

Tasmania: State of the islands

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Summary

Tasmania's offshore islands contain nationally and globally significant natural values, and some are recognised by World Heritage Area status. Many hold a range of highly restricted species and are genetic repositories and refugia for species threatened with extinction on mainland Tasmania or Australia. Tasmania's islands are generally well reserved and due to improving knowledge, better technology and increasing volunteer support, alien species are now being controlled or eradicated with greater efficiency. By expanding the opportunities and role of stewardship programs, volunteers could help further by undertaking biosecurity surveillance and delivering badly needed baseline monitoring. A prioritisation process that ranked islands according to their conservation values would also help direct limited resources to those most in need of priority management. With emerging threats from sea level rise, invasive species and expanding coastal development, the protection of Tasmania's islands has never been more urgent.

Geography - Number, geomorphology and size

Tasmania has over 6,500 islands, islets, rocky stacks and reefs scattered around its coastline, of which 5,890 have land above the high water mark (TASMAP 2006; Parsons 2011). There are 374 islands greater than one hectare in size and 65 islands greater than 20 hectares in size (DPIPWE 2011). On the northern boundary, Rodondo Island and West Moncoeur are less than 10 km from Victoria's Wilsons Promontory and to the south the islets of Pedra Branca and Eddystone Rock are sentinels in the wild Tasman Sea. A further 1,500 km to the southeast in the Southern Ocean is subantarctic Macquarie Island which became part of Tasmania's territorial jurisdiction during its colonial proclamation in 1825. The larger islands of King Island, Flinders Island, Cape Barren Island and Bruny Island are settled, Maria Island has a national parks centre and Macquarie Island retains a permanently manned scientific station. The remaining islands are largely undeveloped although some have infrastructure including light stations, homesteads and farms or associated farming structures and many experience low-level visitation.

All of Tasmania's islands (except for Macquarie Island) were formed as the sea level rose after the Last Glacial; hence the timing of their formation is related directly to the elevation of land between them and the adjacent mainland (Jennings 1959; Dixon 1996). King Island and the Fleurieu Group formed part of the peninsula northwest from Tasmania, and the Furneaux Group (and Kent and other island groups in the northeast) were part of the Bassian Rise land bridge between Tasmania and Victoria. The geomorphology of Tasmania's islands are therefore not unique but an extension of the coast and as such comprise a range of hard and soft rock features, sandy dunes and various types of coastal landforms such as spits, tombolos and isthmuses.

Tenure and jurisdictional arrangements

From the 1970s onwards Tasmania's islands started to be systematically reviewed for statutory protection according to their special values. Some islands, for example Maria, Tasman, South Bruny, the Kent and Maatsyuker Groups, were incorporated into the boundary of national parks while others changed in status from being either unallocated crown land or private lease, to Game Reserve, Conservation Area or Nature Reserve. Macquarie Island, including the islets of Judge and Clerk and Bishop and Clerk, was proclaimed a Wildlife Sanctuary in 1933, a Conservation Area in 1971, State Reserve in 1972, Nature Reserve in 1978 and in 1997 was inscribed on the World Heritage List. Its

boundaries have been extended several times including in 1999 to include a marine reserve (PWS 2006).

Not all islands are 'named' and there is no consistent figure quoted for the exact number of islands thus making it problematic to prepare a complete inventory or determine status. However, of Tasmania's 252 major islands for which status is available, 224 islands or 89% are formally reserved (Table 1). This figure includes 75 islands previously classed as non-allocated Crown Land but declared Conservation Areas through the Crown Lands Assessment Classification process in 2012. Over thirty management plans have been prepared for reserves with islands within their boundary (112 islands), however, some plans e.g. Small Bass Strait Island Reserves, Small North-East Islands and Small South-East Islands have been in draft form for more than a decade but are still used to guide management of these islands (www.parks.tas.gov.au/).

