



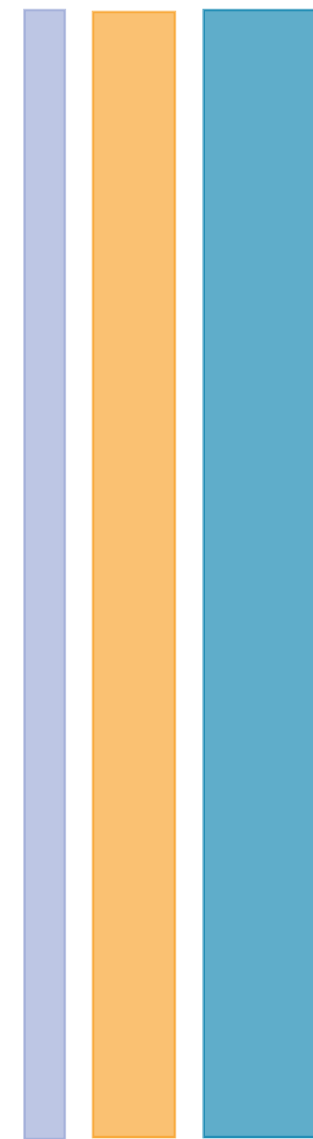
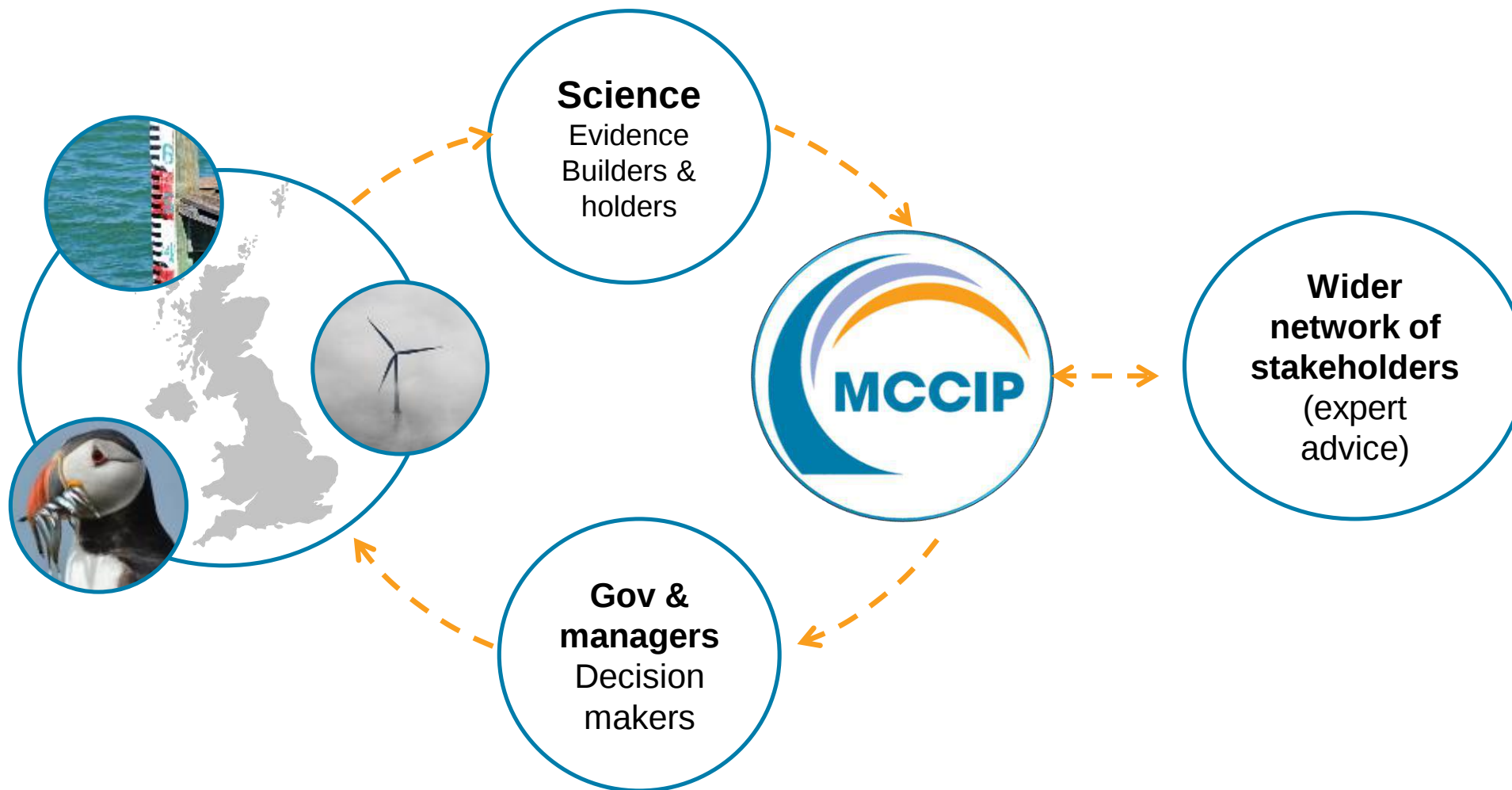
Marine Climate Change
Impacts Partnership

