www.csiro.au

CSIRO Submission 14/500

Inquiry into Australia's future activities and responsibilities in the Southern Ocean and Antarctic

Senate Standing Committee on Foreign Affairs Defence and Trade

June 2014

Enquiries should be addressed to:

Tracey Cootes
CSIRO Ministerial and Parliamentary Liaison
PO Box 225, Dickson ACT 2602
T 02 6276 xxxx
E mplo@csiro.au

Table of Contents

Executive Summary

- Australia's Antarctic and Southern Ocean science provides essential knowledge to advance Australia's economic and environmental wellbeing and security.
- Australia has an, world-class reputation in Antarctic and Southern Ocean science and there is a strong appetite globally to collaborate with us.
- There are opportunities to lead or co-lead major international consortia provided we can resource the necessary logistics, science support, capital equipment, and science capability.
- Illegal, unreported and unregulated fishing has the potential to undermine the sustainable management of our Southern Ocean and sub-Antarctic fisheries and ecosystems.
- A strong science program could advance Australia's economic and environmental wellbeing and security, and maintain our influence in the Antarctic Treaty System.
- Australia's currency in international treaties is in large part based on our science credibility.
- Cooperation with international partners on research and management is best done in the context of a well coordinated Australian Antarctic and Southern Ocean science plan.
- Building efficient, effective, and internationally integrated partnerships among Antarctic research institutions will strengthen Australia's effectiveness and efficiencies in Antarctic and Southern Ocean research.
- Investment in infrastructure and its operation will be essential facilitate Australia's standing in international Antarctic and Southern Ocean affairs and rebuild Australia's capacity to contribute to Antarctic science.
- Whole of government co-ordination of Australia's Antarctic and Southern Ocean interests is desirable, to ensure coordination and alignment of the research and effective use of resources from across the innovation system.
- An interagency advisory committee could help to strengthen national efficiency and coordination.

Introduction

CSIRO welcomes the opportunity to provide input to the Senate Standing Committee on Foreign Affairs Defence and Trade inquiry into Australia's future activities and responsibilities in the Southern Ocean and Antarctic.

CSIRO has a long history of Southern Ocean and Antarctic research aligned to national priorities addressing challenges about the sustainability of Antarctic and sub-Antarctic marine living resources and in understanding and simulating the earth system and its impact on Australia's climate and resources.

Much of CSIRO's research is undertaken in collaboration with national and international partners or as part of international research programs.

CSIRO is a leader in the following areas:

- Marine living resource analysis;
- Southern Ocean dynamics and the implications for global and regional climate;
- Southern Ocean carbon analysis;
- Ozone Hole observation and analysis;
- Greenhouse gas observation and analysis;
- Research into past climate through analysis of ice cores; and
- Climate and Earth System simulation.

Australia has an enviable, world-class reputation in Antarctic and Southern Ocean science and there is a strong appetite globally to collaborate with us. There are opportunities to lead or co-lead major international consortia provided we can resource the necessary logistics, science support, capital equipment, and science capability.

Our global impact is proportional to our access to sites where the best science can be done and where the most difficult and intriguing questions can be answered – in the depths of the ocean, under sea ice, under ice shelves, deep on the Antarctic continent where million year ice might be found, etc.

It is within this context, that the following comments are provided addressing the first three Terms of Reference. CSIRO has no comment in regard to TOR D: "Any related matters".

CSIRO response to the Terms of Reference (ToR)

(a) Australia's management and monitoring of the Southern Ocean in relation to illegal, unreported and unregulated fishing

- Australia has responsibility for monitoring activities in its Exclusive Economic Zone (EEZ) which includes an area subject to claim adjacent to Antarctica. This is a contested space internationally because there are some countries that don't recognise Australia's claim to this area.
- Australia needs to monitor the region to detect illegal activities, using capability including ships, aircraft, access to remote sensing capability, and strong international partnerships.
- CSIRO collaborates with the Australian Antarctic Division (AAD) providing marine living resource assessments in the Southern Ocean and Antarctic and sub-Antarctic that contribute directly to Australia's obligations under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), the Agreement for the Conservation of Albatrosses and Petrels (ACAP), and the Australian Fisheries Management Authority (AFMA).
- Illegal, unreported, and unregulated fishing (IUU) has the potential to undermine the sustainable management of our Southern Ocean and sub-Antarctic fisheries and ecosystems. CSIRO uses estimates of IUU fishing effort published by CCAMLR inits models. Quantifying southern ocean IUU is important to improve the robustness of the models for resource assessment and management advice.
- CSIRO is collaborating with the Antarctic Climate and Ecosystems Co-operative Research Centre (ACE CRC) and AAD, to develop multi-species and ecosystem models for Antarctica. The models to date have focused on climate related scenarios, but could include facets of ecosystem-based management including the broader ecosystem implications of illegal, unreported, and unregulated fishing.

