

Australia has an outstanding record of research provided by a diversity of institutions...I do not think we can afford to rest on our laurels.¹

Antarctic science could have, and deserves, a higher profile. I believe it will get it with the realisation that you establish your right to have a say in the region by doing science. Anything else lacks credibility.²

Australia's Antarctic science program

An overview

- 6.1 Since its beginnings in the 1940s, the priorities which have guided Australia's Antarctic Program have experienced a significant shift. While occupation to uphold territorial claims has always been a leading priority, Australia's Antarctic Program today is guided by the increasing importance of undertaking scientific work, not only in Antarctica, but also in the sub-Antarctic and the Southern Ocean. The nature of much of the research being conducted in the region is now understood to have significant implications for global processes.

1 Antarctic Climate and Ecosystems Cooperative Research Centre (Mapstone B), *Transcript*, 16 March 2004, p 24.

2 Dr Neville Fletcher, former ASAC Chairman, In: Murphy, K. 'Australia in Antarctica: What Price a Presence', *Bulletin with Newsweek*, v.112 no 5726, 10 July 1990, p 46.

- 6.2 As discussed in chapter one, the research objectives of Australia's Antarctic science program are determined by the Government on the advice of ASAC. Its members and the Chair are appointed by, and report to, the Minister with responsibility for Antarctic matters.³ Members are drawn from a wide range of Government and university research institutions whose interests broadly embrace the main facets of the science program.⁴
- 6.3 In collaboration with the wider Antarctic science community, ASAC has developed strategic plans for Australia's Antarctic science program since 1990.⁵ On average, the Antarctic science program supports 130 projects across the following 10 major scientific disciplines: Antarctic marine living resources, astronomy, biology, geosciences, glaciology, human biology and medicine, human impacts, meteorology, oceanography and space and atmospheric sciences.
- 6.4 Approximately 200 scientists participate in Australia's Antarctic science program each year,⁶ and the program comprises scientific research conducted by:
- the Antarctic Climate and Ecosystems CRC – whose core partners include the AAD, CSIRO, the University of Tasmania and the Bureau of Meteorology;
 - a significant number of scientists from Australian universities and other tertiary education institutions who are supported through the Australian Antarctic science grants scheme;
 - scientific staff employed by the AAD; and
 - a small number of scientists based overseas.⁷
- 6.5 Australia's approach to Antarctic science is therefore considered to be a hybrid between the centralised and devolved models adopted by other national Antarctic programs.⁸ The centralised model involves a single central agency assuming responsibility for coordinating all
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3 Currently the Minister for the Environment and Heritage.

4 Department of the Environment and Heritage, Submission no. 24, p 13.

5 Department of the Environment and Heritage, Submission no. 24, p 13. See also Australian Antarctic Division, 2003, *Implementation Plan for National Science Priorities*, <<http://www.dest.gov.au/priorities/plans/AAD.pdf>>, viewed 2 August 2004.

6 Department of the Environment and Heritage, Submission no. 24, p 13.

7 Australian Antarctic Division, *Australia's Antarctic Science Program: Science Strategy 2004/05 – 2008/09*, Australian Antarctic Division, Kingston, Tasmania, p 2.

8 Department of the Environment and Heritage, Submission no. 24, p 16.

aspects of the program, while in the devolved model, all responsibility for the science program is devolved to non-government research bodies and government agencies.⁹ Table 6.1 further details these three models for management of Antarctic science programs.

6.6 In its Foresight Report of 1997, ASAC identified four advantages of the hybrid model adopted by Australia's program:

- the range of scientific skills available to the Australian Antarctic Program is very much greater than would be the case if the AAD depended upon its own scientific workforce;
- this range of skills gives it a responsiveness which will suit it well in a world of inevitable uncertainties;
- scientists who owe their intellectual allegiance to science, and science alone, are able to join the Program and conduct research which, while it must conform to the strategic plan for science, could be regarded as 'blue sky' research. As the history of science has repeatedly shown, it is from projects of this kind that the major future advances are made. The opportunity for such research to be introduced into the Antarctic Program must be encouraged and protected; and
- multi-year baseline monitoring work, which lies at the basis of much environmental change research, is able to be built into the Program and included within the scientific projects led by employed staff of the AAD and other government agencies such as the Australian Geological Survey Organisation (AGSO) and the Bureau of Meteorology (BoM). University and other research personnel cannot give long-term assurances of their continued involvement in the Program.¹⁰