Marine Climate Change Impacts: Report Card 2020

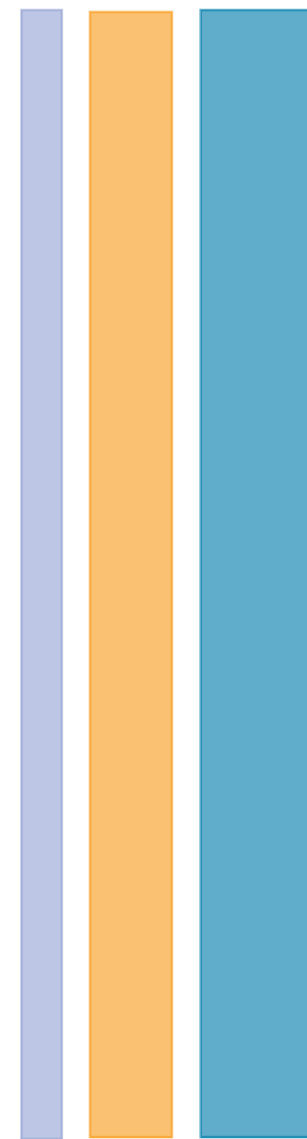
Ella Howes
MCCIP secretariat

The Marine Climate Change Impacts Partnership

*‘Providing a **coordinating framework** for the UK to **enable the transfer of high quality, impartial evidence** on marine climate change **impacts** and guidance on **adaptation**.’*



