Antarctica New Zealand

Addressing Conservation Challenges in the Ross Sea Region

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Antarctica New Zealand

SCAR Open Science Conference 2014

Photo: Andris Apse: Antarctica New Zealand Pictorial Collection

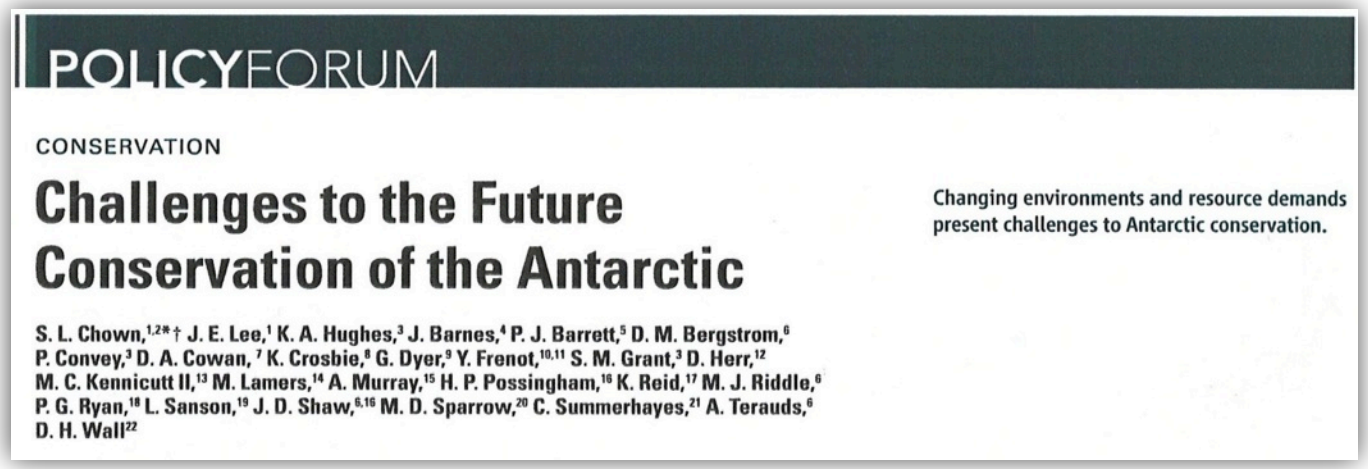
Context

- Environmental Protocol (1991) - high standards of environmental protection
- The Parties:
  - Convinced of the need to enhance the protection of the Antarctic environment;
  - Recalling the designation of Antarctica as a Special Conservation Area and other measures adopted under the Antarctic Treaty system to protect the Antarctic environment;
  - Acknowledging further the unique opportunities Antarctica offers for scientific monitoring of and research on processes of global as well as regional importance;
  - Convinced that the development of a comprehensive regime for the protection of the Antarctic environment and dependent and associated ecosystems is in the interest of mankind as a whole.

Context

- Environmental Protocol (1991)
  - The Parties commit themselves to the comprehensive protection of the Antarctic environment ……. and hereby designate Antarctica as a natural reserve, devoted to peace and science (Article 2)
  - The protection of the Antarctic environment ….. and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research…… shall be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area (Article 3)

Context



POLICYFORUM

CONSERVATION

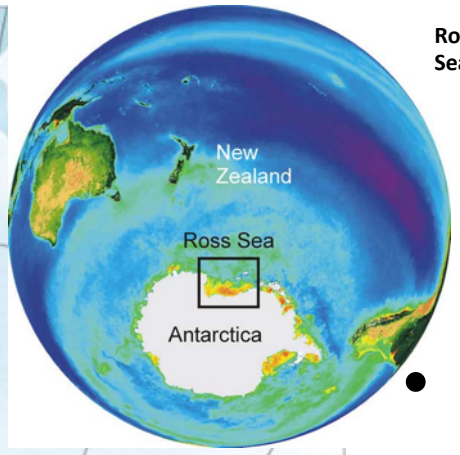
Challenges to the Future Conservation of the Antarctic

Changing environments and resource demands present challenges to Antarctic conservation.

S. L. Chown,[1,2*†] J. E. Lee,[1] K. A. Hughes,[3] J. Barnes,[4] P. J. Barrett,[5] D. M. Bergstrom,[6] P. Convey,[3] D. A. Cowan,[7] K. Crosbie,[8] G. Dyer,[9] Y. Frenot,[10,11] S. M. Grant,[3] D. Herr,[12] M. C. Kennicutt II,[13] M. Lamers,[14] A. Murray,[15] H. P. Possingham,[16] K. Reid,[17] M. J. Riddle,[6] P. G. Ryan,[18] L. Sanson,[19] J. D. Shaw,[6,16] M. D. Sparrow,[20] C. Summerhayes,[21] A. Terauds,[6] D. H. Wall[22]

Conservation challenges for Antarctica:

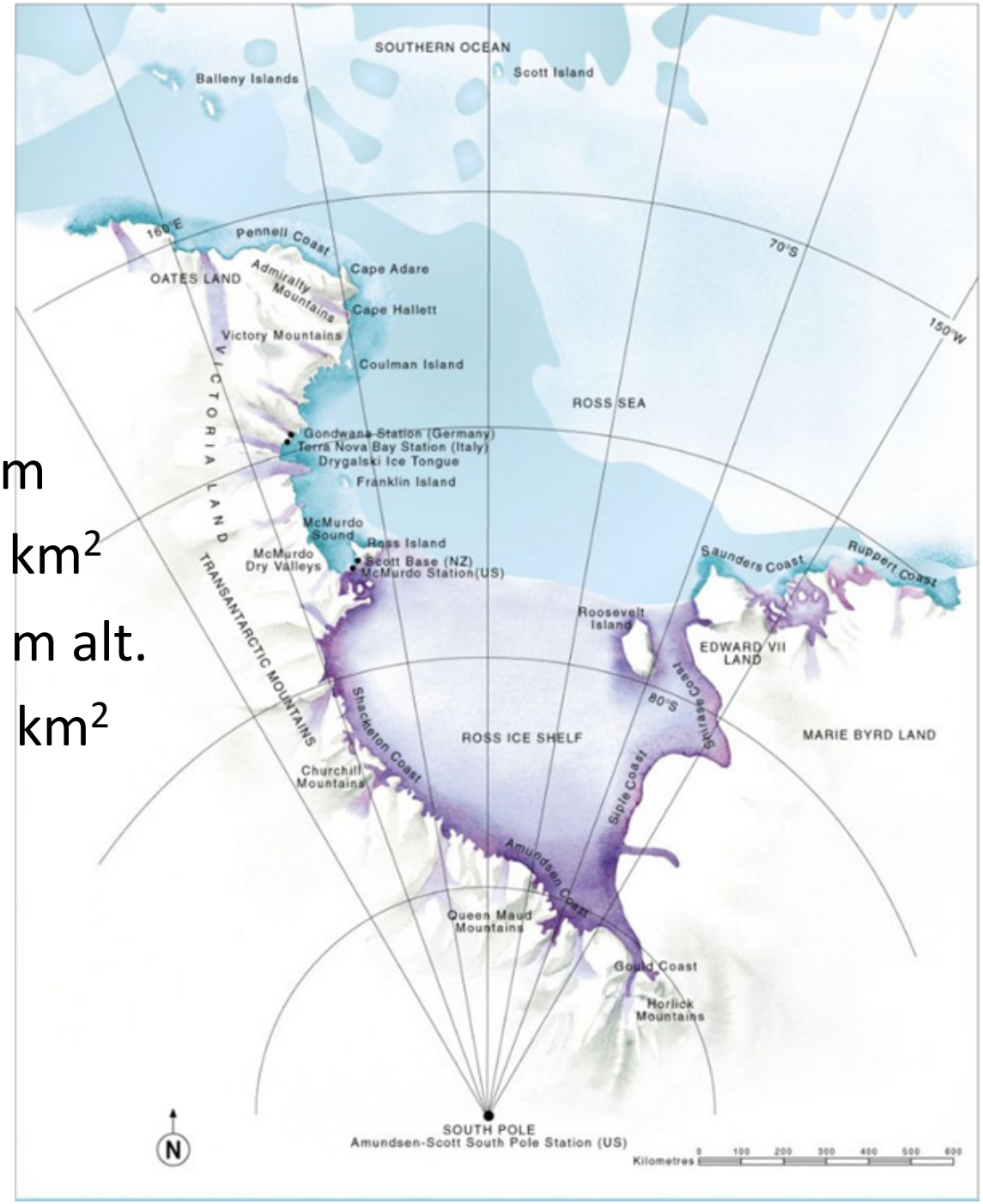
- Consequences of regional warming
  - Ocean acidification; sea-ice distribution; non-natives establishments;
- Human activity
  - increasing presence (logistics / science / tourism); artificial relocation of natives; pollution incidents; disturbance to wildlife
- Longer-term
  - Resource use (marine and mineral); geo-engineering; settlement



Ross Sea as seen from a satellite sensor (the SeaWiFS sensor). www.niwa.co.nz

- Ross Sea Region (RSR) (west to east)
  - Pennel Coast / Cape Adare
  - Victoria Land coast and Trans-Antarctic Mountains
  - Ross Ice Shelf
  - Edward VII Land / Saunders Coast
  - Ross Sea / offshore Islands

- Ross Sea Region
  - Coastline > 4,000 km
  - Ice shelf > 530,000 km^2
  - Mountains > 4,000 m alt.
  - Sea area ~ 960,000 km^2



State – Significance of the Ross Sea Region

- Terrestrial
  - ~30% of the world population of Antarctic petrels
  - ~50% of Antarctica's ice-free area
  - Largest continuous ice-free area – McMurdo Dry Valleys
  - A series of land-locked lakes
  - Antarctica's longest river – River Onyx


Antarctic petrel photo Rodrigo Tapia ©


Lake Joyce, Dry Valleys USAP.gov


Onyx River, wildandpreciousantarctica.tumblr.com

State – Significance of the Ross Sea Region

- Terrestrial
  - Most southerly active volcano - Mt Erebus
  - High altitude geothermal soils and biota
  - Largest ice-shelf – Ross ice shelf
- Human
  - Heritage values
    - Heroic era huts – Ross Island
    - First human settlement - Cape Adare

