IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 08 November 2017

Please note: this is an archived Conservation Outlook Assessment for Macquarie Island. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Macquarie Island

SITE INFORMATION

Country:
Australia
Inscribed in: 1997
Criteria:
(vii) (viii)

Site description:
Macquarie Island (34 km long x 5 km wide) is an oceanic island in the Southern Ocean, lying 1,500 km south-east of Tasmania and approximately halfway between Australia and the Antarctic continent. The island is the exposed crest of the undersea Macquarie Ridge, raised to its present position where the Indo-Australian tectonic plate meets the Pacific plate. It is a site of major geoconservation significance, being the only place on earth where rocks from the earth’s mantle (6 km below the ocean floor) are being actively exposed above sea-level. These unique exposures include excellent examples of pillow basalts and other extrusive rocks. © UNESCO

SUMMARY

2017 Conservation Outlook

Good with some concerns

Although this assessment still identifies a number of areas of concern, given the success of the eradication programme on the island and if the factors influencing die-off of the endemic cushion plant can be remediated, it seems likely that most of the areas of high concern for this site will be resolved in the medium-term. A monitoring programme for the outcomes of the eradication programme will track the recovery of the site's values. Maintaining and improving the efficiency of biosecurity procedures will be critical to protect the ecological gains made from pest removal.The protection and management aspects of the property are for the most part highly effective and will serve as an example of best practice in how to conserve and maintain extremely vulnerable island ecosystems.

Current state and trend of VALUES

Low Concern
Trend: Improving

The geological values for which the site was inscribed have remained unchanged. The landscape is now recovering well in terms of vegetation cover over all habitats except feldmark, where die-back of Azorella macquariensis continues to be an issue. Given the success of the eradication programme, the process of restoration is already well underway and the island is really not comparable to the vegetation condition of 5-6 years ago. However, the recent die-off of the keystone cushion plant is a concern. Vast congregations of wildlife appear to be stable, with the exception of Southern elephant seals.

Overall THREATS

Low Threat

The Macquarie Island Pest Eradication Project was declared successful in April 2014 after eradication efforts were completed in 2011, and two and a half years

of intensive monitoring declared no pest sightings, rapid vegetation recovery response (aiding in the slowing down of land slippage) and increasing non-target and beneficiary species recovery (PWS 2014). Given the high management capacity as well as studies on the unexplained die-back of the cushion plants – a keystone species (Whinam et al., 2014a, 2014b) and Southern elephant seal population (Clausius et al., 2017), and provided current efforts are continued, the anthropogenic threats to the island should be reduced in the short to medium-term. On-going improvement and vigilance in biosecurity procedures will be critical to protect the ecological gains made from pest removal. However, there are also realistic expectations of potential impact by climate change.

Overall PROTECTION and MANAGEMENT

Highly Effective

Protection and management on Macquarie Island is highly effective and the recent success of the eradication program is an excellent example thereof. Ongoing monitoring is being undertaken for the outcomes of the eradication programme to track the recovery of the site’s values and preparedness for future potential risks to the site’s values.

FULL ASSESSMENT

Description of values

Values

World Heritage values

- **Outstanding spectacle of wild, natural beauty**
  Criterion:(vii)

  Macquarie Island provides an outstanding spectacle of wild, natural beauty with steep wind-sculpted escarpments which rise spectacularly to a plateau surface dotted with innumerable lakes, tarns and pools (SoOUV, 2012).

- **Extensive peat beds**
  Criterion:(vii)

  A coastal terrace supports vast waterlogged and heavily vegetated areas, forming a mire based on deep peat beds known as ‘featherbed” (SoOUV, 2012).

- **Dramatic changes in vegetation cover due to climatic conditions**
  Criterion:(vii)

  Changes in topography result in dramatic changes in the vegetation cover which can vary from lush grassland to sparse feldmark within the space of a few metres (SoOUV, 2012).

- **Vast congregations of wildlife**
  Criterion:(vii)

  Huge congregations of penguins and seals form during the breeding season, with King and Gentoo Penguins remaining year-round (SoOUV, 2012;

Nomination, 1996). The breeding population of Royal Penguins (Eudyptes schlegeli), a species endemic to Macquarie Island and nearby Bishop and Clerk Islets, is estimated at over 850,000 pairs, one of the greatest congregations of seabirds in the world. The breeding population of King Penguins (Aptenodytes patagonicus), estimated at around 150,000–170,000 breeding pairs in 2000, is still expanding (SoOUV, 2012).