Partners



Other key end users

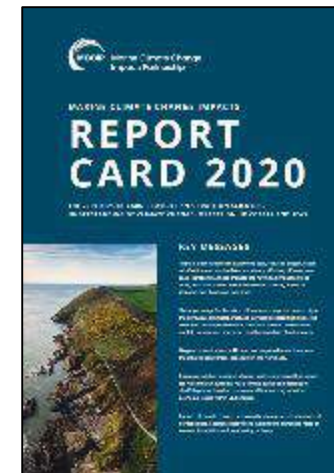
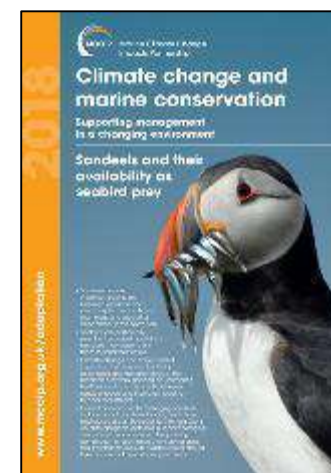
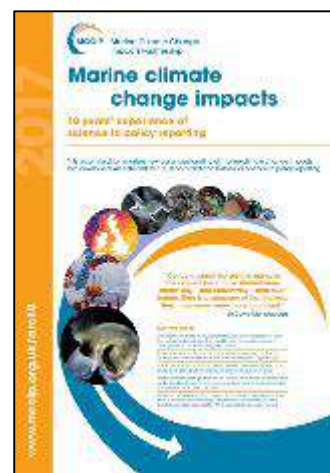
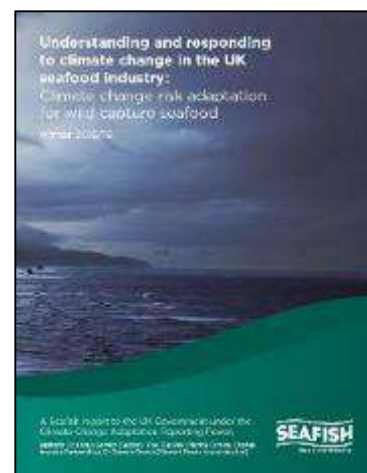
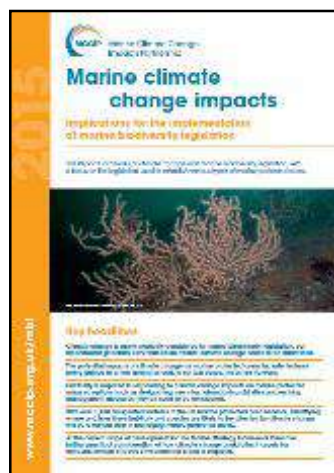
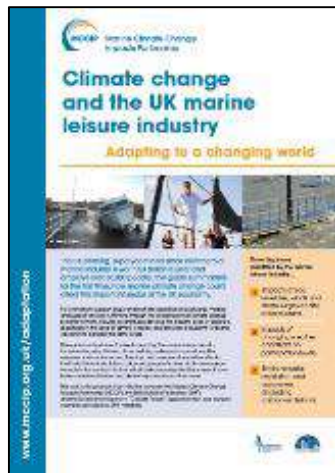


- Feeds into the UK and Devolved Administration's Climate Change Risk Assessment, and Climate Change Adaptation strategies.
- Assessments for the MSFD, WFD, the Charting Progress process, and Scotland's Marine Atlas.
- Helps academic and research community to demonstrate impact from its work.

