

The Big Punchbowl Reserve

Background Report



The Big Punchbowl Reserve Background Report.

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Front Image: The Big Punchbowl Reserve coastal saltmarsh © Matthew Newton

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The Big Punchbowl Reserve is owned by the Tasmanian Land Conservancy TLC and managed for its conservation values. The Reserve was purchased after a successful fundraising campaign which commenced in June 2014 and achieved its target about one year later. The campaign attracted significant support, including the philanthropy of The Thomas Foundation, a separate anonymous donor and donations from many other businesses and private individuals. We sincerely thank everyone for their generosity which has resulted in the permanent protection of this special area.

The TLC also acknowledges those who have contributed their time and expertise towards monitoring, management and promoting this reserve. In particular The Thomas Foundation for supporting on-ground research, monitoring and management of the area since its acquisition; volunteers, namely Mark Wapstra, Jane Keble-Williams, Andry Sculthorpe, Kris Schafer and Marie Brolev for providing invaluable support during the TLC's Open Day on 28 Feb 2015.

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The success of this campaign was aided by the beautiful imagery collected by photographers Matthew Newton [Matthew Newton Photography], Heath Holden [Heath Holden Photography] and Arwen Dywer [Arwen Dywer Photography] and by Prof. Ted Lefroy [UTAS] and Andry Sculthorpe [TAC] who appeared on the promotional vimeo promoting the values of the site.

The TLC acknowledges the data provided by Land Information System Tasmania (*theList*) and the DPIPWE Natural Values Atlas used in compiling maps and tables in this document.

Sincere thanks to everyone.

Acronyms and Abbreviations

ANU	Australian National University, Canberra
CFEV	Conservation of Freshwater Ecosystem Values, Tasmania
DFTD	Tasmanian devil facial tumour disease
DPIPWE	Tasmanian Government's Department of Primary Industries, Parks, Water and Environment
DSEWPC	Commonwealth Government's Department of the Sustainability, Environment, Water, Population and Community
EA	Environment Australia (Commonwealth Department)
EPBC Act	Australian <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FPA	Forest Practices Authority
IBRA	Interim Biogeographic Regionalisation for Australia. A planning framework for the systematic development of a comprehensive, adequate and representative ' <u>CAR</u> ' National Reserve System.
IUCN	International Union for Conservation of Nature
MPA	Marine Protected Area
NC Act	Tasmania's <i>Nature Conservation Act 2002</i>
NRM	Natural Resource Management
NVA	Natural Values Atlas database, DPIPWE
PWS	Parks and Wildlife Service, Tasmania
Ramsar	a wetland of international significance as designated by the Ramsar Convention
STTDP	Save The Tasmanian Devil Program
TLC	Tasmanian Land Conservancy
TSP Act	Tasmania's <i>Threatened Species Protection Act 1995</i>
TSS	Threatened Species and Marine Section, DPIPWE
UTAS	University of Tasmania

INTRODUCTION

The Tasmanian Land Conservancy

The Tasmanian Land Conservancy (TLC) is a non-profit, non-political, private organisation that works towards achieving sustainability and biodiversity conservation in Tasmania.

TLC's 2050 vision is for *Tasmania to be a global leader in nature conservation and sustainability* and its mission:

In partnership with other organisations, communities, individuals and governments, the TLC will:

- 1 *Take a lead role in building a landscape scale approach to conservation including a world-class system of reserves complemented by sustainable development.*
- 2 *Demonstrate excellence in management for biodiversity conservation.*
- 3 *Contribute to Tasmania becoming a centre for knowledge and expertise for nature conservation and planning.*
- 4 *Develop and implement innovative mechanisms for achieving sustainability and biodiversity conservation.*
- 5 *Provide opportunities and mechanisms for communities and individuals to achieve conservation.*
- 6 *Demonstrate organisational leadership through exceptional governance, a positive working environment and financial sustainability.*

The Big Punchbowl Fundraising Campaign

The Big Punchbowl is the largest in a series of lagoons scattered across 244 hectares of private land on Tasmania's east coast. Named for that body of water, this property forms an integral part of the Freycinet Peninsula's biodiversity blueprint adjacent to the internationally important Moulting Lagoon Ramsar wetland and immediately opposite TLC's Long Point Reserve.

The Big Punchbowl property is a complex mix of wetlands, heath, woodlands and saltmarsh containing threatened vegetation communities and habitat for a host of species declining throughout their natural range. It provides refuge and shelter for shorebirds, seabirds and waterfowl using the Moulting Lagoon waterway as well as the multitude of tidal and estuarine fish and plant species that are implicate within this wetland ecosystem.

The property has a resident population of the endangered Tasmanian devil *Sarcophilus harrisii* and conceals two magnificently constructed eagle nests in its coastal bays, one of which was active during the fundraising campaign. The vulnerable hairy brooklime *Gratiola pubescens* and rare Tasmanian velvetbush *Lasiopetalum micranthum* and juniper wattle *Acacia olicifolia* are scattered across the woodland floor. The green and gold bell frog *Litoria raniformis* and Australasian bittern *Botaurus poiciloptilus* have both been recorded calling from the reed beds of The Big Punchbowl lagoon and patches of diverse heathland provide potential habitat for the elusive and endangered New Holland mouse *Pseudomys novaehollandiae*.