► **Unique geological features associated with oceanic crust formation**
Criterion:(viii)

Macquarie Island and its outlying islets are the only place on earth where rocks from the earth's mantle are being actively exposed above sea level, providing an exceptionally complete section of the structure and composition of both the oceanic crust and the upper mantle. In addition to giving evidence for 'sea-floor spreading' and tectonic processes that have operated for hundreds of millions of years, the island is the only ophiolite (a well-developed and studied geological complex) recognised to have been formed within a major ocean basin. The geology of the island is therefore considered to be the connecting link between the ophiolites of continental environments and those located within the oceanic crust (SoOUV, 2012).

Other important biodiversity values

► **Albatrosses and Petrels**

Four species of albatross, 14 (Nomination, 1996) or 9 certain and 4 probable (PWS, 2006) species of petrels and Great Skua breed on the island (SoOUV, 2012; Nomination, 1996; PWS, 2006).

► **Imperial Shag**

An endemic subspecies of Imperial Shag (Phalacrocorax albiventer purpurascens) breeds on Macquarie Island and nearby Bishop and Clerk Islets. Some taxonomic debate as to whether this is a subspecies or species (Nomination, 1996; PWS, 2006; DSEWPC, 2012).

► Endemic flora

The island has 47 species of native vascular plants of which 4 are endemic and 3 listed as threatened including Macquarie Cushions (Azorella macquariensis) that dominate the feldmark vegetation, and 2 species of orchids (the Windswept Helmet-orchid Nematoceras (=Corybas) dienemum and the Grooved Helmet-orchid Nematoceras sulcatum). Macquarie Island is the most southerly location recorded for naturally occurring orchids (Nomination,1996; PWS, 2006; Clements & Jones, 2007; Clements et al., 2007; Carmichael, 2007)

Assessment information

Threats

Current Threats

Low Threat

The Macquarie Island Pest Eradication Project was declared successful in April 2014 after eradication efforts were completed in 2011, and two and a half years of intensive monitoring declared no pest sightings, rapid vegetation recovery response (aiding in the slowing down of land slippage) and increasing non-target species recovery (PWS 2014). There are continuing studies on the unexplained die-back of the cushion plants – a keystone species (Whinam et al., 2014a, 2014b) and declining Southern elephant seal populations (Clausius et al., 2017). Monitoring of petrel species continues annually, undertaken by Tasmania Parks and Wildlife staff.

► Fishing / Harvesting Aquatic Resources

Very Low Threat
Inside site, localised(<5%)
Outside site

A major threat to seabirds (PWS, 2006; DEWR, 2006) but the SP reported that

"strictly managed long line fishing trials around Macquarie Island have now operated for three seasons. No seabirds have been observed to be killed by fishing gear during this time" (SOC, 2010). The Australian Fisheries Management Authority state that no target, bycatch, byproduct or protected species is considered to be at high risk from the effects of fishing in the Macquarie Island demersal trawl sub-fishery, given the suite of management and conservation initiatives that are in place for the fishery (AFMA, 2009) and the fisheries has received MSC certification (SCC, 2012).

► Invasive Non-Native/ Alien Species

Very Low Threat
Inside site, extent of threat not known

Introduced weka (a predatory bird) and cats were eradicated by 1989 and 2000 respectively, and rabbits, black rats and mice by 2011 (PWS & BCB, 2007; PWS 2014). Only five alien plant species have been recorded in the reserve in recent years and do not appear to be invasive (Copson & Whinam, 2001; PWS, 2006; Carmichael, 2007)

► Other

High Threat
Inside site, extent of threat not known
Outside site

Die-back of Azorella macquariensis has emerged as a serious concern since 2009, with up to 90% of cushions in some locations being affected. A number of measures have been implemented to identify the cause of the dieback and prevent its spread (SOC, 2010). This epidemic will cause severe modification to the ecosystem and is likely to lead to major erosion problems and decline of associated species (TPS, 2009). Possible cause has been potential link between climate change and a pathogen (Whinam et al., 2014). Changing climate may be a higher factor in that changing precipitation patterns are meaning that less frequent moisture reaches the plants (IUCN Consultation, 2017).

► Solid Waste

Very Low Threat

Inside site, localised(<5%)

Large quantities of rubbish washed up by ocean currents, affecting the pristine beauty of the island (Osborne, 1997) and extremely dangerous when ingested by seabirds (Birdlife, 2008). Marine debris monitoring and management has been undertaken since 2005 (Periodic Report, 2011). Scientific research is ongoing.

