

SOUNDINGS



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About the Author

Captain Paddy Hodgman RANR commenced full time RAN service in 1972 as a Supply Midshipman, initially on a short service commission. Over the following 18 years, he saw a variety of unit, training and headquarters appointments within the Supply specialisation including seagoing and shore based supply charge appointments and exchange service with the US Navy in 1986-87. Appointed in 1990 as the Navy's first Director of Public Information, his ADF employment since then focused on a range of areas including capability planning, preparedness, strategic workforce planning and as CoS to the Chief of Navy. As a civilian, his private sector employment has covered consultancy, materiel support services and major project roles. In the public sector he has served in both Defence and the Department of Finance in major capital investment review and in the former Defence Materiel Organisation as the Air Warfare Destroyer Assistant Program Manager and as Director, Projects of Concern. He is currently the filling, for the short term, the role of Director General Navy Communications and Coordination.

About the Paper

This paper was commissioned in 2014 by the former Resilience Branch in Joint Capability Coordination Division, Vice Chief of Defence Force Group to understand the implications for Defence capability if a government, now or in the future, expected Defence to do more in the Southern Ocean or Antarctica. It was submitted in June 2015 and has some minor editorial amendments to reflect subsequent activities.

Some Capability and Operating Implications Arising from Australia's Antarctic and Southern Ocean Interests

Paddy Hodgman

Introduction

This paper considers the capability implications for the Department of Defence and the Australian Defence Force (ADF) of:

- current and changing policy and issues in relation to the Antarctic and Southern Ocean
- the impact of related planning, environmental and other change.

This includes developing an understanding of the implications for Defence capability if a government, now or in the future, expects it to do more in the Southern Ocean or Antarctica.

In addressing the scope of the environment scan, this paper outlines:

- current situation: activities, interests and capabilities relevant to Defence
- change factors: implications of key shapers, variables and drivers of demand and change
- principles: conclusions for Defence, derived from current circumstances and change factors
- capability and operating: practical implications for Defence.

Current Situation

Australia, along with a growing number of other states, both individually and collectively, has longstanding interests, presence, activities and involvement in Antarctica and the Southern Ocean. Science, referred to in a number of reports and fora as the 'currency' of national and international interests, is a key driver of current and growing presence, operations and interest. There is a growing focus on climate science. This is also linked to political and some resource interests for both state and non-state actors. The current situation in relation to these matters is discussed in the following paragraphs.

Current International Interests

The Antarctic Treaty System (ATS) '.. provides the overarching international framework for the governance of the land and waters south of 60 degrees South Latitude'.¹ The ATS embraces the *Antarctic Treaty 1959*, as well related agreements such as the *Convention on the Conservation of Antarctic Marine Living Resources 1982*, and the *Protocol on Environmental Protection to the Antarctica Treaty 1991* (Madrid Protocol).² The ATS is central to Australia's policy and interests and significant internationally.

Intended to help ensure the predominance of science as well as peaceful resolution of disagreements, the Antarctic Treaty sets aside any resolution of individual states' Antarctic sovereignty claims, without strengthening or diminishing those claims. While the Treaty contributes to the legal framework within which states' interests are pursued and governed, it remains apparent that, for states to preserve their Antarctic claims and interests, there is a need for them to maintain a level of activity commensurate with those interests. In practical terms, the 'use it or lose it' principle appears to apply.

The Antarctic Treaty '..expressly prohibits actions of a military nature in Antarctica, such as the establishment of military bases, weapons testing or military manoeuvres'.³ This prohibition does not extend to entirely preclude the use of military capabilities for peaceful purposes, such as lift, survey or search and rescue (SAR). It is of note, also, that by agreed practice, states claiming sovereignty over parts of Antarctica will only seek to enforce their domestic laws in respect of their own nationals within the area covered by the ATS.⁴

The Convention on the Conservation of Antarctic Marine Living Resources and related measures govern the conservation of living marine resources. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) Secretariat is headquartered in Hobart and CCAMLR plays a leading and coordinating role in all aspects of managing living marine resources. This covers management of exploitation and includes operation of a vessel monitoring system to assist maintaining compliance. The Madrid Protocol on environmental protection includes prohibition of activities, other than research, relating to exploitation of mineral resources.

The ATS is growing. From its original 12 parties in 1959, the Antarctic Treaty now has 52 parties, 29 of which are ‘consultative parties’ actively engaged in Antarctic research. Now included among the parties are nations such as Malaysia which had previously remained outside and challenged the ATS. This growth in participation reflects and underpins the ATS’ significance and effectiveness in Antarctic and Southern Ocean governance.

The Antarctic Treaty, as well as provisions such as the Madrid Protocol’s mining prohibition, extends until 2048.

While the Madrid Protocol prohibits mining in the Antarctic Treaty area, there is much speculation that some countries are engaged in Antarctic activities in order to position themselves for a time in the future when international attitudes to mining in the Antarctic might change.⁵

Despite some suggestions of resource interest by nations such as China and Russia as well as other states, there appears to be limited prospect, however, of the mining provisions doing anything other than continuing substantially in effect beyond that time.⁶

There is a current trend of growth in the depth and natures of international interest in Antarctica, reflected in national engagement in the ATS, as well as presence and activity in Antarctica. This growth is driven by a range of interests, not least of which are the growing interest in, and value of, living resources, such as krill and valuable fish species. There is also some interest in potential harvesting of non-living resources, albeit limited by the relevant ATS prohibitions.

About 30 countries maintain a total of about 70 research stations (40 year-round or permanent, and 30 summer-only) in Antarctica, with an approximate total population of 4000 in summer and 1000 in winter.

East Antarctica is that part of the continent nearest to Australia and its interests, and substantially covered by Australia’s sovereignty claim, the Australian Antarctic Territory (AAT). Current levels of presence and activity in East Antarctica include 27 national stations, with a further 2 announced, established and operated by 14 states. All states operating or sharing stations in East Antarctica have acceded to the Antarctic Treaty.

United States

There are three permanent US stations in Antarctica including: Amundsen-Scott at the geographic South Pole; Palmer station is located on Anvers Island off the Antarctic Peninsula in West Antarctica and north of the Antarctic Circle; and the most substantial US station, McMurdo, is located on the southern tip of Ross Island, in the New Zealand-claimed Ross Dependency on the shore of McMurdo Sound. Supported by airlift primarily through New Zealand and by sea, the station is the largest community in Antarctica, capable of supporting up to 1258 residents, and serves as the US Antarctic science facility.

There is current discussion in the United States concerning its national icebreaker fleet. While the focus is on Arctic requirements, Antarctic support requirements, such as that provided by the US Coast Guard icebreaker *Polar Star* will also be taken into account.

The United States has been a ‘consultative party’ since 1961. While not claiming territory in Antarctica, the US has reserved the right to claim.

China

China operates two year-round stations:

- Great Wall station on King George Island, West Antarctica
- Zhongshan station located in the Larsemann Hills, in the AAT not far to the south west from Australia's Davis station.

In addition China operates one summer station, Kunlun, located on Dome Argus (Dome A) and Taishan station, both also in the AAT, located in Princess Elizabeth Land.

In late 2014 China announced the planned construction of an airfield near Zhongshan station and planned construction of a Beidou satellite navigation system base station near Great Wall station.

In addition to the current icebreaker and polar research vessel *Xue Long*, China is expected to commission a second polar research vessel in 2016.

China has been a 'consultative party' since 1985. There is speculation and some evidence, notwithstanding the Antarctic Treaty provisions, of Chinese interest in extracting mineral resources in Antarctica. At the 2014 CCAMLR meeting China and Russia are reported to have successfully opposed the creation of Antarctic marine protected areas, but China did not persist with this position in 2015. China has also announced plans for a seven-fold increase in its annual catch of Antarctic krill.⁷ These plans should require CCAMLR approval, and would test CCAMLR.

Overall, China's Antarctic interests and activities reflect continuing sustained and substantial growth.

Russia

There are eight Russian Antarctic stations in current use, of which five are permanent, with one of these jointly operated with Belarus, and four are summer stations. Several were closed in the 1990s and subsequently reopened. In early 2014, Russia announced expenditure of over \$30 million to boost its stations, and fund exploration in the region.

Consistent with its substantial Arctic and Antarctic interests, Russia has a large fleet of icebreakers, including six nuclear powered vessels with a seventh under construction and more than 50 conventionally powered vessels with a further six planned or under construction. In addition, Russia is assisting Argentina repair its damaged icebreaker, as well as its possible purchase of another vessel.

The former Soviet Union, now succeeded by Russia, became a 'consultative party' in 1961. As noted above, Russia also joined with China in opposing the creation of Antarctic marine protected areas. Russia appears to be taking a more assertive stance in the Antarctic and Southern Ocean, including in fora such as CCAMLR.

India

There are currently two permanent Indian Antarctic stations, both in East Antarctica, with one, Maitri, in the Norwegian-claimed Queen Maud Land and the other, Bharati, not far from Davis station in the AAT. India's first permanent station, some 90km from the current Maitri station was commissioned in 1981, decommissioned in 1990 and turned into a supply base.

India's current ocean research vessel has ice capability but resupply of the two Antarctic stations has hitherto been undertaken by contracted vessels. India has announced replacement of the current vessel with a new icebreaker and research-supply vessel by mid-2017.

India has undertaken more than 30 Antarctic expeditions since its first in 1981 and achieved 'consultative party' status in 1986. Its interests in Antarctica appear to be primarily scientific.

France

Bounded on both sides by the AAT, the French Antarctic claim is a 6° wedge emanating from the South Pole. France operates one permanent station, Base Dumont d'Urville, on Île des Pétrils off the coast in this area, as well as maintaining a station, Concordia, jointly with Italy further inland half way to the South Pole and in the AAT.

As is the norm, the focus of the French presence in Antarctica is scientific activity. The icebreaker *Astrolabe* carries supplies and personnel to the station from Hobart, making five round-trips between November and March each season.

France's other Southern Ocean territories include:

- Kerguelen Islands (Archipel des Kerguelen), a group of volcanic islands in the southern Indian Ocean, southeast of Africa, approximately equidistant between Africa, Antarctica and Australia.
- St Paul and Amsterdam islands (Îles Saint Paul et Amsterdam), a group to the north of Kerguelen.

These territories are north of 60° S and outside the Antarctic Treaty area. The Kerguelen Islands exclusive economic zone adjoins that of Australia's Heard and McDonald Islands (HIMI). This region also includes a significant toothfish fishery. Within these two exclusive economic zones, normal enforcement rights and responsibilities apply and there is a cooperative agreement between Australia and France in this regard.

