Joint Standing Committee on the National Capital and External Territories
Antarctica Public Hearing
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Answers to questions on notice

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Hansard Page 9:

Mr SIMPKINS: About five days ago, the Norwegian Polar Institute reported a study they had done which suggests the accumulation of ice across the continent is higher than the melting. Do you have a view on that yet? Is there anything you can tell me about that?

CHAIR: And is that why Western Australia has declining rainfall? Are they getting the rain instead of us?

Mr SIMPKINS : Across the whole continent, is it increasing in density or is it decreasing in density? That is my main point.

Response:

The question revolves around snow/ice accumulation across the continent compared to melting, touching upon the increase over recent decades in snowfall in the Law Dome region (and the associated decrease in rainfall in southwest Western Australia). The key news item being the very recently announced Norwegian results

Taking these matters in turn:

The issue of “mass-balance”, by which we mean the net change in mass of the continent when losses are counted against snowfall input, is a major endeavour in Antarctic glaciology. This is difficult to estimate as it involves a relatively small difference between two large and uncertain terms (snowfall vs calving and melt).

As Dr Fleming notes, the current state of knowledge shows a clear net mass loss in West Antarctica. For East Antarctica, the situation is ambiguous, with a range of methods showing a likely overall mass increase, but one that is within the measurement uncertainty. In other words, we are unable to rule out a small loss, or steady-state. Even so, the total for the whole of Antarctica is dominated by the West Antarctic loss, with a net overall loss of ice and thus a contribution to sea level rise.

The overall East Antarctic picture is compounded by the fact that it is unlikely to be behaving in a uniform way. The exceptionally cold, high interior is likely to have a different response to the coastal margin where ice meets the ocean.

There are some areas where we are observing pronounced surface lowering, implying a drawdown of ice that we associate with warming ocean waters contacting floating ice. Regions of the Totten Glacier, on the East of Law Dome, near Casey station are lowering at 1-2 metres per year, and have thinned markedly in the past 20 years (AAD scientists have a key paper in

submission on this). This is analogous to the situation seen in the Pine Island Glacier in West Antarctica.

The issue of increases in snowfall in recent decades and the associated rainfall declines in southwest Western Australia (SWWA) is an interesting example of the Antarctic-Australian climate connections. There has been a decline in SWWA winter rainfall since ca. 1970 that we have associated with an increased prevalence of cold dry air-flow from the south. This produces south coastal showers, but lower regional rainfall in SWWA than the important north-westerly moisture source that dominates in normal winter conditions. This came to light because we were trying to understand a coincident increase in snowfall in Coastal East Antarctica that is recorded in ice cores from Law Dome. We uncovered a pattern of atmospheric circulation that has strengthened in recent decades which simultaneously brings warm moist air south to the Antarctic coast from the region of Tasmania and circulates cold dry air from the Antarctic to SWWA. Note, it is not quite correct to say that Antarctica is getting SWWA's moisture (which normally comes from west-to-northwest). Rather it is acting to displace or disrupt the historical pattern.

Finally, the Norwegian result is a study based on a particular ice shelf (Fimbul ice shelf). It is not directly concerned with the issue that Mr Simpkins was more interested in – namely the broadscale mass balance issue. What the Norwegians found was that for the Fimbul, the underlying ocean water was colder than thought and thus was melting the ice less rapidly than previously thought. In this case (for the Fimbul) it restores the possibility that the overall catchment mass (snowfall in the interior minus loss at the margin) could well be in balance. This result for one catchment should be taken as just one element of the broader question.

Hansard Page 10:

SENATOR HUMPHRIES: In reducing the number of scientists active in Antarctica, from 90 this year to 80 next year, are particular lines of research that are currently being undertaken going to be discontinued?

Response:

In implementing the new Science Strategic Plan we determined that we would fully support the selected projects and ensure that each Chief Investigator was able to achieve all the stated objectives of the project. In the past we would on occasions offer a part of the requested time in Antarctica in order to maximise the number of science projects. Our experience is that this was not always beneficial as they were not able to fully meet their science objectives. Under the new Plan we therefore intend to support slightly less numbers of scientists, but they are likely to remain in Antarctica doing their work for longer periods. As such the total 'science days' is unlikely to change.

Additional Questions on Notice

Infrastructure and Logistics

Are the current bases and facilities in Antarctica adequate to carry on Australia's Antarctic research program?

