

Threatened Species, Bruny Island & *you*

Managing Threatened Species & Communities on Bruny Island



Document layout: Donna Meaghan

Maps: Esmé Atkinson

Editing: Hans and Annie Wapstra, John Ashworth

Cover photos (left to right): Donna Meaghan (main), Niall Doran, Bill Wakefield, Wendy Potts, Graham Knott

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Compiled by

Dr Tonia Cochran

&

The Threatened Species Unit (DPIWE)

for the

Bruny Island Threatened Species Management Strategy
Steering Committee

September 2003

Threatened Species Unit

Department of Primary Industries, Water and Environment



Threatened Species Unit

Department of Primary Industries,
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Dr Tonia Cochran (landowner on Bruny Island, coordinator of this project and main compiler of this document);

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Margaret Steadman (Coordinator, Tasmanian Environment Centre Inc.) and chair of the steering committee;

Naomi Lawrence (Botanist) Threatened Species Unit, Department of Primary Industries, Water and Environment;

Andy Baird (Bushcare and Land for Wildlife Officer);

Sophie King (Planning Officer, Kingborough Council);

Allegra Biggs-Dale (landowner on Bruny Island);

Bernard Edwards (landowner on Bruny Island, Senior Ranger Bruny Island, Parks & Wildlife Service);

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Bruny – A sanctuary

Bruny Island is a fascinating and important place, treasured by residents and visitors alike. The value of its land and possibilities for development are being increasingly recognised, and the potential of the island is high. But the very reasons that make Bruny Island special need to be recognised before they are lost and the island becomes like everywhere else. The key to avoiding this is information – so that everyone can identify what’s special, and can find out how to better protect it within their daily work.



Photo: Threatened Species Unit, DPIWE

Natural values

Bruny Island has spectacular natural values. The coast of Bruny is stunning and varied, ranging from beautiful sandy beaches to some of Tasmania's most dramatic and imposing cliffs.

Plant-life is very diverse, ranging from coastal species designed to live in very harsh and difficult conditions, through to heathlands and wetlands long since lost or disturbed in other areas of the state, and rainforests that have survived unchanged for thousands of years. Within these plant communities dwell a wide variety of animals.

Over 140 bird species are known to either reside on or visit the island. Twelve of these birds are unique to Tasmania, while there are others that visit the island from as far away as Scandinavia, making Bruny Island a haven for bird watchers.

With almost 300km of coastline, Bruny Island is a sanctuary for a large diversity of fish, shorebirds, seals, penguins, whales and dolphins, providing a strong drawcard for visitors and tourists.

The health of the island depends on the often forgotten and enigmatic invertebrate species – such as the insects, spiders, worms, sandhoppers and shellfish. These are the unseen workers that form the backbone of our ecosystems.

Although Bruny Island shares most of its plant and animal species with mainland Tasmania, it is the stronghold for many of them. In many ways, the island is a presentation or distillation of the some of the best features of Tasmania at a smaller scale.



*Seal colony at South Bruny Island National Park:
Niall Doran & Vicki Colville*

Values under threat

All species provide interesting variety and richness to Bruny Island. From the smallest beetles to the largest trees, they also play a crucial role in keeping the ecosystems of Bruny Island working – through the turnover of soil, the breakdown of waste, the recycling of nutrients, and the distribution of essential materials throughout the food-web of the island.

Across Australia and the world, many plant and animal species are under threat of extinction. Unfortunately, Bruny Island is not immune to these problems, and many of its key species are at risk of being lost forever.

Plant species under threat include rare native orchids and eyebrights, as well as broader forest communities such as white gum. The delicate *Euphrasia fragosa* is only known from three populations, and Bruny Island has the only protected population in Tasmania.

One of Australia's rarest birds, the endangered Forty-spotted pardalote, has half of its entire population living on Bruny Island, with its largest colonies carefully protected on both reserved and private land. The endangered Swift parrot migrates from mainland Australia to south-east Tasmania to breed, and Bruny Island again provides habitat and protection that is crucial to the long-term survival of this species. Similarly, one of the few known breeding sites for the kelp gull falls within the area.

The Mt Mangana stag beetle, a species found on and named after Bruny Island's highest point, is itself under threat. Within the waters surrounding the island are a fish that walks on its fins, and a seastar that is one of the few in the world to give birth to live young: both are endangered.

The Bruny Community

People are strongly linked to Bruny Island's natural wealth, ranging from the strong spiritual ties of aboriginal culture, to the colonial harvest of whales and sea weed. Currently, the natural resources of Bruny Island still provide the basis of the island's industries, from marine aquaculture and fisheries to land-based agriculture, forestry and ecotourism. The protection of Bruny Island's natural values safeguards the resources on which these industries depend.

Although a large portion of Bruny Island is protected within National Park, the threats to these species extend beyond park borders, and conservation work cannot be successful unless the whole community supports it.

The management of threatened species is a crucial part of protecting the natural world. This does not necessarily mean dramatically changing existing land use practices, but instead incorporating better approaches within them. Successfully combining threatened species protection within land management on Bruny Island will protect the values that set Bruny aside from the rest of the world. It will also act to showcase a community working together to avoid the problems that have occurred elsewhere.

How to use this plan

This plan is designed as a compilation of information on the threatened species found on Bruny Island from the key resources and documents produced on them to date. The following sections contain detailed information on the locations and types of habitat in which each species may be found. This is designed to help you:

- Identify which threatened species or plant communities may be found in your area.
- Become familiar with the types of threats that may affect these species.
- Understand what you can do (or help with) to limit these threats, including considering changes or modifications to your current practices, both large and small.
- Spread the word to others.
- Contact the appropriate people or organisations for further information and help if needed (including providing feedback to the Steering Committee managing this plan so that it can be revised in future).

*Dr Niall Doran,
Threatened Species Unit, DPIWE*

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Introduction

The aims of this document are: (a) to list the threatened plant and animal species that occur on Bruny Island, including basic information on their biology, habitat, threats, and management; (b) to list the various plant communities which occur on the island, the threatened species which are likely to occur within them, and the principal threatening processes facing each community; and (c) to provide information on these threatening processes and detail the various ways in which these threats can be managed. Cross references between these three sections should assist both the local community and relevant Government agencies in developing an integrated approach for identifying threatened species, communities and processes on Bruny Island, and in establishing management strategies to deal with threatened species on a local, site specific and community-sensitive manner.

A draft of this document was released for public comment in 2001 and has been revised and updated to take into account the comments received.

What is a threatened species?

A plant or animal species is described as threatened if it is at risk of becoming extinct. Plants and animals become threatened through a range of factors that may be natural or human-induced. For example, a species may be threatened by fire, flood or disease, or by land clearing. Since European settlement, Tasmania has undergone profound changes in the abundance and distribution of numerous plant and animal species. Currently, over 600 Tasmanian plant and animal species are listed as being threatened.

Threatened species are protected under Tasmania's *Threatened Species Protection Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The Tasmanian *Threatened Species Protection Act 1995* provides for the protection and management of Tasmania's threatened flora and fauna. The Act provides for a number of instruments to conserve threatened species. These include the preparation and implementation of the Threatened Species Strategy, determination of critical habitat and agreed protocols for the management of threatened species, the imposition of interim protection orders, the preparation of recovery plans, listing statements and threat abatement plans and the production of land management plans and agreements.

Threatened species are categorised into three classes under the Act depending on the level of threat facing them. These are:

- (i) Endangered – species in danger of extinction because long-term survival is unlikely while the factors causing them to be endangered continue operating. Species within this category may be “presumed extinct” if they have not been sighted or recorded within the past 50 years;**
- (ii) Vulnerable - species which are likely to become endangered/extinct while the factors that are causing them to be listed as vulnerable continue operating; and**
- (iii) Rare - species that have a small population or distribution in Tasmania that is not endangered or vulnerable but is at risk.**

Species that are “presumed extinct” are included on threatened species lists as there is a chance that they may be rediscovered. The most well-known of the animal extinctions are the Thylacine (*Thylacinus cynocephalus*), King Island emu (*Dromaius minor*) and Macquarie Island parakeet (*Cyanoramphus novaezelandiae erythrotis*).

Extinctions in plants include the Pasley fern (*Botrychium australe*) and Brown guinea flower (*Hibbertia rufa*). The Giant New Holland daisy (*Vittadinia megacephala*) is an example of a species that has recently been rediscovered after being presumed extinct. Extinctions in Tasmania include one species of mammal, four species of birds, four species of invertebrates and twenty-five species of plants (Schedule 3.2, *Threatened Species Protection Act 1995*).