6.7 The Government accepted ASAC's recommendation that the hybrid approach be maintained, while acknowledging that this would be dependent on universities continuing to support Antarctic scientific research.¹¹

9 Department of the Environment and Heritage, Submission no. 24, pp 16-17.

10 Antarctic Science Advisory Committee, 1997, *Australia's Antarctic Program Beyond 2000: A Framework for the Future: A Report to the Parliamentary Secretary for the Antarctic*, Department of the Environment, Canberra, pp 51-52.

11 Commonwealth Government, 1998, *Our Antarctic Future: Australia's Antarctic Program Beyond 2000: The Howard Government response to Australia's Antarctic Program Beyond 2000: A Framework for the Future: A Report to the Federal Government by the Antarctic Science Advisory Committee*, p 8.

Table 6.1 Three models for Antarctic research adopted by National Antarctic programs

Three models for Antarctic research adopted by National Antarctic programs
<p>a) The Devolved Model</p> <p><i>Examples:</i> United States, New Zealand, France, Italy</p> <p><i>Characteristics:</i></p> <ul style="list-style-type: none"> ▪ Responsibility for all aspects of Antarctic research is delegated to non-Government research institutions, universities and various Government agencies. ▪ Government directives and indirect funding mechanisms then require agencies to devote an appropriate percentage of their effort (and budget) to Antarctic programs. ▪ Research institutions and universities' participation is funded through an extended grants program. ▪ Government retains responsibility for policy.
<p>b) The Centralised Model</p> <p><i>Examples:</i> None – formerly the UK and Germany ran centralised Antarctic programs but have recently moved to a Hybrid model.</p> <p><i>Characteristics:</i></p> <ul style="list-style-type: none"> ▪ A single central agency is responsible for undertaking, coordinating and supporting all Antarctic science and advising Government on such matters.
<p>c) The Hybrid Model</p> <p><i>Examples:</i> Australia, UK and Germany</p> <p><i>Characteristics:</i></p> <ul style="list-style-type: none"> ▪ A cross between the centralised and devolved model: the scientific expertise of researchers working in academic and research establishments and in other government agencies is utilised in addition to scientists employed by a central agency. ▪ Policy responsibility, program coordination and oversight, undertaking Antarctic research and providing logistical and operational support is maintained in the Government agency. ▪ External participation is undertaken through a grants scheme managed by the central agency, with the agency also providing logistical and other support to venture partners and funded grant applicants.

Source Australian Antarctic Division, Submission no. 24, pp 16-17.

Evaluation of Australia's Antarctic Science Program

6.8 Under its Terms of Reference, one of ASAC's roles is to report to Government on whether Australia's Antarctic science program is meeting Australia's scientific objectives.¹² In 2002, ASAC complied with this requirement by engaging an independent Steering Committee to conduct an evaluation of the science program. The Steering Committee comprised a number of internationally

12 For ASAC's full Terms of Reference, see Antarctic Science Advisory Committee, Submission no. 13, pp 14-15.

recognised scientists from Australia and overseas, who do not participate in Australia's Antarctic science program.¹³ The report which the Steering Committee's prepared for ASAC was based on the findings of four scientific discipline-based subcommittees.¹⁴

6.9 While the Steering Committee was highly complimentary in its evaluation, stating that 'there is not a scintilla of doubt that Australia is well served by its Antarctic science program', the Committee also pointed out that 'there are at the same time elements of organisation, program and structure which require attention'.¹⁵ The issues raised by the Steering Committee included generic issues relating to the Antarctic science program as well as specific program-based issues.¹⁶

6.10 After considering the views of the Steering Committee, ASAC submitted its evaluation in May 2003. The evaluation included 14 generic recommendations and 10 recommendations relating to existing programs. A number of the generic issues raised by ASAC were considered in detail as part of the preparation for a new strategic plan for the Antarctic science program. These issues included:

- Increasing the collaboration between existing programs and between Australian organisations and overseas institutions
- Increasing the visibility of scientific output in journals
- Increasing participation in the scientific program
- Enhancing funding required to carry out scientific research back in Australian laboratories that underpins much of Antarctic research.
- Raising awareness of the program
- Improving the transparency of the program by developing further the existing performance indicators
- Distinguishing between scientific research and monitoring programs
- Expanding scope of the Antarctic Data Centre, and
- Major equipment requirements.¹⁷