(b) Cooperation with international partners on management and research under international treaties and agreements

- Australia's Antarctic and Southern Ocean science provides essential knowledge to advance Australia's economic and environmental wellbeing and security.
- Australia's reputation as a global leader in Antarctic and Southern Ocean science gives us great credibility and influence in international fora, including in the Antarctic Treaty System (ATS). The delivery of science is a major currency to negotiations and decision making under the ATS.
  - A strong science program is integral to maintaining our influence in the Antarctic Treaty System.
  - The relationship between Australia's Antarctic science priorities and those of other Treaty signatories should be explored and possibilities for high level science co-operation considered.
  - Articles 2, 3, and 7 of the Antarctic Treaty System provide for freedom of scientific operations and cooperation, exchange of information and personnel between treaty nations, and access to any area. Australia could consider options to use these provisions where there is mutual benefit in skill and capacity building, science operations and delivery, and infrastructure.
- Cooperation with international partners on research and management is best done in the context of a well coordinated Australian Antarctic and Southern Ocean science plan that articulates strategic priorities targeted to national interests, brings Australian agencies together to enhance co-operation, and provides a framework for continued and enhanced international co-operation. The inquiry underway by Dr Tony Press on a 20 year Antarctic Strategic Plan could provide a foundation for this.
- Australia's currency in international treaties is in large part based on our science credibility.
- The following are key areas of research CSIRO considers to be important foci for collaboration and where CSIRO expects to be well placed to contribute.

  Marine living resource analysis

  CSIRO, works in collaboration with the Australian Antarctic Division (AAD), providing stock assessment, conservation assessment, ecosystem modelling and management advice for sub-

Antarctic and Antarctic fisheries, seabird and marine mammal conservation, design of spatial management and marine protected areas in the Southern Ocean, and potential impacts of climate change on the structure and function of sub-Antarctic and Antarctic ecosystems. These services contribute directly to Australia's obligations under Convention on the Conservation of Antarctic Marine Living Resources, the Agreement for the Conservation of Albatrosses and Petrels, and the Australian Fisheries Management Authority.

Southern Ocean dynamics and the implications for the climate

CSIRO works with national and international partners to progress fundamental understanding and observation-based quantification of how the Southern Ocean modulates and transports heat, Carbon, freshwater, and energy between the warmer latitudes and the frozen continent. Future work increasingly will focus on the consequences of Southern Ocean warming for the Antarctic ice shelves, ice sheet, and consequential feedback effects on ocean circulation and global sea level. CSIRO's teams have been working with many national and international collaborators for over two decades and remain international leaders in this area.

Southern Ocean carbon analysis

CSIRO provides observations and analyses to assess the trends in the strength of the Southern Ocean Carbon dioxide (CO_2) sink – through continuous *in-situ* observations of CO_2 concentrations at Macquarie Island, flask sampling in Antarctica, and, through the ACE CRC, measurement of CO_2 fluxes and fates in the Southern Ocean. This work is supported by CSIRO and the Australian Climate Change Science Program and the ACE CRC.

Ozone Hole observation and analysis

CSIRO provides, under contract to the Australian Government, assessments using satellite and ground-based ozone data to monitor changes in the ozone hole, to comply with the Montreal Protocol and to assess possible impacts on Australia and Australian Antarctic bases, infrastructure, and facilities.

Greenhouse Gas observation and analysis

CSIRO is reconstructing long (millennial scale) time-series of atmospheric greenhouse gas concentrations to reconstruct past carbon–climate feedbacks using ice and snow samples extracted from Antarctic ice cores and analyses. This research is in alignment with the current (2012) Australian Antarctic Science Plan and contributes to the World Meteorological Organisation (WMO) Global Atmosphere Watch, including by measurement QA-QC, calibration, and data submission (http://www.wmo.int/pages/prog/arep/gaw/history.htm).

Climate and Earth System simulation

The observations and analyses outlined above are central to development of Australia's national Earth System modelling capability, spearheaded by the Australian Community Climate and Earth System Simulator (ACCESS), to enable simulations to represent adequately the influence of the Antarctic region on global and regional climate. ACCESS is a joint CSIRO-BoM initiative and a priority is to ensure that ACCESS includes state-of-the-art ice sheet and sea-ice modelling capability. This would equip Australia with a simulation capability to, for example, investigate the effect of global warming on the stability of the Antarctic sea ice extent, ice shelves, and ice sheet and the prospective consequences for sea level of discharge of grounded ice. Such a simulation capability would provide forecasts for operations in the Antarctic region at daily, multi-week, and seasonal timescales, as well as providing projections of future climate scenarios for Antarctic ecosystems.

(c) Appropriate resourcing in the Southern Ocean and Antarctic territory for research and governance

CSIRO's comments address three aspects around resourcing: co-ordination for greater resource efficiency and effectiveness; infrastructure; and national governance.