Table 1. Status of Tasmania's major offshore islands*

Formally Reserved	No	Unreserved	No
National Park	62	Private Freehold	9
Conservation Area	103	Multiple Land Tenure (aboriginal, private, reserved)	12
Nature Reserve	44		
State Reserve	4	Aboriginal Lands	7
Game Reserve	9		
Nature Rec. Area, Historic Site	2		
TOTAL	224	TOTAL	28

Ref: <http://www.islandshare.net/>; * incomplete inventory

Reserved islands are managed under the *National Parks and Reserves Management Act 2002* by the Parks and Wildlife Service. There is no single management authority managing unreserved islands in Tasmania, instead they are managed by a range of state and local government agencies in accordance with Tasmania's Resource Management and Planning System (TPC 2009) and the following legislation:

- *State Policies and Projects Act 1993*
- *Land Use Planning and Approvals Act 1993*
- *Environmental Management and Pollution Control Act 1994*
- *Living Marine Resources Management Act 1995*
- *Nature Conservation Act 2002*
- *National Parks and Reserves Management Act 2002*
- *Water Management Act 1999*

Marine protected areas

Tasmania's first four marine reserves were declared in 1991 around Governor Island, Ninepin Point, Tinderbox and Maria Island, covering a total of 2,110 ha (DPIWE 2000). In 1999, a 74,715 ha marine reserve to 3nm was established around Macquarie Island, and in 2004 marine reserves were created at Port Davey in Bathurst Harbour and around the Kent Island Group in eastern Bass Strait. In 2009, a further 14 small marine reserves were established, many having islands within their boundaries. In 2007 the Huon Commonwealth Marine Reserve was declared in ocean territory to the south of Tasmania. This reserve covers about 999,000 ha and was established to protect a globally significant cluster of cone-shaped submerged mountains (seamounts) (www.environment.gov.au/coasts/mpa/southeast/huon/index.html). The Macquarie Island Commonwealth Marine Park was declared in 1999 to protect waters from 3 nm to 200 nm around Macquarie Island and covers about 16.2 million hectares (PWS 2006).

Tasmania currently has 21 formally declared marine reserves covering a total of 134,589 ha or 2.6% of the State's coastal waters (www.parks.tas.gov.au; Parsons 2011). Less than half of the total area allocated to MPAs is fully protected as 'no take' (42%), whilst 38% allow limited recreational fishing and the remaining 20% have no restrictions on recreational fishing; hence just 1% of waters around Tasmania are fully protected (Parsons 2011). While these reserves protect a range of significant marine values they do not yet comprise a representative system of marine protect areas.

Key Conservation Values

From a geo-perspective many of Tasmania's islands contain significance geological features (Dixon 1996). Macquarie Island achieved world heritage status because of its globally significant geological formation and is the only island in the world composed entirely of oceanic crust and rocks originating from deep below the earth's surface. Other islands of geo-significance are Black Pyramid for its tertiary basaltic volcanic features, the sea caves and seal-related flowstone of Ile des Phoques, the geology of Pedra Branca and Eddystone Rock, and Tasman Island for its well-exposed dolerite structural features (G. Dixon, pers. comm).

On King Island, the City of Melbourne Bay foreshore contains Cambrian rocks including globally significant laval pillows demonstrating seafloor volcanism. Maria Island's fossil cliffs, gulches, sea caves, raised shore platforms, blow hole and a razor-backed saddle-ridge are also a globally unique set of features. Northwestern Tasmania has outstanding examples of beach ridge sequences such as those on Robbins Island, marking at least two major phases of Quaternary activity, and the spectacular parallel dune systems enclosing brackish lagoons along the east coast of the Furneaux Islands, along with the saline lagoon systems of Cape Barren Island, are also of high geo-conservation significance (Dixon 1996).

Fauna and flora

Tasmania's islands are situated within a temperate marine region and their unique marine life and high levels of productivity are due to the upwelling of cold, nutrient rich subantarctic water which is carried northward via the Antarctic Circumpolar Current. Tasmania's marine fish fauna includes more than 600 species: 300 in shallow waters, 125 or more near the continental shelf and about 80 species in deep sea or oceanic habitats (Parsons 2011). Macquarie Island's fish fauna includes at least 33 cold water species, including the 'myctophids' that comprise the second largest biological resource after Antarctic Krill in the Southern Ocean.