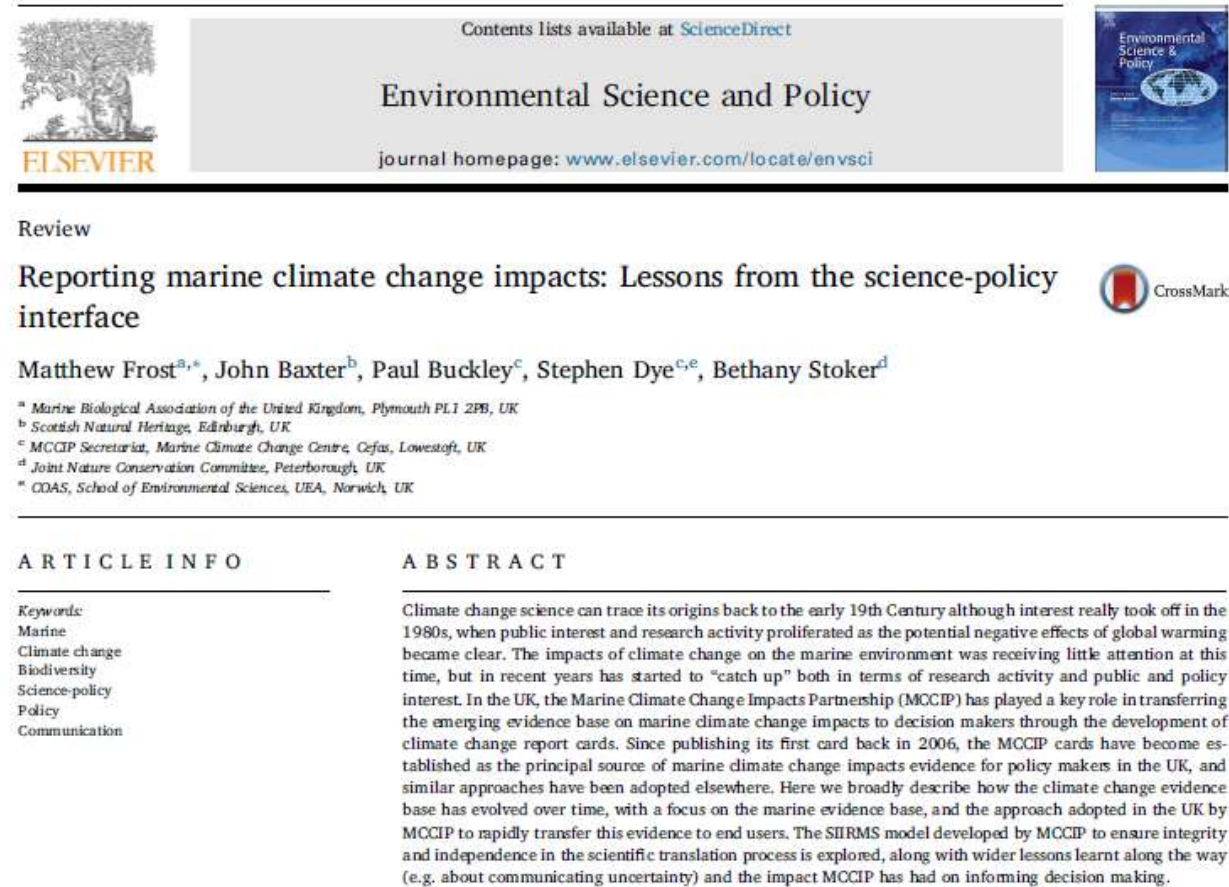
Core MCCIP products



- **Full report cards**
 - Comprehensive review of the state of the science with range of physical, ecological and societal topics covered
- **Special topic report cards**
 - Focus on specific issue(s), driven by user community (e.g. fish, fisheries and aquaculture)
- **Climate smart adaptation**
 - Support specific sectors to understand and respond to climate change risks (and opportunities)



Maintaining scientific integrity and independence



Review

Reporting marine climate change impacts: Lessons from the science-policy interface



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Climate change
Biodiversity
Science-policy
Policy
Communication