The responsibility for listing species on the *Threatened Species Protection Act 1995* rests with the Minister of the Department of Primary Industries, Water and Environment (DPIWE). The Minister is advised in his/her decision by a Scientific Advisory Committee that has published guidelines for listing species on the Act. The guidelines include the total number of individuals of the species, whether that number is declining, and how many populations of the species exist (whether all known individuals are found in a single population or in many populations scattered over a broad area). The circumstances under which species exist will change with time, so that a species can become more or less at risk of extinction. Therefore, it is possible for a threatened species to be “de-listed” (taken off the threatened species list), or for its threatened status to be changed (for example from rare to vulnerable). Any person may nominate flora or fauna that they consider should be added to or removed from the Act.

Threatened species lists and guidelines for listing species can be obtained from the Threatened Species Unit, DPIWE and on the World Wide Web at <http://www.dpiwe.tas.gov.au>

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is similar to the Tasmanian *Threatened Species Protection Act 1995*, except that it is administered by the Commonwealth Government. The Commonwealth Act assesses species on their status across Australia as a whole; the Tasmanian Act assesses status in Tasmania alone. All States and Territories must comply with this Act. It provides for the identification of key threatening process and the protection of critical habitat; the preparation of recovery plans, threat abatement plans, wildlife conservation plans, bioregional plans and conservation agreements; conservation orders and the regulation of imports and exports relating to flora and fauna, including permits.

Similar to the Tasmanian *Threatened Species Protection Act 1995*, the Commonwealth Act categorises threatened species into classes depending on the level of threat facing them. The Tasmanian threatened species category of Rare is not included in the Commonwealth Act. However, the act recognises two additional categories, Extinct in the wild and Critically endangered.

(i) Extinct in the wild: Species that can not be found living in the wild despite exhaustive surveys, but is still known to exist in captivity.

(ii) Critically endangered: Species that are in extreme danger of becoming extinct in the immediate future.

Further information on this Commonwealth legislation can be found on the World Wide Web at <http://www.erin.gov.au/epbc/index.html>

The importance of Bruny Island to the survival of threatened species

Bruny Island is in many ways a microcosm of Tasmania. Most of the major Tasmanian ecosystems are represented on the island, including wetlands, heathlands, wet and dry sclerophyll (eucalypt) forest and woodlands, temperate rainforest and coastal and marine environments. The only ecosystem that is absent is true alpine vegetation. This floral diversity, combined with its isolation from the Tasmanian mainland, has resulted in a very rich, diverse and abundant animal and plant life. Approximately forty species of threatened plant and animal species have thus far been recorded on Bruny Island, it is the stronghold for several threatened species such as the Mt Mangana stag beetle, the Forty-spotted pardalote and the seastar *Smilasterias tasmaniae*. The locations of threatened species that have been recorded from Bruny Island are shown on Maps 1 and 2 (Appendix 7 and 8). The distribution of threatened species encompasses several land tenures, including private property, Crown land, and a range of public and private reserves such as roadside and coastal reserves, State Reserves and the South Bruny National Park. It is of course possible that more threatened species will be found on Bruny Island as a result of further study.

Key habitats

This plan describes habitat features and distributional information important to the survival of threatened species on Bruny Island. However, the plan covers Bruny Island only, while all of the listed species extend into other regions in Tasmania. Additional areas of key habitats are not identified beyond the region covered by this plan, but can be found in the specific Recovery Plans for the species involved.

Threatened species and landowners

Many landowners have been concerned that the presence of threatened species on their property would reduce their ability to work the land or even result in the compulsory acquisition of their land. The Tasmanian *Threatened Species Protection Act 1995* contains some provisions that can be used to protect a listed species, but does not include compulsory land acquisition. In most cases, the conservation and management of threatened species is achieved by undertaking a cooperative approach with landowners that may involve negotiations to produce management agreements. The intention of these agreements is to effectively integrate the conservation of listed species within the overall land management practices of the property. In many cases, the habitat of the threatened species is localised and only small areas need to be specially managed in order to conserve the species. In most cases the threatened species has co-existed with the existing management regime - otherwise it would have become extinct at that site. Therefore, it is often only necessary to modify rather than significantly change current management practices. For example, in some cases stock may need to be excluded from an area for a short period in late spring and early summer while a threatened plant species flowers and sets seed in order to allow its regeneration and survival. This does not necessarily mean fencing off a whole paddock or bush run, as electric or temporary fencing can be effectively used to protect a specified patch of land.

Threatened species on Bruny Island

The following section lists those threatened species that have been formally recorded on Bruny Island in databases such as GTSpot (DPIWE), Roadside Environmental Database (Department of Infrastructure, Energy and Resources) and Tasmanian Herbarium records, as well as results of various surveys conducted by other organisations such as the University of Tasmania. Only species that are regularly found on the island (ie. excluding occasional visitors or vagrants) are considered in detail. The treatment for each species includes the current listing status (Commonwealth and Tasmanian Acts), relevant information on each species with particular reference to Bruny Island, key habitats, threats, and prescribed management procedures.

Threatened species that are only very occasionally found on Bruny Island (ie. vagrants) are listed separately in Table 4. A list of endemic Tasmanian bird species found on Bruny Island and a list of bird species found on Bruny Island which are considered uncommon, require monitoring or are insufficiently known (Vertebrate Advisory Group 1994) are given in Appendices 2 and 3, respectively. A list of endemic Tasmanian plants found on Bruny Island, and a list of other species of flora considered in the "Forest Botany Module 6. D'Entrecasteaux Region" (Forest Practices Board 2000b) to have a high priority for conservation are given in Appendices 4 and 5, respectively.

**Table 1 Summary of species on Bruny Island that are listed on the Tasmanian
Threatened Species Protection Act 1995 (as of September 2003)**

	ENDANGERED	VULNERABLE	RARE	TOTAL
FAUNA				
Mammals	3	-	1	4
Birds	5	-	1	6
Reptiles	-	1	-	1
Fish	1	1	-	2
Invertebrates	1	1	1	3
Sub-total	10	3	3	16
FLORA				
Dicotyledons	1	3	9	13
Monocotyledons	2	-	7	9
Ferns	-	1	-	1
Sub-total	3	4	16	23
TOTAL	12	7	19	39

Table 2 Summary of species on Bruny Island that are listed on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (as of September 2003)

	CRITICALLY ENDANGERED	ENDANGERED	VULNERABLE	TOTAL
FAUNA				
Mammals	-	1	2	3
Birds	-	3	-	3
Reptiles	-	-	1	1
Fish	-	1	1	2
Invertebrates	-	-	-	-
Sub-total	0	5	3	9
FLORA				
Dicotyledons	1	1	-	2
Monocotyledons	2	-	-	2
Ferns	-	-	-	-
Sub-total	3	1	0	4
TOTAL	3	6	4	13

THREATENED FAUNA

There are 16 fauna species recorded from Bruny Island that are currently listed on the schedules of the Tasmanian *Threatened Species Protection Act 1995*, while nine species are listed in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. At the time of this publication the White-bellied sea eagle had been nominated for listing under the Tasmanian *Threatened Species Protection Act 1995* and had been given a preliminary listing of Vulnerable. This listing is subject to review and will be finalised before the end of 2003. The following table summarises the threatened fauna species recorded on Bruny Island. For more detailed information on specific management prescriptions for individual threatened species please contact the Threatened Species Unit, DPIWE.

Table 3 Summary of the threatened fauna recorded on Bruny Island

Species	Common name	TSPA Act status	EPBC Act status
<i>Arctocephalus forsteri</i>	New Zealand fur seal	Rare	Not listed
<i>Mirounga leonina</i>	Southern elephant seal	Endangered	Vulnerable
<i>Eubalaena australis</i>	Southern right whale	Endangered	Endangered
<i>Megaptera novaeangliae</i>	Humpback whale	Endangered	Vulnerable
<i>Aquila audax fleayi</i>	Wedge-tailed eagle	Endangered	Endangered
<i>Haliaeetus leucogaster</i>	White-bellied sea eagle	Nominated	Migratory - listed under CAMBA
<i>Tyto novaehollandiae castanops</i>	Masked owl	Endangered	Not listed
<i>Accipiter novaehollandiae</i>	Grey goshawk	Endangered	Not listed
<i>Lathamus discolor</i>	Swift parrot	Endangered	Endangered
<i>Pardalotus quadragintus</i>	Forty -spotted pardalote	Endangered	Endangered
<i>Sterna nereis</i>	Fairy tern	Rare	Not listed
<i>Dermodochelys coriacea</i>	Leatherback turtle	Vulnerable	Vulnerable
<i>Brachionichthys hirsutus</i>	Spotted handfish	Endangered	Endangered
<i>Carcharodon carcharias</i>	Great white shark	Vulnerable	Not listed
<i>Lissotes menalcas</i>	Mt Mangana stag beetle	Vulnerable	Not listed
<i>Patiriella vivipara</i>	Live-bearing seastar	Endangered	Not listed
<i>Smilasterias tasmaniae</i>	Seastar	Rare	Not listed



VERTEBRATES

MAMMALS

NEW ZEALAND FUR SEAL *Arctocephalus forsteri*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: not listed
Tasmanian *Threatened Species Protection Act 1995*: Rare

Description and distribution:

This species occurs in Western Australian, South Australian, Tasmanian and New Zealand waters. In Tasmania, it breeds off the south coast on Maatsuyker, Walker and Little Witch islands. Breeding colonies are located in small boulder coves and around caves and crevices. This species hauls-out (comes ashore to rest) at numerous islands and shores around the coast, but mainly in the south-western region and on subantarctic Macquarie Island. Breeding and haul-out areas are occupied all year round. The number of seals present at breeding sites is highest during December and January, and highest at haul-out sites during autumn and winter (Bryant & Jackson 1999). This species has been recorded at Cape Queen Elizabeth and possibly also occurs in association with the Australian fur seal at The Friars near Bruny Island (see Map 1).