13 For Steering Committee Membership, see Antarctic Science Advisory Committee, Submission no. 13, pp 33-35.

14 Antarctic Science Advisory Committee, 2003, *Report on Australia's Antarctic Science Program*, p 6.

15 Antarctic Science Advisory Committee, 2003, *Report on Australia's Antarctic Science Program*, p 11.

16 Antarctic Science Advisory Committee, 2003, *Report on Australia's Antarctic Science Program*, p 8.

17 Antarctic Science Advisory Committee, Submission no. 13, p 7.

Science Strategy 2004/05-2008/09

6.11 Following ASAC's evaluation of the science program, and widespread consultation with the science community, the *Science Strategy for Australia's Antarctic Program 2004/05-2008/09* was launched in May 2004 by Dr Sharman Stone, then Parliamentary Secretary with responsibility for Antarctic matters. The science strategy was developed by ASAC, and provides that Australia's Antarctic science program will focus on four priority programs for the forthcoming five-year planning period:

- **Ice, Ocean, Atmosphere and Climate**
The goal of this program is to better understand and quantify the role of Antarctica and the high-latitude Southern Ocean and atmosphere in the global climate system.
- **Southern Ocean Ecosystems**
The Southern Ocean represents a vast international resource and national resource to Australia. Elevated productivity in part of the region such as in the sea-ice zone, supports a high biomass of certain species, and considerable biodiversity. Research here focuses on the species that are targets, or potential targets, for commercial fisheries and on the dependent and related species in the ecosystem.
- **Adaptation to Environment Change**
Antarctica offers an unparalleled natural laboratory for investigating the impacts of environmental changes on the structure and function of biological communities and species.
- **Impact of human activities in Antarctica**
Antarctica is no longer a pristine environment. At some locations, particularly around long-standing research stations, there is evidence of past human activity and, as Antarctic tourism increases, the pressures on the environment grow. Scientific research is required to provide advice in support of environmental management and remediation to minimise the impacts of human activities in Antarctica.¹⁸

¹⁸ Stone, S (Parliamentary Secretary for the Environment and Heritage), 7 May 2004, *New Antarctic science focus on climate change and environmental protection*, media release, Parliament House, Canberra.

6.12 ASAC determined that these themes were consistent with the Government's national research priorities.¹⁹ The AAD pointed out that while the priority programs embrace a wide range of scientific disciplines, the interests of scientists in other fields is also acknowledged:

Within the discipline areas priority is given to scientific studies of the Antarctic but also supports the continued use of Antarctica as a "platform" to conduct externally supported research of high scientific value. Platform research includes areas of astronomy, space and atmospheric sciences, geosciences, and human biology and medicine that do not directly relate to the four priority program areas.²⁰

The Australian Antarctic science grants scheme

6.13 The Australian Government provides around \$700,000 per annum from within the AAD's budget to researchers from Australian universities and other institutions through the Antarctic science grants scheme.²¹ In the grant allocations for 2004-05 the maximum level of funding for an individual grant increased from \$30,000 with a small number of larger grants up to \$60,000 now available to support multidisciplinary projects.²² To be eligible for a grant, projects must contribute to the science strategy. Grants are allocated for a project's special requirements and in addition to the basic facilities provided by the researcher's own organisation. AAD guidelines state that this may include 'financial support for auxiliary staff, equipment, running

19 In late 2002, the Prime Minister announced four 'whole-of-government' themes of long-term importance to Australia:

- An Environmentally Sustainable Australia
- Promoting and Maintaining Good Health
- Frontier Technologies for Building and Transforming Australian Industries
- Safeguarding Australia

For further information see <<http://www.dest.gov.au/priorities/>>, viewed 7 July 2004.

20 Australian Antarctic Division, *Guidelines for Antarctic Research Applications*, Australian Antarctic Division, Kingston, Tasmania, viewed 2 February 2005, <<http://www.aad.gov.au/default.asp?casid=3648>>.

21 In 2004-05, \$760,000 in grants was distributed amongst 54 projects that predominantly fall into the four priority science categories outlined in the Science Strategy 2004/5 - 2008/9.

