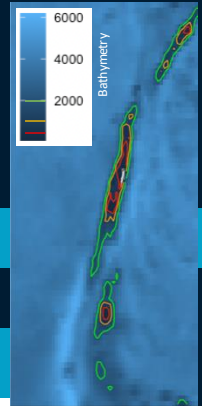




Climate & Ecosystem Status Report

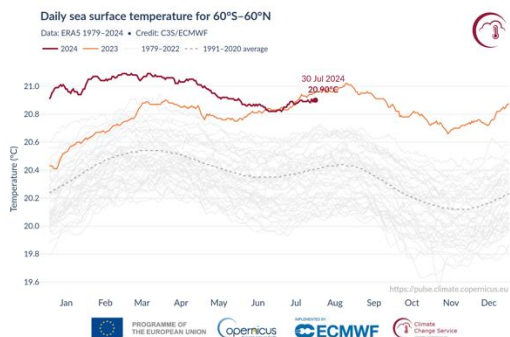
Macquarie Island Toothfish Fishery

August 2024

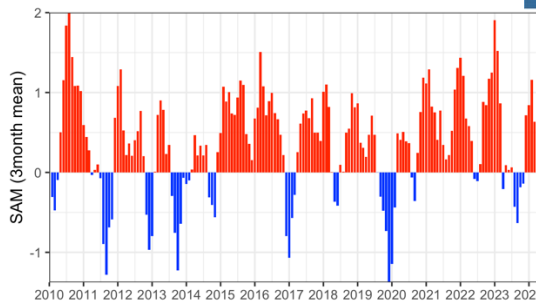


Historical Period

Climate Drivers

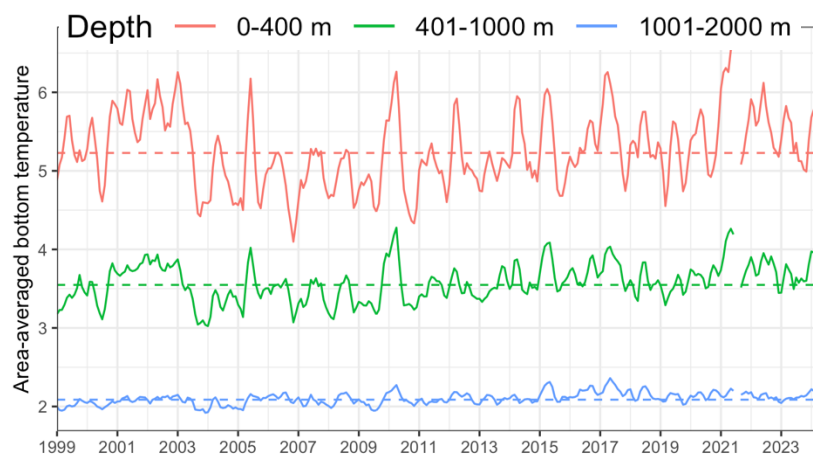


Global Sea Surface Temperature (SST) have remained at record highs from 2023 through 2024 ([link](#))¹.



Southern Annular Mode² ([link](#)) indicates the north-south movement of westerly winds in the mid-high latitudes. Positive phases (westerlies move south) have become more common over time.

Regional Dynamics



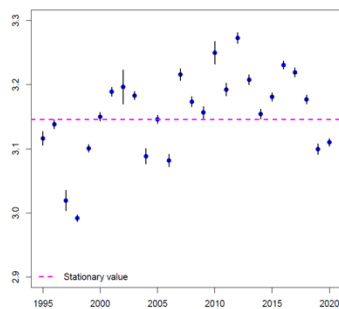
Monthly area-averaged bottom temperature at three depth binds (see map)¹. Time-series is a rolling 6-month average to remove variability.

Long-term warming trend is apparent.

2023/24 has been warmer across all depths than previous years. Seasonal fluctuations are more apparent in shallow depths. Low (high) temperatures can decrease (increase) Patagonian toothfish catchability³.

Ecosystem and Fishery

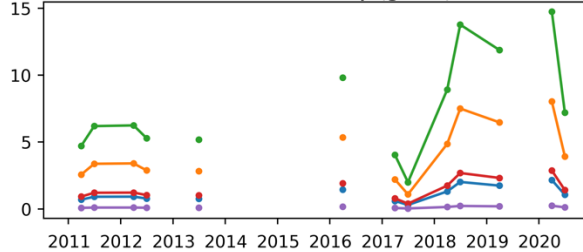
Toothfish body condition



Below average body condition in 2019 & 2020 follows ~12 year of good condition⁵.

Pink line is the long-term average.

Mean micronekton density (g m⁻²)



Micronekton (animals 2-20 cm) density from mesopelagic backscatter.