Islands are central to the ecology of over 40 species of marine mammals in Tasmania including five species of seal (Southern Elephant Seal, Subantarctic Fur Seal, Antarctic Fur Seal on

Macquarie Island, and New Zealand Fur Seal and Australian Fur Seal mainland Tasmania). Islands are critical to over 60 species of seabird in Tasmania with massive aggregations of some species occurring in the Bass Strait islands and on Macquarie Island. The islands of Bass Strait hold the largest colonies (up to 6 million birds) of the migratory Short-tailed Shearwater and are the Australian stronghold for species such as Little Penguin, Pied and Sooty Oystercatcher and Black-faced Cormorant (Brothers *et al.* 2001). Macquarie Island supports some of the world's largest subantarctic bird breeding grounds with an estimated 3.5 million breeding seabirds found there, predominantly penguin species. King and Flinders islands and those in the Boullanger Bay area support the highest diversity of breeding and migratory shorebirds in Tasmania including significant population numbers (>1% of global population) for seven species (Bryant 2002). These values are reflected in Tasmania 29 Important Bird Areas (IBAs) which are wholly or partly on islands, the highest number of island IBAs in any Australian state (in Kirkwood and O'Connor 2010).

Tasmania's coastal environment contains a high proportion of the state's native plant species (about a third), with about 145 species (8% of the flora) largely confined to coastal areas (Balmer *et al.* 2004). Macquarie Island has five vegetation communities, a vascular flora of 46 species including 3 endemics of which *Azorella macquariensis* (cushion plant) is a keystone species of the fjeldmark community (PWS 2006). Tasmania's south-eastern region has the highest level of localised and endemic marine plants in Australia, with over 750 species of macro-algae recorded thus far. The nationally threatened kelp forests which occur around islands off southeastern Tasmania are world-renowned for their ecological and economic significance (Parsons 2011). Some islands retain elements reflecting a stage of evolutionary development. For example, Rodondo Island supports climax communities of *Eucalyptus globulus*, and *Melaleuca armillaris* which have evolved in the absence of fire, and the limestone flora on Prime Seal Island retains direct affinities with the Recherche Archipelago in Western Australia (Harris *et al.* 2001).

Endemics and poorly represented species

Many of Tasmania's islands are safe havens for species threatened on mainland Tasmania or Australia and are repositories for genetic diversity. Islands in the Bass Strait region have been separated from mainland Australia since the Pleistocene and undeniably hold a significant component of Tasmania's endemic and relic species and those at the edge of their natural range. The major and minor land masses and their associated scattering of islands, islets and rock stacks make this area significant in natural features and species. On Flinders, King, Cape Barren and Clarke islands important habitat extends to saltmarsh communities, heathland and remnant forest and woodland which provide breeding sites for restricted, and in some cases threatened species such as the Chappell Island Tiger Snake, Dwarf Galaxiid, New Holland Mouse, Flinders Island Burrowing Crayfish, troglobitic cave invertebrates, Green and Gold frog and the genetically distinct Flinders Island wombat. These islands are microcosms for bird species like Silvereye *Zosterops* which all over the world have evolved into specific island forms (in Kirkwood and O'Connor 2010). King Island also has a rich assemblage of genetically unique and locally endemic species and subspecies such as the Black Currawong, Dusky Robin, Green Rosella, Scrub Tit, Thornbill and Yellow Wattlebird. An analysis of the range and area of occupancy of these subspecies places many in the high risk and threatened species range (TSS 2012).

A review by Ecosure (2009) ranked 15 Tasmanian islands among Australia's top 100 conservation important islands greater than 200ha in size. While those identified (e.g. Deal, Erith, Great Dog, Maria and Macquarie Island, etc.) are of high conservation value, islands much smaller in size also make a valuable contribution to biodiversity. For example, Governor Island is 1.9 ha yet supports one threatened plant species and 7 species of breeding seabird, including over 2,000 pairs of Crested Tern. Pedra Branca islet is 2.5 ha in size and contains critical breeding habitat for Shy Albatross, a

breeding colony of Australasian Gannet, a fur seal haul-out and the only population of the endemic Pedra Branca Skink, one of the rarest and most geographically restricted reptile species in the world. Ile des Phoques (8 ha) is surrounded by a diverse marine community especially corals, filter feeding invertebrates, anemones and zoanths, has sea caves of outstanding geological significance, is a regular haul-out site for Australian Fur Seals, and a breeding site for Little Penguin, Short-tailed Shearwater, Fairy Prion and Common Diving-Petrels.