Australia's input, particularly in terms of patrol and presence, to this cooperative arrangement has been quite limited in recent years with some desire on the part of the French for an increased contribution. Following fire damage in the spring of 2014 to one of France's enforcement vessels, there is the prospect of French pressure for a more substantial Australian contribution. The April-May 2015 deployment of ACV *Ocean Shield* included coverage of French waters in the southern Indian Ocean surrounding the Kerguelen Islands.⁸

An original Antarctic Treaty signatory with consultative status since 1961, France, along with the EU, Australia, United States and New Zealand led the call in CCAMLR in late 2014 for marine protected areas in the Southern Ocean, in the Ross Sea Region and in East Antarctica.

New Zealand

New Zealand's interests go back more than 100 years. Among these, in succession from Great Britain, is the New Zealand-claimed Ross Dependency, covering: '...all the islands and territories between the 160th degree of East Longitude and the 150th degree of West Longitude which are situated south of the 60th degree of South Latitude' adjacent to the east of the AAT.⁹

With its main Antarctic station, Scott Base, 3km from the US McMurdo station on Ross Island, New Zealand pools logistics with the US and Italian Antarctic programs which use Christchurch as their gateway to Antarctica. New Zealand has also previously operated Vanda and, jointly with the United States, Hallett stations, both within the Ross Dependency.

Owned by the National Institute of Water and Atmospheric Research, New Zealand operates RV *Tangaroa* an ice-strengthened deep water research vessel which has undertaken 10 Antarctic voyages as part of its role. For enforcement purposes, the New Zealand Defence Force operates P3 surveillance aircraft and employs Royal New Zealand Navy vessels such as the ice strengthened offshore patrol vessels HMNZ Ships *Wellington* and *Otago*, although deployments to the Southern Ocean have tested the capabilities of these vessels.

Most recently *Wellington* (with 10 RAN personnel embarked as part of ongoing and developing Australia/New Zealand cooperation) intercepted the suspected illegal, unregulated and unreported (IUU) fishing vessels *Kunlun*, *Songhua* and *Yongding* involved in illegally fishing for toothfish in

the Ross Sea. Flag state permission was granted subsequently to board *Kunlun* and *Songhua* by Equatorial Guinea but the captains of both vessels refused to cooperate.

Lastly, New Zealand is understood to be considering the acquisition of C17 aircraft for use, *inter alia*, in Antarctic airlift support.¹⁰

Japan

With four National Institute of Polar Research stations in East Antarctica all in the Norwegian-claimed Queen Maud Land adjacent to the west of the AAT, Japan is also an original Antarctic Treaty signatory, achieving consultative status in 1961. Japan's icebreaker *Shirase*, is operated by the Japan Maritime Self-Defense Force. In addition, the Tokyo University of Marine Science and Technology research vessel *Umitaka Maru* has undertaken collaborative international research voyages into Antarctic waters.

While Japan's Antarctic presence is focused on scientific research, a particularly prominent Japanese interest in the Southern Ocean is whaling. This activity has brought public controversy and disagreement between Japan and Australia as well as many other states. It has also seen a sustained escalation of intervention from non-state actors, particularly the Sea Shepherd Conservation Society.

Other states with East Antarctica permanent or summer bases or other activity include Norway, Germany, Belgium, Belarus, Romania, Italy, Republic of Korea which launched its icebreaking research vessel *Araon* in 2009, and Pakistan. There are also 'rapid' increases in investment by China, India, Malaysia and Republic of Korea, and plans announced by Iran to establish a permanent Antarctic station.¹¹

In the Southern Ocean, IUU fishing is undertaken predominantly by vessels with shifting ownership and flag registration. A number of the ownership companies involved in both IUU and legal fisheries have been based in South American states as well as Spain and Republic of Korea. Flag state registration has, for some vessels, been with African states such as Equatorial Guinea and Nigeria, although Nigeria recently de-registered the IUU toothfish vessel *Thunder*.

Australia's Current Interests and Activities

Australia's currently stated Antarctic interests are to:

- preserve sovereignty over the AAT, including sovereign rights over the adjacent offshore areas
- take advantage of the special opportunities Antarctica offers for scientific research
- protect the Antarctic environment, having regard to its special qualities and effects on the region
- maintain Antarctica's freedom from strategic and/or political confrontation
- be informed about and able to influence developments in a region geographically proximate to Australia
- derive any reasonable economic benefits from living and non-living resources of the Antarctic (excluding deriving such benefits from mining and oil drilling).¹²

The ATS is central to Australia's Antarctic and Southern Ocean interests. To that end, the recent Senate Committee inquiry and the *20 Year Strategic Plan* both strongly emphasise the criticality and primacy of the ATS, with the *20 Year Strategic Plan* recommending the addition of: 'support a strong and effective Antarctic Treaty System', to the list of Australian Antarctic interests, and the Senate Committee inquiry recommending that:

...the Government reaffirms the primacy of the Antarctic Treaty System to Australia's sovereignty and national interests and continues to support and resource Australia's robust engagement in Antarctic Treaty processes and for a in the pursuit and promotion of those interests.¹³

The ATS effectively sets aside any resolution of individual states' Antarctic sovereignty claims, without strengthening or diminishing those claims. Nonetheless, practical realities mean that preservation of Australia's claim to sovereignty and furthering Australia's interests are substantially dependent on maintaining an active, leading role in ATS fora and activities and, particularly, in the predominant Antarctic fields of scientific research. As noted above and notwithstanding the ATS provisions, in practical terms, the 'use it or lose it' principle applies to Australia and its Antarctic interests.

Australia's International Cooperation

Australia cooperates with other states in Antarctica through ATS related fora and activities as well as bilaterally:

- In the area of scientific research, in 2012-13 the Australian Antarctic Science Program undertook 61 science projects involving 136 scientists from 36 Australian institutions, including research conducted in collaboration with 71 institutions in 23 other countries.¹⁴
- Australia has formal agreements for SAR cooperation with New Zealand and South Africa whose SAR zones are adjacent to Australia's. Through the Australian Antarctic Division (AAD), Australia has also provided SAR and evacuation when the need has arisen for other states with an Antarctic presence or operations.
- In the area of enforcement, Australia participates actively in international arrangements, and also participates in bilateral cooperation and arrangements with nations such as France and New Zealand.
- Both bilaterally and within ATS fora, Australia promotes the role of Hobart as one of the five internationally recognised Antarctic Gateways.

Australian National Activities

Four main spheres of national activity emerge within the context of Australia's Antarctic presence, activities, capabilities and interests: science; emergency response, SAR and evacuation; enforcement; and logistic support and infrastructure.

Australia's Antarctic presence comprises three permanent stations maintained and operated by the AAD within the AAT: Mawson, Davis and Casey as well as the ice airstrip at Wilkins aerodrome some 70km south east of Casey station. In addition, within the AAT, Australia:

- Maintains the summer-only Law-Racoviş station in the Larsemann Hills 100km south west of Davis jointly with the Romanian government. It is supported from Davis when Australia conducts programs in the area.
- Supports maintenance of Mawson's original station at Commonwealth Bay.
- Deployed an automatic weather station at Dome A in the AAT as part of an Australian-Chinese collaboration in January 2005.

Southern Ocean

In the Southern Ocean, Australia's presence includes Macquarie Island and HIMI.

Since the operation of the Australian National Antarctic Research Expedition (ANARE) station at Atlas Cove on Heard Island, from 1947 to 1955, the AAD has mounted over 30 expeditions to the region. Personnel usually split into project-specific groups, accommodated in huts or tents at Spit Bay, Atlas Cove and other minor camps distributed across Heard island.

Surveillance patrols in the HIMI region have been undertaken by civilian and ADF vessels and are principally aimed at enforcing fisheries legislation, and detecting and deterring illegal fishing activities within the HIMI Australian Fishing Zone. These patrols also provide opportunities for the surveillance of other illegal activities.

A treaty signed by Australia and France in 2003 also provides for cooperative surveillance activities in the adjacent exclusive economic zones surrounding HIMI and Îles Kerguelen. Under that treaty it is possible that French vessels may undertake surveillance patrols in the HIMI exclusive economic zone.

Macquarie Island, a sub-Antarctic island located in the Southern Ocean, approximately half way between Australia and Antarctica, is a nature reserve managed by the Tasmanian Parks and Wildlife Service. The AAD maintains and operates a Macquarie Island station which is home to about 40 expeditioners over summer, with about 16 over winter.

Science

Consistent with wider international and national interests, science and scientific research is at the centre of Australia's interests and presence, with Australia's prominent role in and support for scientific research seen as underpinning national interests and, hence, shaping national requirements for Antarctic support infrastructure and capabilities. The *Australian Antarctic Science Strategic Plan* is the framework for scientific research priorities and coordination across government and academic institutions, and both the Senate Committee inquiry and the *20 Year Strategic Plan* emphasised the importance of research.¹⁵

The AAD conducts research in the Southern Ocean, the Antarctic and the sub-Antarctic, into fields such as climate change, the human footprint on Antarctica and the increasing demands for food security caused by human population growth. The research program covers physical and life sciences in the atmospheric, terrestrial and marine domains, as well as human biology and medical research. It is also responsible for a broad suite of ongoing observational activities, including a network of meteorological facilities; ionospheric activity monitoring; seismic, magnetic and GPS networks; and hydrographic and bathymetric mapping.¹⁶

Australian scientists also work closely with collaborators in the science programs of other states, and to support this, the AAD has formal memoranda of understanding covering science and operational cooperation with a number of Antarctic Treaty states.¹⁷ The *20 Year Strategic Plan*, consistent with the view of scientific research as the 'currency' of Antarctic interests, describes Antarctic success for Australia as being, *inter alia*: '... a collaborator of choice in science in East Antarctica....'.¹⁸

There is concern, reflected in the *20 Year Strategic Plan* and during the Senate Committee inquiry that, particularly relative to growing interest and activity among other states, Australia's presence, level of scientific activity and standing is diminishing.

Australia's scientific standing is under threat. In 2004 Australia was ranked third in terms of Antarctic scientific output. But Australia's leadership is being eroded by the diminishing capacity to undertake high powered research in Antarctica and the Southern Ocean; by Australia's loss of deep field traverse capability; by limited intra- and inter-continental air transport capability; and by historical under-investment in Antarctic science and science support.¹⁹

Emergency Response, SAR and Evacuation

Australia's SAR region, as defined by international agreement, covers one tenth of the earth's surface, including 8.5 million km² of ocean below 60° S. It extends east and west of Australia's land mass and south to the AAT. In addition to the evacuation support from the ATS area provided through the AAD, meeting Australia's SAR zone obligations is coordinated by the Australian Maritime Safety Authority (AMSA) and involves coordinating the deployment and use of assets available at the time. This can include Maritime Border Command (MBC) and Defence assets, both air and sea, noting that there are few such assets, particularly vessels, with appropriate ice capabilities.