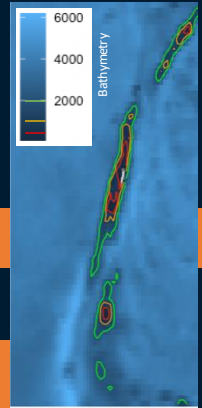
- Crustaceans
- Fish
- Fish with gas bladder
- Gelatinous
- Squid



Climate & Ecosystem Status Report

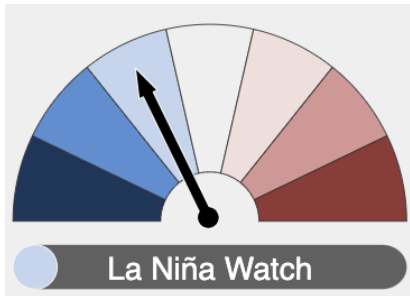
Macquarie Island Toothfish Fishery

August 2024

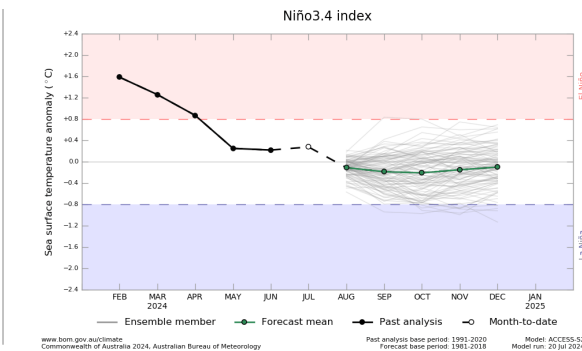


Future Outlook for 2024

Climate Drivers



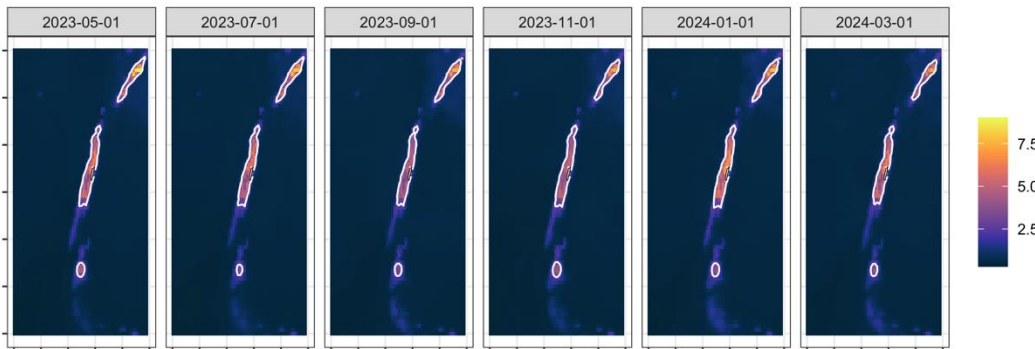
BOM Outlook is La Niña watch (50% chance of La Niña) ([link](#))⁴.



ENSO is likely to remain neutral until early spring. During La Niña, the Southern Annular Mode tends to shift to positive phases, where westerly winds move south and result in strong circumpolar westerlies. ([link](#))⁴.

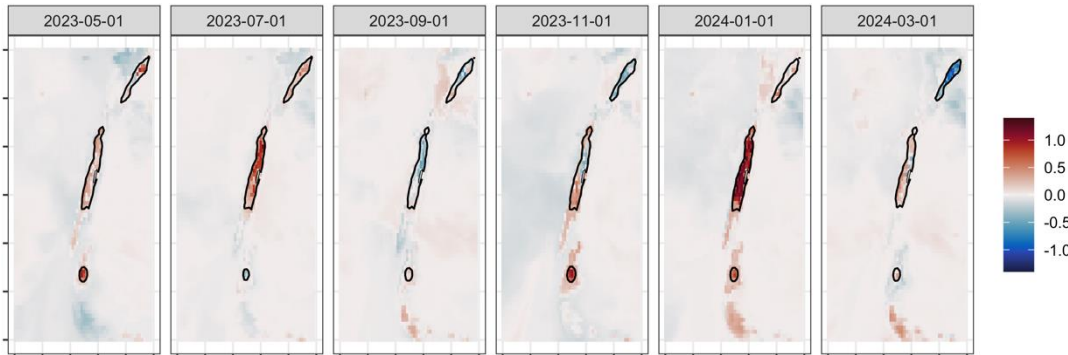
Regional Dynamics

Bottom temperature (°C) showing the long-term average at 2.57 °C (white contour)¹



Over the past year, temperatures >2.57°C were present over most of the shelf. 2°C is the lower thermal preference of Patagonian toothfish³.

Bottom temperature anomaly (°C) showing the same contour as above¹



Bottom temperatures were anomalously warm across the shelf for most of the year. Anomalies can change rapidly between months, as seen in September 2023. Bottom temperatures are from an ocean model and subject to error.