Shackleton's Hut Cape Royds www.gns.cri.nz

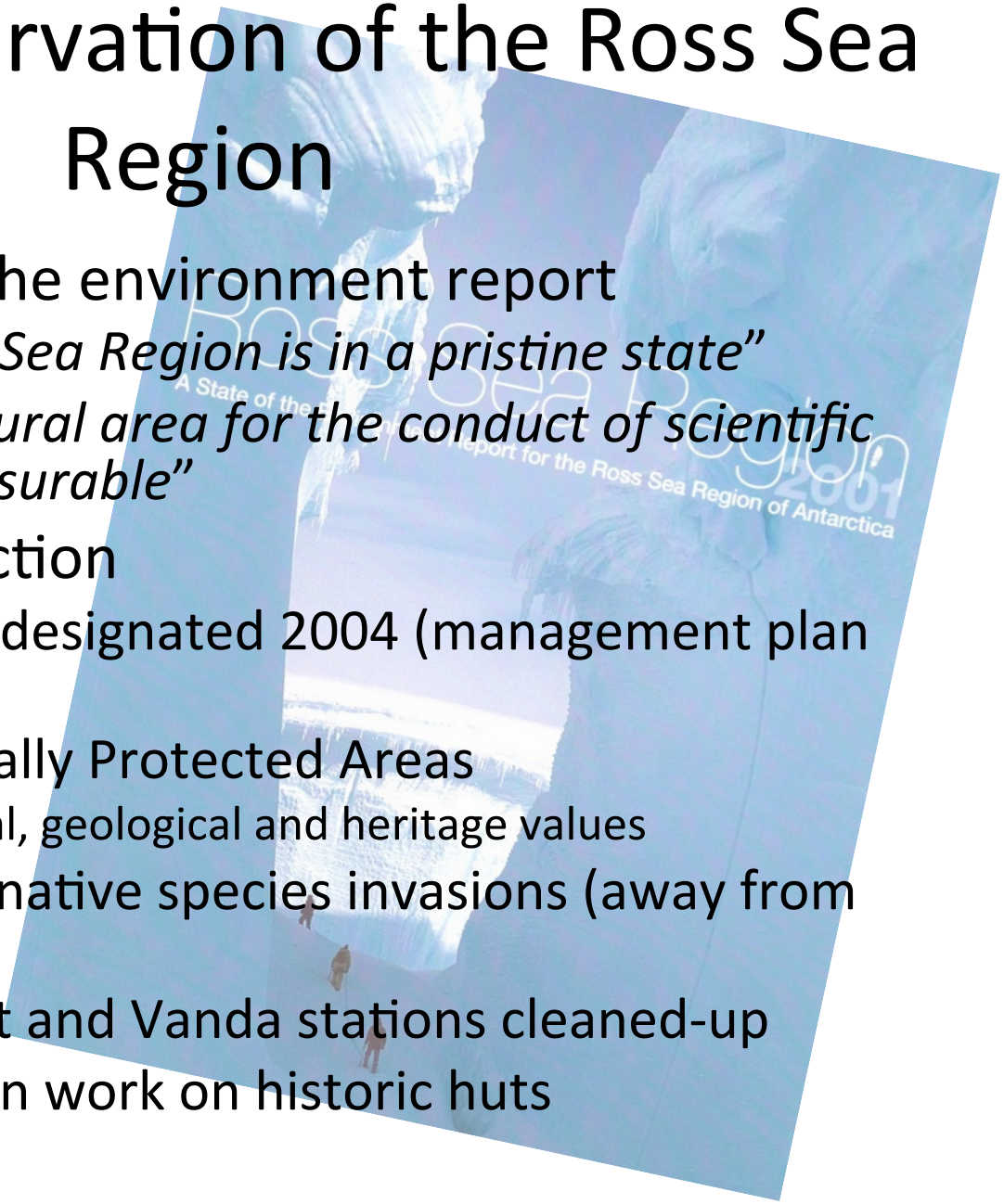
State – Significance of the Ross Sea Region

- Marine
  - 38% of the world population of Adélie penguins including largest & most southerly colonies (Cape Adare, Cape Crozier)
  - 26% of the world population of Emperor penguins including largest colony (Coulman Island)

State – Significance of the Ross Sea Region

- Marine
  - One of the least-disturbed marine ecosystems remaining
  - Biologically and oceanographically significant polynyas
  - 6% of the world population of Antarctic minke whales
  - 45% of the Southern Pacific population of Weddell seals

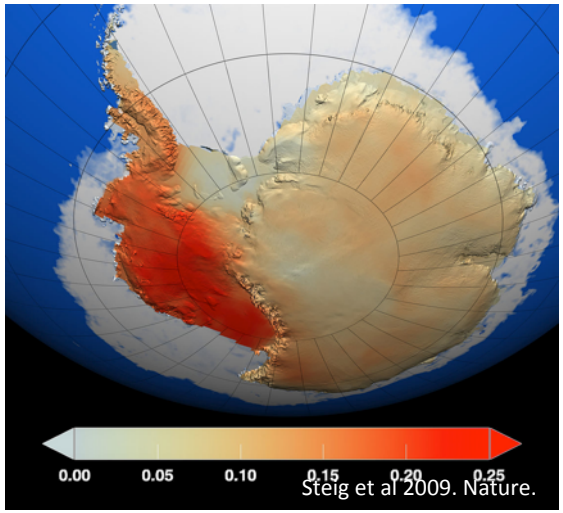
State - Conservation of the Ross Sea Region



- 2001 RSR state of the environment report
  - *"Most of the Ross Sea Region is in a pristine state"*
  - *"Its value as a natural area for the conduct of scientific research is immeasurable"*
- Measures of protection
  - Dry Valleys ASMA designated 2004 (management plan updated 2011)
  - 22 Antarctic Specially Protected Areas
    - Range of biological, geological and heritage values
  - No recorded Non-native species invasions (away from stations)
  - Abandoned Hallett and Vanda stations cleaned-up
  - Major conservation work on historic huts

Pressures

- Climate change
- Human activity
  - Tourism and non-governmental activities
  - Governmental science and logistics
  - Fishing