Location and Access

The Big Punchbowl Reserve is located on Tasmania's east coast on the western side of Freycinet Peninsula. It forms part of a small headland jutting into Moulting Lagoon just north of the Dolphin Sands Spit. It is approximately three hour's drive from either Hobart or Launceston via the Tasman Highway. From Coles Bay Road you turn right into Flacks Road then right into Wallaroo Road which leads to the northern end of the property.

All access roads are in good condition and suitable for two wheel drive although the final stretch of Wallaroo Road is sandy and requires maintenance on a seasonal basis (Figure 2).

Car parking at the reserve is located in the gravel pit immediately opposite the entry gate. No further car access is allowed on the reserve to limit disturbance and the potential ongoing spread of the root rot fungal disease *Phytophthora cinnamomi*. A network of easy walking tracks criss-cross the reserve with several walking loops available depending on the time of year and sensitivity of breeding species (Figure 3).



Figure 2 Access to The Big Punchbowl Reserve via Coles Bay Road on the Freycinet Peninsula, east coast Tasmania.

BIOREGIONAL VALUES AND RESERVE STATUS

Landscape Context

Reserve Size: 244 hectares
Municipality: Glamorgan – Spring Bay
IBRA Bioregion: Southeast
NRM region: South
Focal landscape: Swan-Apsley

Regional values

The Big Punchbowl Reserve provides excellent context to TLC's Long Point Reserve, being located 400 metres directly opposite, and its enhancement of regional values (Figure 4, Figure 5). It provides 4.5 kilometres of protected shoreline vegetation for Moulting Lagoon Ramsar listed wetland which has been identified as:

- Important habitat for animal taxa at vulnerable stages of their life cycle and provides refuge when adverse conditions such as drought prevail; and
- Of outstanding historical or cultural significance.

Reserve Status

IUCN Protected Area Management Category

The Big Punchbowl Reserve meets Category V for protected area management (Dudley 2008, http://www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/) and its management will be in accord with this category and its objectives.

Category V - Protected Landscape / Seascape

Primary objective: To protect and sustain important landscapes/seascapes and the associated nature conservation and other values created by interactions with humans through traditional management practices.

Other objectives:

- To conserve the composition, structure, function and evolutionary potential of biodiversity;
- Contribute to regional conservation strategies (as core reserves, buffer zones, corridors, steppingstones for migratory species etc.);
- Maintain diversity of landscape or habitat and of associated species and ecosystems;
- Be of sufficient size to ensure the integrity and long-term maintenance of the specified conservation targets or be capable of being increased to achieve this end;
- Maintain the values for which it was assigned in perpetuity;

- Be operating under the guidance of a management plan, and a monitoring and evaluation programme that supports adaptive management;
- Possess a clear and equitable governance system.

Legal Status and Compliance

A conservation covenant is currently (2015) being prepared for The Big Punchbowl Reserve under Tasmania's *Nature Conservation Act 2002* (NC Act). This covenant has the force of a statutory document that binds the TLC to its provisions in perpetuity.

Due to the location of this Reserve and that of the TLC's Long Point Reserve within the Moulting Lagoon Game Reserve Ramsar site, the TLC could work toward having this area declared a marine protected area (MPA) established under the *National Parks and Wildlife Act 1970* and *Living Marine Resources Management Act 1995*. Under the Marine Protected Areas Strategy, the Tasmanian Planning Commission undertakes the identification and selection of new marine protected areas following a defined 12 step process which involves extensive public consultation.

The Glamorgan – Spring Bay Planning Scheme 1994 is the local government planning instrument covering this area and any proposed developments may need to meet the requirements of this scheme and be assessed by the Glamorgan Spring Bay Council.

Constraints may apply to activities which could adversely affect species and vegetation communities listed as threatened under Australian and Tasmanian legislation, and special permits for works or research are required. The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's primary legislation which protects threatened species and ecological communities. Tasmania's *Threatened Species Protection Act 1995* (TSP Act) lists species threatened in Tasmania and it is an offence to knowingly disturb or destroy a listed species without a permit. Schedule 3A of the NC Act lists threatened native vegetation communities and any disturbance to listed communities is regulated through revisions to Tasmania's *Forest Practices Act 1985*.