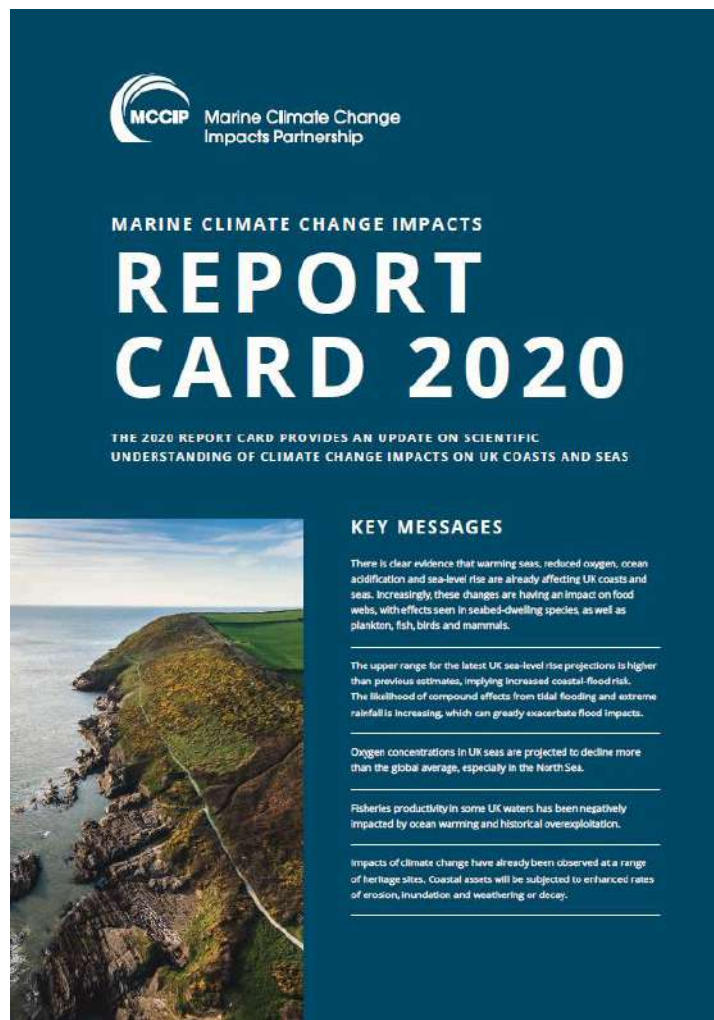
ABSTRACT

Climate change science can trace its origins back to the early 19th Century although interest really took off in the 1980s, when public interest and research activity proliferated as the potential negative effects of global warming became clear. The impacts of climate change on the marine environment was receiving little attention at this time, but in recent years has started to “catch up” both in terms of research activity and public and policy interest. In the UK, the Marine Climate Change Impacts Partnership (MCCIP) has played a key role in transferring the emerging evidence base on marine climate change impacts to decision makers through the development of climate change report cards. Since publishing its first card back in 2006, the MCCIP cards have become established as the principal source of marine climate change impacts evidence for policy makers in the UK, and similar approaches have been adopted elsewhere. Here we broadly describe how the climate change evidence base has evolved over time, with a focus on the marine evidence base, and the approach adopted in the UK by MCCIP to rapidly transfer this evidence to end users. The SIIRMS model developed by MCCIP to ensure integrity and independence in the scientific translation process is explored, along with wider lessons learnt along the way (e.g. about communicating uncertainty) and the impact MCCIP has had on informing decision making.

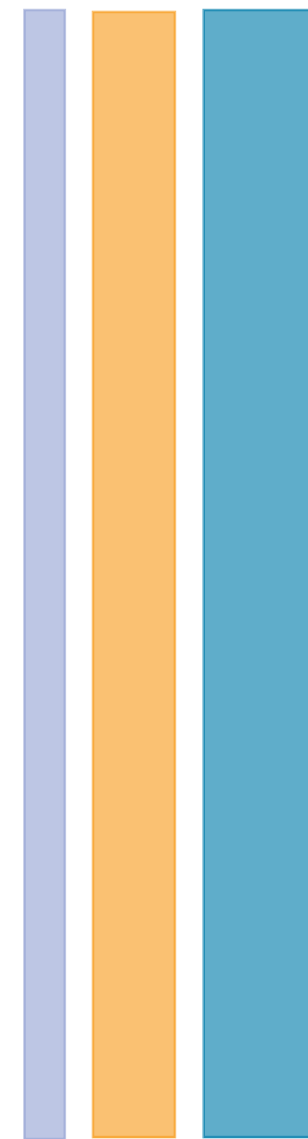
Maintaining scientific integrity and independence



Report Card 2020

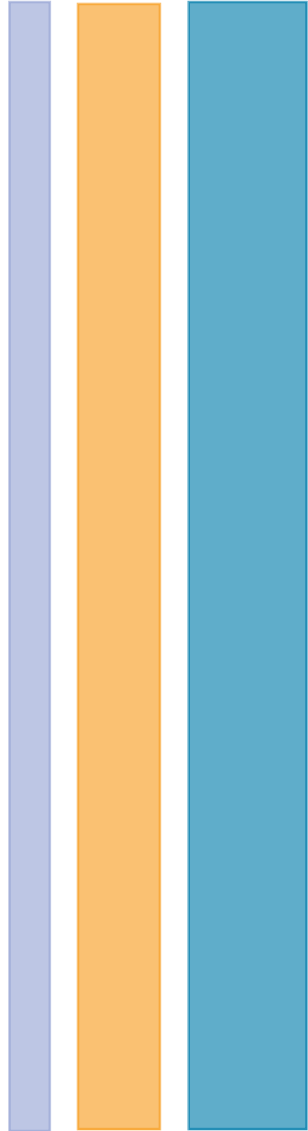


- More than 150 scientists from over 50 leading research organisations contributed.
- Comprehensive, community view on the range and scale of physical, ecological and societal impacts of climate change.
- Summarise evidence from 26 scientific reviews commissioned by MCCIP.
- First time that MCCIP reports on the impacts of climate change on oxygen, cultural heritage, and transport and infrastructure.