In 2013 the, Russian ice-strengthened research ship MV *Akademik Shokalskiy* was chartered by the Australasian Antarctic Expedition 2013-2014, a non-government entity supported by a number of research bodies, to celebrate the centenary of the previous expedition under Douglas Mawson and to repeat his scientific observations. The expedition had nine scientific goals related to observations, mapping, and measurements of environmental, biological, and marine changes associated with climate change. The ship became beset by ice about 190km east of the French station, Dumont d'Urville, with the extraction of its crew and passengers and its eventual recovery involving Australian, French, Chinese and US icebreakers.

The 2014 and ongoing Indian Ocean search for the missing Malaysian Airlines flight MH370, while not within the Southern Ocean, was at levels of distance, endurance and some weather conditions to provide lessons also relevant to Southern Ocean SAR. Like the *Akademik Shokalskiy* recovery, it involved valuable experience in coordinating both within the Australian government and other Australian agencies and, more particularly, with a range of international stakeholders, interests and contributions. There are potentially valuable lessons, particularly in this regard, to be learned from both these experiences.

Enforcement

For Australian enforcement in Antarctic waters and the Southern Ocean, MBC is the lead authority for undertaking and coordinating operations.²⁰ Australia's agency for the management of licensed and regulated fishing is the Australian Fisheries Management Authority (AFMA).

Within the ATS areas of jurisdiction, Australia participates in enforcement activity in accordance with the ATS framework; in particular, enforcing Australian domestic laws only in respect of Australian nationals. In the adjacent HIMI exclusive economic zone, however, normal established *United Nations Convention on the Law of the Sea 1982* (LOSC) obligations and rights apply, and Australia, in cooperation with France (in respect of the neighbouring Kerguelen Islands exclusive economic zone), undertakes enforcement.

Australia participates actively in international arrangements, such as the CCAMLR vessel monitoring system (VMS) and consistent with the ATS framework, licenses and manages Australian fishing within the ATS area. As noted above, Australia also participates in bilateral arrangements with France in respect of the HIMI exclusive economic zone, and contributes cooperatively with New Zealand in surveillance and response in the Southern Ocean. It should be noted, however, that, in the wider international system, the range of enforcement options in relation to IUU fishing extends more broadly beyond surveillance and response into increasingly effective flag and port state control measures, such as those which contributed to the scuttling of the IUU vessel *Thunder*.²¹

After a gap in Australian patrolling of more than three years, on 26 May 2015, *Ocean Shield* completed a 42-day Southern Ocean patrol covering Australia's sub-Antarctic territories, Macquarie Island, HIMI and into the French waters in the southern Indian Ocean surrounding the Kerguelen Islands.

Support

A range of capabilities, from sea and air transport through to the operation of stations in the Antarctic, enables the science programs. These capabilities can also, as applicable, enable, support or contribute to emergency response, SAR, evacuation and enforcement activities, albeit this is usually at the cost of a negative impact on available capacity for planned activity.

Replenishment, transport and support provided to AAD stations and operations are provided by:

- Sea, by the icebreaker *Aurora Australis* operated from Hobart by P&O Polar.
- Intercontinental air transport, complementing sea transport provided by *Aurora Australis*, an Airbus A319-115LR operated by Skytraders, flying from Hobart to the Wilkins ice runway.

- Intracontinental air transport from Wilkins is provided by ski-equipped BT-67 Basler and DHC-6 Twin Otter aircraft operated by Kenn Borek Air and helicopters, operated by Helicopter Resources.

Department of Defence

Operating a range of capabilities relevant to Antarctic and Southern Ocean activities, Defence is more likely to contribute to activities coordinated or led by other authorities rather than conducting its own operations. For example, any Defence contribution to SAR or evacuation operations would be through a response coordinated by AMSA or the AAD as appropriate. Similarly, Defence contributions to enforcement action are provided for operations conducted and coordinated by MBC. Any Defence response to emergency response, SAR, evacuation or enforcement requirements would likely be on the basis of providing whatever relevant capabilities might be available at the time for use in an externally coordinated response.

There is an option underway for the Royal Australian Air Force (RAAF) to contribute to intercontinental airlift using C17 aircraft. This would be coordinated with the AAD and on a more planned basis than emergent requirements for SAR, evacuation or other response, or for enforcement activities coordinated by MBC. In that regard:

- in late 2014, an RAAF C17 pilot participated in US C17 operations into McMurdo
- in March 2015, two RAAF C17 pilots were flown to Wilkins on a scheduled AAD Airbus A319 flight as part of assessing potential for C17 operations
- further investigation is continuing with the prospect of initial flights into Wilkins ice airstrip in the 2015-16 season and initial assessments that there will be sufficient C17 capacity to support the frequency of flights needed to maintain the capability once established.²²

The ADF also has existing, ongoing involvements in Antarctic geospatial activity:

- Army has provided small, two-person, military geospatial information teams each year recently for land based survey work as agreed with the AAD. This program is due for review before undertaking any tasking in 2016. Recent tasks have included surveying operations relating to possible gravel and ice airstrips in the vicinity of Davis station.
- Navy contributes to Australia's hydrographic obligations as well as supporting Australian Antarctic sovereign interests, by undertaking hydrographic survey operations around AAD stations at Casey, Davis and Mawson. The 9m ASV *Wyatt Earp* is used for these surveys.
- Navy also, from time to time, sends personnel to international training for Antarctic related operations, such as the Chilean Antarctic Waters Operations Course held in September/October 2015 in Valparaiso.

Lastly, Defence has provided old, ready to be disposed of, sonobuoys to support research in finding and tracking blue whales in the Southern Ocean.²³

These activities are also legitimate expressions of sovereign responsibility and a means of, within the constraints of the ATS, asserting Australian sovereignty.

Tasmania

Australia actively promotes Hobart as an Antarctic Gateway, and this was re-emphasised during the Senate Committee inquiry and in the *20 Year Strategic Plan*. Hobart is the location of the CCAMLR Secretariat, as well as the prime port of embarkation for both France's Antarctic support vessel, *Astrolabe*, and Australia's *Aurora Australis*. In addition, US Coast Guard icebreakers have staged through Hobart in the course of Antarctic support operations. More recently, the prospects of Chinese use of Hobart as a staging point for Antarctic air transport are being actively pursued. The Antarctic Gateway role has been supported by development of a range of specialised Antarctic support, medical, training, research and academic activities based in Hobart.

Tasmania is home to 17 governmental, academic and related organisations undertaking Antarctic and Southern Ocean work, two secretariats of international organisations focused on Antarctic waters, and approximately 50 local businesses accessing work from the sector.²⁴

Tasmania has also established the Tasmanian Polar Network, a group of businesses and scientific organisations based in Tasmania, all with a common focus on serving commercial and scientific activity in the Antarctic, sub-Antarctic and Southern Ocean. This network is supported by the Tasmanian government through Antarctic Tasmania based in the Department of State Growth.

Of particular relevance to Navy and MBC operations, not just in respect of the Southern Ocean, is the development of a fuel barge option to provide more timely and cost effective alongside refuelling of ships at their berth in the Port of Hobart.²⁵ This would obviate current requirement for tug and pilot supported passage upstream of the Tasman Bridge to refuel at Self's point or to use inconvenient, disruptive and time consuming road tanker replenishment alongside in the port. This improvement would mitigate a significant current support impediment in use of the Port of Hobart.

Non-Government Activities

In addition to the range of specialised Antarctic capabilities developing, particularly around Hobart, the main non-government activities in which Australians are involved are:

- licensed and regulated fishing
- private research institutions and related activities
- tourism, including private individual participation in the tourism market
- interest groups and activism, including industry and interest groups, environmental groups as well as provision of commercial support and services for, and private individuals' participation in, environmental activism.

Fisheries

Individual Southern Ocean fisheries included within AFMA jurisdiction are:

- HIMI
- Macquarie Island
- South Tasman Rise
- Southern Ocean areas which fall within international fisheries agreements, such as CCAMLR, for the issue of high seas permits.

With a broad based international membership, the Western Australian based Coalition of Legal Toothfish Operators (COLTO) represents the two main licensed Australian Southern Ocean fisheries operators:

- Austral Fisheries has four vessels operating in the sub-Antarctic. *Atlas Cove* is a dual purpose trawler-longliner that fishes for MSC-certified Patagonian toothfish and Mackerel icefish (this vessel also spends a small portion of its time fishing the southern Indian Ocean high seas). Austral also has three longline vessels that catch MSC-certified Patagonian toothfish: *Austral Leader II*, *Isla Eden*, and *Corinthian Bay*.
- Australian Longline, with a fleet of two toothfish vessels, *Antarctic Chieftain* and *Jana*, operating in the Southern Ocean.

Research

Private research, particularly in the AAT, is effectively governed by access, and the priorities for that are coordinated by the AAD. For resourcing scientific research, the *20 Year Strategic Plan* recommended:

... the 'hybrid' system of supporting Antarctic science, with the Australian Antarctic Division of the Department of the Environment providing the core of researchers focussed on delivering priority scientific advice to government, and national and international research institutions and universities providing competitive-based research against Australia's Antarctic Science Strategic Plan

should continue.²⁶

Antarctic science is highly collaborative across government, academic institutions, hospitals, museums and other non-government activities, involving researchers from universities and government research agencies throughout Australia and the world. For example, in 2008-09, 119 projects, led by scientists from 31 institutions, were undertaken, involving collaboration with a further 242 institutions from 28 countries, and this level of collaboration is being maintained.²⁷

Related to current collaborative science programs are activities such as the planned January 2017 Homeward Bound expedition, which has selected 42 women in science from Canada, France, Germany, United Kingdom, United States, Norway, Australia, and New Zealand, to participate in a trip to Antarctica including 8 days of education on best leadership practice, 6 days of education on the challenges in polar science and related issues on climate change, and 8 days on world's best practice in articulation, design, measurement and execution of strategy, including planning for change as a result of the trip. The expedition has the support of, *inter alia*, the AAD and the participation of the University of Tasmania.

Notwithstanding the stated and specialised research purposes of the 2013 charter of *Akademik Shokalskiy*, its voyage also overlapped in some aspects, particularly the subsequent rescue operations and passenger evacuation, with factors to be considered in respect of tourism operations.