Threatened or internationally significant species

Six island species or subspecies of fauna are already extinct (Macquarie Island Parakeet, Macquarie Island Rail, King Island Emu, Tasmanian Emu, Thylacine) and one, a Macquarie Island seal species, was exterminated before it could be described. Local extinctions are numerous and varied and include for example the Spotted-tailed Quoll, Wombat and Southern Elephant Seal from King Island.

Many of the larger islands have State or Nationally threatened species or communities. For example, Bruny Island has 39 threatened flora species (Cochran 2003) and King Island has 50 threatened flora, 12 threatened fauna and six threatened vegetation communities (TSS 2012). Island floras of national significance occur on Ile du Golfe, Maatsuyker Island and Flat Witch Island in the World Heritage Area (Balmer *et al.* 2004). Macquarie Island has a total of 27 seabirds, five seal and two plant species threatened at state or national levels, and is critical habitat for two threatened albatross species.

The core breeding range for the nationally Endangered Forty-spotted Pardalote occurs on Flinders Island, Bruny Island and Maria Island and the Orange-bellied Parrot utilises saltmarsh habitat on islands in the King and Hunter groups as staging posts during migration. The only global breeding sites for Shy Albatross are on Pedra Branca, the Mewstone and Albatross Island.

Wetlands of national and international significance, such as Lavinia and Sea Elephant, Logans Lagoon and Cape Barren lagoons are hot spots for migratory waders that use these sites as part of their annual stopover through the East Asian flyway (Woehler & Ruoppolo 2010). Islands in the Boullanger Bay-Robbins Passage area, which includes Robbings Island, Perkins Island, Kangaroo Island, Montague Island and Wallaby Island, are the stronghold for 17 species of migratory wader and are Tasmania's priority sites for resident breeding species like Hooded Plover, Pied Oystercatcher, Little Tern and Fairy Tern (Bryant 2002).

Invasions, reintroductions or translocations

A wide range of species have been introduced to Tasmania's islands for food, recreation or conservation purposes, but up until recently this has occurred on an ad-hoc basis with little planning or impact monitoring in place.

The most numerous and significant range of introductions and translocations have been those to Maria Island which has had farms, vineyards, cement works, penal station and other land uses prior to it becoming a National Park. Since European settlement over 90 exotic plant species have been introduced to Maria Island as ornamental plants or for cultivation. Nineteen bird and mammal species have been deliberately liberated or have self-colonised the island, including cats, rats and mice (PWS 1998). Fallow deer were introduced to the grazing pastures around Frenchs Farm but were successfully eradicated in 1998. In 1968 Australia Emu were introduced in a (failed) breeding experiment to recreate the characteristics of the extinct sub-species of Tasmanian emu. During the 1970s the island was actively stocked with a range of native mammals (Eastern-barred Bandicoot, Brown Bandicoot, Tasmanian Bettong, Bennett's Wallaby, Brush-tailed Possum) as a potential food source for the Thylacine, should it be captured from the wild and relocated there. During the same period, Forester Kangaroo and Cape Barren Geese were introduced to the Darlington area as their

numbers had significantly declined elsewhere across their natural range. In summary, the legacy of these multiple introductions has been the compounding disturbance to Maria's natural ecosystem and the burden of ongoing management to cull macropod numbers causing overgrazing. Maria Island is soon to receive its first intake of Endangered Tasmanian Devils free of facial tumour disease. The translocation plan was approved in August 2012 and in contrast to previous introductions was subject to a comprehensive risk assessment (www.tassiedevil.com.au/tasdevil.nsf/; Invasive Animals CRC 2012). A monitoring program is being established in conjunction with the translocation to assess its success for devils and its impacts on other species especially ground nesting birds on the island.