Co-ordination

- Much of CSIRO's Antarctic and Southern Ocean research is multi-institutional and multi-national because of the investment in operational support and infrastructure required to operate in Antarctica and the Southern Ocean as well as the specialist knowledge required.
- Researchers from CSIRO and elsewhere play key roles in international science through various international panels, partnerships, and collaborations in the key areas outlined above.
- Building efficient, effective, and internationally integrated partnerships among Hobart-based Antarctic research institutions will strengthen Australia's effectiveness and efficiencies in Antarctic and Southern Ocean research.
- Options could be explored to extend these partnerships to recognise Hobart as the national and global knowledge centre for Antarctic and Southern Ocean science, by:
  - Strengthening partnerships among Hobart based agencies and other Australian and international agencies with Antarctic capability to pursue mutual national interests;
  - Developing integrated work programs across the partners;
  - Aligning capabilities to be more effective in delivering science outcomes;
  - Joint planning or co-ordination of infrastructure, including vessels, and sharing of capability and experts; and
  - Co-location in Hobart of research agencies or staff teams where practical.
- Potential benefits include scientific advances from building critical mass, better co-ordination of infrastructure and logistics, better informed policy, growth in associated service industries, and population diversity. Tasmanian institutions' world-class capability, science outputs, and national and international connections provide a strong foundation to achieve this vision.
- Much of Australia's atmospheric observing and Earth System modelling capability are part of the Centre for Australian Weather and Climate Research, a partnership between CSIRO and the Bureau of Meteorology, based predominantly in Melbourne. Deep collaboration with AAD and CSIRO teams in Hobart (and working in the ACE CRC) means that the gateway through CSIRO has national and international reach.
- The ACE CRC has been a very effective collaborative vehicle for delivery of complementary research from AAD, CSIRO, and UTas and international partners since the early 1990s, driving development of new areas of research. It will continue to play a key role only if sustained resourcing of it is provided.
- The strong track record of Australia's Integrated Marine Observing System (IMOS) demonstrates the value of coordinating research infrastructure on a national scale. Continuity of resourcing for the program is key to delivering benefits that only sustained, strategic observing can provide.
- The Marine National Facility's (MNF) new Research Vessel *Investigator* will support oceanographic, atmospheric, climate, geological, fisheries, and ecosystem research. Co-ordination of vessel operations between the MNF and AAD, and potentially with other nations, would enhance the efficiency of marine Antarctic research, provided sufficient resources are available for both the national icebreaker and the MNF.

Infrastructure

- Resourcing of new infrastructure and its operation will be essential to maintain or grow Australia's standing in international Antarctic and Southern Ocean affairs and rebuild Australia's capacity to contribute to Antarctic science, which has diminished over time.
- The key role of the AAD in leading Australia's Antarctic science program should not be understated as it has provided the bulk of the infrastructure, operational services, and complementary scientific capability to enable research in the Antarctic region. CSIRO could not do the research we do without that support and collaboration.

- Support has included transportation of staff, equipment, and samples to and from the Antarctic region, station and field support, specialist technologies (e.g., ice drilling, oceanographic equipment), and scientific contributions.
- AAD's infrastructure and capability ensures access to the Southern Ocean and Antarctica, the safety of staff, and the continuation of science operations.
- The introduction of an air link capable of changing crews on *Aurora Australis* did not deliver expected efficiencies – partly because of operational issues and partly because of continuing constraints on research days available on the ice breaker.
- Aviation nevertheless will be an important part of future access to the continent. A key concern for CSIRO is that the introduction of large cargo-carrying aircraft will increase the need for shipping in the short, medium and long term, as bases continue to expand and modernise. This has the potential to detrimentally affect the availability of ship time for marine science unless managed carefully and resourced appropriately.
- A new state-of-the-art icebreaking vessel is needed to replace the ageing *Aurora Australis*. The arrival of the RV *Investigator* in the Marine National Facility (MNF) will bring a valuable resource, but *Investigator* is not ice capable and cannot work close to the Antarctic coast where high priority research is needed. The MNF services research across the Australian Marine Estate, with sea-time in high demand and subject to a competitive process that is currently independent of Antarctic science planning, making a research ice breaker an essential complementary capability for national marine research infrastructure.
- The new ice breaker vessel needs to have greater icebreaking capability than the *Aurora Australia* as sea ice is increasing in thickness and extent in parts of East Antarctica and demand for search and rescue operations is very likely to increase given increasing activity from other nations and private expeditions in East Antarctica.
- The science systems on any replacement icebreaker ideally would be interchangeable, where possible, with the MNF equipment and technical teams could be shared.
- Separation of resupply and maintenance functions from research functions though the use of two ice-capable vessels would be required to truly reset Australia's Antarctic marine research capacity.
- There are many, well established operational collaborations that save money and deliver benefits to all nations involved in Antarctic operations and research. Building strategic, long-term relationships is the key. Questions to consider are for example:
  - Can the NZ research vessel *Tangaroa* be managed as an 'inter-national facility' together with *Aurora Australis* (or its replacement) and *Investigator*?
  - Can containerised laboratories be standardised so they can 'plug and play' on many vessels?

National Governance

- Whole of government co-ordination of Australia's Antarctic and Southern Ocean interests is desirable and could best be led from the Environment Portfolio, through the AAD, to ensure coordination and alignment of the research and effective use of resources from across the innovation system.
- An interagency advisory committee could help to strengthen national efficiency and coordination. That committee could be formed through review of the current Antarctic Science Advisory Committee with expanded Terms of Reference and a greater balance of expert and representative members.

(d) Any other related matters.

Nil.