Tourism

Tourism into Antarctica:

...has expanded significantly over recent decades, from 6700 people on 12 vessels in 1992-93 to around 36,000 on 33 commercial tour ships in the 2013-14 Antarctic summer, along with 18 private yachts. Most of these operated in the Antarctic Peninsula region, south of South America, and outside Australia's SAR region, while five tourist ships visited the Ross Sea and East Antarctica, carrying 1300 visitors. The vessels, and their passengers, represent a wide range of nations: Australians made up 13 per cent of the tourists last summer, with the United States contributing the most (30 per cent).²⁸

The substantial majority, but not all, of this tourism is undertaken around the Antarctic Peninsula in West Antarctica, operating from South America.

Related activities include the undertaking of adventurous expeditions, such as the December 2013 Walking With Wounded expedition to the South Pole involving Prince Harry and a party of returned wounded military personnel and, the May 2015 Breaking the Cycle tour attempt to cross Antarctica via the South Pole.²⁹ The range and incidences of such activities appears to be increasing, along with an attendant potential for increased demand for emergency response, SAR or evacuation.

Interest Groups and Activism

This sphere of activity and interests covers a diverse range of industry associations, such as COLTO, the Commonwealth Fisheries Association and other relevant fisheries associations.³⁰ Other industry groups include the Tasmanian government-supported, Tasmanian Polar Network, and internationally, the International Association of Antarctica Tour Operators, representing 47 operators with interests in Antarctic tourism.³¹

There is also a range of both university supported and more independent academic and research institutions, some of which provide collaborative frameworks, such as the:

- International Antarctic Institute³²
- Southern Ocean Observing System (SOOS), established to coordinate the collection of scientific information from the Southern Ocean³³
- AAD Southern Ocean Research Partnership, a collaborative consortium for non-lethal whale research.³⁴

The more single-subject focused, Centre for Whale Research is a Western Australia based non-profit research institute focused on whale research. The Centre operates RV *Whale Song* undertaking research all around Australia and into the Southern Ocean.

There are also various environmental organisations, such as the Antarctic Ocean Alliance, which campaigns for protection of the Antarctic and Southern Ocean environment, wildlife and its habitats.³⁵ The Alliance also acts as an umbrella group for 24 partner and supporting environmental groups including Greenpeace, the International Fund for Animal Welfare and the Antarctic and Southern Ocean Coalition, itself a coalition of over 30 non-government organisations working to preserve the Antarctic continent and its surrounding Southern Ocean.³⁶

Most visible and prominent among environmental interest and activist groups with a focus on the Southern Ocean is the Sea Shepherd Conservation Society, a non-profit, marine conservation organisation based in the United States.³⁷ A spinoff from Greenpeace, seeking more direct action and interventions, it has been an increasingly active opponent of Japanese whaling in the Southern Ocean. Its activities in that regard have presented conflicting issues arising from national and public antipathy to whaling, and from the implications for Australia's relationship with Japan of continued Japanese whaling operations.

Sea Shepherd actions at sea against whaling have included aggressive ship manoeuvring, shining laser light into the eyes of whalers, throwing bottles of foul-smelling butyric acid onto vessels at sea and boarding of whaling vessels while at sea. It has also been active in respect of IUU toothfish activities, seizing and destroying drift nets at sea and maintaining surveillance, contact and pursuit of IUU toothfish vessels, culminating recently in the scuttling of the IUU fishing vessel *Thunder*. Some of its actions at sea have resulted in safety incidents, including the sinking of its own vessel *Ady Gill* following a collision with a Japanese whaling vessel. Increasing levels and intensity of the sort of interventions undertaken by Sea Shepherd at sea bring with them potential for increased demand for SAR actions.

Overview: Growth and Erosion?

From the foregoing overview of current activity and interests in Antarctica and the Southern Ocean, science continues to remain central, particularly within the ATS as well as for individual states. Also, the ATS has become increasingly predominant, providing, through its sustained growth in the number and range of its parties, the predominant decision making fora in relation to Antarctica and the Southern Ocean. There is, however, for some states, potential interest in non-living resources. There is also, more and possibly earlier potential for demand pressure in relation to the living resources to be harvested in the Southern Ocean. Currently, however, science endures predominant within the ATS regime as the currency of Australia's and other states' activities and interests.

In the face of growing international Antarctic interests and activities, the *20 Year Strategic Plan* argues that:

Australian leadership in Antarctica and the Southern Ocean is eroding. As Australia's logistic and scientific capabilities stagnate through historical erosion of funding and the aging of its assets, other countries are ramping up their investments in Antarctic science, logistics and infrastructure.³⁸

Overall, it is clear that there is sustained and increasing growth in the range and level of national Antarctic and Southern Ocean interests and activities. This growth in activity and associated demands underpins the change factors discussed in the following paragraphs.

Change Factors

Overlaid on the current situation outlined above, there are a number of strategic, operational, environmental and political factors for change in relation to Antarctica and the Southern Ocean. The context, in considering these factors for change, is whether and, if so, to what extent they might have implications for ADF capability and operations. The following part of this paper will focus on the implications of identified changes, drawing where applicable on any change factors identified above, rather than reiterating them.

Underpinned by the growth in interests and activity in Antarctica and the Southern Ocean, are the following major change factors:

- the ATS environment, including Australia's interests and standing within the Treaty System
- changing interests, both political and economic, and actions of other individual states
- changes in the balance between costs, risk, demand and return on investment in respect of Antarctic and Southern Ocean living and non-living resources
- climate change, as a priority focus for Australian and international scientific research, in terms of its impacts on Antarctic operations and its wider effects and implications both for Australia and globally
- non-government activities, including both regulated and IUU resource extraction, as well as other commercial activities and activism
- Australian Antarctic and Southern Ocean policy and priorities, particularly as these might be influenced by, and reflected in, major policies, priorities and decisions in the government's forthcoming responses to the Senate Committee inquiry and the *20 Year Strategic Plan*
- related impacts on, or changes in, Defence's strategic priorities, interactions, capabilities and operations.

ATS Change

There are two main factors which influence or characterise change within the ATS with potential for changes in Antarctic and Southern Ocean interests and activities:

- growth in ATS participation and the impacts of that growth
- the likelihood and nature of any potential for change in relation to the ATS regimes, particularly for resource recovery.

As noted earlier, ATS participation is growing. This growth has seen states, such as Malaysia accede to the Antarctic Treaty in 2011. It appears, increasingly, that, as a result of this growth, the ATS provides the primary forum within which states with Antarctic interests will pursue those interests as opposed to doing so unilaterally or in alternative fora.

In the 1980s, then Malaysian Prime Minister Dr Mahatir Mohamad is said to have declared: 'I have heard that the South Pole is made of gold and I want my share of it'.³⁹ At that time, Malaysia's position was that, rather than governance via the Antarctic stakeholders participating in the ATS, the 'common heritage of mankind' principle which had underpinned development of LOSC should be applied to Antarctica and the Southern Ocean, the resources there and to governance under a broader framework, such as the United Nations. Malaysia's transition from that position to participation in the ATS is emblematic of the developing predominance of the ATS in Antarctic governance.

Notwithstanding the predominance of the ATS in Antarctic and Southern Ocean international governance, a further implication of growth in participation might be that, with its increasingly broad and varied array of interests and activity, achieving the levels of consensus required to implement change may become more difficult. The 2014 failure to achieve agreement in CCAMLR for the creation of marine protected areas is a case in point. In that regard, a recent comment by the Chairman of the China National Agricultural Development Group, in relation to the krill fishery, that: ‘The Antarctic is a treasure house for all human beings, and China should go there and share’ is an interesting throwback to Dr Mahatir’s comments quoted above and reflect the diversity of interests to be accommodated within the ATS and its fora.⁴⁰ That said, in relation to IUU fishing, information sharing through the CCAMLR VMS has proven useful as has, more significantly, increased effectiveness of, and more widespread vigour in, applying flag and port state controls.

On the other hand, impediments to changes such as the marine protected areas proposal may also apply in relation to other less positive options for change, such as any potential erosion of restrictions around resource extraction. Despite potential pressures in relation to the Madrid Protocol’s mining ban and other resource interests, the mining ban can be expected to substantially endure.⁴¹ The ban does not ‘expire’ in 2048, nor does it change then unless any of the ATS consultative parties mount a call for change and succeed in securing the agreement of ATS parties in a conference called to consider the proposed change. Article 25, clause 7, establishes the framework within which any changes to the mining ban might be pursued.⁴²

While there is little likelihood of significant, binary change, such as entire removal of existing limitations within the ATS, there is potential pressure for more qualitative, marginal change. This might take the form of collective or multilateral initiatives within the ATS for enhanced environmental or wildlife protection, enhanced emergency response, SAR, evacuation, enforcement or logistic support frameworks or responses to external change, such as climate change. There is also some pressure or potential for change within the ATS driven by individual states or groups of states in areas such as:

- Assertion of sovereign rights through the level and nature of national presence and operations - some aspects of national presence and activities, such as Argentina’s, in West Antarctica provide relevant examples.⁴³
- In the interpretation and application of extant ATS limitations - for example, at what point does scientific research cross thresholds of linkage to mining?
- Increasing resource pressures - for example, China’s recent announcement of its desire to increase its krill catch seven-fold.

As noted above, all states operating or sharing stations in East Antarctica have acceded to the Antarctic Treaty. Overall, extant and potential change in relation to the ATS reinforces its importance to Australia. The recommendations in the *20 Year Strategic Plan*, also supported in discussion at the Senate Committee inquiry, emphasise the importance and value of collaboration, particularly through the ATS, with other Antarctic parties. Consistent with the ‘use it or lose it’ principle, support for a strong and effective ATS and continuation of Australia’s robust and leading role within the ATS, provides a key means of furthering Australia’s existing Antarctic and Southern Ocean interests. Strong ATS participation also helps Australia’s ability to lead, influence and respond to change within the ATS as well as wider change relating to Antarctica and the Southern Ocean.

Individual National Interests

Growth and change in the activities and interests of individual states, particularly those with a current or intended presence in East Antarctica, has been canvassed in the preceding part of this paper. As also outlined in the preceding part of this paper, new or planned investments range from establishing and upgrading Antarctic stations through acquisition of new vessels and enhanced transport linkages, both into and within Antarctica, and into new fields of scientific research.

