MNF Voyage Highlights

Voyage #:	**IN2021_V01**		
Voyage title:	Quantifying krill abundance for krill monitoring and management off the Australian Antarctic Territory (TEMPO Voyage)		
Mobilisation:	Hobart, Thursday-Friday, 21-22 January 2021		
Depart:	Hobart, 1400 Friday, 29 January 2021		
Return:	Hobart, 0800 Wednesday, 24 March 2021		
Demobilisation:	Hobart, Wednesday-Thursday, 24-25 March 2021		
Voyage Manager:	Linda Gaskell	**Contact details:**	Linda.Gaskell@csiro.au
Chief Scientist:	Dr So Kawaguchi		
Affiliation:	Australian Antarctic Divison	**Contact details:**	So.Kawaguchi@aad.gov.au
Principal Investigators:	AAD Co-Investigators on proposal: • Rob King (Alternate Chief Scientist) • Karen Westwood (Project Manager) • Natalie Kelly • Martin Cox • Louise Emmerson • Colin Southwell • Mike Double • Elanor Bell • Bruce Deagle (now CSIRO, Hobart) • Brian Miller • Dirk Welsford • Simon Wotherspoon • Phoebe Lewis (PhD Student) External Co-Investigators on proposal: • Andreas Klocker (University of Tasmania, Australia) • Daniel Zitterbart (Woods Hole Oceanographic Institution, USA) • Guoping Zhu (Shanghai Ocean University, China)		
Project name:	**TEMPO: Trends in Euphausiids off Mawson, Predators, and Oceanography**		

Chief Scientist

Dr So Kawaguchi leads the Australian Antarctic Division's krill research program. His current research activity spans across a range of topics relating to Antarctic krill biology and ecology, and studies into the impacts of climate change and ocean acidification on krill. These include field studies on research vessels, as well as laboratory studies using the Antarctic Division's unique krill aquarium facility. So's research also extends to krill fishery management in the Southern Ocean. Collectively, his research is fundamental to improving the understanding of the Southern Ocean ecosystem and better managing the krill fishery in the Southern Ocean.

Title

Quantifying krill abundance for krill monitoring and management off the Australian Antarctic Territory (TEMPO Voyage)

Purpose

The primary goal of TEMPO (Trends in Euphausiids off Mawson, Predators, and Oceanography) was to collect data to estimate krill biomass with a view to update the precautionary catch limit for krill in CCAMLR's Division 58.4.2-East and to support the design of a tractable and sustainable long-term monitoring plan and spatial management of the krill fishery in East Antarctica. We conducted

1. Acostics survey and net sampling to estimate biomass of krill and characterise krill swarms.
2. Deployment of a Krill Observational Moorings for Benthic Investigation (KOMBI) system to monitor seasonal dynamics of krill in the seasonally ice covered area.
3. Predator observation to improve our understanding on the connectivity of the krill population.
4. Biological oceanography measurement to understand habitat condition for krill and predators.

Contribution to the nation

Protecting the unique environment and biological systems of Antarctica and the Southern Ocean is of Australia's national interest. 42% of Antarctica is Australian Antarctic Territory (AAT) with a long strip of Exclusive Economic Zone along the extensive costline.

Australia has a strong reputation as a responsible manager of and participant in Antarctic fisheries and works with other countries to ensure ecologically sustainable fisheries and to prevent, deter and eliminate illegal, unreported and unregulated fishing.

This voyage was designed to help ensure orderly development of the krill fishery by updating the biomass estimate and improving the understanding of the region's ecosystem to revise the catch limit for Antarctic krill in waters off part of the AAT where the krill fishery has re-started recently and is likely to expand in the future.

As a result of this voyage

1. We have a better understanding of the density distribution of Antarctic krill and how that relates to distribution of the predators that feed on krill.
2. We successfully collected data to estimate biomass of krill in the region where krill fishery is likely to expand in the future.
3. We have mapped distribution of krill within the survey region, recorded a total of 716 predator sightings with 1868 individual animals, and more than 5,000 individual seabirds logged during the survey.
4. We have commenced a program to monitor on a range of different seabeds by using the novel deep sea moorings called 'KOMBIs' ('Krill Observational Mooring for Benthic Investigation'), where they'll record krill at depths of up to 1500 metres over the next year or so, including when covered by ice during winter, giving completely new information.

Next steps

We contribute to updating the precautionary catch limit for the krill fishery in Division 58.4.2-East (TEMPO Survey region) through deliberation at International Oganisation called Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) which manages krill fishery in the Southern Ocean.

We will also undertake a synthesis to allow assessment of the East Antarctic-wide ecosystem status through an international collaboration by drawing on other datasets in the region.

We futher aim to collaborate with other nations and conduct a East Antarctic-wide ecosystem status through an international collaboration under CCAMLR system.

Improve our understanding the connectivity of the krill population, and overlap between krill and predators, in order to design a tractable long-term monitoring plan and spatial of the krill fishery.