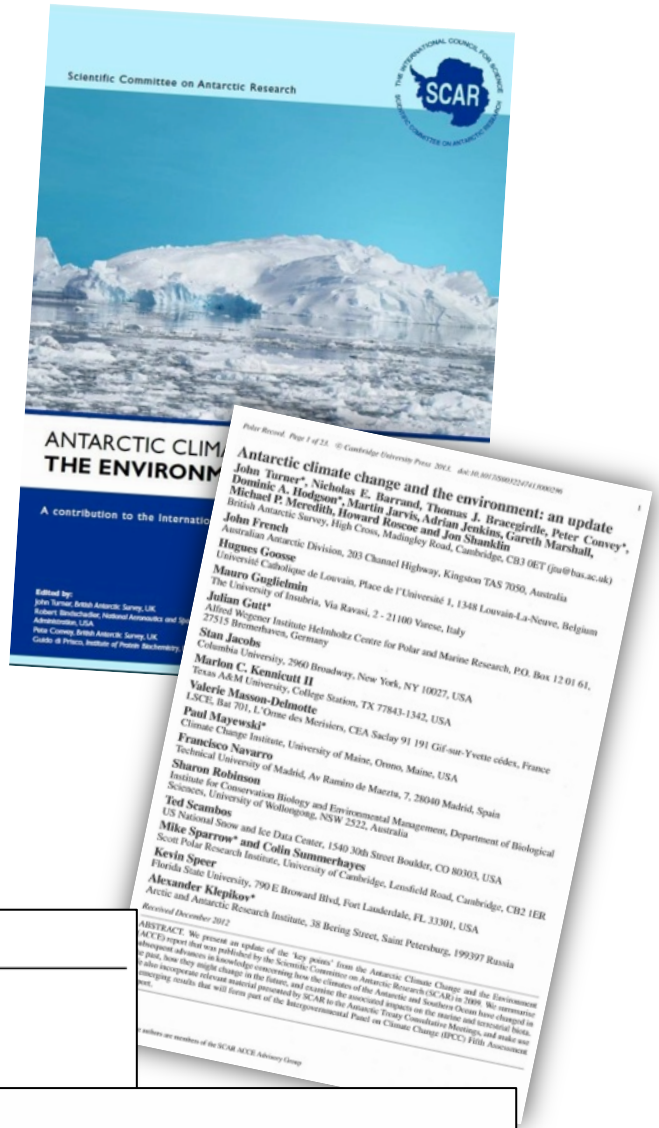


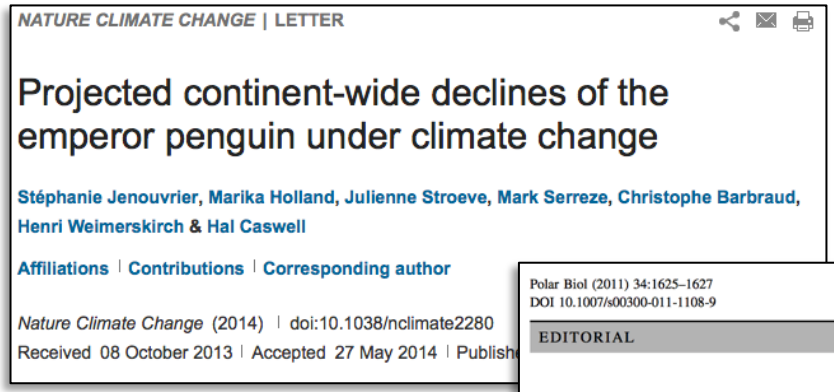
Steig et al 2009. Nature.

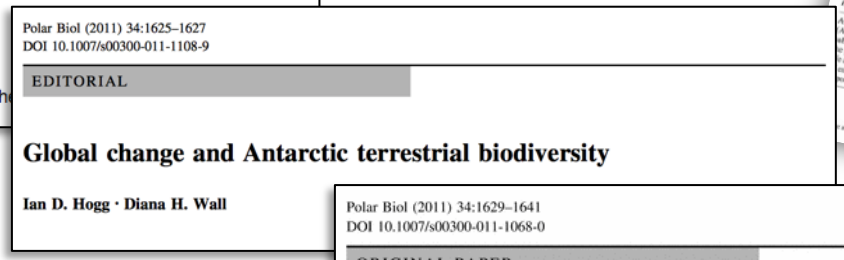

anta.canterbury.ac.nz

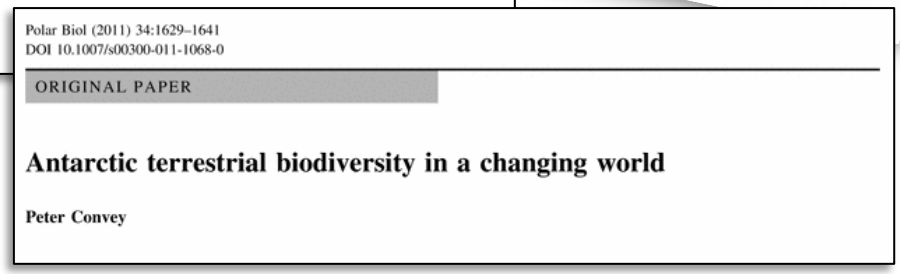
Pressures

- Climate change
  - Difficult to predict at a regional scale
  - Likely to be relative rapid with significant implications for regional ecosystems and biodiversity