Key habitat:

Small boulder coves and around caves and crevices on islands and coastlines.

Key threats to the species:

- Deliberate persecution, especially shooting.
- Entanglement and drowning in trawl and gill nets, bait box straps and other fisheries related material.
- Marine pollution, including oil spills and chemical contaminants, which can cause death or disease.
- Death from ingestion of marine debris, especially plastics.

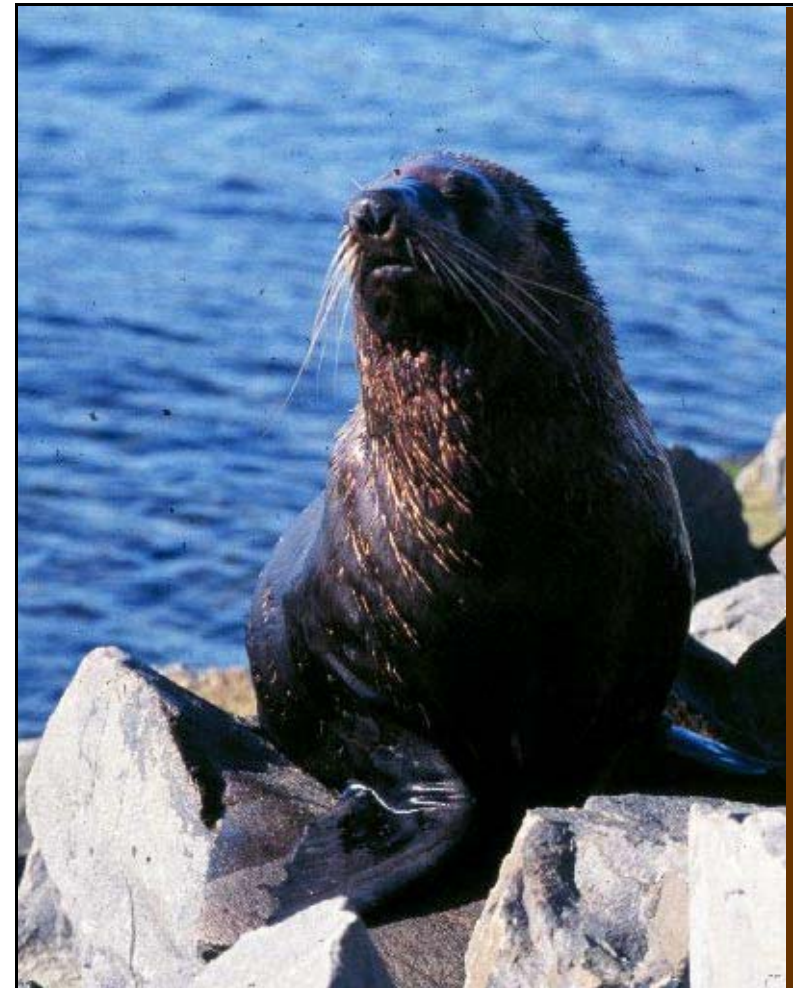


Photo: Graham Knott

- Human disturbance to breeding colonies.
- Depletion of food stocks by overfishing.

Management:

- Stop litter (especially fishing nets or plastics) entering the sea.
- Reduce toxic waste or chemical pollution entering marine waters.
- Do not approach within 200m of haul-outs if circumnavigating or anchor within 100m of haul-outs between mid-October and mid-January (100m and 50m respectively for the remainder of the year). Do not walk on or swim near haul-outs.
- Develop and implement effective mitigation measures to eliminate seal bycatch in fisheries operations, especially trawl and aquaculture fisheries.
- Continue assessment of population numbers and trends.
- Develop and implement appropriate measures to minimise the direct interactions between fur seals and fin-fish aquaculture operators (eg. effective barriers at farms).
- Improve understanding of management needs and techniques.

SOUTHERN ELEPHANT SEAL *Mirounga leonina*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Vulnerable
Tasmanian *Threatened Species Protection Act 1995*: Endangered

Description and Distribution:

The Southern elephant seal inhabits extensive areas of the Southern Ocean. In Australian waters it breeds, moults and hauls out mainly on Macquarie and Heard islands, but individuals range widely and occasionally reach Tasmanian and mainland coasts. Locally, pups have been recorded as being born on Maatsuyker Island on several occasions, as well as on the beaches of East Coast Tasmania, including Bruny Island.

Southern elephant seals breed from September to early November, with the single pup being suckled for 3-4 weeks. After weaning they fast for about seven weeks, before heading for sea. After breeding, adults remain at sea to accumulate reserves to survive the 30 days that they spend ashore during the annual moult between the months of December and February.

Key habitat:

Beaches and coves on islands and coastlines.

Key threats to the species:

- Deliberate persecution, including bashing and shooting
- Interactions with fishing operations, including entanglement and drowning in fishing gear, including trawl, longlines and aquaculture nets.
- Human disturbance when breeding or hauled out, including tourism and research impacts.
- Marine pollution, including marine debris.
- Marine pollution, including oil and chemical contaminants.

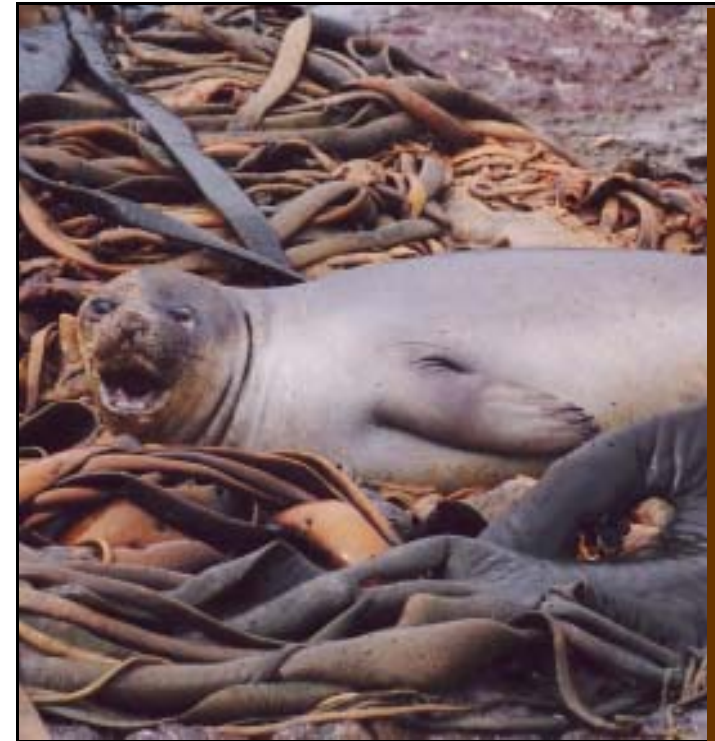


Photo: Nicki Chilcott

Management:

- Reduce levels of marine pollution, including fishing equipment and plastics
- Minimise human disturbance when seals are ashore
- Mitigate interactions of seals with fishing operations and equipment.
- Continue assessment of population numbers and trends.

SOUTHERN RIGHT WHALE *Eubalaena australis*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Endangered
 Tasmanian *Threatened Species Protection Act 1995*: Endangered

HUMPBACK WHALE *Megaptera novaeangliae*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Vulnerable
 Tasmanian *Threatened Species Protection Act 1995*: Endangered

Description and distribution:

Southern right whales have a circumpolar distribution in southern oceans in both cold and warm temperate regions. They occur off the Tasmanian coastline during autumn and winter and are sometimes seen in family groups or in pairs with small calves. This species occasionally gives birth in the warmer, shallower waters of Tasmania. They spend the summer in the Southern Ocean feeding on krill. It is an occasional visitor to Adventure Bay (Map 1). In April 1993 four Southern right whales were sighted approximately 100m offshore from the Neck at Adventure Bay (Allegra Briggs-Dale, personal communication).

