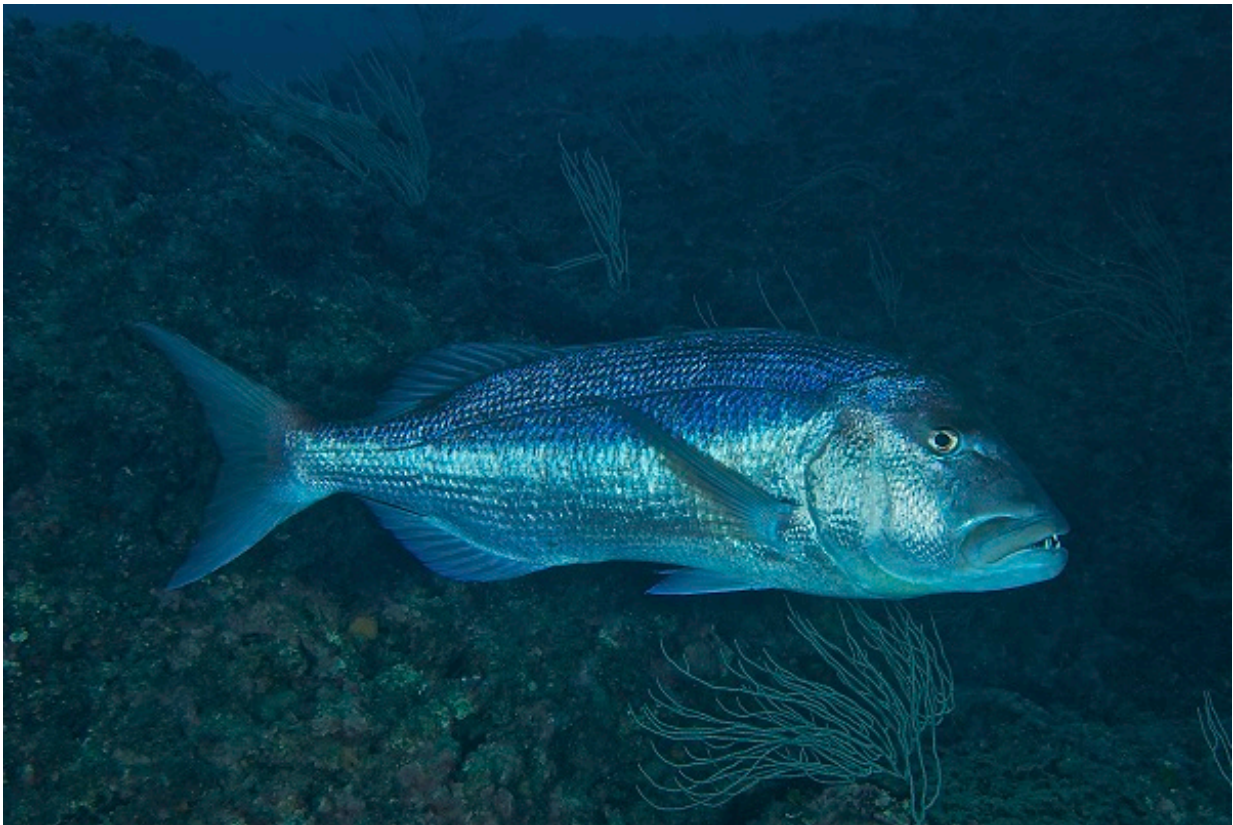


Changes in water temperature have an impact on the dentex in Medes Islands

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Regarding global warming, if dentex changes its nutrition marine areas, all the coastal ecosystem could be affected by it. Credit: Josep Clotas

The movement of the dentex, a fish living in rocky sea floors and marine lands in the Mediterranean and the Atlantic, is influenced by the changes

in ocean temperatures, according to a study carried out in the Medes Islands and published in the journal *Scientific Reports*. Regarding climate change, which brings higher temperatures, this behavioral pattern of the dentex, an apical predator in marine areas, could have an impact on the dynamics of the species and coastal ecosystems.