Big Punchbowl - reserve context in Moulting Lagoon

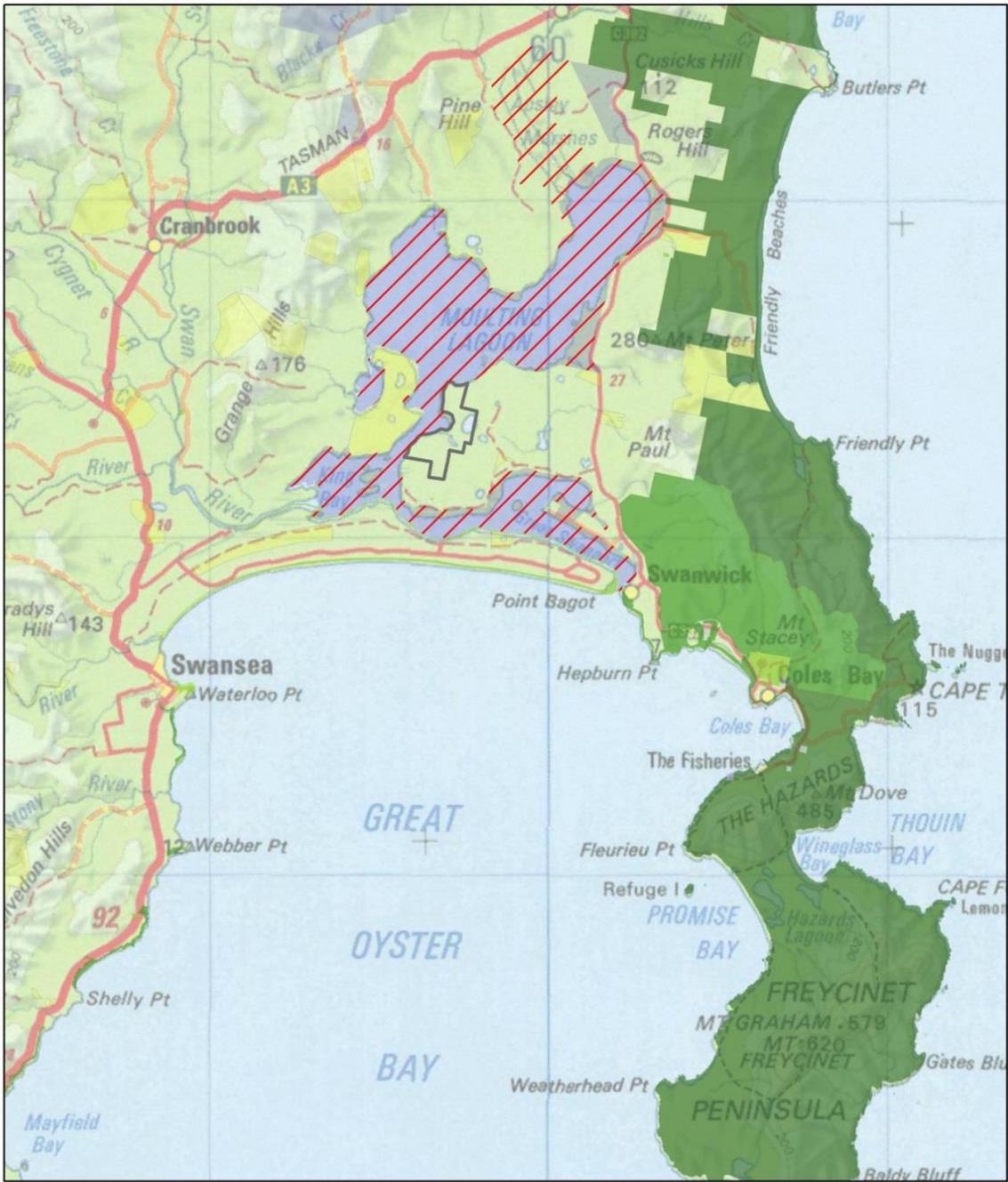
-  Big Punchbowl Reserve
-  Long Point Reserve
-  Ramsar wetland



0 1 2 4
Kilometres

Drawn TLC, NAME, DATE, base data (C) TheList, Client data TLC

Figure 4 Location and context of The Big Punchbowl Reserve and TLC's Long Point Reserve opposite.



Big Punchbowl context - lands managed for conservation



0 1.25 2.5 5 Kilometres

Drawn TLC, NAME, DATE, base data (C) TheList, Client data TLC

Figure 5 Land tenures surrounding The Big Punchbowl Reserve and their managing authorities.

