2025 SKEG Symposium Report

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Abstract

The 2025 SKEG Symposium Report provides an overview of the three-day virtual symposium and the evolving structure of the SCAR Krill Expert Group (SKEG). The group has adopted a Task Force (TF) model to address pressing issues in krill research and to better support CCAMLR's scientific and management needs. This report summarizes the symposium's key discussions, research highlights, and outcomes, with a focus on enhancing collaboration, supporting early-career researchers, and aligning with CCAMLR priorities.

General Overview of the SKEG Symposium

Held from 10–12 March 2025, the annual SKEG Symposium convened approximately 90 participants from 15 countries. The event was hosted online, with sessions scheduled to accommodate global time zones. The symposium emphasized SKEG's restructuring into Task Forces, recent advances in krill and Southern Ocean research, and community engagement—particularly among early-career researchers. A total of about 90 participants from 15 countries registered for the workshop and contributed to the discussions, including scientists as well as representatives from industry, policy, and NGOs. Live participation was consistent across the three days, and the session recordings were viewed after the event. This extended reach reflects strong overall engagement and helped accommodate participants across time zones and schedules.

Expanding SKEG's Structure: Introducing Task Forces

To streamline operations and increase responsiveness to CCAMLR's evolving needs, SKEG introduced a new Task Force (TF) model. TFs are small, thematically focused working groups, each co-led by two scientists and open to participation from across the community. They are designed to tackle specific research or coordination challenges through clearly defined SMART objectives (Specific, Measurable, Achievable, Relevant, and Time-bound), and to foster sustained collaboration between symposia and workshops.

This model builds on the momentum of previous focused workshops—such as the 2021 Evaluating Change workshop, the 2023 development of the Krill Stock Hypothesis (KSH), and the 2024 workshop on advancing the KSH and refining the CCAMLR Ecosystem Monitoring Program (CEMP).

Current and Proposed Task Forces

i. Krill Flux TF: Aims to establish a circumpolar mooring network to monitor krill transport and connectivity between management units. Plans include collaborative deployments with NOAA, AAD, and AWI. The TF is currently focused on ensuring comparability with existing mooring systems and identifying deployment locations through direct engagement with krill vessel operators (see section "Outputs and Ongoing Work").
ii. Fisheries Indices TF: Focuses on improving stock assessment parameters (e.g., growth, recruitment, maturity) and aligning fishery data with CCAMLR's management models. TF aims to provide practical solutions to improve the accuracy and reliability of stock assessment models, (see section "Outputs and Ongoing Work").
iii. KrillBASE TF: Updates and expands the krill abundance and length-frequency databases, with a focus on post-2014 data and underrepresented regions, (see section "Research Highlights").
iv. Communication & Outreach TF: Enhances public and stakeholder engagement through science communication and educational materials.
v. Proposed TFs: Suggestions included a Carbon Sequestration TF (to assess krill's role in carbon export) and a Baleen Whale TF (to integrate whale science into krill management). Currently the Carbon Sequestration TF is the only additional TF in development, (see section "Research Highlights").

Research Highlights

Advancing Field Capabilities

A live demonstration from the *RV Nuyina,* led by Dr. Haiting Zhang, Luke Brokensha, Nia Riengchan, and Inessa Corney, highlighted new technological capabilities for krill research. The live demonstration from East Antarctica showed the vessel's capabilities for live sampling of krill and other marine organisms. The team discussed the design of the wet well, including its three depth-controlled water intakes and the ability to maintain stable water flow rates. They highlighted the successful capture of live krill and other organisms, emphasising the advantages of the wet well over traditional sampling methods, particularly for capturing animals for physiological studies. This demonstration underscored the importance of continued investment in field infrastructure to support high-quality, in situ research.

Long-Term Monitoring and Data Continuity

Several presentations emphasized the value and challenges of long-term ecological monitoring. For example, analysis of data from the Palmer Long Term Ecological Research (LTER) program revealed increasing uncertainty in krill density estimates due to changes in

survey methods over time. These findings reinforce the need for consistent methodologies and robust data management practices—core priorities of the KrillBASE Task Force.

