

Ms Charlina Vitcheva
Director-General for Maritime Affairs and Fisheries
European Commission
Jozef II-straat 99
1000 Brussels
Belgium

Dun Laoghaire, 9 May 2023

Dear Ms Vitcheva,

Subject: Climate change implications in the scientific assessment for cod stocks in the Celtic Seas ecoregion

As mentioned in the [2022 ICES Celtic Seas ecoregion – Ecosystem Overview](#), climate change is already observable within some parts of the Celtic Seas ecoregion, with a mean annual sea surface temperature showing an overall upward trend of about +0.5°C since 1975.

Cod preservation in the Celtic Seas is critically threatened by this, as the species' temperature optimum is outside of the range of temperature values occurring in the Celtic Seas ecosystem¹. This is especially true for cod reproduction, as the spawning cycle of this species is extremely fine-tuned, sophisticated and easily disturbed.

The recent study "*Latitudinally distinct stocks of Atlantic cod face fundamentally different biophysical challenges under on-going climate change*"², published in the Journal Fish and Fisheries in January 2023 by Kjesbu et al., identified a water temperature threshold around 9.6 (± 0.25) °C where cod spawning frequency becomes unpredictable. Cod oocytes do not seem to leave the ovary when temperature goes above this threshold. This has serious implications for spawning ground persistence. As a consequence of climate change, this threshold value moves up in latitude and traditional spawning grounds are likely to disappear from the Celtic Seas region.

Moreover, cod spawning times are also temperature dependent. This was detected for cod in both the North Sea and in the Irish Sea, as reported in a study published in 2017³, where there was a shift to early spawning times. Earlier spawning has the potential to create a mismatch with larval prey, and as the mismatch index increases, the recruitment rates will decrease through food limitation impacting

¹ Hervann, P. Y., Gascuel, D., Grüss, A., Druon, J. N., Kopp, D., Perez, I., ... & Robert, M. (2020). The Celtic Sea through time and space: Ecosystem modeling to unravel fishing and climate change impacts on food-web structure and dynamics. *Frontiers in Marine Science*, 1018.

² Kjesbu, O. S., Alix, M., Sandø, A. B., Strand, E., Wright, P. J., Johns, D. G., ... & Sundby, S. (2023). Latitudinally distinct stocks of Atlantic cod face fundamentally different biophysical challenges under on-going climate change. *Fish and Fisheries*.

³ McQueen, K., & Marshall, C. T. (2017). Shifts in spawning phenology of cod linked to rising sea temperatures. *ICES Journal of Marine Science*, 74(6), 1561-1573.



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North Western Waters Advisory Council
C/o Bord Iascaigh Mhara
Crofton Road
Dun Laoghaire A96 E5A0
Ireland

Email: mo.mathies@nwwac.ie
Email: info@nwwac.ie
Web: www.nwwac.org
Tel: +353 (0) 1 2144 43
Co. Reg. No: 403877

survival. Therefore, temperature dependency of spawning times have the potential for decreasing productivity as waters warm.

The NWWAC has noted that the ICES assessment for cod stocks⁴ in the Celtic Seas ecoregion does not take into account the implications of rising sea temperatures. As already advised in a [letter from July 2022](#), the NWWAC recommends that DG MARE requests ICES to consider in the assessment how ocean warming is affecting cod survivability in the Celtic Seas habitat. The NWWAC believes that this will contribute to the understanding of the future viability of cod fisheries in the Celtic Seas and allow for the suitable and adaptive alignment of fisheries management measures.

We thank you for your attention on this matter and look forward to your reply.

Yours sincerely,



Emiel Brouckaert
NWWAC Chairman

⁴ cod.27.7a and cod.27.7e-k