► Ocean acidification, Temperature extremes

High Threat
Inside site, throughout(>50%)
Outside site

Climate change has already been shown to be having effects as the island gets warmer and drier and rainfall patterns change. For example, Southern elephant seal (Mirounga leonina) population decline has recently been linked to poor foraging success due to changing oceanic conditions perturbing prey availability (Clausius et al., 2017). Changing climate appears to be the causative factor in the dieback of the endemic cushion plant Azorella macquariensis and could potentially improve growing conditions for other invasive plant species (IUCN Consultation, 2017).

Potential Threats

High Threat

Climate change has already been shown to be having effects as the island gets warmer and rainfall patterns change. For example, Southern elephant seal population decline has recently been linked to poor foraging success due to changing oceanic conditions perturbing prey availability (Clausius et al., 2017). There are also the unlikely but possible events of an oil spill or the introduction of a new alien invasive species or pathogen that could devastate this very vulnerable ecosystem, despite authorised visitation being highly regulated (especially through biosecurity measures).

► Habitat Shifting/ Alteration, Ocean acidification, Temperature extremes

High Threat

Inside site, throughout(>50%)

It is reported that mean temperature has increased by more than half a degree over the past 50 years (APSTI, 2012), thus flora and fauna may have difficulty adapting. If ocean waters warm and krill are forced southward, the biodiversity that eat krill (e.g. rockhopper penguins, elephant seals) could disappear, as has happened on other sub-Antarctic islands (Osborne, 1997). Although atmospheric drying is occurring, rainfall patterns are changing and precipitation is increasing (Adams 2009) leading to an increase in soil moisture which appears to be exacerbating erosion and slope instability (Scott and Kirkpatrick 2013, Whinam et al., 2014b).

► Water Pollution

Low Threat
Inside site, localised(<5%)

A “Macquarie Island Station Oil Spill Contingency Plan” has been developed and steps outlined in the management plan (PWS, 2006; Periodic Report 2011) to prevent and manage oil spills, which would have a huge impact on marine life.

► Invasive Non-Native/ Alien Species

Low Threat
Inside site, extent of threat not known

Protocols are in place to prevent new introductions to the island from authorized visitation (PWS, 2006) although as experience has shown, with increased human visitation it is increasingly difficult to prevent introductions (particularly plant and invertebrate species and pathogens). Australian Antarctic Division biosecurity protocols have been significantly enhanced since 2014 with the construction of new cargo-handling and biosecurity facilities in Hobart (IUCN Consultation, 2017).

Protection and management

Assessing Protection and Management

► Relationships with local people

Highly Effective

Not applicable

► Legal framework

Highly Effective

The Island, including waters to three nautical miles, is managed as a Tasmanian nature reserve; waters out to 200 nautical miles to the east of the reserve are within the Macquarie Island Commonwealth Marine Reserve, and enforced by the Parks and Wildlife Service Tasmania (PWS). The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC) provides overarching legal framework for the property (SoOUV, 2010). The overarching management of the property is under the Macquarie Island Nature Reserve and World Heritage Area Management Plan 2006, implemented by PWS.

► Enforcement

Highly Effective

All authorised visits to Macquarie Island are highly regulated, especially with regard to biosecurity.

► Integration into regional and national planning systems

Highly Effective

“There is excellent coordination between all bodies / levels involved in the management of the property” (Periodic Report 2011).

► Management system

Mostly Effective

The current Macquarie Island Management Plan (PWS, 2006) is to be reviewed (possibly commencing in 2018). A number of specific management plans also exist, e.g. Action Plan for birds (Garnett et al., 2011); long-line fishing and bycatch (DE, 2014); seals (DEH, 2004), albatrosses and giant petrels (DSEWPC, 2011) and others. Baseline monitoring of the hydrogeological regime, soil moisture, land-slipping and erosion rates is

included in the scientific and monitoring programs post-eradication. This is especially relevant as rainfall patterns are changing (Adams 2009) which appears to be leading to increased soil moisture and slope instability (Scott & Kirkpatrick 2013).

► Management effectiveness

Mostly Effective

Management comes under the Tasmania Parks and Wildlife Service (PWS). The management system is being fully implemented and monitored (Periodic report 2011).