- ***is the research program determining or being determined by the available facilities?***

Australia manages its Antarctic Science Program through the Australian Antarctic Science Strategic Plan 2011-2021. The Strategic Plan defines our research objectives and priorities against government needs for the next decade. In this first year of the implementation of the Strategic Plan the Australian Antarctic Division (AAD) is finalising the selection of a portfolio of research projects that are seen to best support achieving the objectives of the Strategic Plan. Selecting these projects requires a careful integration of the science needs with our operational capability and capacity. Necessarily, the projects are constrained around our fixed assets and capabilities (such as transport capacity, beds on stations, locations of continental infrastructure). Decisions on the deployment of more flexible assets such as helicopters, support personnel, equipment are made with a view to maximise the possible support of science projects. The AAD's integrated planning processes balances the needs of science support with those of running and maintaining our Antarctic infrastructure.

In general the location of our stations allows excellent access to a wide range of the Antarctic coastline within the AAT. Additional investment in infrastructure such as ship time for marine science, capacity to access remote and deep-field sites, and the number of beds on stations available for scientists would allow an expansion of science activities and outputs.

Does Australia need to refurbish and upgrade existing bases and facilities?

The AAD is engaged in a continuous process of repairing and upgrading our Antarctic facilities. However, the core buildings at our three Antarctic stations are now over 25 years old, and the core buildings at Macquarie Island are over 40 years old (some over 50 years old). All of these buildings are steadily approaching the end of their usable life and we will need to consider replacing them over the next two decades.

- ***Should we move to create new facilities which allow a different research profile?***

Other than perhaps the creation of an inland station, there is no requirement for the creation of new permanently-occupied stations in Antarctica. However, we see potential research benefits in expanding our aviation and traverse capabilities to more readily access inland and coastal areas of the AAT, and this would open up the possibility of developing a flexible and low impact model for the establishment of temporary field camps in remote areas to facilitate deep field research teams.

- ***Should we have a base on the Antarctic Plateau?***

France/Italy (Concordia Station) and China (Kunlun Station) have established permanent inland stations in the AAT in recent years and these join the existing Russian facility at Vostok and the US base at the South Pole (which is just inside the AAT). All these stations are supporting significant scientific work – particularly in the areas of atmospheric science, astronomy and ice core drilling. Australia has substantial scientific interests that could benefit from greater access to the Antarctic plateau. Currently our science is conducted through summer-only over-ice traverses and the establishment of temporary, mobile field camps. The establishment of an Australian permanent inland base would require substantial additional

resources in overland traverse capability, increased shipping bulk cargo capacity and also in ski-equipped inter- and intracontinental aviation. The experience of other nations have shown that, without sufficiently strong logistics capability, supplying and maintaining inland stations is a very difficult task. The US has sufficient resources to manage the task reasonably well, but, in our assessment, all other nations with inland stations are struggling to a greater or lesser extent. An inland station is a very expensive proposition. Australia is continuing to develop strong collaborative arrangements with other nations with an interest in plateau-based science (most notably, France, Italy and China).

How successful has the Antarctic Airlink been?

The Antarctic Airlink has provided the first ever intercontinental aviation link between Australia and Antarctica. The ice runway at Wilkins aerodrome is a remarkable engineering achievement and a tribute to all who worked to establish it. The Airbus A319 aircraft operated by Skytraders is a highly suitable and comfortable aircraft for this operation. The Airlink has provided a beneficial service in terms of moving expeditioners and small cargo to and from Casey Station over the course of the last 5 seasons and will continue to do so for some time to come. We have also been able to use the Airbus A319 to make many flights to and from McMurdo carrying our own passengers (who are then transited by intracontinental flights to Casey Station) and those of the US and other countries under agreements for the exchange of services (including one with the US under which they make two LC130H flights from McMurdo to Casey at the start of each summer to transfer a total up to 60 passengers each way).

Unexpected climactic conditions at Wilkins, particularly in terms of sub-surface melt during the height of summer, have posed problems in terms of the reliability and sustainability of the ice runway which have disrupted flight schedules in three out of five seasons and which are likely to make the Wilkins aerodrome unsustainable over the longer term.