Tasmanian islands also provide opportunities for plant translocations. An ex-situ planting of the Critically Endangered endemic *Epacris stuartii* was undertaken in 2001 on Southport Island to prevent the species from becoming extinct should *Phytophthora cinnamoni* infect the only known wild population on nearby Southport Bluff. In addition, horticulturists at the Royal Tasmanian Botanical Gardens and UTAS, etc. maintain viable ex situ seed and specimen collections of threatened plants such as Macquarie Island's *Azorella macquariensis* which in turn provide opportunities for conservation research.

Community and People

Traditional owners

Tasmania's Aboriginal people retain strong connections to islands and their history of occupation is reflected in numerous cave deposits, artefact scatters, middens, hut depressions, petroglyphs and quarries, of which but a small fraction have been documented or protected. Many islands were visited seasonally to gather food and other resources or as ceremonial sites and today the harvesting of Short-tailed Shearwater 'Yolla' and shellfish remain important commercial and cultural activities for Tasmanian Aborigines. Some islands such as Bruny Island and Flinders Island hold spiritual significance to the Aboriginal community due to long periods of occupation or important historic events. In 1995, as an act of reconciliation, the Tasmanian Government transferred seven islands (Trefoil, Babel, Badger, Big Dog, Mt Chappell, Steep, Clarke) and most of the land on Cape Barren Island to Aboriginal ownership (Ryan 2012). These islands are used for various activities including commercial harvesting, ecotourism, cultural practices or education; however, funding for ongoing management is limited and competitive. Murrayfield Station on Bruny Island is operated by the Indigenous Land Corporation as a farming property (4,097 ha) and to showcase its outstandingly rich Aboriginal heritage.

Cultural values

Many of Tasmania's islands were named by the French during early scientific expeditions and are the type localities for plant and animal specimens shipped back to the museums of Europe. Whaling, sealing, farming, mining and other activities have, over time, deposited their own layers of heritage, many of which are still being discovered. The rich history of islands like Deal, Tasman and Maatsuyker have been well documented by historians and 'Friends of Groups' and their occupation continues through caretaker and artists in residence programs (Friends of Maatsuyker Island 2011). Tasmania celebrates its island heritage through events such as 'Ten Days on the Island', a cultural festival attracting artists from around the world to share dance, music and literature in ways that uniquely define them as islanders.

Partners and volunteers

Volunteers and commercial partnerships and have been instrumental in helping deliver a wide range of conservation programs on Tasmania's islands, and both are pivotal to the ongoing success of

future work. Since the 1970s volunteers from BirdLife Tasmania have collected data on species distribution, important bird areas and sensitive bird breeding islands (www.birdlife.org.au/locations/birdlife-tasmania) and this information is invaluable for conservation management. WILDCARE was established in 1997 in a joint partnership with the State Government, and is now the largest incorporated environmental volunteer group in Tasmania with around 5,000 members (www.wildcarea.org.au/). There are currently 9 island based WILDCARE groups and these volunteers undertake tasks such as weed removal, heritage restoration or act as caretakers on lighthouse islands. WILDCARE Inc. provides insurance cover, grants for projects and facilitates larger sponsorship and donations through its partner programs.

Since 1989 the Princess Melikoff Trust Fund has financially supported marine mammal conservation in Tasmania enabling annual surveys of breeding and haul-out sites on numerous islands around the coast. The Hamish Saunders Island Survey Program was established in 2003 as a partnership between a New Zealand Family Trust and the Tasmanian Government and every year it facilitates a multi-disciplinary scientific survey of a remote island (www.hamishsaunders.com). The results of these surveys are published as monographs by the Department of Primary Industries, Parks, Water and Environment (www.dpipwe.tas.gov.au). Businesses such as Maria Island Walk (www.mariaislandwalk.com.au) supports habitat restoration on Maria Island, and Bruny Island Cruises (www.brunycruises.com.au) makes sizeable donations toward island protection through its Tasmanian Coast Conservation Fund established in 2008 with WILDCARE Inc. The donations from Bruny Island Cruises were critical in resourcing the Tasman Island cat eradication program, enabling it to proceed in a timely way and to its ultimate success.