► Implementation of Committee decisions and recommendations

Highly Effective

Good (all Committee decisions responded to). In 2013 the World Heritage Committee “expressed its satisfaction about the preliminary results of the Macquarie Island Pest Eradication Plan”. However, the Committee also recommended “to include the monitoring of outcomes to confirm the continued recovery of the property’s vegetation and ecosystems” (37COM 7B.11). This information is now available in the Evaluation Report: Macquarie Island Pest Eradication Project (PWS 2014).

► Boundaries

Highly Effective

The property is of sufficient size and contains the necessary elements to demonstrate the key aspects of the geological processes of Macquarie Island and the outlying Bishop and Clerk and Judge and Clerk islets. All major elements of the Macquarie deformational zone are included in the property. (SoOUV, 2012).

► Sustainable finance

Mostly Effective

Funding can be considered sustainable for the medium–long term as the Australian Antarctic Division has agreed (2016) to continue their scientific presence on Macquarie Island, to commence a new station build, and to decommission old buildings, by 2022 (Frydenburg 2016). Further state

funding would enable more effective management to international best practice standard. The AAD station is an infrastructure element that will enable support for science/research programmes, but is not funded as a management initiative per se (IUCN Consultation, 2017).

► Staff training and development

Highly Effective

Good for the medium term, for the long term the available budget is sufficient but further funding would enable more effective management to international best practice standard. (Periodic Report 2011).

► Sustainable use

Data Deficient

n.a.

► Education and interpretation programs

Mostly Effective

Period Report (2011) notes adequate but could be better.

► Tourism and visitation management

Highly Effective

Tourism is very limited. Managers report good links with tour operators. They receive 20% of funding from commercial operations (Periodic Report, 2011). Numbers have been variable over the years and some operators have stopped visiting Macquarie Island as their Southern Ocean itineraries have changed (IUCN Consultation, 2017).

► Monitoring

Mostly Effective

Ongoing monitoring is good (PWS, 2014). Baseline information and monitoring of the hydrogeological regime, soil moisture, landslipping and erosion rates is included in the scientific and monitoring programs (Comfort, 2014). Annual monitoring of seabird and marine mammal species is undertaken by PWS.

► Research

Mostly Effective

Knowledge about the values of the World Heritage property is sufficient for most key areas but there are gaps (Periodic Report, 2011). A number of research projects are occurring on the island (e.g., Southern elephant seals, Clausius et al., 2017).

Overall assessment of protection and management

Highly Effective

Protection and management on Macquarie Island is highly effective and the recent success of the eradication program is an excellent example thereof. Ongoing monitoring is being undertaken for the outcomes of the eradication programme to track the recovery of the site's values and preparedness for future potential risks to the site's values.

► Assessment of the effectiveness of protection and management in addressing threats outside the site

Highly Effective

Major efforts have been made to ensure that long-line fishing does not harm seabirds and these seem to be having an effect.

► Best practice examples

Rabbits, rats and mice have been eradicated from the island and the strategies and outcomes now contribute to the eradication success literature and can be considered an example of best practice (PWS, 2014).

State and trend of values

Assessing the current state and trend of values

World Heritage values

► Outstanding spectacle of wild, natural beauty

Low Concern
Trend:Improving

The island's landscapes, especially the steep coastal slopes which provide a backdrop to the spectacular wildlife congregations along the beaches, had experienced damage in the past (Scott et al., 2007). This trend is now reversing following the success of the eradication program and all current signs are positive for regeneration (PWS, 2014; Springer, 2016).

► Extensive peat beds

Low Concern
Trend:Improving

Improving as loss of vegetation is reversing since 2011 (IUCN Consultation, 2017).

► Dramatic changes in vegetation cover due to climatic conditions

Low Concern
Trend:Data Deficient

The as yet undetermined die-off of the Macquarie cushion plants (Whinam et al., 2014a) is of concern. However, aside from the Azorella macquariensis dieback, Macquarie Island vegetation is significantly improving and is in the best shape it has been for over a century, now that rabbit grazing and rodent impacts have ceased (Springer, 2016).

► Vast congregations of wildlife

Good
Trend:Data Deficient

As a result of the eradication programme, Birdlife Australia Threatened Species Committee recommended the down-listing of 8 bird species found on Macquarie Island as the threats to their population was no longer present. This was accepted in 2016. Breeding success can still be reduced as a result of disturbance by researchers and tourists. Marine pollution, particularly ingested plastics, is an increasing concern (Isobe et al., 2017). Planned research will help to scale the problem of marine debris – a global phenomenon – at the Island. Fishing around sub-Antarctic islands may also

adversely affect the species. No population decline has been signalled on Macquarie, although the global conservation status of the Royal Penguin is Near Threatened (Birdlife International, 2017) and the species is endemic to the property. Global conservation status for King Penguins (Aptenodytes patagonicus) and Gentoo (Pygoscelis papua) is Least Concern, and Rockhopper (Eudyptes chrysocome) is Vulnerable (Birdlife International, 2017). There are very small breeding populations of Antarctic, sub-Antarctic and New Zealand Fur seals that appear stable (Scott et al., 2007) but Southern elephant seal numbers are still in decline (Clausius et al., 2017).