Key implications flowing from the range of change and growth in individual states' Antarctic and Southern Ocean interests and activities, and particularly from increases in the level and range of activities, include:

- increased demand for logistic support, services and for energy to sustain Antarctic operations and infrastructure
- potentially increased risk in both the range and likelihood of safety or environmental incidents
- increased opportunities for further collaboration capturing synergies and rationalising overheads in areas of scientific research, logistic support, infrastructure, emergency response, SAR, evacuation and possibly in areas within enforcement, such as intelligence, surveillance and reconnaissance (ISR)
- potentially increased need, in terms of both capabilities and capacity, for enforcement in areas such as activism (possibly in respect of unlawful incidents at sea) and resource extraction
- increased pressure, arising from increased activity levels and risk, on the Antarctic and Southern Ocean environment and wildlife.

Logistic Support and Energy

Growth in the level and range of national Antarctic presence and activities is accompanied by increased need for locally provided energy. With nuclear power, apart from the US reactor decommissioned in 1972 at McMurdo station effectively excluded, the predominant energy source is fossil fuels, with its attendant costs and demands in delivery, local storage and disposal of waste - both containers and emissions. Energy supply, which is predominantly dependent on shipping into Antarctica, has the potential to be a significant limiting factor for Antarctic presence and operations. Local fossil fuel sources would be problematic in view of both the mining ban and the need for refinement. There does not yet appear to be substantial development and major use of alternate renewable sources such as wind, solar or tidal energy, although the AAD in particular has pursued, trialled and implemented a range of renewable energy options, as well as a hydrogen fuel demonstration project.

For Australia, key aspects of individual states' interests and activities include a number of aspects canvassed above:

- scientific collaboration
- collaborative enforcement operations, particularly with France in respect of the HIMI exclusive economic zone and with New Zealand
- collaborative logistic support, emergency response, SAR, evacuation and other station operations.

Perhaps the major change factor in individual national Antarctic interests is the prospective increase in China's presence. This has particular relevance to Hobart's role as an Antarctic Gateway. Development of the airstrip at Zhongshan brings with it potential for both increased Chinese airlift staging through Hobart, an opportunity which is being actively pursued and, possibly, shared Australian usage of the Zhongshan airstrip for intercontinental airlift. The Antarctic Gateway role is also the context for pursuing development of opportunities for continued and increased use of Hobart for collaboration and staging of support for other states' Antarctic presence and operations.

Other change factors considered in this part of the paper, particularly in relation to political and resource interests, may also lead to potentially increased international competition, albeit within the ATS framework, in areas such preservation or assertion of claimed sovereignty and in testing of the interpretation and application of ATS limitations. As noted above, the 'use it or lose it' principle will apply.

Resources and Energy: Return on Investment, Risk and Capabilities

There are ongoing patterns of global change in resource demand, value, availability, extraction technologies and regulatory regimes, all balanced against operational, technological, commercial, enforcement and other risk. These factors are also influenced by environmental change and, hence, shape the pressures and thresholds for both living and non-living resource extraction anywhere on Earth. Antarctica and the Southern Ocean, albeit governed within the ATS framework, are not exempt from the influences of these factors. Similarly, extra-regulatory practices such as IUU fishing are affected. It might be argued, for example, that the value of the Toothfish market made the IUU toothfish fishery viable, but that value is now increasingly offset by the increasing effectiveness of regulatory and enforcement responses.

Changes in these drivers will govern the nature and timing of the next and subsequent resource extraction pressures. Assessed as probably the world's largest underexploited fishery, the Southern Ocean krill fishery is now the subject of a possibly unsustainable Chinese aim to increase its harvest seven-fold.⁴⁴ This development reflects both growing demand for protein sources and available extraction capabilities and capacity, and is part of what can be predicted to be an ongoing and escalating trend.

Whether the next and subsequent resources which become, as a result of developments in one or more of the change areas identified above, attractive for regulated or even IUU extraction are living or non-living, there is an ongoing likelihood of increases in the level and range of pressures for resource extraction and in the range of those resources. This will apply to both mining and fisheries including krill harvesting as demand, cost or risk changes, and also where safer more cost effective recovery technologies emerge.

Where the return on investment justifies the cost and risk, resource extraction will be pursued. In many cases, this will bring pressures within the ATS in its governance arrangements and fora, particularly in relation to the mining ban and, also, in relation to fisheries enforcement. Australia's ability to pursue and preserve its interests within the ATS in this regard will be directly linked to its levels of influence and standing within the ATS.

Climate Change

Climate change and climate science are predominant factors in terms of Antarctic and Southern Ocean scientific research as well as national interests, presence, support and operations. This is particularly so for Australia in view of the significant influence of the Antarctic and Southern Ocean climate on Australia's climate and the high priority accorded to Australian climate research in the *Australian Antarctic Science Strategic Plan*. Climate change exercises a range of influences covering operations, support, resources and enforcement as well as scientific research.

Polar ice, both Arctic and Antarctic is melting, and this is widely attributed to climate change. In the Arctic, navigation via the North West Passage is now more achievable. In the Antarctic, ice loss occurs through both iceberg calving, as large chunks of glacial ice break away and also through basal melting, caused by warmed ocean waters which melt the ice from its underside.

The largest ice shelf in the Antarctic Peninsula [in West Antarctica] is being thinned from above by warming air and below by warmer seas making it vulnerable to collapse, say scientists.⁴⁵

Basal melting is estimated to account for about 55 per cent of Antarctic ice loss.⁴⁶ Overall, there is some partial, but insufficient, offset to ice loss from enhanced snow precipitation due to warmer atmospheric conditions.⁴⁷ The ice sheet in West Antarctica is losing ice at a faster rate than any other part of the continent and some glaciers are receding annually by over 1m. West Antarctica's thinning ice adds almost 10 per cent to global rises in sea levels and there is considered to be some potential risk of eventual collapse of the West Antarctic ice sheet.⁴⁸

Impacts, particularly in Antarctic waters, of ice melt include increased volumes of fresh water and, hence reduced salinity. The resultant higher freezing temperature of this sea water, possibly supported by wind and sea current patterns is thought to have contributed to the formation of more extensive areas of sea ice in recent years. In 2014, it was considered that more extensive sea ice off East Antarctica than had previously been observed, could potentially interfere with sea access to AAD stations.⁴⁹ One consequence of impaired sea access would be a possible increase in demand for both intercontinental and intracontinental airlift, possibly including options for intercontinental airlift direct to individual AAD stations.

Antarctic waters play a significant role in the atmospheric CO₂ balance, with resultant impacts on acidification and hence the ecosystem. Because of its cooler water temperature, the Southern Ocean absorbs more CO₂ than warmer waters.

Ocean research has also shown that about half of all the CO₂ released by human activities is now found in the world's oceans and that about a third of this has been taken up in the Southern Ocean. As CO₂ continues to dissolve in the ocean it increases ocean acidity, making it harder for some marine organisms to form shells. These ecological changes in turn reduce the capacity of the ocean to absorb CO₂.⁵⁰

A further rise in Southern Ocean water temperatures has the potential to reduce its capacity to absorb CO₂ with resultant implications for the amount of CO₂ remaining in the atmosphere and, consequentially, for greenhouse related climate effects.

Research, particularly over the last decade has pointed to aspects of movement of fish stocks, as well as of their food sources, in both hemispheres in response to climate change, particularly warming and related changes in ocean currents.⁵¹

From observations that have been made in the Southern Ocean since the early nineties we know that the Southern Ocean is fresher, warmer, more acidic and lower in dissolved oxygen than it was several decades ago. That points to some fairly fundamental changes that are happening in the Southern Ocean and it is important that we understand what those processes are if we are to understand the likely future impacts on climate and ecosystems and, therefore, fish stocks.⁵²

Antarctica's significant influence on Australia's climate, along with the global importance of climate science, contributes to the prominence and priority accorded by Australia to this field of scientific research. The *Australian Antarctic Science Strategic Plan*, notes that:

Antarctica and the Southern Ocean are dynamic and critical elements of our earth system:

- Antarctica contains 90 per cent of the ice on earth and 60-70 per cent of its freshwater, which if melted would increase sea level by 60+ metres.
- The seasonal growth of sea ice each year is one of the earth's most significant seasonal cycles, covering an area of 19 million km² at maximum extent. This is 1.5 times the area of the Antarctic continent.
- Antarctic and Southern Ocean water masses dominate the global oceans and in so doing influence the climate of Australia and all of the other continents.
- The Southern Ocean is a major sink for global carbon dioxide emissions (accounting for 30 per cent of the global ocean uptake).
- Regional weather and global climate are heavily influenced by the composition and dynamics of the atmosphere above Antarctica.
- The unique ecosystems and iconic wildlife of the continent and Southern Ocean are sentinels for the rest of the world on the impacts of ocean acidification and global warming.⁵³

and emphasises the increasing urgency of: ‘...the need to better understand how Antarctica and the Southern Ocean influence the functioning and resilience of the earth system, and how they will respond to future changes...’.⁵⁴

Of the four scientific research themes in the *Australian Antarctic Science Strategic Plan*, Theme 1 - Climate Processes and Change is among those described as ‘...priority science needs...’.⁵⁵

As with effects such as fish stock movement, there are significant global implications from climate change relevant to Antarctica, the Southern Ocean, the ATS and related national interests. Speculatively, some relevant aspects and impacts of global climate change might potentially include, *inter alia*:

- global food supply changes, resulting in more demand and harvesting capability being diverted to the Southern Ocean
- changes in the level, distribution, demand for and availability of energy, including possible increased pressure to explore and exploit potential Antarctic and Southern Ocean non-renewable energy sources
- accelerated Antarctic ice loss contributing to rising sea levels
- changed weather patterns and rising sea levels, leading to some redistribution of populations and current forms of resource harvesting
- political and security stresses affected by, and affecting, both overall governance within the ATS regime and individual nations’ interests.

Climate and climate related changes in the Antarctic and Southern Ocean environment and ecosystems will, as well as impacting on living resources, interact with other changes considered in this part of this paper. For example, resource pressures and demand may well follow fish stocks into Southern Ocean waters and jurisdictions, bringing associated extraction, governance and, potentially, enforcement risks and demands. The related, and complementary effect to be considered is the impact on those areas from which fish stocks have moved and, hence, on pre-existing ecosystems including their fisheries.

Non-Government Activities

A common underlying feature across the range of non-government activity canvassed above in the preceding part of this paper is increase and growth in the range and level of activities. This, growing non-government activity also brings similar implications and changes in areas such as risk, as are outlined above in relation to individual national interests.