- ***Should we be using different aircraft types, such as LC-130 Hercules, for transcontintental flights?***

The ski-equipped LC130H aircraft currently used by the US to fly from Christchurch to McMurdo and on to the South Pole are extremely well suited to operating intercontinental and intracontinental aviation services in Antarctica. The preparation and maintenance of skiways for such aircraft is a much quicker and less resource-intensive task than the preparation of an ice runway. Unfortunately, the distances between Hobart and our Antarctic stations would limit the extent to which LC130H aircraft could service our intercontinental aviation needs. These airframes are also very old, and new LC130Hs are not being manufactured. A newer model, the C130J, could possibly be equipped with skis, but no Antarctic nation has yet endeavoured to do so. Modelling indicates that a ski-equipped C130J, were one to be developed, would have a significantly superior payload/flying range compared to the LC130H and might therefore be capable of servicing the AAD's intercontinental aviation needs.

Does Australia need a larger and more diversified fleet of aircraft for movement within Antarctica?

The current range of ski-equipped aircraft available to be hired for intracontinental aviation in Antarctica are all capable of moving small amounts of personnel and cargo between our stations and are largely adequate in meeting our needs in the deep field. However, when connected to the Airlink at Wilkins, no intracontinental solution has so far proven capable of moving more than a small proportion of our expeditioners to and from our stations at Davis and Mawson. The weather patterns and small to medium size aircraft utilised (with their associated capability restrictions), limit the available flying days over summer, have proved a

particular barrier to this. It is unlikely that any aviation network based on a hub and spoke model using small to medium sized ski-equipped aircraft to transfer passengers from Wilkins and/or McMurdo to our continental stations could ever replace our seaborne logistics as a way of moving passengers to and from our stations.

- **Do we currently have the capacity to access the Antarctic Plateau by air?**

Yes. Wilkins runway is on the Antarctic plateau and is accessed by the Airbus A319. Each year, smaller ski-equipped aircraft engaged by the AAD fly missions from there, or from skiways at our three stations, to a wide range of locations on the Antarctic plateau.

What is Australia's current seaborne research and logistics capacity?

- **Do we need to increase that capacity?**

Australia utilises the Research and Supply Vessel Aurora Australis for seaborne research and logistics. The vessel provides a good platform for research in the Southern Ocean including in areas where sea ice is present. With nine laboratories, trawl facilities, the ability to collect a range of scientific underway data and capacity to utilise autonomous vehicles and helicopters the ship provides a good capability for science. Up to 116 expeditioners can be accommodated on the ship at any one time.

In terms of seaborne logistics the vessel is able to resupply our stations with bulk cargo and fuel and where required can break up to 1.2m of ice to reach the coastal stations. Up to four helicopters can be carried to assist cargo and personnel delivery from up to 100nm away when required.

The AAD also operates a range of small craft in the form of rigid inflatable boats, barges and amphibious vessels to support science and logistic activities.

The RSV Aurora Australis is operational and effective now as a research and supply vessel however is nearing the end of its useful life and a replacement needs to be considered to ensure the Australian seaborne capability is at least maintained if not enhanced.

Policy and Program Objectives

An objective of Australia's Antarctic program is to derive reasonable economic benefits from the living and non-living resources of the Antarctic and the Southern Ocean. What sort of economic benefits do we derive from the Antarctic and Southern Ocean?

A small number of Australian companies operate Antarctic tourism activities. The economic benefits of these activities have not been quantified. Some of these activities occur in the Australian Antarctic Territory (AAT), although most occur in other parts of Antarctica, including the Antarctic Peninsula region which is the most easily accessible and commonly visited area. Similarly, companies based in other countries that are Party to the Antarctic Treaty operate tourism activities that visit the AAT. Overall, tourism activity in the AAT is a very small proportion of Antarctic tourism. In addition to those companies that operate tourism activities, a number of other Australian companies market Antarctic tourism products. Australians are the second most common nationality visiting Antarctica as tourists (travelling with Australian and other companies), making up 10% of tourist visitors.

Two Australian fishing companies operate in the Heard Island and McDonald Islands (HIMI) Fishery for Patagonian toothfish and Mackerel icefish. The HIMI Fishery is managed by the Australian Fisheries Management Authority in consultation with the AAD. The HIMI fishery falls inside the Convention for the Conservation of Antarctic marine Living Resources (CAMLR

Convention) area. As such the fishery is managed in accordance with the objective of the CAMLR Convention and conservation measures adopted by the Commission established under that convention (CCAMLR).

