IUCN Conservation Outlook Assessment 2014 **(archived)**
Finalised on 12 September 2014

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

2014 Conservation Outlook

Good with some concerns

Although this assessment still identifies a number of areas of high concern, given the success of the eradication programme on the island and if the die-off of the endemic cushion plant can be identified and 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 would help track the recovery of the site's values. 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: Data Deficient

The geological values for which the site was inscribed are unchanged, while the landscape values have undergone some deterioration, mainly due to the devastation caused by invasive species and possibly exacerbated by climate change. Given the success of the eradication programme it is likely that most of the values of the island will be able to be restored. However, the recent die-off of the keystone cushion plant is a concern. Vast congregations of wildlife appear to be stable.

Overall THREATS

High Threat

Given the positive progress on rabbit and rodent eradication on the island the outlook looks good, but prudence requires the complete eradication of these species before crying victory (it only takes one pair of pests to start the whole process again). Given the high management capacity and important resources

being put into the sucessful pest eradication as well as for studies on the unexplained die-back of the cushion plants (a keystone species), and provided current efforts are continued, the threats to the island should hopefully be reduced in the short to medium-term. However there are also realistic expectations of potential impact by climate change. This means that for the moment substantial threats still exist, meriting a high threat assessment, with real hope that this will be reduced in the future.

Overall PROTECTION and MANAGEMENT

Highly Effective

Protection and management on Macquarie Island is highly effective and the recent success of the eradication programme is an excellent example thereof. A monitoring programme for the outcomes of the eradication programme is needed to track the recovery of the site’s values and better monitoring and preparedness for future potential risks to the site’s values need to be put in place.

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 Skuas 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

High Threat

Given the positive progress on rabbit and rodent eradication on the island the outlook looks good, but prudence requires the complete eradication of these species before crying victory (it only takes one pair of pests to start the whole process again). Given the high management capacity and important resources being put into pest eradication as well as for studies on the unexplained die-back of the cushion plants (a keystone species), and provided current efforts are continued, the threats to the island should hopefully be reduced in the medium-term. However for the moment substantial threats still exist meriting a high threat assessment.

► Invasive Non-Native/ Alien Species

High Threat
Inside site

Wekas (a predatory bird) and cats were introduced and eradicated by 1989 and 2000 respectively, but rabbits, black rats and mice still occur on the

island (PWS & BCB, 2007). However results from the pest eradication plan (PWS & BCB, 2007) are positive, with little sign of any rabbits, rats or mice in 2012 (The Australian, 2012; PWS blog). 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)

► Erosion and Siltation/ Deposition

High Threat
Inside site

Modified vegetation associations and nutrient cycles due to alien invasive species have modified natural ecosystem processes, and erosion processes on the island have accelerated (Scott et al., 2007; Scott & Kirkpatrick, 2008, Scott & Kirkpatrick, 2013).

► Fishing / Harvesting Aquatic Resources

Very Low Threat
Inside site
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 MITF 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).

► Other

High Threat

Die-back of Azorella macquariensis has 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 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).

▶ Solid Waste

Very Low Threat
Inside site

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). Intensive marine debris monitoring and management has been undertaken since 2005 (Periodic Report, 2011).

Potential Threats

High Threat

Climate change has already been shown to be having effects as the island gets warmer and drier and rainfall patterns change, and populations of Rockhopper Penguins for example have crashed elsewhere as their food source (krill) moves south. 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. Therefore the island will always be faced with high or even very high potential threats.

▶ Habitat Shifting/ Alteration, Chemical changes in oceanic waters, Temperature changes

High Threat
Inside site

It is reported that mean temperature has increased by more than half a degree over the past 50 years and the island is drying out and warming up (APSTI, 2012), thus flora and fauna will have difficulty adapting. If ocean waters warm and krill are forced southward, the biodiversity eating 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).

► Other

Low Threat
Inside site

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

Protocols are in place to prevent new introductions to the island (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).