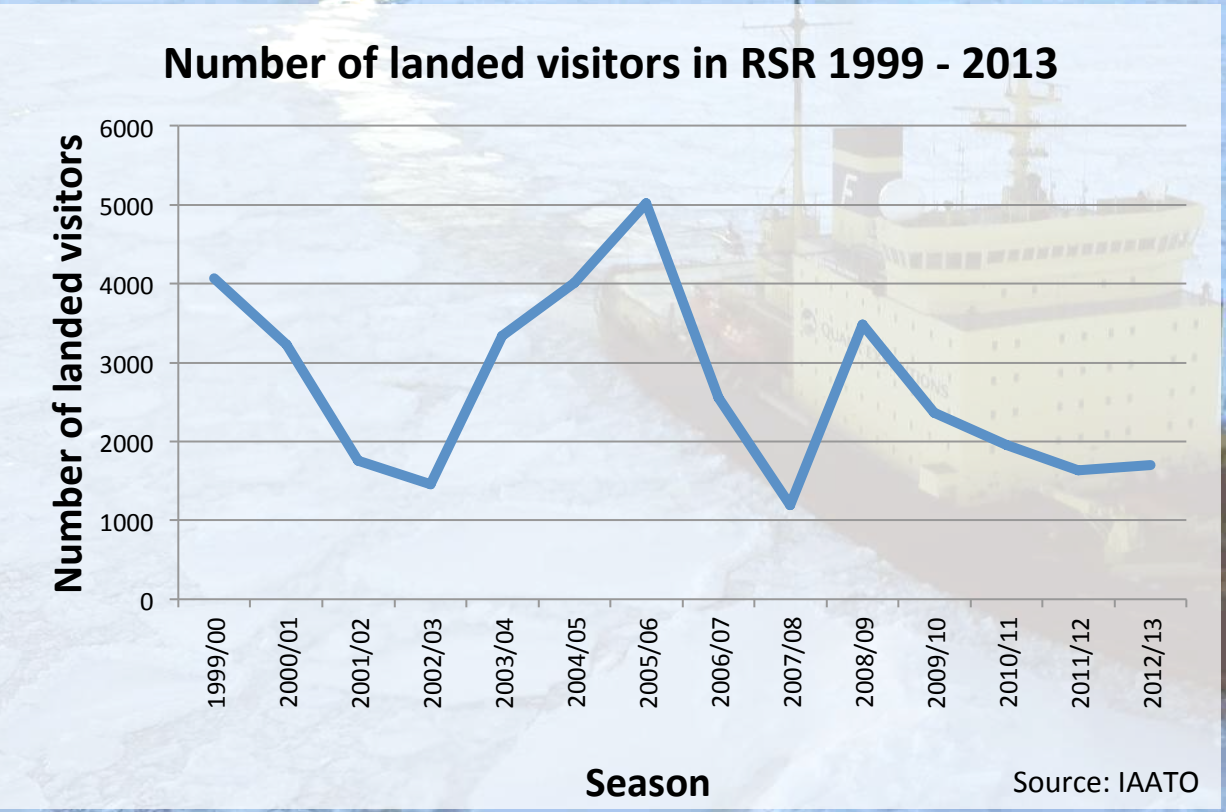






Pressures

- Tourism
  - Variable & low compared to the Peninsula
  - Dictated by conditions and vessel availability



Pressures

- Governmental
  - Increasing governmental activity
    - Bases, vessels, aircraft, scientists

1955 McMurdo Station (US)

1983 Gondwana Station (Germany)

2014 Jang Bogo Station (Korea)

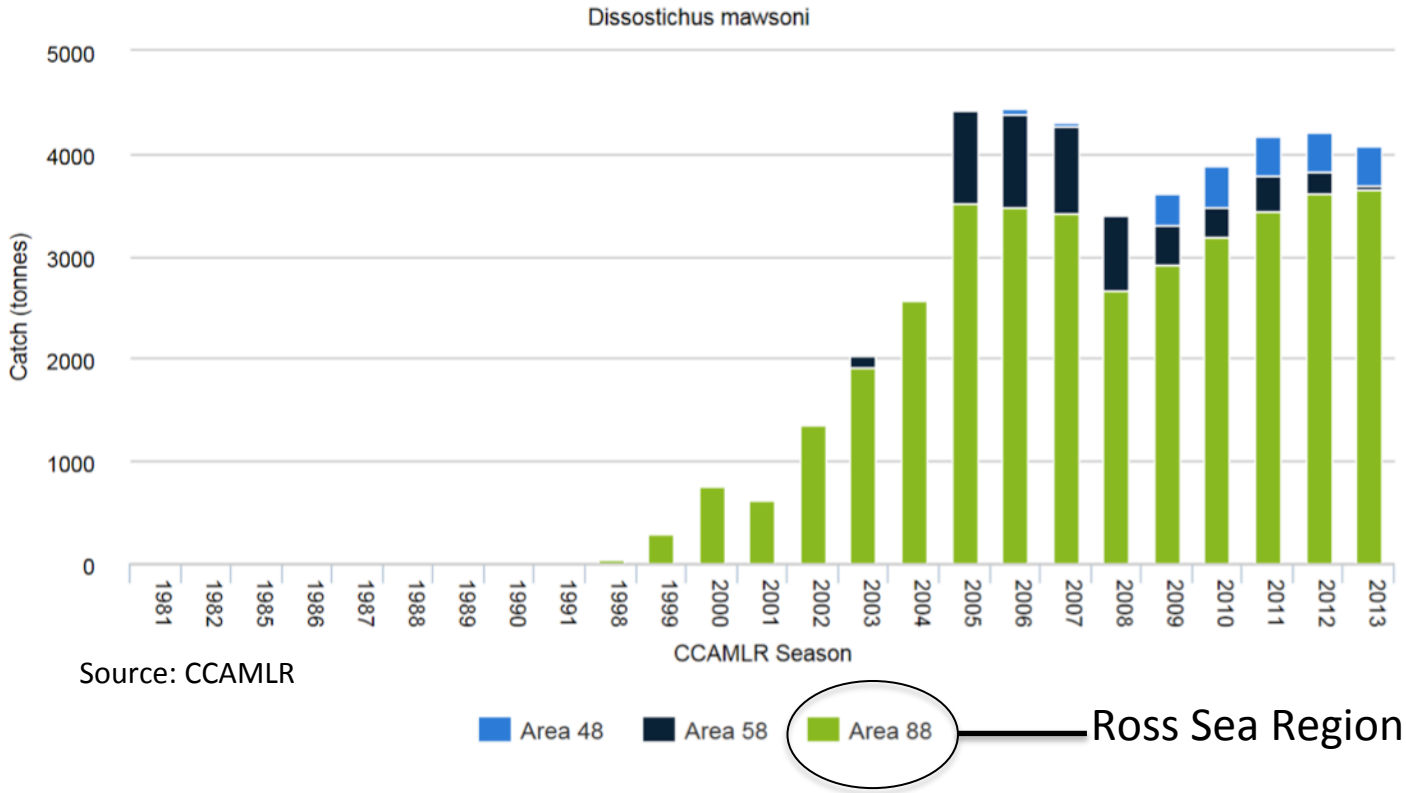
1957 Scott Base (NZ)