Current Condition

It is not possible to report on the state or trends in the condition of Tasmania's island environments due to a lack of baseline data. However, in 2008 the Estuarine, Coastal and Marine Indicators Working Group established 18 indicators and a standard set of monitoring methods to assess changes in condition in estuarine, coastal and marine ecosystems (*Tasmanian Indicator Compendium*). These indicators are being trialled by Natural Resource Management regions around the state (TPC 2009).

More than 50 offshore islands have or are being monitored with some regularity in Tasmania, mainly for threatened species or harvested species assessments (Table 2). One of the longest running wildlife monitoring programs anywhere in the world is undertaken on Fisher Island studying the breeding ecology of the Short-tailed Shearwater. This program was started in 1948 by Dom Serventy, taken over by the Tasmanian Government in 1970 and continues today. Cape Barren Geese and Brown Quail are counted annually on 12 islands in the Furneaux Group and over 20 islands and rock stacks are surveyed regularly for seal activity. Resident and migratory shorebirds are surveyed annually on 10 islands in the Boullanger Bay or southeast area, with a further 70 islands having been surveyed repeatedly over the last 30 years (Bryant 2002). Banding and monitoring of Shy Albatrosses on Albatross Island, Mewstone and Pedra Branca has been ongoing for about 20 years as part of the species recovery program. Monitoring programs are undertaken on Macquarie Island to provide information on the recovery of threatened species populations and to collect metrological information. One monitoring program assessing the impact of rabbit browsing on vegetation was established in 1981 and is repeated every 2 to 3 years. This program is now also contributing valuable climate change information which has broader global application (Copson and Whinam 2001).

Table 2. Vertebrate monitoring on Tasmanian islands.

Species or groups	Islands Monitored
Seals (breeding and haul-outs in Tasmanian waters)	Maatsuyker, De Witt, Needles, Walker, Little Witch, Pedra Branca, Mewstone, Sugarloaf Rocks, Tasman, Hippolyte Rock, Albatross, Black Pyramid, Tenth, Judgement Rocks, West Moncoeur, Bass Pyramid, Wright Rocks, Reid Rocks, East Moriarty, West Moriarty Rocks; Bull Rocks, Iles des Phoques, Bruny, The Friars
Albatross (4 species)	Albatross, Mewstone, Pedra Branca and Macquarie
Australasian Gannett	Pedra Branca, Black Pyramid, Eddystone
Seals, Penguins, Seabirds, Rabbits, Rodents, Flora	Macquarie Island
Little Penguin	Bruny, Ninth, Passage, Forsyth, King, Councillor, Georges Rocks, Diamond, Maria, Schouten, Huon, Tasman, De Witt, Maatsuyker, Louisa, Flinders
Short-tailed Shearwater	Furneaux Islands – Fisher, Big Green, East Kangaroo, Little Green, Great Dog, Little Dog, Chappell, Bruny, Tasman
Pacific Gull	Goose, Flinders
Shorebirds (breeding and migratory)	Robbins, Perkins, Kangaroo, Wallaby Islets, Montague, Maria, Flinders, Cape Barren, King, Bruny
Forty-spotted Pardalote, Swift Parrot	Maria, Flinders, Bruny including Partridge
Orange-bellied Parrot	King, Robbins, Perkins, Celery Tops
Raptors	Maria, Bruny, Flinders
Cape Barren Goose & Brown Quail	Flinders and the breeding islands of Vansittart, Tin Kettle, Woody, Big Green, East Kangaroo, Goose, Isabella, Chappell, Inner Sister, Badger
Pedra Branca Skink	Pedra Branca
Pheasant and waterfowl sp	King, Flinders
Macropods, Brush-tailed Possum	Maria, Flinders, King

Monitoring may be regular or irregular. Ref: Bryant & Jackson 1999, Driessen & Hocking 2008

Threats

Animal and plant pests

When Captain Cook released two pigs on Bruny Island in 1777, it was the first in a long list of alien introductions to Tasmanian islands (Pfennigwerth 2008). While Cook's pigs didn't survive, those released on Flinders Island a century later did, and now pigs threaten native plant and animal species there. Tasmania as an island state has 44 species of exotic vertebrates and 350 species of exotic invertebrates (Mallick and Driessen 2009) with a further 58 pest species in its marine environment (RPDC 2006).

