5	2.3	2.5
Irish Sea Cod Box	2.5	2.6	2.4	2.7

Predicted change in the near sea bed temperature (°C) assuming a medium emissions scenario for the years 2080-2099.

Understanding the public

TNS opinion was commissioned by Cefas to conduct a quantitative evaluation of the awareness of marine climate change issues in 10 European countries

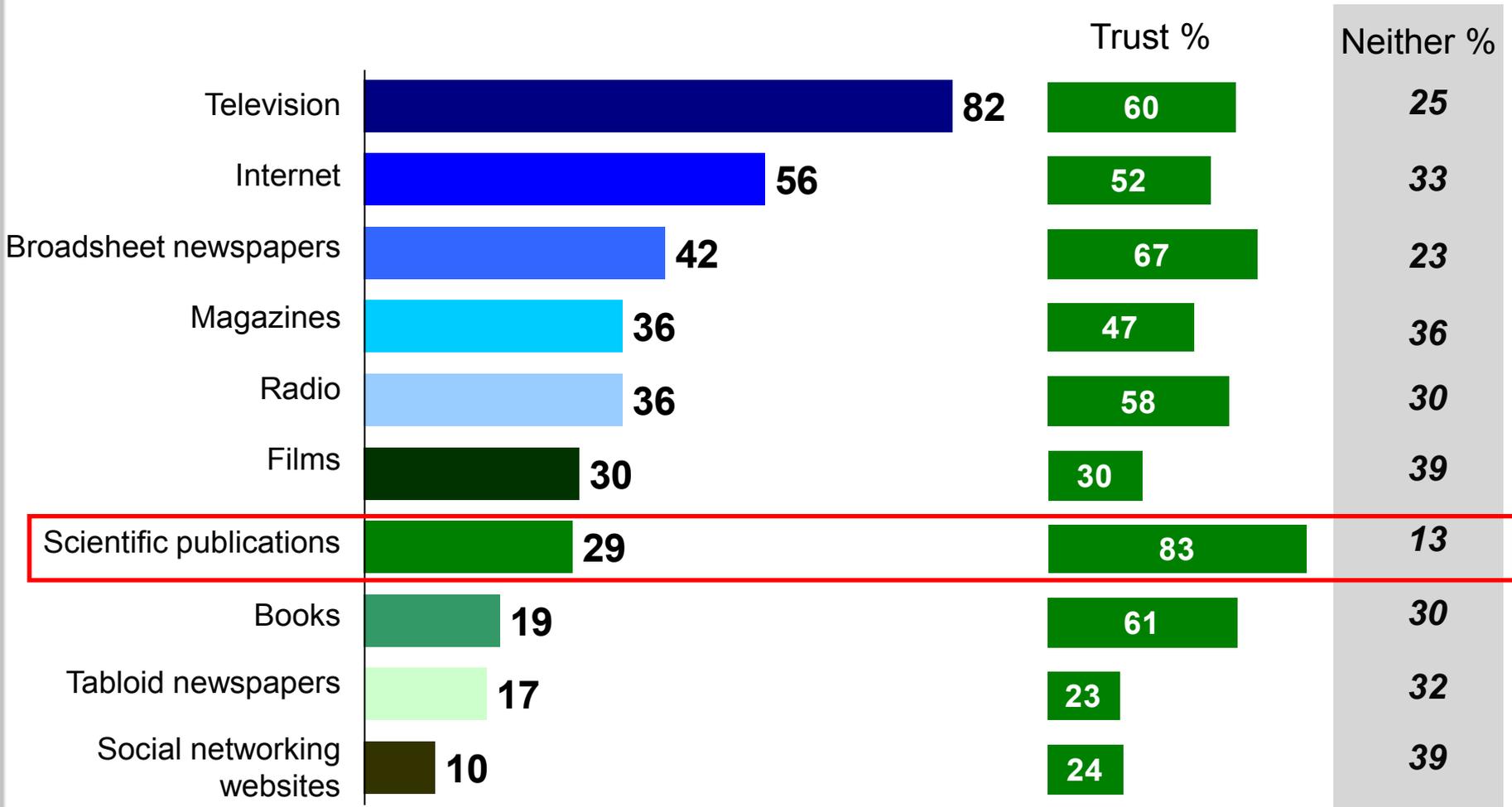


CLAMER is a European Union 7th Framework Programme project

