Fish on the Move

The shelf seas around the British Isles are home to more than 330 species of fish. All are affected by climate change—but how?

The March Northwards

In response to warming waters, fish and the plankton they feed on are generally moving northwards or into deeper water. Demersal fish have specific spawning, nursery and foraging grounds so adult individuals are unlikely to be able to move. It is more likely that eggs and larvae are successfully colonising northwards.

Pelagic fish are less habitat-attached and can change their ranges far more rapidly. Atlantic mackerel track moving plankton blooms each year and now migrate earlier and travel further north towards the Arctic. Similarly, warmer-water fish (such as John Dory, tuna, squid) are becoming more common in the Celtic and North Seas.

Multiple Pressures

Fish on the move can cause pressure on the habitats they are moving into if native prey species have few defences against the newcomers. Likewise warmer waters can increase the impact of disease and pathogens e.g. sea lice.

Some fish, such as salmon, may be unable to move as they need to return to the rivers where they were born to spawn. Their numbers are declining steeply.

In the short term fish may be out of step with the food they depend on (if it is, perhaps, more able to move to cooler water). However, after their initial response to change, species may become acclimatised and/or migrate, changing local ecosystems.

Physical Effects of Ocean Acidification

Increased CO_2 causes less dense bone growth, particularly of ear bones (*otoliths)* used for hearing and balance. Sensory impacts include:

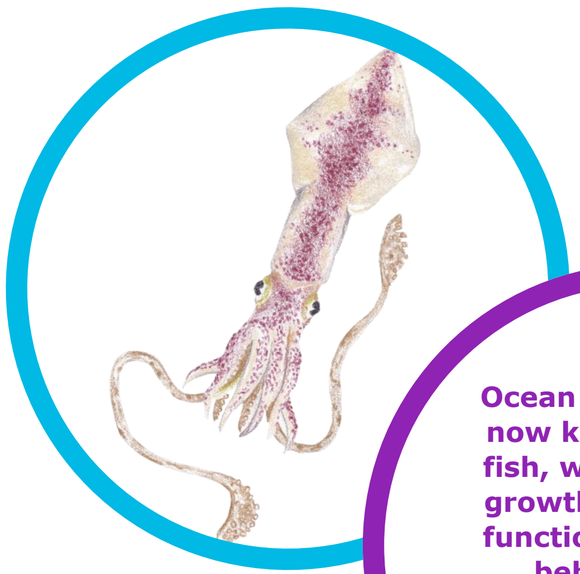
- loss of sense of smell
- loss of hearing
- elevated boldness
- impaired cognitive function
- compromised neurological transmission

making fish less able to sniff out habitats or food, less able to communicate and more vulnerable to predators.

Oxygen levels

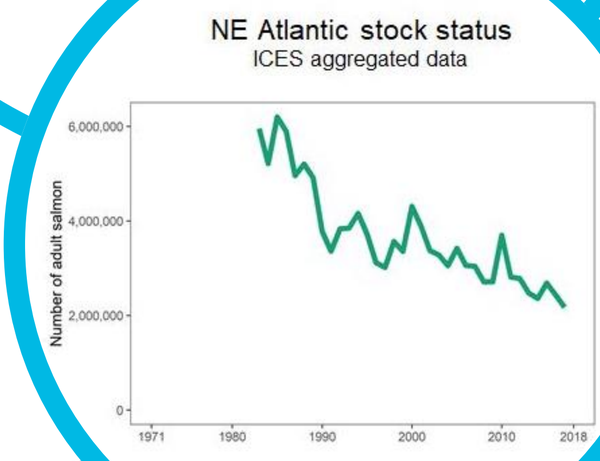
In warmer waters, fish have a higher metabolic rate leading to rapid early growth but smaller final size. Increased water temperature increases demand for oxygen whilst also reducing supply. Some studies predict that between 2000 and 2050, there could be a decline of 14—24% in adult body size in fish globally with the largest changes in the temperate and tropic regions.

Fish may be able to adapt if changes are gradual enough so more research is needed to chart these impacts over time.



Ocean acidification is now known to affect fish, with impacts on growth, neurological function, physiology, behaviour and cognitive processing.

Marine Climate Change Impacts Partnership 2013



Declining salmon stocks are predicted to continue

Phytoplankton photosynthesis contributes to more than half of the oxygen content in the Earth's atmosphere.

Copernicus Marine Service 2019

Spatial distribution and individual growth rates of fish show a coherent response on a global scale to changes in climate.

FIS Aberdeen 2019

Images: Claire Corrigan, Marine Scotland