Sixty-nine Tasmanian offshore islands have, or have had introduced mammal species, with rabbits being the most commonly recorded

(www.environment.gov.au/biodiversity/invasive/publications/tasmanian-islands/pubs/tasmanian-islands.pdf External Link; Terauds 2005; TPC 2009; Table 3). While no comprehensive information exists on the distribution of exotic bird or invertebrate species, both these groups are becoming more widespread and expanding onto many islands. European wasps *Vespula germanica* and bumblebees *Bombus terrestris* occur on Mewstone and De Witt Island, and several species of introduced invertebrate i.e. flatworms, earthworms, slugs and springtails occur on Macquarie Island. More comprehensive information is available on the distribution of marine pests such as the Northern Pacific Seastar *Asterias amurensis* including their potential impact and quarantine measures needed (www.dpipwe.tas.gov.au, TPC 2009).

Table 3. Alien mammals on Tasmanian islands

Species	No of Islands
Rabbit	29
Cat	22
Rat (black)	17
House mouse	14
Cattle	11
Sheep	11
Horse	2
Goat	2
Deer	3*
Pig	1
Hare	1

Source Terauds 2005, *4 islands if deer on Bruny Island become established

Weeds are widespread across many offshore islands, especially African Boxthorn *Lycium ferocissimum*, Gorse *Ulex europaeus*, Canary Broom *Genista monspessulana* and Spanish Heath *Erica lusitanica*. Marram Grass *Ammophila arenaria* was introduced to Tasmania to stabilise sand dunes and now infests the coasts of most near onshore islands as does Sea Spurge *Euphorbia paralias*. Weed removal is regularly undertaken on over 20 Tasmanian islands, including 12 in the Furneaux Group (Jackson 2009). Much of this work is delivered by dedicated volunteers such as Friends of Bass Strait Islands, SPRATS (Sea Spurge Remote Area Teams) or the Weed Alert Network, supported through the WILDCARE Inc program. Macquarie Island had at least five alien plant species, two of which *Anthoxanthum odoratum* and *Rumex crispus* have already been removed (PWS 2006).

Until recently, animal eradication programs have been largely unsuccessful due to a lack of resourcing and sustainable methods. However, Macquarie Island and Tasman Island are two examples where recent eradication programs have been well planned and successfully implemented. On Macquarie Island Weka were exterminated by 1988 and feral cats by 2002. A multispecies pest management program is currently underway to eradicate rabbits, ship rats and house mice, with a high likelihood of success (PWS 2006, Invasive Animals CRC 2011a). In 2005, feral cats were estimated to be killing between 30,000 and 60,000 seabirds annually on Tasman Island. Using a combination of aerial baiting and ground techniques, the last feral cat was killed in 2010, and after two years of surveillance monitoring the program has been declared a success (Invasive Animals CRC 2011b, PWS 2011). A feasibility plan has just been completed for the removal of feral pigs from Flinders Island but this has yet to secure a funding commitment.

Visitor management and biosecurity

Inappropriate or uncontrolled access to islands increases the potential to impact on sensitive natural values, and the risk of spread or introduction of pests, weeds, disease and fire. Several Tasmanian islands restrict public access unless authorised by permit (Macquarie Island, Judgement Rocks, North East Isle, South West Isle, Vissher Island Il de Phoques, Albatross, Rodondo, and others) and partial restrictions apply to a number of islands within Freycinet National Park (The Nuggets, Refuge Island, Promise Rock, Lemon Rock, Half Lemon Rock, Eastern Rock and Taillefer Rocks).

