

## Synthesis

### Next steps for fisheries and marine ecosystem research on the Kerguelen Plateau

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#### Abstract

The final session of the Second Symposium on Kerguelen Plateau Marine Ecosystem and Fisheries was devoted to a discussion amongst scientists, managers, policy makers and industry stakeholders as to where the greatest needs and opportunities existed for future research in the region. This discussion identified potential for rapid results from combining existing biological and environmental datasets, currently held separately by France and Australia. It also noted there was potential to enhance observations by using fishing vessels as ships of opportunity for collecting underway data and deploying moored instruments at a potentially much lower cost than dedicated research voyages. In future, increasing coordination in planning and funding research, and enhancing the visibility of the work done in the region is likely to result in significant dividends for understanding and managing this region.

#### Introduction

One of the key benefits from the First Symposium on Kerguelen Plateau Marine Ecosystem and Fisheries (Duhamel and Welsford, 2011) was that it provided a rare opportunity for researchers, managers, policy makers, the fishing industry and the public to all experience the current state of scientific knowledge in this remote region. Preparations for the first symposium and the symposium itself lead to several examples of enhanced collaboration between French and Australian counterparts, including:

- (i) research pot fishing at Crozet Islands using a chartered Australian vessel (Gasco et al., 2010)
- (ii) the formal exchange of fishery data and stock assessment expertise between the Australian Antarctic Division, the Australian Fisheries Management Authority, the Museum National d'Histoire Naturelle and the Terres Austral et Antarctique Francaises. A crucial step in gaining unconditional Marine Stewardship Council Certification for the

Patagonian toothfish fisheries in the French and Australian exclusive economic zones (EEZs) on the Kerguelen Plateau

- (iii) the agreement between the French and Australian governments on a 5-year strategy for fisheries and ecosystem research in the region.

Hence when the Second Symposium was developed, it was agreed by the planning committee that it was essential that sufficient time be made available to discuss the key outcomes of the symposium presentations and identify the next steps that should be undertaken. This paper summarises the outcomes of that discussion.

#### Workshop format

All attendees at the symposium self-organised into four groups, with the proviso that each group was required to have at least one representative from the following groups: male, female, researcher, manager or policy, industry, native French speaking and native

English speaking. Each group was then asked to discuss a selection of topics amongst themselves. Facilitators provided set time limits and the opportunity for each group, through a nominated spokesperson, to report a summary of their main discussion to the rest of the workshop participants. The discussion points included:

- (i) What were the highlights of the symposium?
- (ii) Identify the new linkages that would facilitate ‘easy wins’ for further work in the region.
- (iii) What are the highest priority gaps in science and policy in the region?
- (iv) The future of Kerguelen Plateau symposia.

Actions for each discussion item were then agreed by the workshop attendees.

#### Highlights of the symposium

The workshop agreed that there had been great value in the Symposium, with highlights including:

- (i) The opportunity for science, policy and industry groups to hear each other’s perspective and projects, in a forum that enhanced the development future linkages and collaboration.
- (ii) The truly transdisciplinary content of the workshop, spanning marine biology, ecology, geology, oceanography, policy and management. This allowed some linkages to be made between disciplines for the first time, for example the likely importance of submarine volcanoes to iron cycling and ecosystem productivity.
- (iii) Highlighting the parallels and contrasts in fisheries operations and management approaches across the region, providing early insight of possible solutions to issues. For example, the relatively high levels of whale depredation of the French fleet had led to the development of innovative approaches to mitigate the impacts on catch rates that were of benefit to the Australian fleet once it began to encounter whales in recent years.
- (iv) The recognition that there are rich and diverse datasets available, despite the region being so remote.
- (v) The impact new technology has had on the types, quality and volume of information that can be collected since the first symposium in 2011. Examples include those sampling devices and platforms that utilise compact electronic sensors to collect everything from conductivity, temperature and depth from pen-sized data loggers (CTDs), ocean

productivity data from ARGOS floats to high-definition video from dispensable camera systems mounted to fishing gears and moorings.