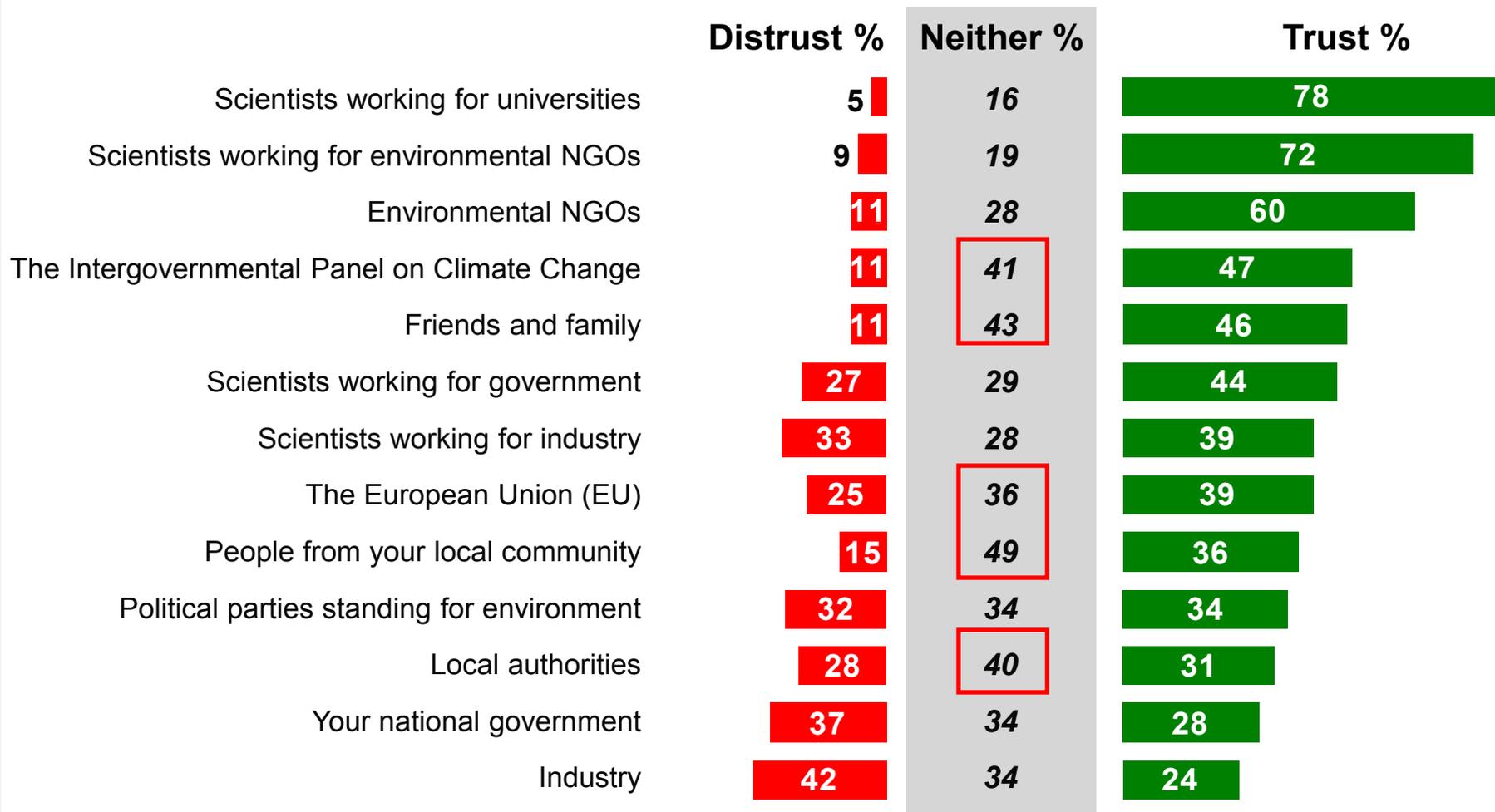
The project builds upon the widely-held belief that **there is a gap between what is known through research and what policy makers and the public know and understand** about the effects of climate change on the oceans.



Sources of information and trust - media



Information and trust – organizations / individuals



Fin.....

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