A protocol has been developed which identifies 12 steps to preventing pests, weeds and diseases spreading to Tasmania's islands

(http://www.islandshare.net/Documents/Island_Biosecurity_Guide.pdf), with additional biosecurity measures recommended for islands in Tasmania's Southwest Wilderness Area (Mallick and Driessen 2009). Minimal impact guidelines have been prepared for sea kayakers to ensure that sensitive areas are not disturbed or compromised during recreational visits

(<http://www.parks.tas.gov.au/index.aspx?base=1349>). Rigorous biosecurity procedures are in-place for people and equipment arriving on Macquarie Island and these are outlined in the reserve management plan, pest eradication project plan and as part of the guidelines for tourist operations to the island (PWS 2006, <http://www.parks.tas.gov.au/>). Monitoring on the island to detect potential pest incursions is also a high priority but as yet not formally in place.

Climate change

Tasmania's islands are highly vulnerable to the impacts of climate change through loss of coastal habitat and changes to marine productivity. Climate change predictions show that more than 1,440 km of Tasmania's coast is at risk of flooding, and more than 975 km of shoreline at risk of erosion, sand dune mobility, rock falls and slumping as a result of sea level rise and storm surges (Sharples 2006; DPIPWE 2010). South-eastern Tasmania is expected to show the greatest increase in sea

surface temperature (SST) for any location in the Southern Hemisphere with a resultant southern extension of warmer, nutrient poor waters (DPIPWE 2010; Parsons 2011). Data shows that the mean SST in Mercury Passage has already risen by 1.6°C in 50 years, which is three times the average rate of global warming (CSIRO 2007). Ocean acidification and reduced calcification is anticipated to cause increased erosion of coral reefs such as those off the islands in the Kent Group, potentially having significant consequences for the marine food chain (TPC 2009). Australia-wide nearly 20% of migratory bird species will potentially be affected through the loss of coastal habitat due to sea level rise and marine and coastal birds will also be affected in combination with coastal development (Mallon 2007). In Tasmania, this will impact on six resident shorebird species dependent on sandy beaches for breeding and at least four species of penguin that breed in low lying areas on Macquarie Island. Loss of frontline beach foredune and shrubland communities and tussock grassland will reduce breeding habitat for shearwaters, prion and little penguin, all of which have high site fidelity.

Information Sources

Plans and major publications

There are 13 statutory and draft reserve management plans covering 112 islands, containing topographical maps, title boundaries, lists of species, history of disturbances and management regulations (<http://www.parks.tas.gov.au>). There is substantial information about Tasmania's offshore islands stemming back to early field naturalists reports to present day inventories and research programs. A number of specific reports on island flora, fauna, pest incursions or other inventories have been produced, many of which are available on the DPIPWE publications database (www.dpipwe.tas.gov.au/library/Publications.htm) or in the Nature Conservation Report Series (<http://www.dpiw.tas.gov.au/inter.nsf/WebPages/LJEM-6EM25L?open#ReportList>). Key baseline references include Dixon (1996) island sites of geo-conservation significance, Harris *et al.* (2001) flora of the Furneaux islands, Brothers *et al.* (2001) seabird survey of 280 offshore islands, Parsons (2011) review of Tasmania's marine natural values, and Terauds and Stewart (2008) natural values of Macquarie Island. Tasmania's State of the Environment Reports are significant resource documents for coastal and marine habitats including changes and trends in condition over time (TPC 2009; <http://soer.justice.tas.gov.au>).

Databases

The State and Commonwealth governments maintain databases containing specific island information including the AMSA Oil Spill Response Atlas (www.amsa.gov.au/index.asp), DPIPWE Natural Values Atlas (www.naturalvaluesatlas.tas.gov.au) and internal DPIPWE databases on marine mammal surveys and strandings. The Australian Antarctic Division maintains logistic, species and environmental information on Macquarie Island including a link to publications (www.antarctica.gov.au/). 'Islandshare' is a web portal (www.islandshare.net/) providing a range of information about Tasmania's islands such as access, publications and status and this resource was created in 2012 by the Friends of the Bass Strait Islands (WILDCARE Inc.), the Tasmanian Conservation Trust and BirdLife Tasmania.

Acknowledgements

Sincere thanks to Stephen Harris, Keith Springer, Justine Shaw and Grant Dixon for editorial comments and to Andrew Smith and Christian Bell for advice on Wildcare volunteer programs. Geodata Services from DPIPWE very kindly supplied the Tasmapi.

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