One key distinction in respect of non-government activity lies in the areas of governance and enforcement. Under the ATS regime, individual states are responsible for enforcing their own laws in respect of their own nationals. Apart from the CCAMLR compliance coordination and management role in relation to fishing, which relies on individual nations licensing that fishing, there is a lack of effective shared international governance or enforcement arrangements within the area covered by the ATS and its various conventions. Moreover, recent CCAMLR experience in relation to proposed marine protected areas points to some degree of challenge in developing and implementing any shared or cooperative regulatory or enforcement arrangements. Thus, it falls primarily to individual states, particularly flag states to regulate non-government activity in respect of their own nationals.

Development in recent years of non-government activism in relation to whaling and IUU fishing has seen changes which both challenge and support governance in Antarctic and Southern Ocean waters.

- On the challenging side, the limitations of legal enforcement and governance jurisdiction are tested by increasingly assertive activism at sea, particularly by organisations such as Sea

Shepherd. There is potential for further escalation to some forms of activism which potentially breach national laws, or even fall within the scope of the *Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation, 1988*.

- More positively, Sea Shepherd's recent role in monitoring, pursuing and intervening in IUU toothfish vessels' activities has been more widely seen as constructive, contributing to ISR and being complementary to improving flag and port state controls, particularly in contributing to denial of market and operational options for these vessels.

There appears to be a clear distinction between Sea Shepherd's interventions into whaling, and its interventions in relation to IUU toothfish operations, a more widely condemned activity lacking state sponsorship or support.

Change and growth in the nature and level of non-government activism brings risk above and beyond the general increases of potential need for emergency response or SAR. In particular, that part of activism which involves close quarters ship manoeuvring or other direct physical interventions also brings significantly heightened safety risks, as well as the risk of increasingly forceful response and an associated increase in the risk of increased SAR demand. The 2010 loss of *Ady Gill* following a collision with the Japanese whaling support vessel *MV Shōnan Maru 2* is a relevant example.

Australian Antarctic and Southern Ocean Policy and Priorities

The potential for change in Australia's Antarctic and Southern Ocean policy and priorities, is presently centred around consideration of, and expected government decisions in response to the Senate Committee inquiry report and the *20 Year Strategic Plan*. Potential implications for defence policy will be considered separately below. At the time of writing, the government's responses to either of these reports had not yet been released.

A potential outcome of the government's response to both reports may possibly be increased emphasis across government on aligning national activity with supporting Australia's stated Antarctic interests. Such an approach would see increased emphasis and support as well as possibly increased investment in science and scientific research. This would be done, in addition to the desired scientific outcomes, both in terms of asserting a prominent national presence within the ATS and in terms of international collaboration. Similarly, there might be emphasis directed towards characterising and aligning existing, increased or new activities in terms of their contribution towards asserting Australia's national Antarctic interests, including sovereignty. In other words, Australian activities and presence would be seen as responding to the 'use it or lose it' principle.

Informal advice indicates that the government response to the Senate Committee inquiry report is unlikely to disagree with its recommendations but, in a number of cases, may defer specific decisions and actions to the response which will subsequently be made to the *20 Year Strategic Plan*. That said, action is proceeding in a range of mostly pre-existing areas supported by the two reports. The key balance to be struck will lie between the level of importance and priority ascribed to Australia's Antarctic and Southern Ocean interests, and the resourcing that would be commensurate with that level of priority and needed to implement the reports' various recommendations.

In the logistic support area, the approved replacement of *Aurora Australis* is proceeding.⁵⁶ Also, as noted above, work is progressing between RAAF and the AAD to establish the feasibility of C17 intercontinental operations to the Wilkins ice runway, with a trial underway during November 2015 and February 2016.

Specialised and Non-Specialised Demand and Capabilities

The Senate Committee inquiry canvassed options for more coordinated management of the 'national fleet' of Antarctic and Southern Ocean vessels.⁵⁷ It noted the intrusion of emergent

requirements such as SAR and evacuation into the capacity limited balancing of logistic resupply and scientific research. Also factored into this mix is the requirement for enforcement capability and capacity. Elements of these areas of demand are covered in varying degrees by:

- *Aurora Australis* and its planned replacement: logistic resupply and scientific research, interrupted by emergent SAR and evacuation requirements, capacity is fully utilised.
- *Ocean Shield*: enforcement, but apart from a Southern Ocean deployment in May/June 2015, its capacity has been fully utilised for non-Antarctic and Southern Ocean requirements and there have also been requirements for vessel availability, which precludes Southern Ocean deployment, to meet potential disaster relief requirements.
- *Investigator*: scientific research, not funded for a full year of operation, fitted with specialised science-focused systems, suited to Southern Ocean research operations but ‘...is not ice capable and cannot work close to the Antarctic coast where high priority research is needed...’.⁵⁸
- ADF assets, particularly HMAS *Choules*, the Navy’s only ice-strengthened vessel, with limited capability to operate in light ice.⁵⁹ Emergency response, SAR or evacuation within vessel capability limitations, enforcement but at a direct cost to ADF priorities and operations.

There appears to be some opportunity to share distribution of the various areas of demand identified in this paragraph across at least some of these platforms. This can also apply to task-based embarkation of specialist equipment in more general purpose platforms.⁶⁰ This approach also needs to take account of other national priorities such as availability for disaster relief and for other border enforcement. Such a solution would depend on improved coordination across the agencies with Antarctic and Southern Ocean requirements and those operating relevant capabilities. A common approach to priorities would need to be established and applied consistently.

The Australian government’s decisions in response to both the Senate Committee inquiry and the closely aligned and very comprehensive *20 Year Strategic Plan* will both set the context for Australia’s Antarctic and Southern Ocean interests and the level of priority and resourcing to be applied, and to the level of Australian activity and presence. These factors will also be significant determinants of Australia’s standing, particularly within the ATS and, hence the extent to which Australia will be able to advance its Antarctic interests internationally. Thus, also, will the context be set for levels of priority, government expectations and potential demand across those areas of activity in which Defence might be asked or expected to contribute.

Implications for Defence

Informal advice suggests that the government response to the Senate Committee inquiry may defer matters with specific implications for Defence to the 2016 Defence White Paper. This might not, however, likely extend to decisions to direct Defence capital investment priority to Antarctic or Southern Ocean capabilities for the ADF nor, possibly, to significant diversion of preparedness resources. A related option may be in the form of proposed capabilities for MBC, such as an additional large-hulled vessel.

Within the context of national priority and levels of both Australian activity and interests, Defence’s potential contributions in respect of Antarctica and the Southern Ocean, (which are canvassed in more detail in a subsequent part of this paper) include:

- available capabilities to emergency response, SAR or evacuation coordinated by AMSA and/or the AAD
- planned enforcement activity coordinated and controlled by MBC
- possible C17 intercontinental airlift
- participation in areas of enhancement to inter-agency and international coordination arrangements, particularly for emergency response including SAR.

Overall increases in national and international presence, activity and interests levels and the change implications canvassed in the preceding paragraphs all point to varying degrees of increase in the likelihood, frequency and range of potential calls for Defence or ADF participation or direct contribution.

A more definitive assessment of potential implications for Defence will necessarily depend on the outcomes of government consideration and response to the two reports, as well as in *2016 Defence White Paper* and its resultant decisions and determinations of priorities and resourcing.⁶¹ These should, however, see emphasis on support for and alignment with, where applicable, the stated Australian Antarctic interests.

Principles

There is an overall context of growth in the range and level of both state and non-state Antarctic and Southern Ocean interests, activity, presence, demand for infrastructure and logistic support. Similarly, this growth context applies as well to increasing risk and demand for enforcement, emergency response, SAR and related services. Within this context, several common underlying principles emerge from the foregoing consideration of the current Antarctic and Southern Ocean situation and the implications of change:

- Along with the primacy of the ATS to Australia's Antarctic and Southern Ocean interests, the 'use it or lose it' principle applies, so that Australia's standing and ability to preserve and promote its interests will be critically dependent on sustaining prominent presence, activity and, hence, a leading role in ATS fora.
- There may be a case to, in addition to primary outcomes being sought, emphasise the alignment of Australia's existing, increased or new activities in terms of their contribution to promoting Australia's stated national Antarctic interests.
- There are opportunities and potential demand arising from whatever responses government makes to the two reports for improved coordination and sharing of national assets capable of, or used for, Antarctic and Southern Ocean science, support, enforcement, emergency response, SAR and logistic support.
- There is a need to understand and anticipate the thresholds and balances between costs, risk, demand and return on investment in respect of Antarctic and Southern Ocean living and non-living resources, as these will influence both international interests and patterns of demand for enforcement, emergency response, SAR, presence and logistic support.
- Defence's place in Australia's systems of Antarctic and Southern Ocean activities and support is predominantly characterised by participation in, or contribution of available capabilities to activities led or coordinated by other lead national agencies, rather than as lead agency itself.
- Overall, likely Antarctic and Southern Ocean change does not point to significant discontinuities for Defence but rather, if government, now or in the future, expected Defence to do more in the Southern Ocean or Antarctica, the likely impacts would involve potential increase in priority or demand on currently planned and existing capabilities and roles.

Defence

There is a range of Defence capabilities with actual or potential relevance to Antarctica and the Southern Ocean. As noted above, while Antarctic and Southern Ocean issues and priorities may not necessarily lead to major discontinuities or significantly changed priorities and resourcing for Defence, there are areas and scope within which Defence's possible contributions can be examined. Also, as noted in earlier parts of this paper, there are relevant current Defence activities in place or under development.

Clearly, in the case of emergent requirements, such as enforcement response, emergency response, SAR or evacuation, the nature and urgency of the emergent requirement, along with the availability of these and other agencies' capabilities, will determine the selection and the level of impact to be accepted by Defence against existing national priorities and tasks and for ongoing force generation activities.

The following paragraphs will consider Defence capabilities and activity relevant to the main areas of national Antarctic and Southern Ocean activities and interests.

Science

Antarctic and Southern Ocean science is the primary driver of Australia's Antarctic presence and activities and the prime vehicle for supporting Australia's Antarctic interests. Defence's possible contributions in relation to science, however, are more likely to arise indirectly from its contribution of services in areas such as logistic support, emergency response, SAR or evacuation, discussed below, or in areas related to current hydrographic and geospatial activities. Opportunities may also arise from time to time for support or collaboration such as that, noted above, in the provision of sonobuoys to support Southern Ocean whale research.

Emergency Response, SAR and Evacuation

Normally in support of activities coordinated by the AAD or AMSA, ADF capabilities that might, if capacity is available, contribute, instead of or along with suitable MBC capabilities, include:

- in limited ice conditions, *Choules* has limited ice-strengthening
- noting the risks and, particularly, potential structural impacts of adverse Southern Ocean weather conditions, some RAN major fleet units for SAR
- subject to successful development, implementation and maintenance of capabilities for RAAF C17 aircraft operation into Antarctic airstrips.
- RAAF assets for search and for support for search, potentially: AP3C maritime patrol aircraft, future unmanned aerial vehicles (UAV) such as Triton, air-to-air refuelling tankers and C130 aircraft.