Protection and management

Assessing Protection and Management

► Relationships with local people

Highly Effective

Not applicable

► Management effectiveness

Mostly Effective

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

► Legal framework and enforcement

Highly Effective

The island including waters to three nautical miles is managed as a nature

reserve, with most of the waters out to 200 nautical miles to the east of the reserve within the Macquarie Island Commonwealth Marine Reserve, and enforced by the Parks and Wildlife Service Tasmania (PWS). The Environment Protection and Biodiversity Conservation Act 1999 (EPBC) provides overarching management of the property (SoOUV, 2010).

► 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

Current management plan (PWS, 2006) and a number of specific management plans e.g. rabbit and rodent eradication (PWS & BCB, 2007); Action Plan for birds (Garnett et al., 2011); long-line fishing and bycatch (DEWR, 2006); seals (DEH, 2005), albatrosses and giant petrels (DSEWPC, 2011) and others. There is a lack of baseline monitoring data on the hydrogeological regime, soil moisture, landslipping and erosion rates, which presents difficulties and is a major oversight in management.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). A major shortfall in the management planning is the lack of an outcomes monitoring programme for monitoring effects of the eradication programme on ecosystem recovery.

► 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).

► 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

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).

► 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 interpretation

Highly Effective

Very limited tourism (but increasing). Managers report good links with tour operators. They receive 20% of funding from commercial operations (Periodic

Report, 2011).

► Monitoring

Mostly Effective

Monitoring seems to be reasonable apart from the lack of an Outcomes Monitoring programme for evaluating the Eradication Programme's effects on ecosystem recovery which was also recommended by the World Heritage Committee (Decision 37COM 7B.11). Baseline information and monitoring of the hydrogeological regime, soil moisture, landslipping and erosion rates is also lacking. Seabird monitoring is, on the other hand, excellent.

► 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 occurring on the island.

Overall assessment of protection and management

Highly Effective

Protection and management on Macquarie Island is highly effective and the recent success of the eradication programme is an excellent example thereof. A monitoring programme for the outcomes of the eradication programme is needed to track the recovery of the site's values and better monitoring and preparedness for future potential risks to the site's values need to be put in place.

► 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

When rabbits, rats and mice are eradicated from the island this will

contribute to the eradication success literature and will certainly be an example of best practice.

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ **Outstanding spectacle of wild, natural beauty**
High Concern
Trend:Improving

The island’s landscapes, especially the steep coastal slopes which provide a backdrop to the spectacular wildlife congregations along the beaches, have experienced severe damage, with few areas remaining which indicate the once-pristine nature of the coastal landscape (Scott et al., 2007). However this trend is expected to reverse now given the success of the eradication programme. However as the baseline for this assessment is time of inscription in 1997, and since the property has undergone deterioration since then and there are still rabbits and rodents present on the island, it is too early to note that the problem has been solved.

▶ **Extensive peat beds**
High Concern
Trend:Improving

As noted above, the loss of vegetation and associated rate of geomorphic processes has increased, causing deterioration in the state of conservation of the peat beds (Scott et al., 2007).

▶ **Dramatic changes in vegetation cover due to climatic conditions**
High Concern
Trend:Deteriorating

As noted above, the vegetation has undergone a marked deterioration since inscription (Scott et al., 2007) and the as yet undetermined die-off of the Macquarie cushion plants (TPS, 2009; SOC, 2010) is another factor

threatening this value.

► Vast congregations of wildlife

Good
Trend:Stable

While this value is not under threat, one portion of the King Penguin colony was reportedly buried by a landslip caused by erosion in 2006 (Scott et al., 2007). However despite this these congregations appear to be stable. It has been argued that there is currently no plausible and serious threat to Royal Penguins Eudyptes schlegeli;(Garnett et al., 2011). On land, rats take some eggs and young. Breeding success can be reduced as a result of disturbance by researchers and tourists. Marine pollution, particularly ingested plastics, kills some birds. Fishing around sub-Antarctic islands may also adversely affect the species. No population decline has been signalled on Macquarie, although its global conservation status is Vulnerable (VU) (Birdlife, 2012) and the species is endemic to the property. Global conservation status for King Penguins (Aptenodytes patagonicus) is Least Concern, Gentoo (Pygoscelis papua) Near Threatened and Rockhopper (Eudyptes chrysocome) VU (Birdlife, 2012). Populations of Elephant and Fur Seals seem to be stable (Scott et al., 2007).