A voracious predator of fish and shellfish

The common dentex (*Dentex dentex*) is a voracious and aggressive predator that eats fish, crabs and cephalopods. It plays an essential role in the activity of marine benthic ecosystems and it is a target [species](#) with great economic value in trade and sports fisheries.

According to Professor Bernat Hereu from the Department of Evolutionary Biology, Ecology and Environmental Sciences of the UB and IRBio, "Knowing the movement patterns of the dentex is essential to better understand their biology and ecology as well as to determine the role of marine reserves in the recovery of populations and exportation of models (biomass) that can be captured by fisheries out of the reserves."

"Acoustic telemetry, together with new analytical and computational methods in the framework of movement ecology, are revolutionizing marine biology and will allow us to understand the effects of climate change and fishery pressure on key species, as well as the search for solutions for their preservation," added Frederic Bartumeus, ICREA researcher from CEAB-CSIC and CREAM, and expert in animal dispersal and movement patterns.

Acoustic transmitters to study fish movement

The experts studied dentex populations in the Medes Islands with acoustic telemetry techniques based on tagging with acoustic transmitters

that send periodic signals. These signals are received by a network of receivers in the study region and track the fish movement. After more than 15 months of research, the researchers registered the position and depth of all individuals tagged in the study in two-minute intervals.

According to Eneko Aspillaga (UB-IRBio and CEAB-CSIC), first author of the article, "The study shows a clear pattern of dentex movement depending on the temperature of the water. In winter, temperatures around 12° C do not alter the whole water column, and dentex move in a depth range between 10 and 40 meters, without any defined pattern."

"The thermal pattern of water mass in the Medes Islands is the typical northwestern Mediterranean one. After April, the surface gets warmer, and between May and June, two different water masses appear—shallow ones, which are warm and less dense, and deep, cold ones separated by a frontier called the thermocline. When the thermocline is formed in summer, dentex are found only over this limit, regardless of its depth."

Why do dentex move to warmer waters?

The new study, published in *Scientific Reports*, finds that dentex is a thermophile species, with dispersal patterns and activity conditioned to summer due the depth and period the thermocline lasts in the water column. Since the dentex is poikilothermal, with an internal temperature fully dependent on the climate, it would move through the [water column](#) until finding warmer and better conditions for its physiology, especially in summer, when they are more active. The population growth of dentex, observed in preserved areas and fishery areas in the Medes Islands, could occur due the rise in the sea temperatures (more than 0.5°C over the last 30 years in the area).

The thermocline temperature and distribution, which lasts until late October, could also have an important impact on the spread of other

fish, both predators and others of lower trophic levels, according to data by Josep Pascual, from the Weather Station in Estartit.

Climate change, a threat to biodiversity in the Medes Islands

The archipelago of the Medes Islands has exceptional ecological value as a natural ecosystem, with a great diversity of habitats and related species. The special orography of the Montgrí mountains, the rivers and the positive effect of marine ecosystem preservation have benefited the richness and biodiversity of the islands, part of the Natural Park of Montgrí, Medes Islands and Baix Ter. Despite being one of the areas less affected by climate change in the Mediterranean, this reserve is also sensitive to global warming due its richness in species and habitats.

Gorgonians, coral reefs, sponges or shellfish, filtering organisms that live fixed in marine depths, are highly vulnerable to climate change, especially if they are above the thermocline. Fish and other mobile species are also sensitive to temperature changes during some stages in their life cycles (reproduction, nutrition, etc.). Some thermophile species could widen their distribution range and force other marine organisms to move. Moreover, species that are more prone to move around colder waters could disappear. The authors warn that in this global [climate change](#) scenario, the introduction of tropical species is particularly worrying, since they can deeply influence the balance in marine ecosystems.

More information: Eneko Aspillaga et al. Thermal stratification drives movement of a coastal apex predator, *Scientific Reports* (2017). [DOI: 10.1038/s41598-017-00576-z](https://doi.org/10.1038/s41598-017-00576-z)

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