1986 Mario Zucchelli Station (Italy)

Proposed Chinese Station

Pressures

- Fishing
  - Average take ~3,300 tonnes toothfish / season since 2005



Source: CCAMLR

Response / Challenges

- Pressures arguably modest compared to Antarctic Peninsula (more bases, more tourism, greater climate impacts, non-native establishments)
- But in context of RSR values where do we set our conservation benchmark?

1898?

First buildings

1957?

First year-round bases

1995?

Pre-toothfishing

2014?

Pre non-native establishments

Response / Challenges

- Given the high standards of environmental protection we have set ourselves – how should we respond?
- Time to think differently?
  - Antarctica is not just one big place
    - Multiple regional environmental, biological and human activity differences
    - RSR has characteristics and values not found elsewhere in Antarctica
  - A region demanding particular attention?

Response / Challenges

- Currently regional environmental planning is *modest*
- No holistic overview of the protected areas network
- Limited regional monitoring
  - e.g. NNS surveillance; Dry Valleys; human impacts
- EIA activity specific – no cumulative / holistic impact assessment
- Lack of any regional emergency response planning
- Ross Sea MPA proposal is making slow political progress

Response / Challenges

- Need for improved use of existing tools regionally and continent wide

OPEN ACCESS Freely available online

PLOS | BIOLOGY

Perspective

Antarctica's Protected Areas Are Inadequate, Unrepresentative, and at Risk

Justine D. Shaw[1,2]*, Aleks Terauds[2], Martin J. Riddle[2], Hugh P. Possingham[1], Steven L. Chown[3]

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Area protection in Antarctica: How can conservation and scientific research goals be managed compatibly?

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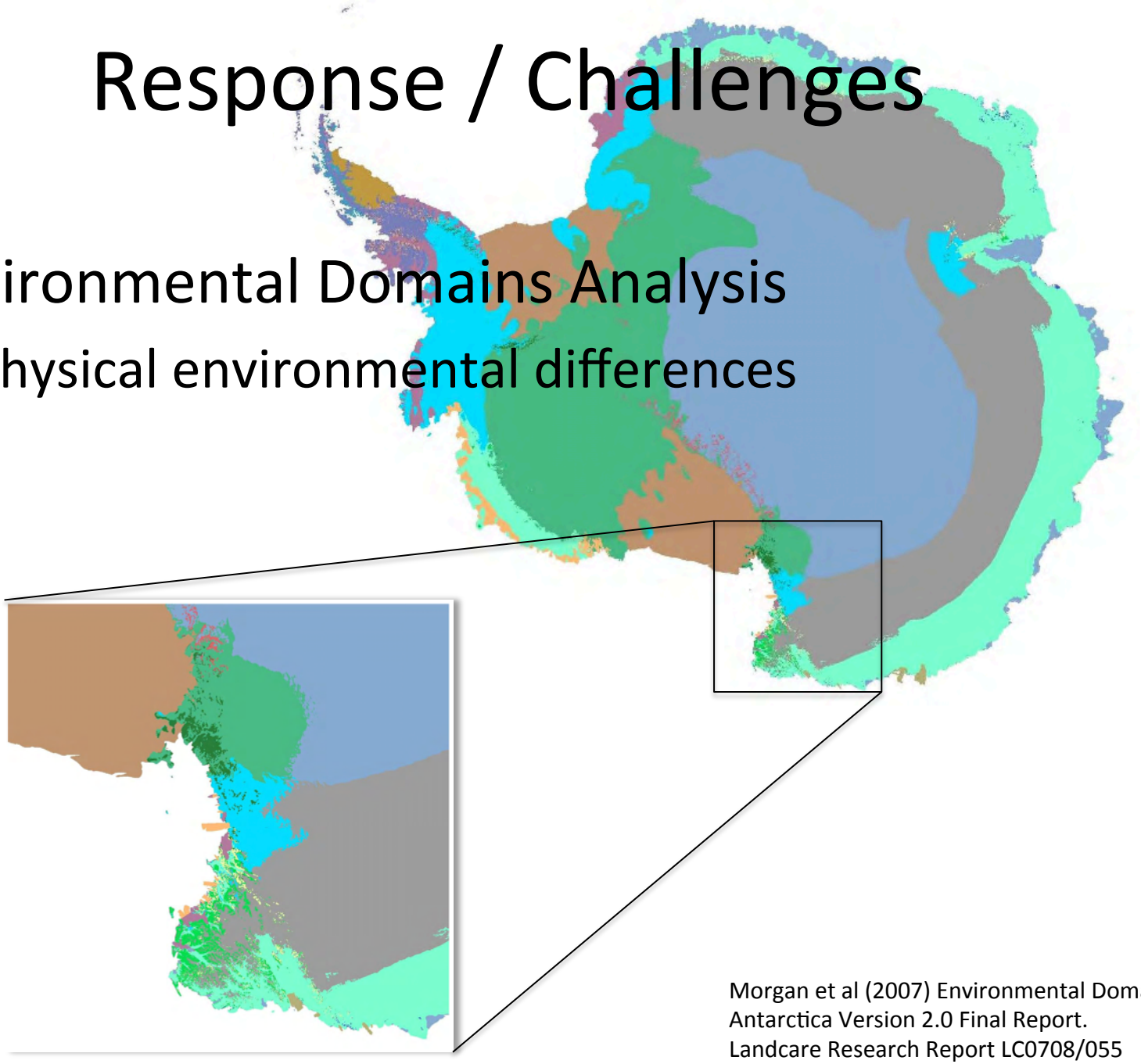
Response / Challenges