Humpback whales are widely distributed in all oceans. These whales spend the summer in Antarctic waters before migrating to warmer waters in winter to breed. Like the Southern right whale, this species is also a occasional visitor to Bruny Island.

Key habitat:

Oceanic, but closer to shore during their migration route.

Key threats to the species:

- Human disturbance and harassment eg. acoustic interference, inappropriately managed ecotourism.
- Entanglement in trawl nets, gill nets, fishing gear or other debris.



Photo: Aleks Terauds

- Collision with oceanic vessels.
- Marine pollution such as oil spills.
- Depletion of food stocks through fisheries operations, especially potentially unsustainable harvest of krill.
- Several historic whaling stations are present on Bruny Island. During the early 1800's whale hunting poised a key threat, causing a dramatic population crash, from which the species is still recovering.

Management:

- Observe whale watching protocols as described in ANZECC Australian National Guidelines for Cetacean Observation and Areas for Special Interest in Cetacean Observation (2000).
- Stop litter (especially fishing nets or plastics) entering the sea.
- Reduce toxic waste or chemical pollution entering marine waters.

BIRDS

WEDGE-TAILED EAGLE *Aquila audax fleayi*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Endangered
 Tasmanian *Threatened Species Protection Act 1995*: Endangered.
 Recovery Plan: Bell & Mooney (1998).

Description and distribution:

The population size of this Tasmanian sub-species is estimated at less than 1000 individuals, including about 95 breeding pairs, which occupy approximately 220 territories throughout Tasmania (Bell & Mooney 1998). Large nests constructed of sticks are built in emergent trees in old-growth eucalypt forest greater than 10ha in size, usually on slopes sheltered from prevailing winds (Bell & Mooney 1998). Territories contain up to 5 alternative nests, which are usually constructed within 200m of each other, although one is favoured for breeding, and is generally re-used every year until breeding fails (Mooney & Holdsworth 1991; Bell & Mooney 1998). Wedge-tailed eagles breed from August to January and are very sensitive to disturbance whilst breeding. If disturbed they are likely to desert a nest either permanently or until the eggs or chicks perish from the cold or predation (Bryant and Jackson 1999).

Wedge-tailed eagles and White-bellied sea eagles (*Haliaeetus leucogaster*) can occur in the same areas and intense competition for nest sites has been recorded (Terry & Wiersma 1996). This behaviour appears to be increasing as options for nesting sites decrease. Wedge-tailed eagles are usually dominant in such encounters but may still not breed if disturbed. Hence, in such situations, the breeding success of both species is affected.

Wedge-tailed eagles hunt over a wide range of habitats, including forest, pasture, heath and grasslands. Their main food items are rabbits, hares, wallabies, possums and carrion from paddocks and roadsides (Bryant & Jackson 1999). Losses of lambs to eagles are very low, and substantial research indicates that mainly sick or dead stock are taken (Rowley 1970; Parks & Wildlife Service 1997). Surveys of neonatal lamb mortality have shown that neither disease nor predation is responsible for most of the losses and that almost half of lamb mortality is caused by starvation (Rowley 1970). In an extensive study by CSIRO on the mainland, the main diet of Wedge-tailed eagles in lambing districts during the lambing season was rabbit. During this study lamb was rarely taken (Leopold & Wolfe 1970). Similar figures have been reported elsewhere in the country.

Up to four pairs of Wedge-tailed eagles are believed to occur on Bruny Island, although only two nests have been recorded (one on Mount Cook and one at Variety Bay; see Map 1). Breeding success varies with climatic conditions from none to (rarely) two chicks per year (Nick Mooney, personal communication). Two fledglings were recorded in the nest at Variety Bay in the 2000 season (Bill Brown, personal communication). Nick



Photo: Dave Watts

Mooney, Bernard Edwards, Andrew Kirkley and Tonia Cochran made an unsuccessful search for the nest on Mount Cook on 2 June 1998. There is no data to verify nesting activity at this site and it is thought that this nest is no longer active (Nick Mooney, personal communication). However, inactive nests may subsequently be re-occupied and so even deserted nests should be conserved (Mooney & Holdsworth 1991).

Key habitat:

Nesting habitat comprising old-growth eucalypt forest greater than 10ha in size, usually located on slopes sheltered from prevailing winds (Mooney & Holdsworth 1991, Bell & Mooney 1998).

Key threats to the species:

- Loss and disturbance of nesting habitat through land clearance (eg. agriculture, forestry, urban and rural development).
- Fragmentation of habitat (eg. subdivisions and inappropriate road placements).
- Loss or desertion of young due to disturbances to eagles at breeding time (August to January).
- Persecution by shooting or poisoning.
- Felling and natural loss of trees containing nests (both active and inactive).
- Human-related accidents such as electrocution on power lines, collisions with wires, fences or vehicles.

Management:

Protection of existing nests by:

- Retention of a buffer zone of a minimum size of 10ha of undisturbed old-growth eucalypt forest around any nest site (equivalent to a circle of about 350m diameter or an oval of 400 x 300m). More protection on the uphill side of the nest is important for shelter from prevailing winds.
- Protection from hot or frequent fires or any disturbance to nest tree or canopy.
- During the breeding season (August to January) prevent any mechanical or human activity within 500m of a nest site (or 1km if in line of sight of the nest)
- Aim for long term protection of nest sites (eg. management agreement or covenant).

Further protection of the species by:

- Taking care with farm chemicals. The use of agricultural chemicals to poison wildlife often kills eagles and other birds of prey as there is little control over which animals take baits or feed on poisoned carcasses.
- Take care with the use of poisons such as Pindone, which though legal for poisoning wildlife and rabbits, often kills eagles and other birds of prey by secondary poisoning.
- Effective management of stock on farmland. Stock losses to predators are often associated with animal health problems and are very rarely caused by eagles.
- Ensuring that shooters are aware that this species is wholly protected by law.
- Retaining large tracts of undisturbed forest in areas that may be favourable for nesting in the future.
- Not felling large trees or dead stags as these are often important nesting, lookout or roosting sites.

WHITE-BELLIED SEA-EAGLE *Haliaeetus leucogaster*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: listed as a migratory bird covered by an international agreement (CAMBA).

Tasmanian *Threatened Species Protection Act 1995*: Preliminary listing as Vulnerable, currently under review.

Description and distribution:

This widespread species occurs from Western India to South China and South-east Asia to Australia, including Tasmania and its offshore islands (Mooney 1987; Marchant & Higgins 1993). The species inhabits a range of coastal environments, including rivers, lakes and estuaries (Thurstans 1998, Turner & Thurstans 2000).

While the status of some populations appears stable, populations in areas such as Tasmania and Victoria are believed to have declined in recent times (Thurstans 1998). There are approximately only 100 breeding pairs occurring in Tasmania (Mooney 1987). The White-bellied sea eagle has similar requirements to those of the Wedge-tailed eagle, and the two species sometimes compete for nests (see notes for Wedge-tailed eagle: Terry & Wiersma 1996). Large nests constructed of sticks are usually built in tall trees and the breeding season is from July/August to December.

The White-bellied sea eagle is a territorial species, and territories are usually at least 4km apart (Mooney 1987). Food availability is thought to be the main requirement of a successful breeding territory, which accounts for the disproportionate number of nests near open water bodies (Williams 1997). Territories can be in the form of a T-shape if they include a combination of coastline and riverbanks (Thurstans 1998). Similar to the Wedge-tailed eagle, each territory may have a number of nests, although only one is used each season for breeding. In south-eastern Tasmania, White-bellied sea eagles select sites with high tree densities (Thurstans 1998). Availability of suitable and undisturbed habitat, which includes adequately sized patches of forest containing large, old-growth trees is of primary importance to the long term viability of White-bellied sea eagle populations (Olsen 1995).

Although this species is slightly more disturbance-tolerant than the Wedge-tailed eagle, human activity near the nest can lead to abandonment of eggs and young chicks, particularly early in the breeding season (August and September: Mooney 1987, Turner & Thurstans 2000).

The use of GIS (Geographical Information System) for modelling potential habitat and suitable nesting sites has proven to be successful in identifying new White-bellied sea eagles nests in southeastern Tasmania (Thurstans 1998). Up to 20 pairs of this species are thought to occur on Bruny Island (Nick Mooney, personal communication), and this high density is a good indicator of food availability in the area, combined with the



Photo: W. E. Brown

length of coastline available for foraging. Main food items are fish and birds, which are snatched from the water surface, although lizards, small mammals and carrion are also taken and eaten on land (Bryant & Jackson 1999). Thirteen White-bellied sea-eagle nests have been recorded on Bruny Island (see Map 1). Seven of these nests are not currently in use and there is no data for three other nests. In a search in 1997, a nest at Snake Bay was found to have disappeared. Two fledglings were recorded at each of two nests (Simpsons and Oak Points) in the 2000 breeding season (Allegra & Adrian Dale, personal communication).