Report Card 2020

26 topics covered across three core themes



What's in the card?

Topic by topic headlines

CLIMATE OF THE MARINE ENVIRONMENT

Climate change affects the physical characteristics of UK seas, and surrounding oceans. Long-term observations show air and sea warming, sea-ice loss, ocean acidification and sea-level rise. These trends are expected to continue. For sea level, the latest UK projections show bigger changes than previously estimated, increasing the risk of coastal flooding and erosion.

Links between climate change and wind, wave and storm activity around the UK remain less clear, although there is some suggestion that the most severe storms and significant wave heights have increased in recent decades. At the broader scale, ocean and atmospheric circulation may be changing in the North Atlantic, with potential implications for UK climate and extreme weather events.

These physical changes have profound effects on marine ecosystems and people in the UK, as later sections of this Report Card explore.

Summary of full section

Current and future impacts

MCCIP REPORT CARD 2020

AIR AND SEA TEMPERATURE

WHAT IS ALREADY HAPPENING

HIGH CONFIDENCE

UK seas show a clear overall warming trend. Over the past 30 years, warming has been most pronounced to the north of Scotland in the North Sea, with sea-surface temperature increasing by up to 0.24°C per decade.

Superimposed on this long term warming trend are short-term variations. For example, UK shelf seas were warmer in 2000-2008 than 2009-2013, but recent years have seen warmer conditions return.

UK sea-surface temperature in 2014 was the warmest on record (records go back to 1870), and eight of the ten warmest years have occurred since 2000.

WHAT COULD HAPPEN

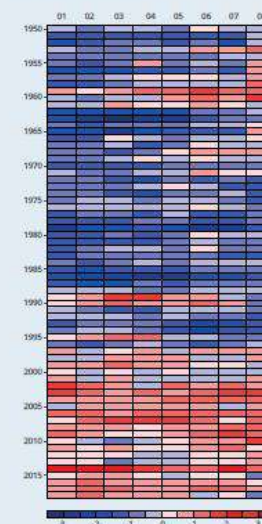
MEDIUM CONFIDENCE

Warming of UK shelf seas is projected to continue over the coming century. Most models suggest an increase of between 0.2°C and 0.4°C per decade.

There may be some regional differences. For example, warming is expected to be greatest in the English Channel and North Sea, with smaller increases in the outer UK shelf regions.

ANNUAL UK REGIONAL SEA-SURFACE TEMPERATURE (°C) ANOMALY FOR PERIOD 1950-2015

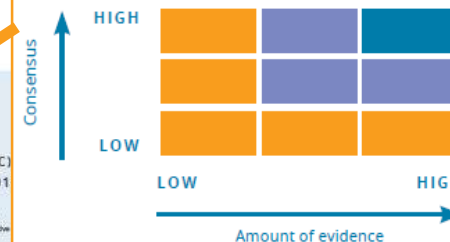
Fig 1. Sea-surface temperature anomaly (°C) for the period 1950-2015, relative to the 1981-2010 average. Red = positive (warmer); Blue = negative (cooler). Based on data from HADISST v1.



01: NORTHERN NORTH SEA
02: SOUTHERN NORTH SEA
03: EASTERN CHANNEL
04: WESTERN CHANNEL CELTIC SEA
05: IRISH SEA
06: MINCHES WESTERN SCOTLAND
07: SCOTTISH CONTINENTAL SHELF
08: ATLANTIC NW APPROACHES

These eight regions are based on biogeographical areas used for UK marine assessments.

