

Non-indigenous species

What is the issue?

Changes to ocean climate, particular sea temperature could allow some species to expand their ranges to become established in new regions, whilst some already introduced species could take advantage of warmer conditions to become more abundant.

Some of these non-native species can be considered to be invasive if they spread rapidly and cause economic or environmental harm, or harm to human health. Most introductions arrive via human intervention, intentional or otherwise (e.g. aquaculture, ballast water).

What has happened and how confident?

ICES 2008a highlights the following non-indigenous species that have become established (i.e. reproducing in the new location) in the OSPAR maritime area:

Algae (*Codium fragile* (a green alga), *Sargassum muticum* (a brown alga); molluscs (slipper limpet *Crepidula fornicata*, Pacific oyster *Crassostrea gigas*); barnacles (*Megabalanus tintinnalulum*, *Balanus amphitrite*, *Solidobalanus fallax*, *Elminius modestus*); and a bryozoan (*Bugula neritina*).

The establishment of two non-indigenous species have been directly related to warming temperatures in the OSPAR maritime area, the Pacific oyster *Crassostrea gigas* (an escaped aquaculture species) and the barnacle species *Elminius modestus*, which has extended reproductive periods due to warmer sea temperatures.

Crassostrea gigas is similarly enjoying longer reproductive periods, most notably in OSPAR Region II (Greater North Sea) along Belgium and British coasts, in Dutch and German waters and along the Swedish West Coast (Spencer *et al.*, 1994; Gollasch *et al.*, 2007; Kerckhof *et al.*, 2007). In the Wadden Sea, increases have been particularly pronounced since 2000 to the detriment of the blue mussel *Mytilus edulis*. This increase appears to be highly correlated to increased summer temperatures (Nehls and Büttger, 2007).

Pacific oysters have also been found in OSPAR Region III (Celtic Seas) on southern and western Irish coasts in recent decades (Boelens *et al.*, 2005).

As sea ice continues to decrease, we could see a potential inundation of new organisms to the North Atlantic from the Pacific. The Pacific diatom *Neodenticula seminae* arrived in the North Atlantic in 1999, after becoming locally extinct 800 000 years ago, and could be the first evidence of a trans-Arctic migration in modern times (Reid *et al.*, 2007). Global studies project species invasion to be most intense in the Arctic and the Southern Ocean (Cheung *et al.*, 2009a).

What might happen?

The 2008 MCCIP report card assigned a high level of confidence that climate change would impact on non-natives (MCCIP, 2008). There is a growing body of evidence from around the world that climate change can facilitate marine invasions, and the potential risks from new introductions in the future are high and these introduced species can have severe impacts on the existing ecosystems (Elliott *et al.*, 2008).

Are there any OSPAR regional differences?

See 'What has happened?' section.

➔ [Go to the full QSR assessment report on impacts of climate change \(publication number 463/2009\)](#)

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