Key habitat:

Forest areas of greater than 10ha containing large, old growth trees usually within 5km of open water.

Key threats to the species:

Similar to those of Wedge-tailed eagles. Additional threats are:

- Oil spills which cause feather damage.
- Poisoning or reduction of food stocks.
- Disturbance through recreational pursuits in marine, estuarine and freshwater environments near nesting sites.
- Entanglement in fishing nets.
- Fish offal waste pits (oiling and entanglement).

Management:

In general, management requirements are similar to those for Wedge-tailed eagles (Bryant & Jackson 1999). Human disturbance can be further reduced by:

- Restricting activity in the vicinity of the nest during the breeding season, from July/August to December (Thurstans 1998).
- Ensure that sea-eagles cannot access fish offal waste pits.

MASKED OWL Tyto novaehollandiae castanops

Current Status

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: not listed
 Tasmanian *Threatened Species Protection Act 1995*: Endangered
 Listing Statement: Threatened Species Unit (2003)

Description and distribution:

The Masked owl is a largish bird with dark upper features and facial disc, chestnut shading around the eyes, fully feathered legs and powerful feet. *Tyto novaehollandiae castanops* is an endemic subspecies and has been recorded throughout Tasmania. Most records are from lowland, dry sclerophyll forest and woodland, in the south-east and central north of the state. It has also been recorded in other habitats including wet eucalypt forest, scrub and urban environments. Preferred habitat is close to the forest edge and where there is a complex mosaic of understorey species (Bell *et al.* 2002). Masked owls nest in large hollows in mature (>150 years old) eucalypts, primarily white gum (Mooney 1997). The principal food items are introduced rodents and rabbits on agricultural land, and marsupials and native birds in less disturbed habitats (Mooney 1993). Bell *et al.* (2002) estimate the number of Masked owls in Tasmania to be in the range of 200-400 pairs. A nest site recorded at Moorina Bay on Bruny Island is an old record and may no longer be in use (Tonia Cochran & Gerry Reid August 2000, personal observation). The Masked owl is a very enigmatic and secretive species and could appear anywhere on Bruny Island.

Key habitat:

The Masked owl occurs in dry forest and woodland on the coastal and sub-coastal lowlands in the north, north-east, east and south-east (Bell *et al.* 2002). Clearance of these dry forests and woodlands has been particularly extensive since European settlement. While Masked owls do occur outside lowland dry forest/woodland habitats, densities are extremely low in wet forest and at higher altitudes (Bell *et al.* 2002). The Masked owl requires old growth forest eg. tree hollows for nesting.

Key threats to the species:

- Any type of land clearance that results in the loss of old-growth dry eucalypt forest (eg. commercial timber harvesting, tree felling for firewood, construction of dams, subdivisions etc.).
- Remnant old-growth trees in a modified landscape of native forest and agricultural land are typically old and fragile, and natural attrition of these trees will lead to a loss of nesting habitat.
- Competition for nest hollows by feral honeybees, starlings and other introduced species.



Photo: W. E. Brown

- Deaths from collisions with vehicles, fences or power poles and electrocution on powerlines.

Management:

- Undertake surveys to identify roost and nest sites.
- Protect roost and nest sites preferability with adequate buffers (minimum of 10ha of intact forest surrounding the site).
- Protect nest sites with long-term agreements (eg. management agreement or covenant).
- Retain old growth trees, including those with hollows, and those likely to develop hollows in the future.

GREY GOSHAWK *Accipiter novaehollandiae*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: not listed
 Tasmanian *Threatened Species Protection Act 1995*: Endangered

Description and distribution:

Only the pure white form of the Grey goshawk occurs in Tasmania. This species hunts and nests in all types of wet forests, including rainforest, mixed eucalypt forest and blackwood swamps. Most nest sites occur in wet old growth forest or regrowth more than 50 years old that usually contains blackwoods (*Acacia melanoxylon*). Blackwood is the preferred nest tree of this species, and preferred nest sites are usually adjacent to a watercourse or in swamp forest (Brereton & Mooney 1994). Swamp forest dominated by blackwood has been heavily cleared and drained for agricultural purposes and is inadequately reserved (Bryant & Jackson 1999). Less than 110 breeding pairs occur in Tasmania (Mooney & Holdsworth 1988). Nests are always in intact forest greater than 5ha in area. The same nest site is not necessarily used each year. Breeding usually starts in September/October (Brereton & Mooney 1994), eggs are laid in early November and young have left the nest by February (Mooney 1987). Female Grey goshawks eat mainly rodents, ringtail possums, rabbits and birds such as rosellas, while the much smaller male eats small birds, rodents and insects (Bryant & Jackson 1999). Carrion from paddocks and roadsides is also eaten, and juveniles will sometimes harass domestic poultry or aviary birds. There are believed to be about 3-4 pairs of Grey goshawk on south Bruny Island (Nick Mooney, personal communication), and most sightings have been recorded near Adventure Bay and "Inala" near Cloudy Bay. No nests have been recorded on Bruny Island, and there is little information on habitat use and breeding activity of this species in the south of Tasmanian (Brereton & Mooney 1994).

Key habitat:

All types of wet forest, including rainforest, mixed eucalypt forest and blackwood swamps. Most nest sites occur in wet old growth forest or regrowth more than 50 years old that usually contains blackwoods, which is the preferred nest tree of this species, and preferred nest sites are usually adjacent to a watercourse or in swamp forest.



Photo: C Baars

Key threats to the species:

- Clearing and fragmentation of old growth wet forests for agriculture and tree plantations (especially blackwood swamps and streamside forest).
- Deliberate persecution (shooting and trapping).
- Accidental death from poisoning, electrocution and collision.

Management:

- Retain and protect prime Grey goshawk habitat from disturbance and degradation i.e. native wet forest, particularly along gullies and areas containing blackwoods.
- Protect nest sites with long-term agreements (eg. management agreement or covenant).
- Prevent disturbance within 100m around active nest sites until the young have fledged (eg. between early November and late January).
- Link corridors of wet forest, targeting gullies and watercourses, to increase foraging and breeding areas.
- Protect poultry and caged birds with housing that includes wire netting on the roof and a double layer of mesh placed approximately 5cm apart on aviaries.

SWIFT PARROT *Lathamus discolor*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Endangered

Tasmanian *Threatened Species Protection Act 1995*: Endangered

Recovery Plan: Swift Parrot Recovery Team (2001).

Notesheet: Parks and Wildlife Service (1996)

Description and distribution:

Swift parrots migrate between the south-eastern part of mainland Australia and Tasmania. They arrive in Tasmania in August and September to breed, before returning to mainland Australia in February and March (Bryant & Jackson 1999). The migratory route is generally down the eastern coastline of Tasmania in a narrow coastal band that usually extends no more than 10km inland. Swift parrots feed on nectar and target the large flowers of the blue gum (*Eucalyptus globulus*) during the breeding season. The flowering of blue gums triggers reproduction in the Swift parrot, which is the reason for its migration to Tasmania. The nectar from black gum (*Eucalyptus ovata*) is also an important food resource early in the breeding season and in years when flowering of blue gums is poor (Brown 1989, Brereton *et. al.* 1997). Swift parrots nest in tree hollows, usually on upper slopes and ridges in dry eucalypt forest within 10km of the coast (Bryant & Jackson 1999). At the end of the breeding season, the entire population begins its northward migration by travelling up the western half of Tasmania and feeding in flowering forest and woodland *en route*. The total population of this species in Tasmania is estimated at approximately 1000 breeding pairs. Adventure Bay and Cloudy Bay on south Bruny Island have been identified as two of the key sites for this species in Tasmania (Bryant & Jackson 1999). The most important breeding sites on Bruny Island occur around Dennes Hill, Barnes Bay and especially Roberts Hill (see Map 1).

Key habitat:

Forest containing flowering eucalypts, especially grassy blue gum (*Eucalyptus globulus*) forest and shrubby black gum (*Eucalyptus ovata*) forest. This species nests in tree hollows, usually on upper slopes and ridges in dry eucalypt forest within 10km of the coast (Bryant & Jackson 1999).



Photo: Dave Watts

Key threats to the species:

- Loss of mature blue and black gums (both forest and isolated trees) which reduces the food supply and thus breeding success of the Swift parrot.
- Habitat loss and fragmentation through land clearance for agriculture, plantations, and urban and coastal developments.
- Loss of old growth forest, which reduces availability of nesting hollows for breeding and a reduction in available food sources.
- Collisions with cars, windows, fences or other structures.
- Competition for nectar with introduced bumblebees.