As part of this effort, Dr. Angus Atkinson and Dr. Simeon Hill presented the KrillBASE Task Force's plans to update the KRILLBASE database, which integrates four major datasets on krill abundance, larval krill, length frequency, and zooplankton biomass. They highlighted the need to improve data harmonization across sources, expand coverage in underrepresented regions, and ensure accessibility for the broader research community.

Linking Krill Ecology to Ecosystem Services

Keynote research presented by Dr. Abigail Smith (Australian Antarctic Division) focused on krill diel vertical migration (DVM) and its implications for carbon export. The study, published in Science (DOI: 10.1126/science.adq5564), found that krill rarely migrate below 200 meters during the productive summer period—when carbon export would be most efficient. This suggests that the contribution of krill to the biological carbon pump may be overestimated in current models.

Key discussion points included the need to incorporate seasonal variability in DVM into ecosystem models, the importance of expanding mooring networks to capture vertical migration patterns, and the potential for re-evaluating krill's role in carbon sequestration under climate change scenarios.

This discussion, along with an idea pitch by Dr. Emma Cavan (Imperial College London), led to strong support for the formation of a proposed Krill Carbon Sequestration Task Force. The TF would aim to coordinate research on krill's role as a natural carbon sink and explore how this ecosystem service could be recognized and integrated into CCAMLR's conservation and management frameworks.

Predator-Prey Dynamics and Cross-Taxa Integration

Presentations by Dr. Tracy Dornan (Krill for Whales project) and Dr. Nat Kelly (Australian Antarctic Division) emphasized the importance of integrating cetacean science into krill management. Their work highlighted the ecological and management value of understanding whale-krill interactions, particularly in the context of spatial overlap and predator demand.

Key contributions included proposals for standardized whale observation protocols to improve data quality and comparability, opportunities for collaboration between CCAMLR and the International Whaling Commission (IWC) to align monitoring efforts, and the potential for joint data platforms to support ecosystem-based management.

This theme was reinforced by a presentation from Dr. Suzanne Hill, who discussed her long-term Humpback Whale Sentinel Program, active since 2008. The program contributes data to the IWC and offers valuable insights into predator-prey dynamics. Dr. Hill expressed interest in aligning this work with CCAMLR timelines and priorities to support integrated

ecosystem assessments and avoid missed opportunities for cross-institutional collaboration.

These discussions reflect growing interest in cross-taxa approaches and support CCAMLR's efforts to incorporate multi-trophic interactions into conservation planning.

Outputs and Ongoing Work

Several Task Forces are now operational and have begun coordinating activities aligned with CCAMLR's scientific and management priorities:

Krill Flux TF is preparing for the deployment of mooring systems in CCAMLR Area 48.1 during the 2027 German expedition aboard RV Polarstern (PS159). The TF is currently developing a questionnaire for krill vessel captains and researchers to identify optimal deployment sites and ensure data comparability with existing mooring systems.

Fisheries Indices TF is working to refine biological parameters for stock assessments and is coordinating the development of two working papers for WG-EMM 2025:

- WG-EMM-2025/XX: Data Collection from Krill Fishing Vessels (Kawaguchi et al.)
- WG-EMM-2025/XX: Integrating the Krill Stock Hypothesis (KSH) (Meyer et al.)

KrillBASE TF is updating the KRILLBASE dataset to address spatial and temporal gaps, particularly in the Atlantic sector and post-2014. The TF is also working on harmonizing data formats and improving accessibility for the broader research community.

Proposed TF: Krill Carbon Sequestration is in early development, following strong community interest during the symposium. The TF would coordinate research on krill's role in carbon export and explore how this ecosystem service could be recognized within CCAMLR's policy framework.

Summary

The 2025 SKEG Symposium marked a significant step forward in the group's efforts to enhance collaboration, support early-career researchers, and align with CCAMLR priorities. The introduction of Task Forces has provided a more structured and continuous framework for addressing key research and management challenges. The symposium's discussions and presentations highlighted the importance of long-term monitoring, data integration, and cross-taxa collaboration in advancing ecosystem-based management. SKEG remains committed to supporting CCAMLR's scientific and conservation goals through ongoing Task Force activities and collaborative efforts.