

Northwest Atlantic Fisheries Organization

Environmental indices for NAFO subareas 0 to 4 in support of the Standing Committee on Fisheries Science



Fisheries and Oceans Pêches et Océans Canada Canada

Atlantic Zone Monitoring Program (AZMP) NAFC Oceanography Section



MEMORIAL UNIVERSITY

NAFO Subareas 2, 3 and 4

Oceanographic stations and survey sections

A) Satellite ocean colour boxes FP FC wss Css Longitude







NAFO Subareas 0 &1 - Greenland and Davis Strait



Ocean Climate Index

 The ocean climate has been predominantly warmer than normal (or near normal) since the early 2000s (except for 2015 and 2018)

The index remained **near normal** in 2022 and 2023. 2024 was slightly above normal

Before the warm period of the last decade, cold conditions persisted between the mid-1980s and the mid-1990s



NAFO Subareas 0 &1 - Greenland and Davis Strait



Lower Trophic Level Indicators:

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- The timing of the spring bloom has been generally **near or earlier than normal** since 1998 except for 2009 and between 2012 and 2015
- Earlier timing is generally associated with a higher bloom intensity
- The 2024 bloom was the 2nd earliest and the most intense of the time series



NAFO Subareas 3M - Flemish Cap

Ocean Climate Index

- The ocean climate was mostly warmer between the late 1990s and 2013, and colder between 2014 and 2019, including in 2015 where it reached its coldest state since 1992
- Since 2020, a warming phase is emerging, with years 2023 and 2022 ranking respectively as the warmest and second warmest years since 1985
- 2024 continued this **warming** phase, although not as warm as the previous 3 years



NAFO Subareas 3M - Flemish Cap

Lower Trophic Level Indicators

- The timing of the spring bloom was near normal in 2024, following two years of delayed blooms.
- Bloom intensity continued its decreasing trend, reaching a lower-than-normal level for the first time since 2015.
- Copepod abundance was normal in 2024 after two years of below-normal levels
- Total zooplankton biomass has remained near normal since 2016, including in 2024.



NAFO Subareas 3LNO -Grand Banks

Ocean Climate Index

- A cold period occurred from the mid-1980s and the mid-1990s
- The relatively warm post collapse period was interrupted by cold conditions in 2009 and 2014-2017
- Years since 2020 were much warmer than normal (except for 2023); 2021 and 2020 were the warmest and second warmest years on record





NAFO Subareas 3LNO -Grand Banks

Lower Trophic Level Indicators

- Spring bloom timing shifted from mostly earlier than normal (2005-2013) to later than normal (2014 to 2019); the timing has remained near-normal since 2020
- Spring bloom intensity has been variable across the time series (normal in 2024)⁴
- Copepods and non-copepods abundance has exhibited a steady increase over the time series (above normal since 2016)
- Zooplankton biomass declined to below normal in the cold 2010s and has been
 mostly normal since





NAFO Subareas 2, 3 & 4 - NL shelf, Scotian Shelf & Gulf of Maine

Ocean Climate Index

The ongoing **warm** phase started in 2020 continued in 2024 (**subareas 2 and 3** were **above normal** while **subarea 4** was **normal**)

Lower Trophic Level Indicators

- Some of the earliest and most intense spring blooms in the time series have been observed since 2020; timing and intensity were however close to normal in 2024.
- Copepod and non-copepod abundances have remained normal over the past 2-3 years, following a period of near- to above-normal levels during the mid-2010s and early 2020s.
- Zooplankton biomass was normal in 2024 but comparatively higher in Subareas 2-3 than in Subarea
 4, a prevailing situation since 2016.



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Source:

Bélanger, D., Coyne, J., & Cyr, F. 2025. Environmental indices for NAFO subareas 0 to 4 in support of the Standing Committee on Fisheries Science (STACFIS) – 2024 update. Scientific Council Research Document, SCR Doc. 25/012

Supporting data: https://doi.org/10.5281/zenodo.15538217