▶ **Unique geological features associated with oceanic crust formation**

Good

Trend:Stable

No decline (Comfort, 2014).

Summary of the Values

▶ **Assessment of the current state and trend of World Heritage values**

Low Concern

Trend: Improving

The geological values for which the site was inscribed have remained unchanged. The landscape is now recovering well in terms of vegetation cover over all habitats except feldmark, where die-back of Azorella macquariensis continues to be an issue. Given the success of the eradication programme, the process of restoration is already well underway and the island is really not comparable to the vegetation condition of 5-6 years ago. However, the recent die-off of the keystone cushion plant is a concern. Vast congregations of wildlife appear to be stable, with the exception of Southern elephant seals.

▶ **Assessment of the current state and trend of other important biodiversity values**

High Concern

Trend: Data Deficient

The important biodiversity values of the property are for the most part stable

and are broadly improving following the eradication of invasive animal species . Some albatross species and grey petrel are still at some risk to long-line fisheries as they are circumpolar foragers but risks to them on-island have reduced and grey petrel numbers and breeding success have increased since 2011.
The status of the extremely small breeding population of wandering albatross (Diomedea exulans, globally VU) with 5-10 pairs breeding on the island is currently uncertain, with relative trends in numbers and survival in the past similar to those observed in the Indian Ocean populations, prior to an apparent decline in recent years (for the conservation status of all Macquarie Island albatrosses and petrels see ACAP, 2017).The recent die-back of the Macquarie cushion (Azorella macquariensis) emerged as a serious concern in 2009, with up to 90% of cushions in some locations being affected. A number of measures have been implemented to identify the cause of the dieback (SOC, 2010) but one potential cause is a pathogen, exacerbated by climate change (Whinam et al., 2014a).

Additional information

Benefits

Understanding Benefits

▶ **Fishing areas and conservation of fish stocks**

The marine reserve of 3 nautical miles around the island provides a fish reserve in addition to the marine reserve to the east of the island, which is the largest “no-take” fishing zone in the region. The current Toothfish fishery is considered sustainable (AFMA 2017).

▶ **Wilderness and iconic features**

Although very small numbers of visitors and staff benefit from this due to the high inaccessibility of the island, those that manage to get to the island can

appreciate its iconic wilderness.

▶ **Importance for research**

Much scientific research has been carried out about the island and will continue into the longer term. Specifically, the site has benefits for southern ocean atmospheric, meteorological and biological research.

▶ **Contribution to education**

Although visitation is low, documentaries made on the island have addressed a far wider public.

▶ **History and tradition**

Macquarie Island has internationally significant historic heritage with outstanding examples of early steam digester technology at several sites, such as Hurd Point, Lusitania Bay, The Isthmus and the Nuggets (Nash 2003; Carmichael, 2007).

Summary of benefits

Principal benefits are conservation of a unique wilderness with high biodiversity and geological values which have been thoroughly documented to the wider public. Knowledge generated through research and active management, such as the pest eradication campaign, has greatly benefited conservation management elsewhere.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects

1	Tasmania Parks and Wildlife Service and Natural Values Conservation Branch with Australian Antarctic Division	From: 2010 To: 2016	Macquarie Island Pest Eradication Project. AU$24.6 million programme of a scale and complexity never before attempted (12,860 ha) to eradicate rabbits, black rats and mice. Planning 2007-2011, project implemented 2011-14 with completion 2015). Ongoing annual wildlife monitoring by Natural Values Conservation Branch. Seal research by NVCB, universities. New station construction announced October 2016, scheduled for completion 2022.

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	Biosecurity	Ongoing development and implementation of biosecurity protocols, especially with the advent of new station construction.	
2	Monitoring	Outcomes Monitoring Program for evaluating and monitoring the effects of the Eradication Program on terrestrial ecosystems, covering all aspects of the terrestrial environment.	
3	Monitoring	Monitoring of the Southern elephant seal populations (Jabour et al 2016)	

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