- Environmental Domains Analysis
  - Physical environmental differences

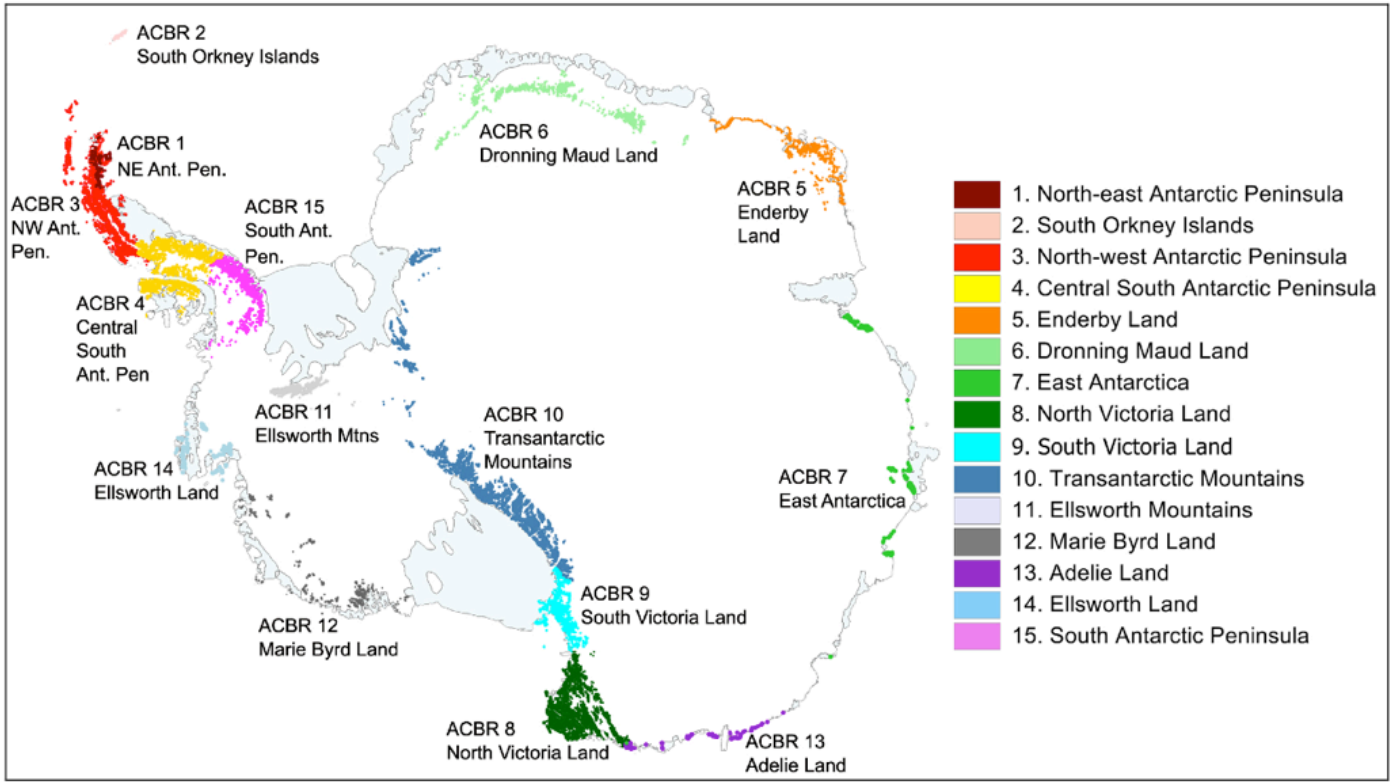


Morgan et al (2007) Environmental Domains of Antarctica Version 2.0 Final Report. Landcare Research Report LC0708/055

Response / Challenges

- Biogeographic analyses moving us towards evidence based spatial conservation planning

Figure 1 – Map of Antarctica showing the 15 Antarctic Conservation Biogeographic Regions



Source: Terauds *et al.* (2012)

Response - Taking a regional approach

- Science for conservation
  - Regional biodiversity surveys and mapping
  - Regional monitoring
  - Regional impact assessments incl. cumulative impacts
- Regional goals and targets
- Regional environmental quality standards
- Integrated terrestrial and marine management approaches
- Modern conservation approaches
- Combined (multi-national) approach

Response - Taking a regional approach

- Regional thinking is not new in Antarctica
- CRAMRA (1989) envisaged:
  - sub-dividing Antarctic into “areas” for possible exploration and development of mineral resource activities (Article 39)
  - establishing Regulatory Committees for each “area” identified (Article 29)
- If we can sub-divide Antarctica for mineral resource exploitation, can we not do so for conservation planning and action?