Management:

- Retain grassy blue gum forest and shrubby black gum forest, particularly mature and old-growth stands.
- Rehabilitate habitat by allowing regeneration and undertaking revegetation programs.
- Protect nest sites as undisturbed patches of forest.
- Retain trees with hollows, both alive and dead. Only trees without hollows should be removed when collecting firewood.
- Protect grassy blue gum forest and shrubby black gum forest and nest sites with long term agreements (eg. management agreement or covenant).
- Reduce the risk of bird strikes and collision with man-made structures in the flight path of Swift parrots. Guidelines for reducing the risk of collisions may be found in Bryant & Jackson (1999) and in information leaflets available from the Nature Conservation Branch, DPIWE.

FORTY-SPOTTED PARDALOTE *Pardalotus quadragintus*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Endangered

Tasmanian *Threatened Species Protection Act 1995*: Endangered

Recovery Plan: Forty-spotted pardalote Recovery Team (in prep).

Listing Statement: Threatened Species Unit (1998).

Description and distribution:

The Forty-spotted pardalote is endemic to Tasmania, and is reliant on one species of eucalypt, the white gum (*Eucalyptus viminalis*) for its survival. This species feeds on small insects and manna (a sugary substance produced by the tree). Pairs become sedentary and territorial, and form colonies of varying sizes. The main breeding areas for this species are on Flinders, Maria and Bruny islands, Howden and Tinderbox Peninsula, with small colonies also occurring at Coningham, Huntingfield and the Tarroona Hills. The colony at Lime Bay on the Tasman Peninsula is now thought to be extinct, as there have been no sightings in this area since the late 1980s. More than half of the original area of white gum forest and woodland has been cleared or severely degraded (Bryant & Jackson 1999), thus further reducing the available habitat for the Forty-spotted pardalote.

Bruny Island has been identified as a key area for the Forty-spotted pardalote, as over half of the total population is found in approximately 70 colonies throughout the island (Bryant, 1991). Dennes Hill State Reserve on north Bruny Island was declared specifically to protect this species and contains the largest known breeding colony (about 250 birds). Other priority colonies on Bruny Island include Roberts Hill, Waterview Hill, Lodge Hill, McCrackens Gully, Pybus Hill and "Inala" near Cloudy Bay (Bryant & Jackson 1999). Further information on this species, together with the locations of colonies on Bruny Island, can be found in Brown (1986) and the Forty-spotted pardalote Recovery Plan (in preparation).



Photo: Bill Wakefield

Key habitat:

The Forty-spotted pardalote is naturally restricted to dry grassy forest and woodland containing white gum along the east coast of Tasmania, on headlands, peninsulas and nearby islands (Bryant & Jackson 1999).

Key threats to the species:

- Removal of mature white gum (even single trees) or disturbance of any trees in or near colonies.
- Loss of nesting hollows through felling mature timber and firewood collection.
- Potential competition and displacement by aggressive birds such as kookaburras and noisy miners.

Management:

- Retain white gum habitat (either living or dead, single trees or large stands).
- Rehabilitate habitat by allowing regeneration (control stock grazing) and undertake revegetation with white gums (seedlings are provided free of charge for this purpose; contact Parks and Wildlife Service for more information).
- Limit the collection and cutting of firewood in or near colonies. Limbs and logs with nesting cavities are essential for nesting and take at least 50-80 years to form.
- Protect white gum habitat with long term agreements (eg. management agreement or covenant).
- Reduce fuel loads and the risk of fire destroying nest sites and canopies of habitat trees by cool patchwork burning on a 10-14 year interval. Do not undertake burning without advice from DPIWE or Parks and Wildlife Service. More frequent burning will lead to habitat degradation, which favours more aggressive birds.
- Any grassy dry forest and woodland containing white gum should be retained within a 3km radius of a known Forty-spotted pardalote colony, as this represents possible future expansion of the species (Brereton *et. al* 1997).

FAIRY TERN *Sterna nereis*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: not listed
 Tasmanian *Threatened Species Protection Act 1995*: Rare

Description and distribution:

This species nests above the high water mark on sheltered beaches, sand spits and bars, banks and ridges usually of sand, but sometimes of shell-grit or coral and often within estuaries and embankments (Higgins & Davies 1996). The nest may occur in bare exposed areas near low shrubs, tussocks or amongst low succulent coastal vegetation such as *Sarcocornia* (glasswort) and *Carpobrotus* (pig-face), or amongst beach cast seaweed (Higgins & Davies 1996). The nest consists of a scrape in the substrate, sometimes beside driftwood or other debris on the lee side, and the species may nest with other birds such as the Pied oystercatcher, Red-capped and Hooded plovers. Fairy terns normally forage alone or in small groups close inshore over sheltered waters, but can range offshore over the continental shelf (Higgins & Davies 1996). Locations on Bruny Island such as Adventure Bay, The Neck, Wares Point and Cloudy Bay provide important habitat for this species (Bryant and Jackson 1999, Bryant 2002: see Map 1).

Key habitat:

The Fairy tern occurs on sheltered coasts, including harbours, inlets, bays, estuaries, lagoons and ocean beaches from the Western Australian to Victorian and Tasmanian coastlines.

Key threats to the species:

- Disturbance and destruction of nests and nesting habitat (including steep and peaty slopes on islands), especially through trampling by vehicles, quad bikes, people, dogs and horses.
- Destruction of nesting habitat through encroaching development, clearing, grazing by stock or rabbits and frequent firing.
- Introduction and spread of exotic weed species such as *Euphorbia paralias* (sea spurge), and the extensive use of Marram grass (*Ammophila arenaria*) for dune stabilisation, making dunes and the upper sections of beaches unsuitable for nesting.

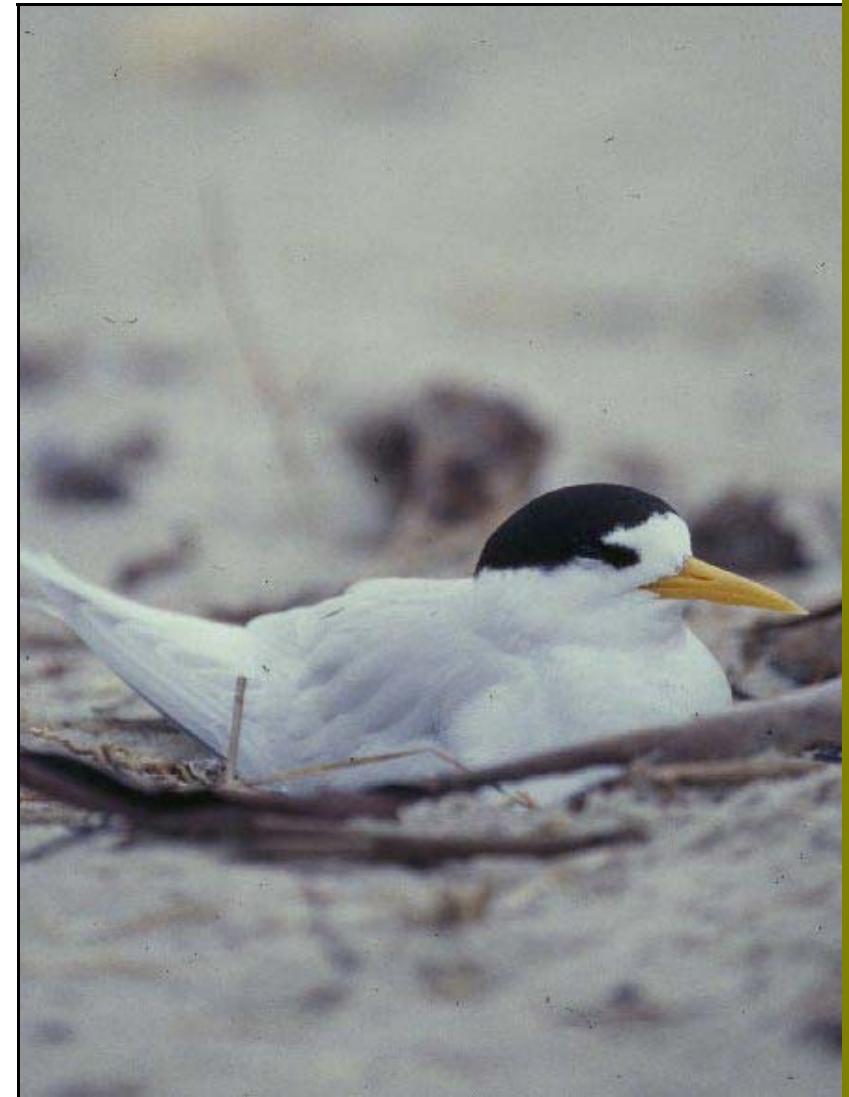


Photo: Dave James

- Disturbance of birds on nests which may cause loss of eggs through predation, cold or over heating.
- Continued disturbance to chicks while feeding, which causes them to hide for long periods and starve.
- Pollution of waterways (including oil spills), especially tidal estuaries.
- Predation by introduced rats, cats and dogs.