Vegetation Communities and Flora of Significance

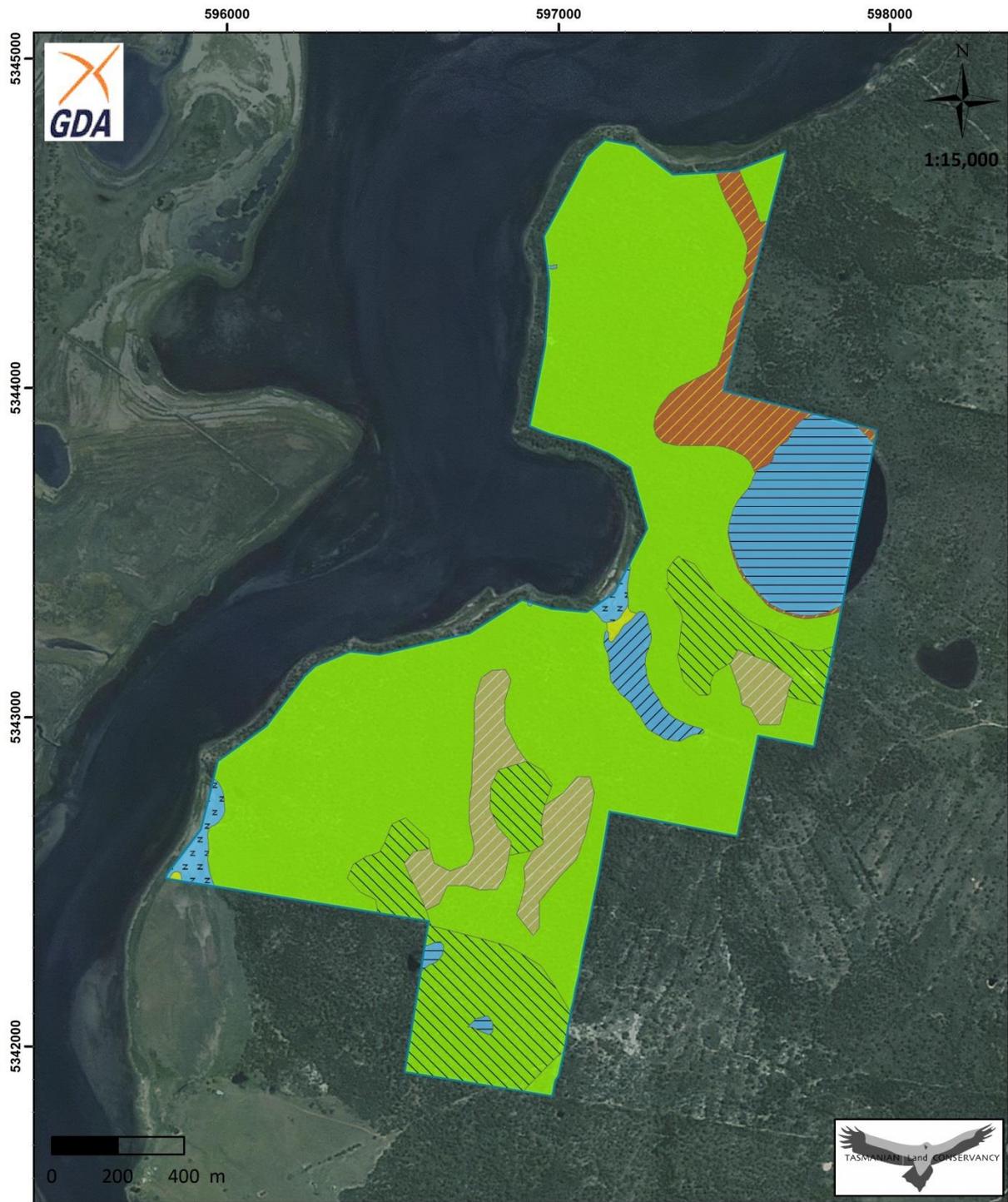
Surveys and site visits made to the reserve during 2014 have now refined the vegetation mapping shown in Figure 6 and summarised in Table 1. Field visits indicate that the area previously mapped in TASVEG as coastal *E. amygdalina* forest (DAC) is actually a mosaic of DAC, *E. amygdalina* forest on Cainozoic deposits (DAZ – listed as vulnerable in the NCA 2002), *Allocasuarina littoralis* forest (NAL– listed as rare in the NCA 2002) and small patches which could arguably be mapped as coastal white gum habitat (DVC – listed as rare and vulnerable in the NCA 2002). Temperate saltmarshes are listed on the EPBCA and source data uses the three TASVEG communities ASS, AHS and ARS.

Table 1 Vegetation communities on The Big Punchbowl Reserve, refined in 2014.

Vegetation Community (TASVEG 3.0, partial remap)	Area (ha)	Status
(ASF) Freshwater aquatic sedgeland and rushland	18.9	v
(ASS) Succulent saline herbland	3.7	V
(DAC) Eucalyptus amygdalina coastal forest and woodland	156.5	
(DAZ) Eucalyptus amygdalina inland forest and woodland on Cainozoic deposits	39.5	r, v
(NAL) Allocasuarina littoralis forest	15.6	r
(GHC) Coastal grass and herbfield	0.1	
(GCL) Lowland grassland complex	0.3	
(OAQ) Water, sea	4.0	
(SCH) Coastal heathland	0.8	
(SSC) Coastal scrub	4.1	
Total area	247	

Status of vegetation communities listed on Tasmania's Nature Conservation Act 2002 (NCA) as r rare or v vulnerable or the Commonwealth Environmental Protection and Biodiversity Conservation Act (EPBCA) as V Vulnerable.

A number of threatened flora species occur on the reserve (Table 2, Figure 8) though more may be found with ongoing surveys. The vulnerable perennial herb hairy brooklime *Gratiola pubescens* was recorded on the edge of The Big Punchbowl Lagoon in 2014 and the main threat to this species is habitat depletion from vegetation clearance and/or changes to hydrology. Plants may be susceptible to trampling and grazing, so areas supporting the species should be managed as stock-free zones (TSU Notesheet 1).



Big Punchbowl - Vegetation Communities

- | | |
|--|---|
|  (AHS) Saline aquatic herbfield |  (ASF) Freshwater aquatic sedgeland and rushland |
|  (DAC) Eucalyptus amygdalina coastal forest |  (ASS) Succulent saline herbfield |
|  (DAZ) Eucalyptus amygalina forest on Cainozoic sediments |  (SCH) Coastal heath |
|  (NAL) Allocasuarina littoralis forest |  (GHC) Coastal grass and herbfield |



Data sources: the LIST, TLC

Figure 6 Vegetation communities on The Big Punchbowl Reserve (TASVEG).