#### New linkages for ‘easy wins’

##### 1. Synthesis of existing bathymetric datasets

The workshop noted that many presentations included new bathymetric data and recognised the many benefits, including for habitat modelling, oceanography, geology, spatial management and fisheries operations. However, high-resolution depth elevation models (centred on the Australian EEZ) had not been updated since 2011 (Beaman and O’Brien, 2011). While it was also noted that global initiatives such as the General Bathymetric Chart of the Ocean (GEBCO, [www.gebco.net](http://www.gebco.net)) and national hydrographic offices periodically update their bathymetric products, a joint initiative by French and Australian data owners would likely lead to a more prompt result. Therefore, it was agreed that single beam data collected from fishing vessels and multi-beam data collected from recent scientific voyages should be synthesised to develop a high-resolution model for the whole region.

##### 2. The French and Australian fishing fleets as research platforms of opportunity

The workshop recognised that the Australian and French fleets fishing in the region have made significant contributions towards fisheries and ecosystem research and monitoring. Aside from the comprehensive operational and biological data collected by vessel crew and fishery observers, it was noted that fishing vessels could collect underway data for other projects, such as the bioacoustic transects conducted by Austral fisheries vessel from port to fishing ground as a contribution to the Australian Integrated Marine Observing System (IMOS, [imos.org.au](http://imos.org.au)).

##### 3. Collaborative deployment of sensor arrays and profiling of the waters above the Kerguelen Plateau

It was also noted that trials were underway deploying ARGOS standard CTDs on fishing gears to collect data similar to those collected from diving marine mammals using the same devices (e.g. Roquet et al. 2014). This provides CTD data in areas and at times that have been relatively poorly sampled otherwise, such as in spring/summer and deeper than 1 000 m where fishing activity occurs, but elephant seal data are less common. It was further noted that the Southern Ocean Observing System (SOOS) had developed Due South as a tool to facilitate collaboration and coordination on research expeditions to the Southern Ocean ([data.aad.gov.au/duesouth/](http://data.aad.gov.au/duesouth/)) and adding fishing vessel trips to Due South

would be a useful way to augment SOOS. It was also noted that a mooring for listening to whales was planned to be deployed from a fishing vessel near Heard Island in 2018, which, if successful, could lead to a very cost-effective method for deploying other moored sensors in the region.

#### Key gaps for science and policy

The workshop noted that an apparent gap, for both science and policy in the region, was an integrated program addressing the challenges flowing from climate change. It was noted that initiatives existed at the scale of the globe, and at the scale of the Southern Ocean, often focussing on time frames of several decades. However, a gap existed for scientific advice at the scale of the EEZs on the Kerguelen Plateau, and at shorter time scales (<10 years) that are often relevant to industry stakeholders and managers with responsibilities at the regional scale. It was also noted that there was a relative paucity of understanding of the physical structure of the ocean over the plateau. As this was an important habitat in the region, the deployment of ARGOS floats and expendable bathythermographs and similar oceanographic sampling devices should be encouraged across the plateau to collect data that, along with CTDs deployed on fishing gear, could be used in the development of regional-scale models for the region.

The workshop noted that France had a permanent station at Kerguelen which facilitated more regular scientific campaigns in the region. It agreed that there was likely to be substantial benefit in more regular fishery-independent research in the Australian EEZ. It also noted that research in adjacent parts of southern Kerguelen, such as BANZARE Bank and Elan Bank would help provide context to the information available from the plateau around Heard Island and McDonald Islands (HIMI) and the Kerguelen Islands.

Other key gaps identified included:

- (i) trophic dynamics, particularly for mesopelagic fauna
- (ii) the paucity of early life-history studies
- (iii) generating biodiversity data from archived samples using latest taxonomic knowledge and techniques such as DNA barcoding
- (iv) developing standardised metadata templates for datasets from the region, and a centralised repository for metadata and data.

#### Future symposia

The workshop agreed that there should be symposia in the future. I noted that the 7-year period between the first and second symposium was an obstacle to maintaining a ‘community’ around plateau-wide science and policy issues, and recommended that a 3- to 4-year frequency was more appropriate. It also agreed that future symposia could provide more opportunity for industry stakeholders to present their perspectives on their operations, priorities for research and policy development and opportunities fishing vessel-based research. It also looked forward to more oceanographers attending future symposia, as well as considerations of linkages between terrestrial and marine processes.

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