Enforcement

The wider context for enforcement embraces ISR and response, to which Australian national capabilities might contribute directly, as well as increasingly effective regimes and activity in areas such as flag and port state controls. In current circumstances, the effectiveness of this wider system of controls has potential to reduce demand for direct response. For Australian ISR and, where needed, response operations, MBC has the lead role in coordinating the employment of its and ADF capabilities. Within that context, Defence might contribute to ISR or response by means of:

Intelligence, Surveillance and Reconnaissance

Supported by national MBC ISR capabilities and international CCAMLR strategic VMS, the focus for ADF contribution lies more substantially in area or tactical ISR, with options such as: AP3C aircraft, Triton UAV when in service, major fleet unit sensors if deployed and, suitably fitted for operation in Southern Ocean conditions, major fleet unit UAV or embarked aircraft. For strategic ISR there are currently challenges with satellite coverage, particularly as far south as the Southern Ocean, both for surveillance and to support UAV operations.

Response

Potential functions here range from interdiction and boarding through to hot pursuit. Although a call for Defence contribution might be more likely only in the event of unavailability of MBC capabilities such as *Ocean Shield*, circumstances might arise in which employment of *Choules* or even a sufficiently suitable major fleet unit might be considered. In the hot pursuit function, use of aircraft to maintain contact is also permissible.⁶²

While the impact on priority tasking of diverting vessels as highly capable and specialised as the *Hobart* class destroyers would be significant, it is relevant that the steel used in their hull construction is suitable for cold water operations.

The call in the Senate Committee inquiry to examine options to also equip the Navy's planned offshore combatant vessels for Southern Ocean operations would need to be carefully considered in light of the likely resultant impacts on the primary purpose, role, capacity and capabilities of these vessels.⁶³

Logistic Support

Overall, logistic support, particularly resupply and the movement of personnel, for Antarctic stations and activity should be considered in the context of the 'national fleet' concept canvassed in the Senate Committee inquiry and above in this paper. In other words, as a substantially shared system of contributions making best use of overall capacities within the current range of national capabilities.

- Inclusion of RAAF C17 intercontinental airlift to the Wilkins ice airstrip has potential to make a significant contribution to meeting overall lift and resupply needs, also with beneficial flow-on impacts on the demand on other means of resupply.
- Should planned developments allow, options could also be explored for access to, and use of the planned Chinese dry airstrip at Zhongshan for airlift and, also, for evacuation or other emergent requirements.
- There have also, from time to time over the past 20 years been suggestions from outside Defence for the provision of ski-equipped RAAF C130 intercontinental flights direct to individual AAD stations. Such an option would attract an overhead in establishing and maintaining the necessary levels of operational capability. It would also inject competition with existing commercial operators of intracontinental airlift. Moreover, it does not appear to be consistent with priorities for C130 use, nor within available capacity.
- Use of ADF maritime assets for resupply by sea has not been part of existing arrangements and its consideration would appear likely to be very much on an exceptional basis, not least because of the very limited ice capabilities of *Choules*, and because of other priorities for its availability.

One further overarching area of potential Defence involvement relates to working for enhancement of national strategic level inter-agency coordination and also international coordination arrangements, particularly for emergency response, including SAR. Noting the very relevant and comparable challenges of distance and operating environment, as well as the complexity of both international and national coordination in the MH370 search, a number of relevant lessons and recommendations have been considered in the Australian Civil-Military Centre's assessment of whole of government lessons from that search.⁶⁴ Their findings might usefully inform inclusion of scenario content into strategic level desktop exercising in Defence, as well as in conjunction with other relevant agencies.

Defence as an arm of government, is an instrument of national policy and, particularly, of the assertion of national interests. Its contributions in all the foregoing areas are also legitimate expressions of sovereign responsibility and, within the constraints of the ATS, of supporting Australian Antarctic interests and asserting sovereignty.

Options for Defence: Decisions and Actions

In responding to the current and changing situation in respect of Australia's Antarctic and Southern Ocean interests, presence and priorities, potential growth in demand, along with substantial continuities in the range of Defence's capabilities and capacity, underpin the options that Defence might consider. There do not appear to be significant Antarctic and Southern Ocean driven imperatives for major changes in capability priorities and capital investment or for significant

diversion of preparedness resources. However, whatever options may be pursued will need to be, and be seen to be, aligned with and supporting the stated Australian Antarctic interests. Moreover, these interests may add justification for some, likely marginal, adjustments to priorities or resourcing in some instances.

Among the options for Defence decisions or actions, or to be continued, are:

- Maintenance of a basic level of capabilities, particularly individual and collective training and skills, for safe operations - covering emergency response, SAR, evacuation and enforcement - in challenging Southern Ocean conditions.
- Continuing ADF contribution, under existing MBC arrangements, to enforcement activities, including international cooperation - such as the HIMI cooperation with France and RAN/RNZN cooperation.
- Continuing Antarctic military geospatial information and, particularly, hydrographic activity, including as an assertion of sovereign responsibility and, wherever possible, linking that to other relevant Antarctic activities, such scientific research or, as in the case of recent airstrip survey work done by the Army, the provision of logistic support.
- Development of options for use of Triton and other eventual UAV after introduction into service to support both strategic and tactical Southern Ocean ISR.
- Continuation of development and, if successful, implementation and ongoing RAAF C17 intercontinental airlift capability to support Antarctic resupply.
- Undertaking strategic level desktop exercising focused on whole-of-government coordination for major emergent Antarctic or Southern Ocean events or issues.

In conclusion, this paper has sought to provide an overview of current and changing policy and issues in relation to Antarctica and Southern Ocean, to identify and understand the impact of change and to distil the context, implications and options for Defence if government, now or in the future, expected Defence to do more.

¹ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, Parliament of Australia, Canberra, October 2014, paragraph 1.11, p. 4. www.aph.gov.au/Parliamentary_Business/Committees/Senate/Foreign_Affairs_Defence_and_Trade/Southern_Ocean_and_Antarctic_waters/~media/Committees/fact_ctte/Southern_Ocean_and_Antarctic_waters/report/report.pdf.

Importantly, the recommendations of parliamentary committees are not binding upon the Australian government, but it is common for the government to provide a written response to any recommendations.

² Australian Antarctic Division, *Antarctic law and Treaty*, www.antarctica.gov.au/law-and-treaty.

³ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, Chapter 2, paragraph 2.4, page 11, quoting the Department of Defence submission to the Committee.

⁴ Submission by the Department of Foreign Affairs and Trade to the Senate Standing Committees on Foreign Affairs, Defence and Trade Inquiry into Australia's future activities and responsibilities in the Southern Ocean and Antarctic waters, June 2014, paragraphs 13-15, www.aph.gov.au/Parliamentary_Business/Committees/Senate/Foreign_Affairs_Defence_and_Trade/Southern_Ocean_and_Antarctic_waters/Submissions.

⁵ AJ Press, *20 Year Australian Antarctic Strategic Plan*, July 2014, p. 19, http://20yearplan.antarctica.gov.au/_data/assets/pdf_file/0004/146155/20-Year-Plan.pdf. referred to throughout this paper as the *20 Year Strategic Plan*.

⁶ Cheng-Yu Chiang, Sue Ferrar, Chanel Furborough and Ruth Watson, 'If you Can't Beat 'em, join 'em: Malaysia's Accession to the ATS', Postgraduate Certificate in Antarctic Studies Course 14 Syndicate Report, University of Canterbury, 20 January 2012, www.anta.canterbury.ac.nz/documents/PCAS_14/SyndicateReports/Malaysia%20PCAS%2014%20Syndicate%20Report_Final.pdf.

⁷ 'Chinese group plans to widen Antarctic krill fishing operations', www.fis.com/fis/worldnews/worldnews.asp?monthyear=&day=14&id=75789&l=e&special=0&ndb=0; and Andrew

Darby, 'China Moves in for the Krill', *Sydney Morning Herald*, 12 April 2015, www.smh.com.au/environment/china-moves-in-for-the-krill-20150411-1m9868.html.

⁸ Minister of Immigration and Border Protection and Parliamentary Secretary to the Minister for Agriculture, 'ACV Ocean Shield returns home after patrolling the Southern Ocean', joint media release, 25 May 2015, www.minister.border.gov.au/peterdutton/2015/Pages/ACV-ocean-shield-to-return-home-after-patrolling-the-southern-ocean.aspx.

⁹ Order in Council, 30 July 1923, quoted in 'Ross Dependency', *Wikipedia*, http://en.wikipedia.org/wiki/Ross_Dependency.

¹⁰ Email correspondence with Group Captain Lennon (8 May 2015), and with Squadron Leader Teagle (4 June 2015) in Air Force Capability Planning Barnch.

¹¹ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, para 2.13.

¹² Press, *20 Year Australian Antarctic Strategic Plan*, p. 19.

¹³ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, p. ix.

¹⁴ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, p. 46.

¹⁵ Australian Antarctic Division, *Australian Antarctic Science Strategic Plan 2011-12 to 2020-21*, Department of Sustainability, Environment, Water, Population and Communities, Kingston, 2011, www.antarctica.gov.au/data/assets/pdf_file/0019/27307/AASSP_final-published-version_Apr-2011.pdf.

¹⁶ Australian Antarctic Division, 'Science', www.antarctica.gov.au/science.

¹⁷ Australian Antarctic Division, *Australian Antarctic Science Strategic Plan 2011-12 to 2020-21*, p. 10.

¹⁸ Press, *20 Year Australian Antarctic Strategic Plan*, p. 5.

¹⁹ Press, *20 Year Australian Antarctic Strategic Plan*, p. 21.

²⁰ Maritime Border Command, www.border.gov.au/australian-border-force-abf/protecting/maritime/command.

²¹ Australian Fisheries Management Authority, 'Thunder Struck', 26 April 2013, www.afma.gov.au/thunder-struck/; Oliver Milman, 'Captain deliberately sank illegal fishing vessel, claim Sea Shepherd rescuers', *The Guardian*, 7 April 2015, www.theguardian.com/environment/2015/apr/07/captain-deliberately-sank-illegal-fishing-vessel-claim-sea-shepherd-rescuers; Kate Aubusson, 'Sea Shepherd rescues crew of sinking pirate fishing ship', *Sydney Morning Herald*, 7 April 2015, www.smh.com.au/environment/sea-shepherd-rescues-crew-of-sinking-pirate-fishing-ship-20150406-1mfiqu.html; Sea Shepherd, 'Poaching Vessel, Thunder, Sinks in Suspicious Circumstances', 6 April 2015, www.seashepherdglobal.org/news-and-commentary/news/poaching-vessel-thunder-sinks-in-suspicious-circumstances.html.