The rare endemic Tasmanian velvet bush *Lasiopetalum micranthum* occurs in several locations on the reserve and this low spreading shrub favours shallow, dry dolerite soils in dry sclerophyll forest in the east of the State between Swanport and the St Pauls River. Tasmanian velvet bush may recruit from the soil seed-bank following disturbance, and is often found along roadsides and tracks. The species has the ability to re-sprout after fire and seed production, however this may be depleted by grazing. (Barker & Johnson 1998, TSU Notesheet 2).

The rare juniper wattle *Acacia ulicifolia* was identified by Mark Wapstra during the TLC's Open Day in March 2015 in white gum woodland towards the southern sector of the property. The reserve is within the known range of this small prickly shrub which occurs on sandy coastal heaths, open forest and woodland in the north and east of Tasmania and also in Victoria, New South Wales and Queensland. This species is threatened by inappropriate fire and land clearance (TSU Notesheet 3).

Coastal Woodlands

The coastal woodlands of The Big Punchbowl contain several TASVEG communities. *Eucalyptus amygdalina* coastal forest and woodland (DAC) occurs across much of the property from open forest to low open woodland. This community is largely dominated by stands *Eucalyptus amygdalina*, with patches of *Eucalyptus viminalis* occurring throughout, with an understorey varying from heathy to shrub dominated areas, as well as dense patches of sedge and *Pteridium esculentum* associated with historic fire and grazing regimes. Dense understorey, typically containing *Banksia marginata* and *Allocasuarina* spp. occur throughout the coastal woodland areas, increasing the structural complexity of the vegetation and providing a range of habitats.

Small patches of the state listed (vulnerable) *Eucalyptus amygdalina* inland forest and woodland on Cainozoic deposits (DAZ) occurs on isolated areas across the reserve and these exhibit a much more open understorey consisting of prostrate shrubs, stands of *Pteridium esculentum* and grasses or sedges.

Wetland Complex

The Big Punchbowl wetland (Figure 3, Figure 7) is of sub-regional significance (Dunn 2002) and has a very characteristic circular formation known as a deflation hollow with a bare sediment perimeter denuded of vegetation due to its wet/dry cycle. Freshwater aquatic sedgeland and rushland (ASF) and succulent saline herbland (ASS) comprise its main vegetation types, with dense to sparse sward of a sedge or rush species (mainly *Baumea rubiginosa*) providing the tallest stratum in the community. The floristic composition of the community is largely associated with the drying regime of the wetland, with a range of herbaceous species fluctuating in their distribution and abundance based on conditions.

Barney Ward's Lagoon and the surrounding fringes of Moulting Lagoon are characterised by the succulent saline herbland (ASS) community. This low growing community is dominated by dense areas of *Sarcocornia quinqueflora*, with a distinct suite of herbaceous species also taking advantage of the saline condition. Common species include

Samolus repens, *Selliera radicans* and *Apium prostratum* as well as more common shrub species such as *Atriplex cinerea* and *Rhagodia candolleana*. As with ASF, the ASS community species composition and distribution change in response to hydrological variation and seasonal conditions.

Moulting Lagoon Ramsar Site

Moulting Lagoon Game Reserve extends from the northern end of Great Oyster Bay to Coles Bay (Figure 4) and is one of ten Ramsar wetlands of international significance in Tasmania. It is recognised primarily because it supports a large number of waterbirds at key stages of their lifecycles. It provides year-round habitat for approximately 8,000 black swans and is a critical late summer staging area for Australian shelduck, chestnut teal, and several shorebird species listed on The Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA) (Parks and Wildlife Service 2003). The Moulting Lagoon Ramsar site ecological character description can be viewed on <http://www.environment.gov.au/resource/moulting-lagoon-ramsar-site-ecological-character-description>.

Most of the land fringing Moulting Lagoon is privately owned and used for grazing, agriculture and horticulture, particularly grape growing. The importance of maintaining good land management practices and protection of natural assets has been outlined in a recent NRM South community report (NRM 2014) which emphasises the joint action needed in combatting weed infestations, stock damage, water pollution and other threats. The Tasmania Parks and Wildlife Service is the managing authority responsible for the reserve and Crown Land Services for the surrounding areas.

Nine threatened plant species are known in the Moulting Lagoon area and its estuary and coastal wetlands have long been recognised as an essential nursery for a myriad of marine species. Socially, the area provides a range of recreational and economic opportunities, especially duck hunting and fishing, and has commercial value for the local tourism and aquaculture industries. Its continued conservation contributes to the economic and social well-being of the local community (Parks and Wildlife Service 2003).

While most of the property title of The Big Punchbowl Reserve is above the high tide mark, the reserve is integral to the ecology and integrity of the wider Moulting Lagoon area. The network of wetlands on this reserve complement the lagoon and provide refuge and a source of freshwater for waterfowl and other species. Vegetation fringing the reserve provide habitat and roost sites for species using the lagoon, especially the coastal saltmarsh. The close proximity of The Big Punchbowl Reserve with TLC's Long Point Reserve immediately opposite further reinforces the importance of maintaining the ecological connectivity in this landscape (Figure 7).