22 See Australian Antarctic Division, *Overview for Scientific Research in 2005/06*, Australian Antarctic Division, Kingston, Tasmania, viewed 4 June 2004, <<http://www.aad.gov.au/default.asp?casid=70>>.

expenses, consumables and travel'.²³ All research proposals are subject to a 'rigorous screening and assessment process' including an international peer-review and scrutiny by an Antarctic Research Assessment Committee.²⁴ According to the AAD:

...all scientists in Australia are eligible to apply for grants and the criteria are open and transparent and available to anybody who wishes to apply.²⁵

- 6.14 The general consensus from the Antarctic science community is that grants allocated by the AAD, while welcome, are not nearly sufficient enough to support research programs by themselves. According to the University of New South Wales (UNSW) Antarctic Astronomy Group, the Antarctic research grants typically cover the cost of medicals and transportation to Hobart, and that as a result:

...there is no means through the Antarctic research grants scheme that an externally generated research proposal can establish a new line of investigation outside of the existing infrastructure, or seek the funds necessary to develop the requisite new infrastructure over a period of time.²⁶

- 6.15 NCAR – a committee of the Australian Academy of Science – is also concerned about the adequacy of funding available to university researchers. NCAR estimates that a shortfall of approximately \$400,000 exists for requested projects which are considered to be highly appropriate for funding.²⁷ ASAC recommended that the pool of grants be increased to \$1.5 million over the course of the Science Strategy.²⁸

- 6.16 The Output Pricing Review (discussed in chapter two) conducted by the Department of Finance and Administration in conjunction with the AAD found that when analysed on a 'costs per paper' basis, the Australian science program is more effective than its counterparts in the UK, France, Italy, Japan and New Zealand.²⁹ In addition, according to NCAR, 'the benefits and international recognition gained

23 Australian Antarctic Division, *Guidelines for Antarctic Research Applications*, Australian Antarctic Division, Kingston, Tasmania, viewed 2 February 2005, <<http://www.aad.gov.au/default.asp?casid=3697>>.

24 Department of the Environment and Heritage, Submission no. 24, p 13.

25 Australian Antarctic Division (Press A), *Transcript*, 23 June 2004, p 4.

26 University of New South Wales Antarctic Astronomy Group, Submission no. 11, pp 3-4.

27 National Committee on Antarctic Research, Submission no. 4, p 1.

28 Antarctic Science Advisory Committee, Submission no. 13, p 11.

29 Department of the Environment and Heritage, Submission no. 24, p 20.

from the inclusion of university-based scientists into the program is very high indeed'.³⁰

- 6.17 While in the past some universities have been willing to supplement Antarctic science grants with their own funding, NCAR is concerned that this has decreased substantially over recent years.³¹ ASAC also expressed concern about the capacity of universities to continue to support Antarctic research:

...requests to the Antarctic science grants scheme have increased over the years and will increase further as the Antarctic Science goals are pursued. The currently available funding supports only a fraction of what is required. It is the capacity of contributing agencies to continue to participate within the Antarctic Science program, particularly the Universities, that concerns ASAC.³²

Budget limitations restricting opportunities for 'new' science

- 6.18 Australia's Antarctic science budget is included within the overall budget of the AAD. At present, less than 15% of the AAD's total budget is devoted to scientific research (see Table 2.2). The UNSW Antarctic Astronomy Group stated that:

...While there is no doubt that Australia conducts excellent science in Antarctica, it is only a subset of what we could be doing.³³

- 6.19 In comparison, the US Antarctic Program keeps its science budget separate from its operations and logistics budget. Any funding decisions for the US Antarctic Program are made in consultation between the science and logistics sections, and the Director adjudicates any differences.³⁴
- 6.20 The UNSW Antarctic Astronomy Group argued that this variance affords the US Antarctic Program opportunities to consider proposals for completely new projects, whereas the funding available through

30 National Committee on Antarctic Research, Submission no. 4, p 2.

31 National Committee on Antarctic Research, Submission no. 4, p 1.

32 Antarctic Science Advisory Committee, Submission no. 13, p 11.

33 University of New South Wales Antarctic Astronomy Group, Submission no. 11, p 5.

34 National Science Foundation (U.S.), Submission no. 26, p 1.

the Australian Antarctic Science grants scheme, while welcome, is 'not sufficient to promote new initiatives'.³⁵