²² Editorial Note. Over the period November 2015 to February 2016, a RAAF C17 aircraft touched down at Wilkins ice runway five times, moving 109 tonnes of equipment and cargo in and out of Antarctica, conducted an air drop of four heliboxes from a height of 55 feet, and simulated an emergency areomaedical evacuation. See 'Antarctic flights prove a huge success', Defence Media Release, 20 February 2016, <http://news.defence.gov.au/2016/02/20/antarctic-flights-prove-a-huge-success/>.

²³ 'Military technology helps Antarctic researchers find blue whale hot spot', *ABC News*, 16 February 2015, www.abc.net.au/news/2015-02-16/antarctic-researchers-find-and-follow-large-pod-of-blue-whales/6119322.

²⁴ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, p. 69.

²⁵ Interview, Mr Kevin Moore, Business Development Manager, TasPorts, 14 November 2014. See also TasPorts, *Port of Hobart*, www.tasports.com.au/pdf/140064-Tasports-Port-Information-2014-Hobart.pdf.

²⁶ Press, *20 Year Australian Antarctic Strategic Plan*, Recommendation 15.

²⁷ Australian Antarctic Division, *Australian Antarctic Science Strategic Plan 2011-12 to 2020-21*, p. 10.

²⁸ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, p. 17.

²⁹ Imogen Elliott, 'Cyclist Kate Leeming prepares for ride across Antarctic via the South Pole', *Mercury*, 3 June 2015, www.themercury.com.au/lifestyle/cyclist-kate-leeming-prepares-for-ride-across-antarctica-via-the-south-pole/story-fnj64o6u-1227380846754.

³⁰ Australian Fisheries Management Authority, 'Industry Association Contacts', www.afma.gov.au/contact/industry-association-contacts/.

³¹ International Association of Antarctica Tour Operators, 'IAATO Membership Directory 2015-2016', <http://apps.iaato.org/iaato/member/list.xhtml>.

³² International Antarctic Institute, www.iai.utas.edu.au/cms/home.

³³ Southern Ocean Observing System, www.soos.aq/.

³⁴ Australian Antarctic Division, 'Australian Marine Mammal Centre', www.marinemammals.gov.au/sorp.

³⁵ Antarctic Oceans Alliance, <http://antarcticocean.org/>.

³⁶ Antarctic and Southern Ocean Coalition, www.asoc.org/.

³⁷ Sea Shepherd, www.seashepherdglobal.org/.

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- ³⁸ Press, 20 Year Australian Antarctic Strategic Plan, p. 21. This perception of erosion is echoed by comments in *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, particularly in its Chapter 4 discussion of scientific research.
- ³⁹ Quoted in Allen D Hemmings, Donald Rothwell and Karen N Scott, *Antarctic Security in the 21st Century: Legal and Policy Perspectives*, Routledge, Angus & Robertson, 2012, p. 408, and Chiang (et al), 'If you Can't Beat 'em, join 'em: Malaysia's Accession to the ATS'.
- ⁴⁰ Darby, 'China Moves in for the Krill', quoting China National Agricultural Development Chairman Liu Shenli.
- ⁴¹ Press, 20 Year Australian Antarctic Strategic Plan, pp. 47-48.
- ⁴² Madrid Protocol, as quoted in Press, 20 Year Australian Antarctic Strategic Plan, p. 48.
5. (a) With respect to Article 7, the prohibition on Antarctic mineral resource activities contained therein shall continue unless there is in force a binding legal regime on Antarctic mineral resource activities that includes an agreed means for determining whether, and, if so, under which conditions, any such activities would be acceptable. This regime shall fully safeguard the interests of all States referred to in Article IV of the Antarctic Treaty and apply the principles thereof. Therefore, if a modification or amendment to Article 7 is proposed at a Review Conference referred to in paragraph 2 above, it shall include such a binding legal regime.
- ⁴³ Some aspects of Argentina's presence in its claimed territory in West Antarctica include military presence which might be seen as pushing the boundaries of ATS limitations and may possibly be seen as reinforcing claimed sovereignty. Similarly, some reported aspects of that presence, such as encouraging births on the Antarctic continent appear to be directed at reinforcing claimed sovereignty.
- ⁴⁴ Interview, Dr Anthony Bergin, Australian Strategic Policy Institute, 2 December 2014; and Anthony Press, Anthony Bergin and Eliza Garnsey, *Heavy Weather: Climate and the Australian Defence Force*, Special Report Issue 49, Australian Strategic Policy Institute, Canberra, March 2013, www.aspi.org.au/publications/special-report-issue-49-heavy-weather-climate-and-the-australian-defence-force/SR49_heavy_weather.pdf.
- ⁴⁵ 'Antarctic ice shelf melting from above and below', *ABC News*, 13 May 2015, www.abc.net.au/science/articles/2015/05/13/4235152.htm.
- ⁴⁶ Karl Mathieson, 'Antarctic Ice Shelves are Melting Dramatically, Study Finds', *The Guardian*, 27 March 2015, www.theguardian.com/environment/2015/mar/26/collapse-antarctic-glaciers-ice-melt-sooner-than-thought-scientists-warn; also, 'Warming ocean is biggest driver of Antarctic ice shelf melt, says new study', *Carbon Brief*, 13 June 2013, www.carbonbrief.org/blog/2013/06/warming-ocean-is-the-biggest-driver-of-antarctic-ice-shelf-melt,-says-new-study/; and Gino Casassa, 'New concerns on the stability of the west Antarctic ice sheet', *Polar Times*, GRID-Arundel, www.grida.no/publications/et/pt/page.aspx.
- ⁴⁷ Casassa, 'New concerns on the stability of the west Antarctic ice sheet'.
- ⁴⁸ Tabu Puiu, 'Antarctic rift the size of the Grand Canyon speeds ice sheet melting', *ZME Studies*, July 2012, www.zmescience.com/research/studies/antarctic-rift-sized-grand-canyon-ice-sheet-melting-4234423/; and 'West Antarctic Ice Sheet', *Wikipedia*, http://en.wikipedia.org/wiki/West_Antarctic_Ice_Sheet.
- ⁴⁹ Sam Ikin, 'Antarctic sea ice continues to grow beyond record coverage', *ABC News*, 23 September 2014, www.abc.net.au/news/2014-09-22/antarctic-sea-ice-continues-to-expand/5760642?section=tas; Anne Mather, 'Sea ice at record levels as Aurora Australis leaves Hobart for 2014-15 research season', *Mercury*, 22 October 2014, www.themercury.com.au/news/tasmania/sea-ice-at-record-levels-as-aurora-australis-leaves-hobart-for-201415-research-season/story-fnj4f7k1-1227098503133; and Kieran Jones, 'Antarctic sea ice: Record coverage causes problems for supply ships to South Pole', *ABC News*, 12 May 2015, www.abc.net.au/news/2015-05-12/antarctic-sea-ice-record-coverage-causes-problems-for-supply/6464178?section=tas. Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, p. 62, quoting a submission by Dr Julia Jabour, IMAS, University of Tasmania.
- ⁵⁰ Australian Antarctic Division, 'Ocean acidification', www.antarctica.gov.au/about-antarctica/environment/climate-change/ocean-acidification-and-the-southern-ocean.
- ⁵¹ Fisheries Research and Development Corporation, *Climate Change, Marine Biodiversity and the Fishing and Aquaculture Industries*, <http://frdc.com.au/knowledge/Factsheets/Factsheet%20-%20Fisheries%20Climate%20Change.pdf>.
- ⁵² Professor Anthony Worby, Antarctic Climate and Ecosystems CRC, quoted in the *Senate Committee Report*, p. 44.
- ⁵³ Australian Antarctic Division, *Australian Antarctic Science Strategic Plan 2011-12 to 2020-21*, p. 2.
- ⁵⁴ Australian Antarctic Division, *Australian Antarctic Science Strategic Plan 2011-12 to 2020-21*, p. 2.
- ⁵⁵ Australian Antarctic Division, *Australian Antarctic Science Strategic Plan 2011-12 to 2020-21*, p. 3.
- ⁵⁶ Prime Minister of Australia, *Australia's New State of the Art Icebreaker Unveiled*, Media Release, Canberra, 29 October 2015, www.pm.gov.au/media/2015-10-29/australias-new-state-of-the-art-icebreaker-unveiled.
- ⁵⁷ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, Chapter 5.
- ⁵⁸ CSIRO Submission, dated 2 April 2014, to Press, 20 Year Australian Antarctic Strategic Plan, p. 2.
- ⁵⁹ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, p. 7.

⁶⁰ For example, future hydrographic capabilities deployed into the Antarctic may well take the form of specialised equipment and systems to be embarked for a particular tasking in an available more general purpose vessel, rather than continued use of dedicated vessels such as the current survey vessel, *Wyatt Earp*.

⁶¹ Editorial Note. The 2016 Defence White Paper was released on 25 February 2016. In its consideration of Antarctic and Southern Ocean issues, it noted:

The Australian Antarctic Territory faced no credible risk of being challenged in such a way that requires a substantial military response for at least the next few decades. It is in our interest to work with like-minded countries to prevent any militarisation of Antarctica which could threaten Australia's sovereignty over the Australian Antarctic Territory and its sovereign rights over its offshore waters. Australia is a strong supporter of the Antarctic Treaty System, which expressly prohibits any mining in Antarctica. Australia also strongly supports the Convention on the Conservation of Antarctic Marine Living Resources which regulates fishing activity in Antarctic waters.

Defence will continue to support maritime resource protection operations, particularly in the fisheries of our Heard and McDonald Islands Exclusive Economic Zone, and will provide niche support to the Australian Antarctic Division's operations, including Royal Australian Air Force heavy air lift missions in support of Australia's stations in Antarctica. See Department of Defence, *2016 Defence White Paper*, Canberra, 2016, p. 54.

⁶² LOSC Article 111.5.

⁶³ Senate Foreign Affairs, Defence and Trade References Committee, *Australia's Future Activities and Responsibilities in the Southern Ocean and Antarctic Waters*, paras 5.54-5.58.

⁶⁴ Interview, Greg Elliott and Judy Swann, Australian Civil-Military Centre, Queanbeyan, 16 February 2015.

SOUNDINGS