Confidence assessment



Diagrams and information boxes

SNAPSHOTS OF CLIMATE CHANGE AROUND THE UK

Current and future
regional impacts

DECREASING pH

By 2050, summer warming may exceed the thermal tolerance of the main reef-forming cold-water coral, *Solenastrea hebraea*, at the Mingulay reef complex, and by 2050 about 85% of cold-water corals in the North-east Atlantic are likely to be exposed to acidified waters.

FISH ASSEMBLAGES

The structure of marine fish assemblages has changed markedly off the west of Scotland over the past three decades, with mackerel increasingly dominant at many survey sites.

INCREASING VIBRIO SPECIES

Elevated levels of pathogenic *Vibrio* species from several south-west UK coastal sites coincided with record water temperatures during the 2018 heatwave. With heatwaves projected to increase in future, higher levels of pathogenic *Vibrio* may be recorded.

DECREASING COLD-WATER KELP

Increases in the abundance of the warm water kelp species, *Laminaria achrasica*, have been observed at sites around Plymouth, the Isles of Scilly and Lundy Island. Models project that cold-water kelp species could be lost from southern England and Wales by the end of the century.

OCEAN ACIDIFICATION IN WALES

Impacts of ocean acidification on shellfish fisheries may be most pronounced in Wales, due to the importance of cockle and whelk fisheries there.

SALINE INTRUSION

Shingle aquifers in the east and south England are likely to be at risk from saline intrusion associated with sea-level rise, combined with reduced rainfall and increased abstraction for public use.

COASTAL FLOODING IN SCOTLAND

A review of climate change risks on Historic Environment Scotland properties found 31 to be at high or very high risk from coastal flooding, and 24 to be at high or very high risk from coastal erosion.

NORTHERN HAKE

Northern hake, a warm water species, has recolonised the northern North Sea after being largely absent for over 50 years, with implications for stock management.

TIDAL SURGES RISK PORT CAPACITY

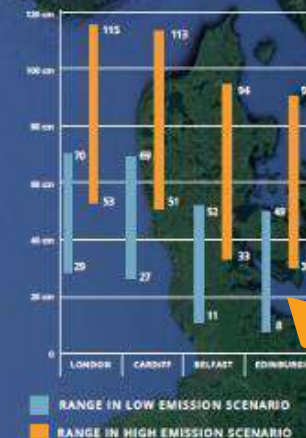
Half of the UK's port capacity is located on the east coast, where the risk of damage from a tidal surge is greatest. This risk will be enhanced with rising sea levels.

THAMES BARRIER

If the Thames Barrier continues to be managing both river flow and tidal flow, sea-level rise is predicted to make the barrier closure unsustainable by the 2030s. Only for tidal flooding, this is predicted to around 2070.

SEA-LEVEL RISE BY 2100

Fig 5. Generally, increases will be greater in the South than in the North (figures reflect sea-level rise by 2100 relative to 1981-2000).



Adapted from UKCP18 sea-level rise figures, Crown Copyright 2018, Met Office.

Sea level rise
estimates for
capital cities taken
from UKCP18

Key headlines

- 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 exacerbate flood impacts.



Key headlines



- 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.



Emerging issues



Next steps

- Continued launch events: Wales and Scotland:
 - Present at MASTS
- Webinars on the report card
- Knowledge gaps paper based on information identified by the scientific backing papers.
- UNFCCC Conference of Parties 26 in Glasgow
- Fifth phase of MCCIP



COP 26 GLASGOW



UNITED NATIONS
CLIMATE CHANGE
CONFERENCE

NOVEMBER 2020

MCCIP in numbers....



Over the past 14 years there have been:

30

PARTNERS

01 Secretariat

04 Working Groups

300+

SCIENTIFIC AUTHORS

150+

SCIENTIFIC REVIEWERS



Who have produced:

05 Full report cards

04 Special topic report cards

10 Climate Smart Adaptation Products



Thank you!



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