Management:

- Rehabilitation of coastal areas using naturally occurring coastal species.
- Control the use of Marram grass to stabilise dunes or change their natural configuration, particularly at important shorebird sites. Dune systems naturally change over time and shorebirds have adapted their nesting behaviour accordingly.
- Prevent access to dunes and beaches by stock to reduce trampling of nests.
- Reduce disturbance of nest sites and dunes or upper beach area by people, vehicles, dogs and horses, especially during the breeding season (October to March). This may be achieved by erecting temporary enclosures around nesting sites for the period of the breeding season.
- Place signs instructing people to keep dogs on a leash on beaches and walk them near the water. Designate some beaches with key nesting sites 'no dogs'.
- Erect interpretation signs on beaches explaining the habits of nesting shore birds so that the public do not pick up eggs or chicks on the beach, even though they appear to be deserted.
- Limit the amount of seaweed collected from beaches.

REPTILES

LEATHERBACK TURTLE* *Dermochelys coriacea

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Vulnerable
Tasmanian *Threatened Species Protection Act 1995*: Vulnerable.
Recovery Plan: Commonwealth Recovery Plan for Marine Turtles in Australia (draft).

Description and distribution:

Leatherback turtles have a global distribution, and may travel enormous distances. As with other turtle species, they nest in tropical areas but may feed in temperate waters. Four turtle species (Loggerhead, Green, Hawksbill and Leatherback) are occasional visitors to Tasmania, of which the Leatherback is the most frequent (Bryant & Jackson 1999). This species has been recorded in all waters around the state, and may be a more regular visitor than previously thought. It is most commonly sighted in late summer/early autumn, and feeds on jellyfish and other soft bodied marine invertebrates.

Key habitat:

Generally oceanic, but may come closer to shore.

Key threats to the species:

- Entanglement in fishing nets, ropes and rock lobster pot floatlines is a significant and increasing problem in Tasmanian waters. Floatlines and buoys appear to lure turtle attention (possibly mistaking them for prey items) and this seems to be a major cause of entanglement.
- Incidental by-catch from the trawl fishery.
- Marine pollution, including oil spills and chemical contaminants, which can cause death or disease.
- Death from ingestion of marine debris, especially plastics.



Photo: Col Limpus

Management:

- Check lobster pots, longlines and nets frequently to free any entangled turtles, at least and ideally in the morning (most entanglements occur at night). Contact the Marine Unit of the Nature Conservation Branch, DPIWE, for information on how to best release entangled turtles.
- If entanglement is a recurring problem, investigate means of discouraging turtles from approaching fishing equipment (eg. turtle excluder devices as used interstate for trawling or netting, or the use of buoys less likely to attract turtle attention).
- Reduce toxic waste or chemical pollution entering marine waters.

FISH***SPOTTED HANDFISH *Brachionichthys hirsutus******Current Status:**

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Endangered

Tasmanian *Threatened Species Protection Act 1995*: Endangered

Tasmanian *Living Marine Resources Management Act 1995*: Protected Fish

Recovery Plan: Spotted handfish Recovery Plan (Green, 2002)

Description and distribution:

Members of this family are restricted to the waters off south-eastern Australia, with five of the eight currently recognised species being endemic to Tasmanian waters. The Spotted handfish was once relatively common in south-eastern Tasmania, but by the late 1980s, numbers had declined. Surveys and reports suggest that the current population is approximately 300-400 mature individuals within regularly surveyed areas (Green 2002). Colonies are located in the lower Derwent River estuary and adjoining bays and channels. This species occurs on muddy and sandy bottoms, often in shell-filled depressions or near rocks at depths of 2m-30m (most commonly 5m-10m). Their diet consists of shrimps, other small crustaceans, and polychaete worms. Spotted handfish spawn in September and October. The eggs are wrapped around objects on the sea floor, and hatch 7-8 weeks later and move straight to the sea bottom. Captive breeding, and the provision of artificial spawning substrates in areas with degraded sea floors has been undertaken as part of a National Recovery Program for this species (Bryant & Jackson 1999). There is one record of the Spotted handfish from Dennes Point in 1984, near the northern tip of Bruny Island (see Map 1).

Key threats to the species:

- Degradation and modification of the sea floor, particularly the loss of egg attachment structures through activities such as dredging, poor placement of boat anchors and net fishing.
- Water and sediment pollution, especially by heavy metal contamination and run-off from urban development.
- Eutrophication (nutrient enrichment) of water, which may result in phytoplankton blooms, and aquatic plant growth that causes excessive shading and subsequent loss of habitat.
- Predation on eggs and disturbance of benthic communities by introduced species such as the Northern Pacific seastar.
- Illegal collection for aquaria (home or commercial trade).



Photo: Mark Green

Management:

- Provide education to boat users regarding setting anchors and nets.
- Ensure continuation and participation in education programs such as Waterwatch which aims to increase awareness and provide information on stopping pollutants such as detergents, oils, pesticides or fertilisers from reaching storm water drains that flow into the sea.
- Provide education to divers about threatened fish species and their habitats.
- Control pests such as the Northern Pacific seastar, which competes with and displaces handfish and other marine life.

GREAT WHITE SHARK *Carcharodon carcharias*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Vulnerable

Tasmanian *Threatened Species Protection Act 1995*: Vulnerable

Tasmanian *Living Marine Resources Management Act 1995*: Protected Fish

Recovery Plan: White Shark Recovery Plan (2002)

Description and distribution:

This species is usually found in open water from North-West Cape, Western Australia to southern Queensland and around Tasmania, but is also widespread elsewhere. It feeds mainly on fish, but marine mammals form the main diet component of larger specimens (Edgar 1997). Great white sharks have a fearsome reputation and human fatalities have resulted from attacks by this species. Most attacks have been focused on scuba divers, surfers or swimmers, although the species has also been known to attack small boats. The world population of Great white sharks appears to be steadily declining, with very few pregnant females reported worldwide during the past fifty years (Edgar 1997). This species has been recorded around the coastline of Bruny Island, the most recent being caught in a net off Adventure Bay on 2 September 2000 (Bruny News, December 2000).

Key habitat:

Oceanic and coastal waters.

Key threats to the species:

- Entanglement and drowning in fishing nets.
- Deliberate persecution (including shooting and illegal netting).

Management:

- Increase awareness of the threatened status of the species and promote measures to reduce the risk of entanglement through education programs.
- Do not kill sharks caught on lines.
- Check nets twice a day and do not leave them overnight.
- Ban gill netting and fine filament nets.
- Take measures to reduce incidental bycatch.



Photo: www.greatwhite.org

INVERTEBRATES



Photo: Niall Doran

INSECTS

MT MANGANA STAG BEETLE* *Lissotes menalcas

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: not listed
 Tasmanian *Threatened Species Protection Act 1995*: Vulnerable

Description and distribution:

The Mt Mangana stag beetle is endemic to Tasmania and has a patchy distribution, extending throughout the south-east, including parts of the Wellington Range, south Bruny Island and the Tasman and Forestier peninsulas, usually at altitudes of less than 650m (Bryant & Jackson 1999). This species is found in a variety of wet forest types ranging from mature mixed forest to advanced wet eucalypt regrowth, but the occurrence of old large fallen logs in wet situations is essential. It is not often realised that dead or dying trees are just as important to animals as living forest. This species lives within these fallen rotting logs throughout its lifecycle, where the larvae feed on fungi. The species can survive a cool bushfire provided the decaying log habitat remains intact. The Mt Mangana stag beetle is a relatively long-lived species, with a lifespan of approximately 5-6 years. South Bruny Island is listed as a key site for this species with five records on or near Mt Mangana, near the junction of Resolution Road with Simpsons Creek, and near Simpsons Bay (Bryant & Jackson 1999: see Map 1).

Key habitat:

Old large fallen logs in wet forest types ranging from mature mixed forest to advanced wet eucalypt regrowth.

Key threats to the species:

- Loss of native forest habitat, especially wet forest, through clearing.
- Extensive conversion of native forest to eucalypt or pine plantation.
- Rotation of forestry activity on a cycle of less than 80 years.
- Frequent hot burns leading to loss of ground litter and decaying logs.



Photo: Graham Knott

- Removal of fallen logs for firewood collection or burning on-site.
- Illegal collecting.