- 6.21 Director of the US Office of Polar Programs, Dr Karl Erb, stated that part of the US Antarctic Program's policy was to reserve two thirds of its annual science budget for projects that would result from newly submitted proposals.³⁶ According to Dr Wilfred Walsh, the problem facing astronomers wishing to utilise the Antarctic for observations under Australia's Antarctic program, is that they cannot seek funding for infrastructure to support new projects:

...The problem is that there is no mechanism by which we can apply for funding to build new infrastructure. That infrastructure will be required for ongoing astronomical research on the plateau. For example, the American system is to have a certain amount of funding allocated for their logistics and then another part of their funding is available for the scientific community to apply for. Whichever research is considered to be the best by an independent review mechanism gets funding.

Most other countries have something similar where they typically would allocate 20 per cent of their research funding to peer reviewed, competitively applied for funding. The astronomy community does not have a clear target to aim for when it comes to applying for Antarctic funding, and particularly in the case of applying for funding to create new infrastructure.³⁷

Committee comment

- 6.22 The Committee recognises that the AAD has gradually increased allocations through the Australian Antarctic Science grants scheme, but as ASAC pointed out, the Division's generally static budget prevents it from providing substantial increases in grants.³⁸ The Committee also acknowledges that, of course, there is always likely to be a demand for grants which exceeds the funding available. However, the Committee believes that an increase in funding available through the grants scheme will enhance the level of support
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35 University of New South Wales Antarctic Astronomy Group, Submission no. 11, p 5.

36 National Science Foundation (U.S.), Submission no. 26, p 1.

37 University of New South Wales Antarctic Astronomy Group (Walsh W), *Transcript*, 23 June 2004, p 33.

38 Antarctic Science Advisory Committee, Submission no. 13, p 11.

for each approved project, as well as attracting more scientists to participate in Australia's Antarctic Program.

- 6.23 The AAD cannot be expected to produce further savings through cutbacks in other areas, given that it has already made considerable savings to fund new initiatives such as the introduction of the intra-continental air transport system. In considering the advice put forward in evidence by ASAC and NCAR as to what extent the pool of grant funding should be increased, the Committee believes that doubling the current level of approximately \$700,000 would significantly enhance the support available through the grants scheme.

Recommendation 5

- 6.24 **The Committee recommends that the current appropriation for the Australian Antarctic Science grants scheme administered by the Australian Antarctic Division be doubled from the current level of approximately \$700,000 per annum for the remainder of the Science Strategy 2004/05-2008/09 and be reassessed after that period.**

Raising the public profile of Antarctic science

- 6.25 The Australian Academy of Science commented that Australian Antarctic science 'has the highest reputation internationally' and that much of Australia's Antarctic science is considered world leading.³⁹ This view was supported by the international steering committee which contributed to ASAC's evaluation of the Australian Antarctic science program in 2003.⁴⁰ However, one area the international steering committee suggested could be improved is public outreach:

...in order to satisfy the general public's interest in the Antarctic and an enhanced profile of science and technology in the general media, there are opportunities to invest some personnel time and other resources in the broader dissemination of Antarctic science.

39 Australian Academy of Science, Submission no. 22, p 1.

40 Antarctic Science Advisory Committee, Submission no. 13, p 7.

- 6.26 The steering committee gave examples of further outlets that the AAD should be targeting including CSIRO's Double Helix Science Club and the various science centres in the states and territories.⁴¹
- 6.27 In its submission, the AAD stated that it 'plays an important role in highlighting the national and international value of the Australian Antarctic program and responding to the considerable public interest in the Antarctic experience'.⁴² The dissemination of information to the public is largely achieved through the AAD's website, through its publications, and through the public display centre located at the AAD's headquarters in Kingston, Tasmania.
- 6.28 A breakdown of usage statistics for the AAD's website (<http://www.aad.gov.au>) is provided in Table 6.2 and illustrates the high level of interest in Australia's Antarctic Program. Table 6.3 reveals that the most popular section of the website is the live webcams which depict the weather conditions and activities at each of Australia's stations on the Antarctic continent, and on Macquarie Island in the sub-Antarctic. The data in Table 6.3 also demonstrates the value of the educational resources provided by the AAD and the level of interest of those wishing to work for Australia's Antarctic Program.
- 6.29 The AAD also publishes the *Australian Antarctic Magazine* twice-yearly, which seeks to inform the Australian and international community about the work of Australia's Antarctic program. The magazine includes contributions from AAD officers and from external organisations and individuals.
- 6.30 In 2002, *Classroom Antarctica*, a comprehensive web-based Antarctic educational resource developed by the Australian Antarctic Division was launched by the then Parliamentary Secretary with responsibility for Antarctic matters.⁴³ The package is aimed at upper primary and lower secondary levels. According to the AAD:

...Classroom Antarctica is designed to help both teachers and students gain a greater awareness of the global importance of

41 Antarctic Science Advisory Committee, 2003, *Report on Australia's Antarctic Science Program*, Antarctic Science Advisory Committee, Kingston, Tasmania, p 15.

42 Department of the Environment and Heritage, Submission no. 24, pp 26-27.

43 Stone, S (Parliamentary Secretary for the Environment and Heritage) 18 Feb 2002, *Bringing Antarctica into the Classroom*, media release, Parliament House, Canberra.

Antarctica, of Australia's role in Antarctica, past and present, and our commitment to its future.⁴⁴

Table 6.2 Usage Statistics for Australian Antarctic Division website

Monthly Usage Statistics for www.aad.gov.au – March 2005		
Total Hits		3,250,043
Total Files		2,432,985
Total Pages		689,288
Total Visits		148,083
Total MBytes		22,082
Total Unique Sites		71,539
Total Unique URLs		40,515
Total Unique Referrers		47,551
Total Unique User Agents		596
	Avg	Max
Hits per Hour	7,127	17,105
Hits per Day	171,054	201,213
Files per Day	128,051	150,283
Pages per Day	36,278	48,301
Visits per Day	7,793	10,978
MBytes per Day	1,162	1,856

Source Australian Antarctic Division, 2005.

Table 6.3 Most popular web pages within Australian Antarctic Division website

Top 10 of 40515 Total URLs			
#	Hits		
1	40,760	1.25%	AAD Homepage
2	25,007	0.77%	Mawson Station webcam
3	20,143	0.62%	Davis Station webcam
4	17,981	0.55%	Casey Station webcam
5	15,053	0.46%	Macquarie Station webcam
6	6,529	0.20%	Station webcams and weather
7	5,529	0.17%	Experience Antarctica
8	4,610	0.14%	Mawson Station
9	4,464	0.14%	Jobs supporting Australia's Antarctic Program
10	3,888	0.12%	Australia's Antarctic Program Recruiting 2006

Source Australian Antarctic Division, 2005.

44 Australian Antarctic Division, *Classroom Antarctica – Introduction*, Australian Antarctic Division, Kingston, Tasmania, viewed 4 March 2005, <http://classroomantarctica.aad.gov.au/textversion/Introduction_txt.html>.

Committee comment

- 6.31 Australia's excellent international standing among Antarctic claimant nations is premised on the conduct of world-class science. Australia's reputation for its scientific efforts in the Antarctic region should not be undervalued or taken for granted.
- 6.32 The Committee acknowledges the high standard of public outreach achieved through the AAD's website, its educational packages and high quality publications like the *Australian Antarctic Magazine*.
- 6.33 However, the Committee believes that Australia's Antarctic Program needs a higher profile both within government and the wider community. The physical location of the AAD's headquarters and the isolation of the Antarctic continent and Southern Ocean means that for many Australians, the work of Australia's Antarctic program is 'out of sight, out of mind'.
- 6.34 The Committee believes that the public's perception of Australia's role in Antarctica would be enhanced if there was a deeper appreciation for the importance and global relevance of the scientific research being undertaken.
- 6.35 The Committee concurs with ASAC which acknowledged the importance of maintaining the public profile of Australia's Antarctic science program and recommended that the effort towards achieving this be increased. While the Committee acknowledges that the various science bodies and schools are obvious target markets, the Committee believes that the AAD should not limit its public outreach to the science community and should continue to raise awareness of the Antarctic program within the wider Australia community, particularly those elements of the science program which could have significant implications for Australia and the region.

Senator Ross Lightfoot
Chairman