Figure 7 Aerial of the Big Punchbowl Lagoon (circular wetland on the left), smaller Barney Ward's Lagoon to the right opening into the Moulting Lagoon coastline with the Freycinet mountains in the background.

Fauna of Conservation Significance

A number of significant fauna values occur on the reserve and this list continues to grow as more survey work is undertaken. Appendix B records the species identified by the TLC since surveys commenced in late 2013, and Table 2 shows which species on Tasmania's *Threatened Species Protection Act 1995* (TSPA) or Commonwealth *Environmental Protection and Biodiversity Conservation Act* (EPBCA) are known to occur on - or near the reserve.

Two well-constructed eagle nests were discovered in 2014 (Fig 8); the northern nest was subsequently occupied by a pair of white-bellied sea-eagles *Haliaeetus leucogaster* that successfully fledged one young in 2015. A further dilapidated nest was found in mid-2015 but this is no longer viable. Wedge-tailed eagle *Aquila audax fleayi* are regularly seen on the reserve, as are swamp harrier and a brown falcon nest was located south of Barney Ward's Lagoon in 2014. The reserve contains abundant breeding hollows suitable for masked owl *Tyto novaehollandiae castanops*, swift parrot *Lathamus discolor* and a host of other hollow dependent fauna species.

The endangered Tasmanian devil (*Sarcophilus harrisii*) is widespread across the reserve despite the persistence of devil facial tumour disease in the area and a den site has been located on-route to Barney Ward's Lagoon. This

reserve has been a past monitoring site by The Save The Tasmanian Devil STTD Program. The nationally vulnerable spotted-tail quoll *Dasyurus maculatus* also occurs on the reserve and is regularly recorded on fauna cameras.

The Australasian bittern *Botaurus poiciloptilus*, was heard calling on The Big Lagoon in January 2014 and may occur there on a seasonal basis when water levels are high. The green and gold bell frog *Litoria raniformis* prefers perennial freshwater wetlands in the Freycinet area and anecdotal reports are of it occurring on the reserve.

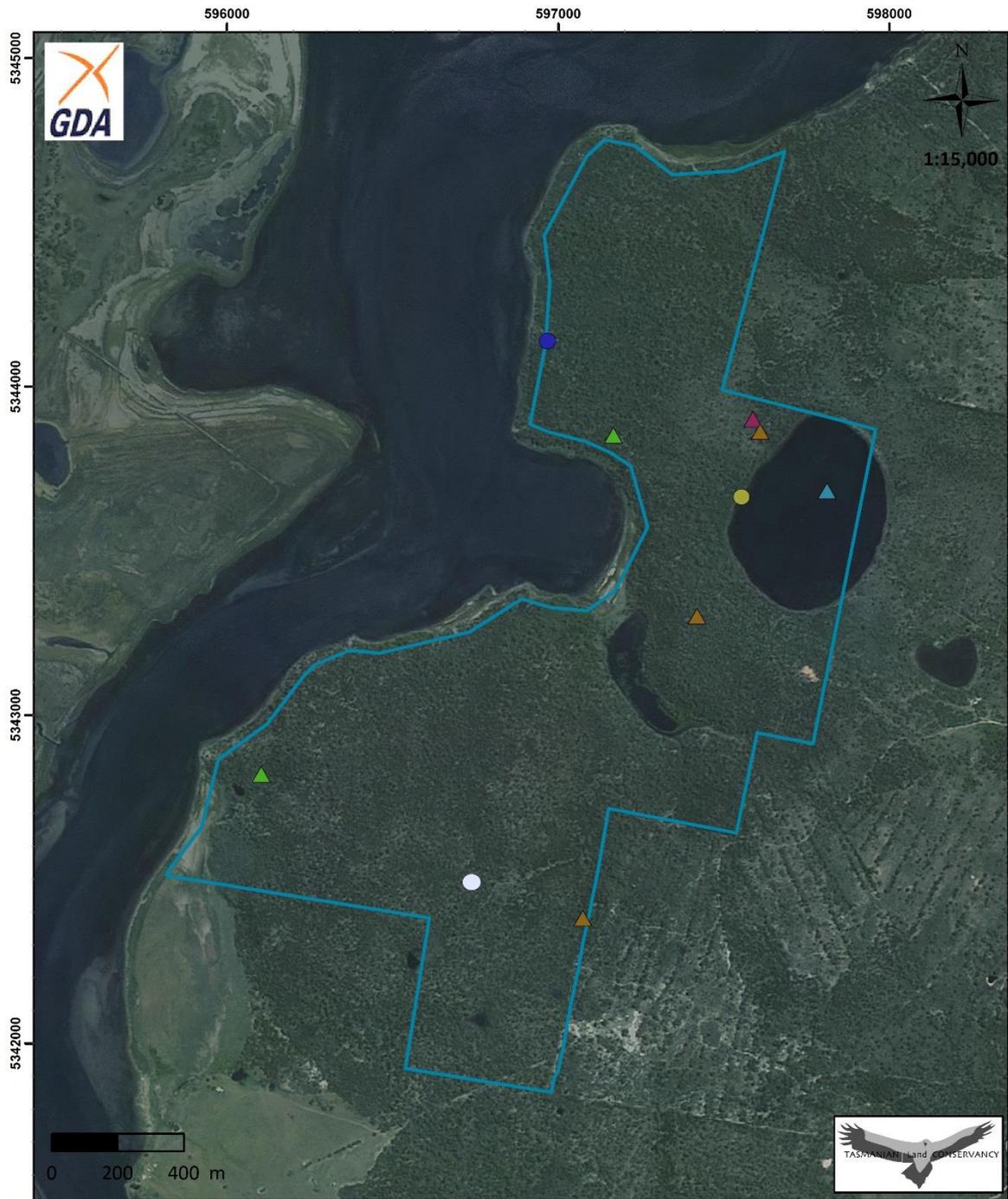
Potential habitat for the New Holland mouse *Pseudomys novaehollandiae* occurs in woodland and heathland across the reserve (i.e. *Aotus ericoides*, *Hypolaena fastigiata*, *Lepidosperma concavum*, *Xanthorrhoea spp.*) but previous surveys undertaken nearby in Coles Bay failed to locate this species and suggested it may now be locally extinct (Threatened Species Section 2008). Fauna cameras installed in 2014 failed to detect this species but efforts are ongoing. The reserve also contains potential habitat for the chaostola skipper *Antipodia chaostola leucophaea* and future surveys are planned for the adult flying period.