Response – the need for knowledge

- Pace of change in Antarctica demands improved access to policy-ready science

- Portal aims to put Antarctic science at the fingertips of policy makers
- Mobilising independent, reliable, up-to-date, policy-ready Antarctic knowledge

Antarctica New Zealand

Manaaki Whenua
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Antarctic Environments Portal

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Overview

The Antarctic Environments Portal provides a link between Antarctic science and Antarctic policy. Science-based information on the priority issues identified by the Antarctic Treaty System's Committee for Environmental Protection (CEP) is presented. Information in the Portal supports CEP discussions and the development of advice and recommendations to the Antarctic Treaty Consultative Parties on environmental protection. The Portal also supports Antarctic scientists, particularly through the Scientific Committee on Antarctic Research (SCAR) to provide independent, scientific advice to the Antarctic Treaty System including to bring emerging issues to the attention of policy makers. The information available through the Portal is based on published, peer-reviewed science and has been through a rigorous review and editorial process.

The introduction of non-native species to Antarctica

Antarctica's biodiversity and its intrinsic values are at risk from the introduction of non-native species, ...

Current Priority Issues

View All

The introduction of non-native species to Antarctica

More...

Tourism and non-governmental activities

More...

Global pressure: climate change

More...

Specially protected and managed areas in Antarctica

More...

Marine spatial protection and management

More...

Repair or remediation of environmental damage

More...

Human footprint / wilderness

Monitoring and state of the

Interactive Map...

Information Summaries

Emerging Issues

What's Changed

Biodiversity knowledge	03/04/2014
Human disturbance to Antarctic wildlife	03/04/2014
The introduction of non-native species to Antarctica	09/04/2014
Specially protected and managed areas in Antarctica	09/04/2014
Climate change as an emerging threat to Emperor Penguins	01/04/2014
Repair or remediation of environmental damage	03/04/2014
Clean-up of past waste disposal sites and abandoned work sites in Antarctica	03/04/2014
Tourism and non-governmental activities	03/04/2014
Global pressure: climate change	03/04/2014
Marine spatial protection and management	03/04/2014
Human footprint / wilderness management	03/04/2014
Monitoring and state of the environment reporting	03/04/2014
Specially protected species	03/04/2014

Current Priority Issues

Biodiversity knowledge

No information summary on this topic has been prepared to date. An information summary on the sub-topic of Human disturbance to Antarctic wildlife is available here and under the heading *related Portal content*.

The Committee for Environmental Protection has listed biodiversity knowledge as a priority 2 issue in its 5-year work plan.

More...

The introduction of non-native species to Antarctica

Antarctica's biodiversity and its intrinsic values are at risk from the introduction of non-native species, predominantly facilitated by human activity. Non-native species, or species that live outside of their natural range, can spread inter-regionally (from outside the Antarctic and its associated and dependent ecosystems) or intra-regionally (within the Antarctic and its associated and dependent ecosystems). Research suggests that non-native species in Antarctica could have substantial environmental, financial and irreversible impacts on Antarctic ecosystems and biodiversity. Research also suggests that the risk of establishment of non-native species is likely to increase with climate warming. Given the likelihood of increased pressures on Antarctic ecosystems from non-native species, addressing non-native species introductions is one of the highest priorities of the Committee for Environmental Protection (CEP). The CEP has acknowledged that continued research on the impacts of non-native species and the adoption of practices to reduce their introduction and spread are needed.

More...

Specially protected and managed areas in Antarctica

Annex V to the Protocol on Environmental Protection to the Antarctic Treaty (the Protocol) establishes a framework for designating Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs). These areas are intended to support the objective of protecting comprehensively the Antarctic environment. There are 73 ASPAs and 7 ASMAs currently. ASPAs are sites with outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research. Important work has been done to underpin the development of a representative series of ASPAs, including spatial analyses to identify distinct 'Environmental Domains' and 'Antarctic Conservation Biogeographic Regions'. The Antarctic Treaty Parties have agreed that these spatial frameworks are useful references to guide the designation of ASPAs within a systematic environmental-geographic framework, and the Committee for Environmental Protection (CEP) has recognised the need for a more systematic approach to the development of the protected area system.

More...

Repair or remediation of environmental damage

An information summary on this topic is currently under review. An information summary on the sub-topic of clean-up is available here and under the heading related Portal content..

The Committee for Environmental Protection has listed repair or remediation as a priority 1 issue in its 5-year work plan.

More...

CURRENT PRIORITY ISSUES

Search...

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Antarctic Environments Portal

The introduction of non-native species to Antarctica

Last updated: 09/04/2014 6:04pm

KEYWORDS

Non-native species | Climate change | Species introductions

RELATED

Colonisation status of known non-native species in the Antarctic terrestrial environment (updated 2013)

Non-native species Manual

Biodiversity database

Global pressure: climate change

Human footprint / wilderness management

Biodiversity knowledge

Synopsis

Antarctica's biodiversity and its intrinsic values are at risk from the introduction of non-native species. Non-native species, or species that live outside of their natural range, can spread inter-regionally (from outside the Antarctic and its associated and dependent ecosystems) or intra-regionally (within the Antarctic and its associated and dependent ecosystems). Research suggests that non-native species in Antarctica could have substantial environmental, financial and irreversible impacts on Antarctic ecosystems and biodiversity. Research also suggests that the risk of establishment of non-native species is likely to increase with climate warming. Given the likelihood of increased pressures on Antarctic ecosystems from non-native species, addressing non-native species introductions is one of the highest priorities of the Committee for Environmental Protection (CEP). The CEP has acknowledged that continued research on the impacts of non-native species and the adoption of practices to reduce their introduction and spread are needed.

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Summary

- International community has set high environmental expectations for Antarctica
- Retention of Antarctica's science value demands expectations are met
- Across the continent the state of, pressures on and responses to managing the environment are different
- *"Value of RSR as a natural area for the conduct of scientific research is immeasurable"*
- Antarctic Conservation Strategy, modern spatial conservation planning tools, enhanced science / policy dialogue urgently need to be implemented