The Antarctic sector has been identified in Tasmanian Government economic studies as likely to be one of the key sectors to stimulate growth in jobs and economic activity in Southern Tasmania over future decades. According to Tasmanian Government statistics, the sector contributes over $182 million per annum to the local economy and accounts for 830 jobs across Tasmania (mainly in the south). Around 60 per cent (over $70 million in 2011-12, falling to an estimated $68 million in 2012-13) of AAD's budget flows directly into the Tasmanian economy in the form of salaries and wages and the purchase of goods and services.

- **What additional economic benefits is Australia exploring?**

We are not actively exploring other potential economic benefits. We are not aware of other potential benefits, noting that a legally binding and indefinite ban on mineral resource exploration and exploitation is in place through the Protocol on Environmental Protection to the Antarctic Treaty.

- **What is Australia's attitude to Antarctic tourism, bio-prospecting and fishing?**
    - **How active is Australia in these areas?**

Antarctic tourism

See response to question relating to Antarctic Tourism below.

Bioprospecting

Australia considers bioprospecting and the derivation of economic benefits from novel compounds identified through Antarctic research to be a reasonable economic use of Antarctica. Such activities are covered by, and must be conducted in a manner consistent with, the Antarctic Treaty and its Protocol on Environmental Protection, and the Convention on the Conservation of Antarctic Marine Living Resources. The Antarctic Treaty Parties regularly discuss the subject of bioprospecting, including developments on bioprospecting in other international fora and consider how such developments may interact with the provisions and objectives of the Antarctic Treaty system agreements.

Fishing

Australia strongly upholds the objective of the CAMLR Convention which is the conservation of Antarctic marine living resources where conservation includes rational use. Australia supports fishing practices that ensure the ecological sustainability of harvesting in the Southern Ocean and consistent with the CAMLR Convention also takes account of the needs of the dependent and related species. An exploratory fishery for Antarctic toothfish exists in the waters off the Australian Antarctic Territory which is managed by CCAMLR. Currently no Australian fishing companies operate in this area.

- **Is Australia actively engaged in geological surveying in the Antarctic and Southern Ocean?**
    - **Are other nations active in this field?**

Research projects are selected on a competitive basis and are assessed for their excellence in science, alignment to the Australian Antarctic Science Strategic Plan 2011 -2021 and their delivery against government priorities. Geology is not a high priority in the Strategic Plan, but geological surveys that address the science objectives of the Plan, or more broadly, the Australian National Research Priorities are supported. Geoscience Australia play an active role within the Australian Antarctic Program. Understanding the geomorphology of the Antarctic continent that lies beneath the Antarctic ice cap is a key and important area of research in which Australia, and other nations are actively engaged.

Other nations conduct geological surveys around Antarctica within their national programs.

Antarctic Treaty System

- **What role does the Antarctic Treat System play in protecting Australia's sovereign interests in Antarctica?**

DFAT to respond to this question.

- **How do we use that Antarctic Treaty System to protect Australia's sovereign interests?**

DFAT to respond to this question.

- **Is Australia's place within the Antarctic Treaty System enhanced by maintaining a physical presence and a strong research effort in Antarctica and the Southern Ocean?**

Yes. Australia's place in the Antarctic Treaty System is enhanced by having a physical presence in Antarctica, the capability to conduct Antarctic activities including scientific research of global significance, the provision of scientific and management-relevant outcomes to the Parties to the agreements of the ATS, and the advancement of Australian scientific, environmental protection, and policy objectives in the forums of the ATS.

Australia's Antarctic science program is internationally recognised for the excellence of its research and is a leader in the fields such as understanding the role of Antarctica and the Southern Ocean in the global climate system. Australia's scientific activity in many cases also contributes directly to the work of the Parties to the agreements of the ATS, for example in providing the basis for conservation and sustainable management of living resources, and to understanding, minimising, and remediating the impacts of human activities. In these ways, transport and logistics, outcomes of our science program contribute to Australia's position of influence within the ATS. The government is currently investigating options for renewed flexible logistic capabilities that would allow Australia to fully exploit the opportunities for excellent science identified in the Australian Antarctic Science Strategic Plan 2011-2021.

