

Sardines move north due to ocean warming

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Sardines, anchovies and mackerels play a crucial role in marine ecosystems, as well as having a high commercial value. However, the warming of waters makes them vanish from their usual seas and migrate north, as confirmed by a pioneering study analysing 57,000 fish censuses from 40 years. The researchers warn that coastal towns dependent on these fishery resources must adapt their economies.

The continued increase in water temperature has altered the structure and functioning of [marine ecosystems](#) across the world. The effect has been greater in the North Atlantic, with increases of up to 1.3 °C in the average temperature over the last 30 years.

This variation directly affects the frequency and biogeography of a group of pelagic fish, which includes the sardine (*Sardina pilchardus*), anchovy (*Engraulis encrasicolus*), horse mackerel (*Trachurus trachurus*) and mackerel (*Scomber scombrus*), among others, which feed off phytoplankton and zooplankton and that are the staple diet of large predators such as cetaceans, large fish and marine birds. These fish also represent a significant source of income for the majority of coastal countries in the world.

Until now, scientists had not managed to prove whether the changes observed in the physiology of the pelagic fish were the direct result of the [water temperature](#) or if they were due to changes in plankton communities, their main food source, which have also been affected by global warming and have changed their distribution and abundance.

The new study, published in *Global Change Biology* and that has developed statistical models for the North Sea area, confirms the great importance of sea temperatures. "Time series of zooplankton and [sea surface temperature](#) data have been included to determine the factor causing these patterns", Ignasi Montero-Serra, lead author of the study and researcher in the department of Ecology at the University of Barcelona, explains to SINC.

Bioindicators of the health of the sea

To demonstrate the consequences of the warming of the seas, the research team analysed 57,000 fish censuses from commercial fishing performed independently along the European continental shelf between 1965 and 2012, extracted from data provided by the International Council for the Exploration of the Sea (ICES).

The study, the first to be carried out on such a large time scale and area, allows for the dynamics of this species to be understood in relation to the rapid warming of the oceans that has been happening since the eighties.

The results reveal that sardines and other fish (with fast life cycles, planktonic larval stage and low habitat dependence) are highly vulnerable to changes in ocean temperature, and therefore represent "an exceptional bioindicator to measure the direction and speed of climate change expected in the near future", points out Montero-Serra.

Subtropicalization of North Sea species

Due to the accelerated increase in [temperature](#) of the continental seas, sardines and anchovies (with a typically subtropical distribution) have increased their presence in the North Sea "even venturing into the Baltic Sea", confirms Montero-Serra, who adds that the species with a more

northern distribution (like the herring and the sprat) have decreased their presence.

The analysis is therefore a clear sign that species in the North Sea and Baltic Sea are "becoming subtropical [...] where sardines, anchovies, mackerel and horse mackerel, more related to higher temperatures, have increased their presence", says the researcher.

This is due to the pelagic fish being highly dependent on environmental temperatures at different stages of their life cycle: from reproductive migrations and egg-laying, to development and survival of larvae.

According to researchers, the changes in such an important ecological group "will have an effect on the structure and functioning of the whole ecosystem". The expert warns that coastal towns that are highly dependent on these fishery resources "must adapt to the new ecological contexts and the possible consequences of these changes", although they still do not know the scale of the socio-economic and ecological repercussions.

More information: Montero-Serra, Ignasi; Edwards, Martin; Genner, Martin J. "Warming shelf seas drive the subtropicalization of European pelagic fish communities" *Global Change Biology* 21(1): 144-153 January 2015 [DOI: 10.1111/gcb.12747](https://doi.org/10.1111/gcb.12747)

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