► Unique geological features associated with oceanic crust formation

Good
Trend:Stable

No decline (Scott et al., 2007).

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 Skuas 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)

Summary of the Values

► Assessment of the current state and trend of World Heritage values

Low Concern

Trend: Data Deficient

The geological values for which the site was inscribed are unchanged, while the landscape values have undergone some deterioration, mainly due to the devastation caused by invasive species and possibly exacerbated by climate change. Given the success of the eradication programme it is likely that most of the values of the island will be able to be restored. However, the recent die-off of the keystone cushion plant is a concern. Vast congregations of wildlife appear to be stable.

► 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 stand to improve once the invasive animal species eradication succeeds, However, all four species of Albatross and most of the 7 species of burrowing petrels breeding on the island have been listed as threatened in some way

(Scott et al., 2007). As the Albatrosses nest in tussock grass which has been lost due to the rabbits it has been observed that their situation has deteriorated, and the burrowing petrels compete with rabbits for burrows (Scott et al., 2007). This situation is improving with implementation of the Eradication Programme, with significant regrowth of tussock grass commencing (Shaw et al. 2011, Scott & Kirkpatrick 2013). 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 (ACAP, 2009d).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 and prevent its spread (SOC, 2010).

Additional information

Key conservation issues

▶ Invasive species

Local

Probably the most serious threat to vulnerable island ecosystems, it is well-recognised that the invasive rabbits, black rats and mice must be eradicated if WH values are to be maintained. As important is the prevention of new invasions, particularly once the rabbits (which may have been keeping some invasive plants in check) are gone. Although human visitation is limited, quarantine measures in place need to be consistently reviewed and maintained. If the Macquarie Cushion plant die-back is due to an introduced pathogen then serious questions about future quarantine measures will need to be raised.

▶ Climate change

Local

Effects of climate change will probably be more evident on a simpler island ecosystem in the sub-Antarctic and monitoring to identify changes in any WH values, both terrestrial and marine, that could be connected to climate change is very important.

▶ **Long-line fishing and bycatch issues**
Local

Although excellent progress has been made, monitoring is still needed to ensure that surrounding fisheries are not having an impact on biodiversity values in the property.

▶ **Rubbish**
Local

Plastic and other rubbish carried around the world on ocean currents is a clear threat to marine life and monitoring as well as cleaning operations are needed to maintain WH values.

▶ **Oil spills**
Local

Although just one aspect of risk management, given increasing boat traffic to and around the island, prevention and preparation are essential if a catastrophe were to occur.

Benefits

Understanding Benefits

▶ **Is the protected area valued for its nature conservation?**

Conservation of international and national biological and geological values.

▶ **Does management of the site provide jobs (e.g. for managers or rangers)?**

Approximately 45 staff in summer and 15 in winter work on the island. Very

moderate tourism to the island is increasing.

▶ **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 has received MSC certification.

▶ **Sacred natural sites or landscapes**

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

▶ **Importance for research**

Much scientific research has been carried out on the island.

▶ **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 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 has 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	Tasmanian Parks and Wildlife Service and Biodiversity Conservation Branch with Australian Antarctic Division.		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. Plan 2007, project implemented 2010 with expected completion 2016).
2	Royal Tasmanian Botanical Gardens (RTBG)/ Biodiversity Conservation Branch and Australian Antarctic Division/ Mohamed bin Zayed Species Conservation Fund		Macquarie Island Cushion Plant Project (Azorella macquariensis).

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	.	Outcomes Monitoring Program for evaluating and monitoring the effects of the Eradication Program on terrestrial ecosystems, covering all aspects of the terrestrial environment.	

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