Management:

- Maintain large areas of suitable undisturbed habitat, particularly along wet gullies or drainage lines, and areas with fallen and decaying logs.
- Avoid hot or frequent burning which destroys leaf litter and decaying logs. The appropriate fire interval for this vegetation type is about 40 years or more, with burns in winter or autumn on a rotational basis in mosaic patches of 1-3ha which leaves burnt and unburnt patches of vegetation. Do not undertake burning without advice from DPIWE or Parks and Wildlife Service.
- Control intensive firewood collection. Fallen logs can take 20-50 years to decay to a suitable stage for the beetle and other invertebrate fauna.
- Improve understanding and enforcement of legislation (under which it is an offence to collect, possess, display or trade this species without a permit).

ECHINODERMS (SEASTARS)

LIVE-BEARING SEASTAR *Patiriella vivipara*

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: not listed
 Tasmanian *Threatened Species Protection Act 1995*: Endangered

Description and distribution:

This species is endemic to Tasmania, and has a very limited distribution in the south-east near the River Derwent and its channels at the following locations: Pittwater at Midway Point, Roches Beach at Lauderdale, the Tessellated Pavement and Fortescue Bay on the Tasman Peninsula, Woodbridge on the D'Entrecasteaux Channel, Daniels Bay at Bruny Island and recently at Pipe Clay Lagoon (Elizabeth Turner, personal communication) and Primrose Sands (Geoff Prestedge, personal communication). The species was also recorded at Kettering, but is now thought to be extinct at that location, possibly because of foreshore development (Dartnall 1969, Hoggins 1976). A small colony recorded from Tinderbox has also disappeared (Micheal Rowland, personal communication). *Patiriella vivipara* is one of only four species of seastar in the world that are known to be viviparous (bear live young). The species breeds throughout the year, with a peak in reproduction in the spring and summer months (Dartnall 1969, Prestedge 1998). The young are incubated in the gonads (Dartnall 1969) and emerge on the surface of the parent as tiny miniatures of the adult. This type of reproductive strategy means that this species has a very limited dispersal ability, hence its limited distribution. *Patiriella vivipara*, together with the closely related *P. parvivipara* has the most limited distribution of any seastar known (Byrne 1996). *Patiriella vivipara* lives in rocky areas in the upper intertidal zone, usually under rocks or in crevices, and prefers gently sloping, shallow shores (Dartnall 1969). Although this species has been noted to have a very strong affinity to sandstone (Dartnall 1969), it is also found on other substrata such as dolerite and even old concrete blocks and house bricks (Geoff Prestedge, personal communication). This species occurs as single individuals or colonies of several hundred individuals, feeding at night and on overcast days on algae and microbes, which coat the rock surfaces. Their lifespan may be up to 8-10 years. Prestedge and Cochran found a very small population of *P. vivipara* (6-8 individuals) at Daniels Bay on south Bruny Island in 1988 (see Map 1). This colony has expanded to over 900 individuals according to a recent census (Rowland 2000) and is now listed as a key site for this species (Bryant & Jackson 1999). There are three small unconnected colonies of *P. vivipara* within a 30m stretch of foreshore in this location, covering 2m², 8m² and 24m² respectively, and all specimens are found only where there is a single layer of dolerite stone on muddy substrate (Rowland 2000).



Photo: Graham Knott

Key habitat:

Rocky areas in the upper intertidal zone, usually under rocks or in crevices; prefers gently sloping, shallow shores (Dartnall 1969), usually on a sandstone or dolerite substrate.

Key threats:

- Removal of rocks and suitable substrates from the shore and intertidal zone.
- Decreasing water quality and increasing nutrients (eutrophication) from sewage and fertiliser run-off and seepage from outlets into the intertidal zone.
- Sedimentation and increased siltation.
- Increased coastal development, including the construction of jetties in sensitive locations.
- Collection for aquaria.
- Competition and displacement from the introduced seastars *Patiriella regularis* (from New Zealand) and *Asterias amurensis* (the Northern Pacific seastar).

Management:

- Any proposed coastal development within the range of this species should undertake a detailed environmental impact assessment. Such developments would include jetties, boat sheds, and fish farms, or any other developments which would cause increased turbidity of the water, or input of sewage or other pollutants (eg. from boat motors, generators or buildings).
- Ensure continuation and participation in education programs such as Waterwatch which aims to increase awareness and provide information on stopping pollutants such as detergents, oils, pesticides or fertilisers from reaching storm water drains that flow into the sea.
- Promote awareness of its threatened species status so that specimens are not collected for aquaria (private or commercial).
- Control pests such as the Northern Pacific seastar, which competes with and displaces these species and other marine life.

SEASTAR Smilasterias tasmaniae

Current Status:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: not listed

Tasmanian *Threatened Species Protection Act 1995*: Rare

Description and distribution:

Smilasterias tasmaniae is endemic to south-eastern Tasmania and was first described in 1990 from specimens collected at three locations: Lighthouse Bay at Bruny Island, Recherche Bay and Catamaran. Surveys by Christina Materia in 1994 found the species was absent from the latter two localities, and is now restricted to six locations on the western side of Bruny Island: Bligh Point, Simmonds Bay, Grundys Point, Pt Winifred at Daniels Bay, Chevertons Point and Sadgrove Point at Fords Bay (see Map 1). Elizabeth Turner (Tasmanian Museum & Art Gallery, personal communication) has also recently collected this species at a seventh location at Stockyard Point, Bruny Island (see Map 1). Each site probably contains less than 30 individuals (Bryant & Jackson 1999).

Key habitat:

On rocks in the littoral zone at 0 to 8 m depth.

Key threats:

- Removal of rocks and suitable substrates from the shore and intertidal zone.
- Decreasing water quality and increasing nutrients (eutrophication) from sewage and fertiliser run-off and seepage from outlets into the intertidal zone.
- Sedimentation and increased siltation.
- Increased coastal development, including the construction of jetties in sensitive locations.
- Collection for aquaria.
- Marine pests such as the Northern Pacific seastar, which competes with and displaces these species and other marine life.

Management:

- Any proposed coastal development within the range of this species should undertake a detailed environmental impact assessment. Such developments would include jetties, boat sheds, and fish farms, or any other developments which would cause increased turbidity of the water, or input of sewage or other pollutants (eg. from boat motors, generators or buildings).
- Ensure continuation and participation in education programs such as Waterwatch which aims to increase awareness and provide information on stopping pollutants such as detergents, oils, pesticides or fertilisers from reaching storm water drains that flow into the sea.
- Promote awareness of its threatened species status so that specimens are not collected for aquaria (private or commercial).
- Control pests such as the Northern Pacific seastar, which competes with and displaces these species and other marine life.

OTHER SIGNIFICANT FAUNA SPECIES

The following table lists significant fauna species that are occasionally found at Bruny Island and are listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Table 4 Significant fauna species that are only occasionally found on Bruny Island (i.e. vagrants).

Species	Common Name	Comments
<i>Thalassarche cauta</i>	Shy albatross	Foraging shy albatross are occasionally sighted from cliffs near the Cape Bruny lighthouse or from recreational and fishing vessels off the coast of Bruny Island.
<i>Neophema chrysogaster</i>	Orange-bellied parrot	1 record on Courts Island, Cape Bruny in 1981.
<i>Sterna striata</i>	White-fronted tern	Rare vagrant on Bruny Island.
<i>Aptenodytes patagonicus</i>	King penguin	2 records from Adventure Bay, 1 from Courts Island and 2 from Cloudy Bay between 1955 and 1997 (E. Woehler 1992, T. Cochran personal observation).
<i>Eudyptes chrysolophus</i>	Macaroni penguin	1 record from Adventure Bay (5/3/1962, E. Woehler 1992) and 1 record from Grass Point/ Penguin Island, Adventure Bay (11-17/2/2001, T. Cochran personal observation).
<i>Eudyptes chrysolophus</i>	Rockhopper penguin	1 record from South Bruny Island (11/2/1977, E. Woehler 1992).
<i>Eudyptes pachyrhynchus</i>	Fiordland penguin	1 specimen collected by Forster on Cook's 2nd voyage from Adventure Bay in February 1773 (E. Woehler 1992).
<i>Eudyptes robustus</i>	Snares crested penguin	1 record from south Bruny Island (15/12/1977, E. Woehler 1992).
<i>Mirounga leonina</i>	Southern elephant seal	1 record from Adventure Bay (January 1999).
<i>Hydrurga leptonyx</i>	Leopard seal	1 record from Cloudy Bay (1/11/1998).
<i>Dermochelys coriacea</i>	Leatherback turtle	1 record from Cape Bruny (1968, Bryant & Jackson 1999) and 1 record from Sykes Cove, Barnes Bay (11/1/2000, B. Edwards personal observation).