- **What role does Australia's legal system and law enforcement agencies play in maintaining the integrity of the Antarctic Treaty System?**

The integrity of the Antarctic Treaty System (ATS) relies on Parties giving effect to their international obligations with respect to their own nationals in Antarctica. Australia's legal system enshrines the provisions agreed under the agreements of the Antarctic Treaty System in our domestic law, and applies them to Australian nationals in Antarctica. The administration of relevant Australian legislation by Australian agencies consequently play an important role in contributing to the integrity of the Antarctic Treaty System. Australian agencies also contribute directly to the integrity of the Treaty System by conducting activities mandated in international agreements of the ATS, for example, inspections conducted by Australia in accordance with the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) System

of Inspection. Australia's Southern Ocean customs and fisheries patrol program is a key contributor to CCAMLR's efforts to prevent, deter and eliminate illegal, unregulated and unreported (IUU) fishing from the CCAMLR Area.

Antarctic Tourism

- **What is Australia's view of Antarctic tourism?**

Australia regards tourism as an appropriate use of Antarctica, provided it is conducted in a safe and environmentally responsible manner. Antarctic tourism provides an opportunity for Australian businesses to derive economic benefits from Antarctica, including the Australian Antarctic Territory. Australia works actively with other Antarctic Treaty nations to ensure that Antarctic tourism is managed appropriately. It also provides an opportunity for Australia to experience Antarctica directly.

- **What sort of impacts is tourism having on the Antarctic environment?**

A study recently conducted by the Committee on Environmental Protection, which advises the Antarctic Treaty Consultative Meeting on environmental matters, concluded that there is little evidence of environmental impacts specific to Antarctic tourism. The Committee also concluded that continued close attention, including a systematic approach to monitoring, were warranted.

By comparison with many other sensitive natural places the numbers visiting the Antarctic continent are relatively small, visits are distributed over a wide geographic area and a number of sites, and the majority of visitors travel aboard ships and spend limited time ashore. Around 27 000 visitors went to Antarctica in the 2011/12 Antarctic summer season, and recent seasons have seen a sustained decline in the number of visitors.

- **What is being done to regulate tourism in Antarctica?**

Tourism is subject to the stringent environmental management provisions of the Protocol on Environmental Protection to the Antarctic Treaty (the Protocol), which among other things requires that all activities be subject to environmental assessment requirements, provides for the designation of protected areas, prohibits interference with vegetation and wildlife, and imposes restrictions on waste disposal. In addition to the Protocol, the Antarctic Treaty parties have agreed additional binding measures which apply specifically to tourism activities and are in the process of being implemented by Parties, including:

- requirements for contingency plans and insurance;
- a ban on landing of passengers from large vessels carrying more than 500 passengers;
- limits on the number of passengers ashore at any site (100 maximum);
- a requirement for operators to coordinate to ensure only one ship is present at a landing site at a time; and
- maintenance of a guide to visitor ratio of 1:20 on shore visits;

The Treaty Parties have also agreed a suite of advisory arrangements, which are not legally binding including:

- general guidelines for visitors to the Antarctic, and for those organising and conducting Antarctic tourism, which address matters such as behaviour around wildlife and avoiding introduction of non-native species;
- site-specific guidelines for sites regularly visited by tourists;

- guidance for sharing of information on tourism and non-governmental activities between Treaty parties; and
- arrangements for visits to Antarctic stations.

The tourism industry representative body, the International Association of Antarctica Tour Operators (IAATO), also has guidelines, operating procedures and policies in place to assist its members to conduct their activities in a safe and environmentally sustainable manner.

- **What sort of constraints apply to the regulation of tourism from an Australian point of view?**

Antarctic tourism is subject to the provisions of the Antarctic Treaty and its Protocol on Environmental Protection. Decisions taken under these agreements are by consensus of the relevant States Parties. A consensus-based approach to decision-making has the potential to delay or prevent agreement on management measures but, as indicated above (Q3), the Antarctic Treaty Consultative Parties have agreed a suite of binding and non-binding instruments that apply to the management of Antarctic tourism. The remoteness of sites visited by tourists does present practical constraints for management and regulation, as in most cases an on-site management presence is not practical. In Australia's view this has not resulted in a significant risk of non-compliance.

- **Does the Antarctic Treaty System have legal effect or moral effect in governing issues such as tourism?**

The provisions of the Antarctic Treaty, the Protocol and measures adopted under these agreements at an Antarctic Treaty Consultative Meeting have effect in international and in the domestic law of Treaty Parties (following ratification processes). Non-binding guidance agreed by the ATCM is implemented through each Party's administrative processes. Due to the unique legal and political status of Antarctica, and in line with established practice, each Party only enforces its domestic legislation with respect to its own nationals.