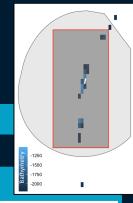


Climate & Ecosystem Status Report

Macquarie Island Toothfish Fishery
August 2023

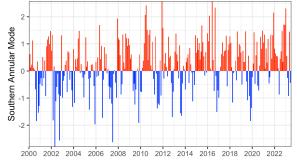
Historical Period



Climate Drivers



Monthly Southern Oscillation Index¹ (link).

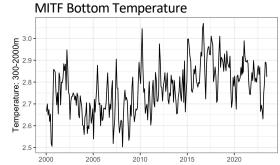


Southern Annular Mode¹ (<u>link</u>) where positive phases have become more common. When positive, westerlies & fronts move poleward, & sea ice extent increases.

Regional Dynamics



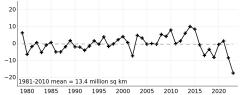
A strong-to-extreme MHW was present during July 2023². The ecosystem level impacts are unknown. (<u>link</u>).



Temperature from 380-2225 m is variable but has increased over time^{3.}

Ecosystem and Fishery

Sea Ice Extent Anomalies. Recent years have had very low sea ice extent².



Observations

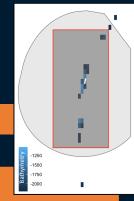
- Initial fishing efforts finding good sized fish
- No obvious signs of the impact of low sea ice extent
- The interaction and location of currents in this region are of interest, and a better indicator of ecosystem and fishing conditions compared to sea ice extent.



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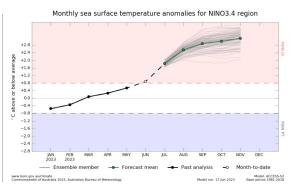
Future Outlook for 2023



Climate Drivers

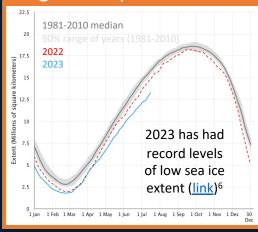


Currently transitioning to El Niño¹ (link)

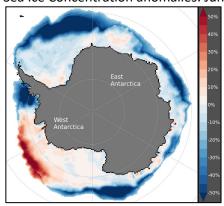


El Niño is predicted. During El Niño, the Southern Annular Mode tends to shift to negative phases, where westerly winds move north and result in weak circumpolar westerlies. (link).

Regional Dynamics

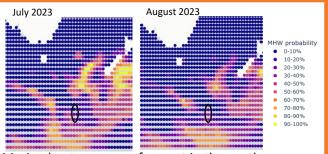


Sea Ice Concentration anomalies: June 2023



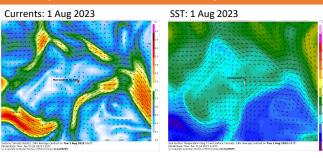
Spatial map of sea ice anomalies show low concentrations across most of Antarctica (link)⁶.

Marine Heatwave Forecast



Marine heatwaves are forecast in the southern ocean adjacent to the MITF region through July and decreasing through August. Forecasts are 1° spatial resolution, with black circle on MI (link)⁷.

Ecosystem and Fishery



10-day forecasts show the position of fronts that are important foraging regions for top predators. Other variables are available online (link)¹.