Moulting Lagoon is an important foraging and breeding area for waterfowl and annual population counts have been conducted in this area for decades (PWS 2003). A range of migratory shorebird species listed under JAMBA and CAMBA use the entire area particularly the coastline and Moulting Lagoon waterway and annual population counts have detected ongoing declines in most of these species. The rare great-crested grebe *Podiceps cristatus* has been sighted consistently in the sheltered bay opposite Barney Ward's Lagoon during 2014 and 2015.

Table 2 Threatened and conservation significant species on The Big Punchbowl Reserve.

Species	Confirmed #	EPBCA	TSPA	IUCN
Flora				
Hairy brooklime <i>Gratiola pubescens</i>	Yes	-	v	-
Tasmanian velvet bush <i>Lasiopetalum micranthum</i>	Yes	-	r	-
Juniper wattle <i>Acacia ulicifolia</i>	Yes	-	r	-
Fauna				
Tasmanian devil <i>Sarcophilus harrisii</i>	Yes	EN	e	Endangered A2be+3e
Spotted-tailed quoll <i>Dasyurus maculatus</i>	Yes	VU	r	Near threatened
Green and gold frog <i>Litoria raniformis</i>	No	VU	v	A2ae
Australasian bittern <i>Botaurus poiciloptilus</i>	Yes	EN	-	Endangered C1
Wedge-tailed eagle <i>Aquila audax fleayi</i>	Yes	EN	e	-
White-bellied sea-eagle <i>Haliaeetus leucogaster</i>	Yes	-	v	-
Masked owl <i>Tyto novaehollandiae castanops</i>	No	VU	e	-
Swift parrot <i>Lathamus discolor</i>	No	EN	e	Endangered C2a(ii)
New Holland mouse <i>Pseudomys novaehollandiae</i>	No	-	v	Vulnerable C1+2a(i)
Tasmanian Chaostola skipper <i>Antipodia chaostola</i>	No	EN	e	-

confirmed: Yes sighted since acquisition, otherwise recorded in the NVA, EPBCA: endangered EN or vulnerable VU under the Commonwealth EPBC Act 1999, TSPA: endangered e, vulnerable v or rare r under Tasmania's TSP Act 1995, IUCN Red List



Big Punchbowl - Threatened Species

Threatened fauna

- ▲ *Dasyurus maculatus* subsp. *maculatus*
- ▲ *Haliaeetus leucogaster*
- ▲ *Litoria raniformis*
- ▲ *Sarcophilus harrisi*

Threatened flora

- *Gratiola pubescens*
- *Lasiopetalum micranthum*
- *Acacia ulicifolia*



Data sources: the LIST, TLC

Figure 8 Threatened species records on The Big Punchbowl Reserve (includes 2013 NVA data). Some species are more wide ranging than indicated by the symbols.

Geomorphology

A preliminary geology of The Big Punchbowl and Long Point Reserves has been compiled by K. Corbett in 2015. The following information has been extracted from Corbett's report which will be published in full in the future.

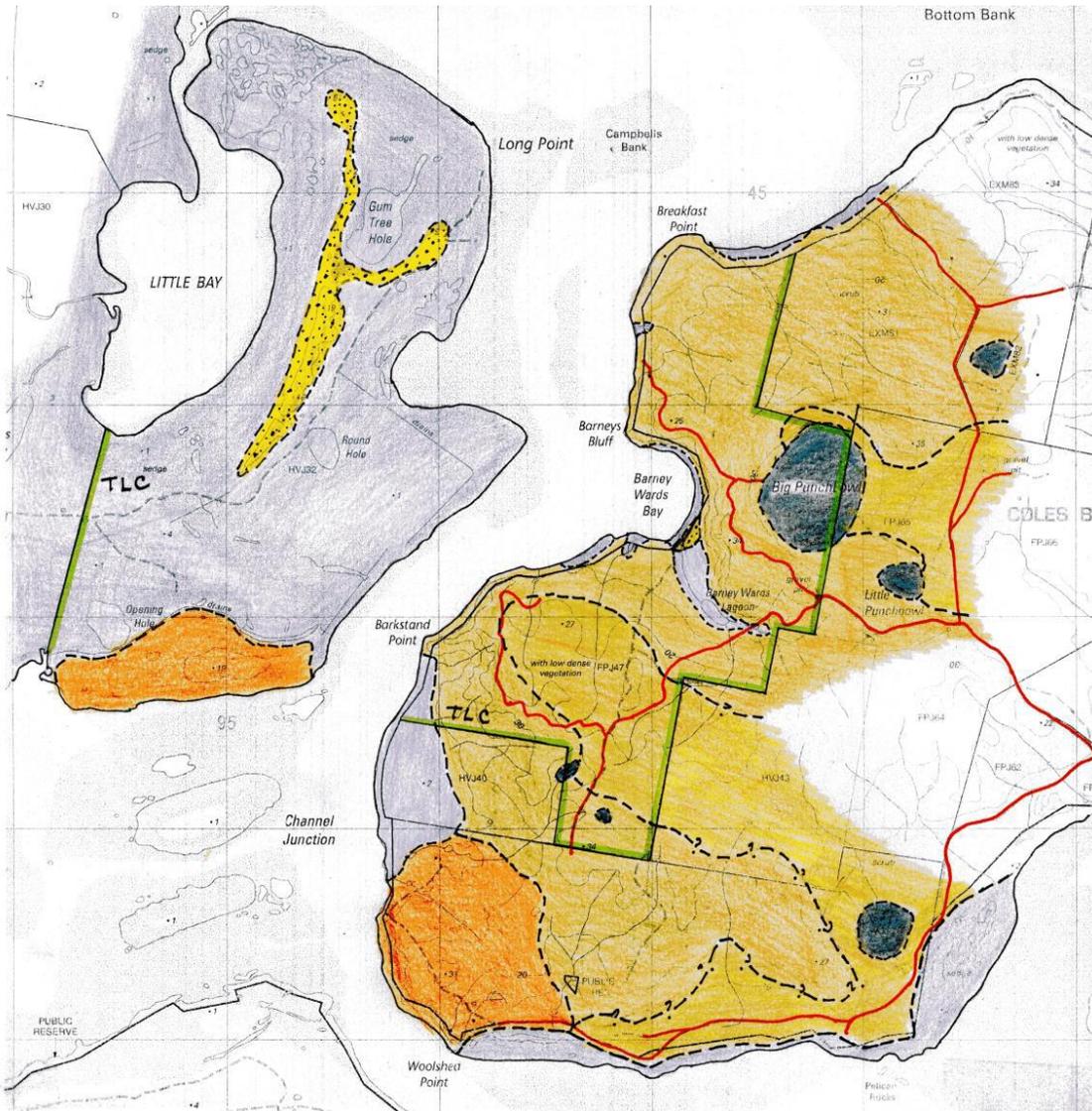
The Big Punchbowl and Long Point Reserves lie to the east and west respectively of the main outlet channel from Moulting Lagoon, a major wetland area fed by the Apsley River to the north and debouching via a long and complex tidal channel into Oyster Bay to the south. A long E-W sand barrier, the Nine Mile Beach spit, separates the large wetland area from the open sea, with the channel outlet located at its eastern end. The second major river in the area, the Swan, debouches from the west into the channel zone at the SW corner of the wetland. Extensive salt marshes are present around the edges of the lagoon and channels, on the various shallow islands in the channel, and covering much of the Long Point area.

The Moulting Lagoon area is considered to represent the northern part of the Oyster Bay Graben (a down-faulted valley), a large Cainozoic structure bounded by the uplifted spine of Devonian granite on the Freycinet Peninsula to the east, and occupying most of Great Oyster Bay. The eastern margin of the graben is marked by a line of intermittently exposed faults between the granites and Jurassic dolerite, extending from the Bicheno area down the eastern side of Moulting Lagoon to Coles Bay, and reappearing on Schouten Island and the southern peninsula. The western side of the graben is rather poorly defined, with no large faults mapped.

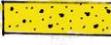
Most of the Big Punchbowl peninsula is underlain by Cainozoic fluvial sandstones derived mainly from the granitic rocks to the east. The coarse breccia of granite and dolerite boulders seen at White Rock Bay, and possibly also the dolerite breccia-like deposit at Buckleys Rocks, could represent the proximal equivalent of these sediments near the eastern graben margin. The presence of bedrock dolerite to the SW of Big Punchbowl, and just across the channel at Opening Hole, suggests a relatively shallow thickness (less than 300 m?) to these graben-fill Cainozoic sediments. A preliminary geology map of this area has been compiled by Corbett (2015, Fig 9).

The Big Punchbowl lagoon is the largest of a series of shallow flat-bottomed sub-circular depressions scattered around the eastern peninsula, and apparently eroded into the Cainozoic basement sandstones. They mostly lie at altitudes of 20-30 m, except for the one in the SE, at about 5m, and have a more or less continuous rim of the order of 5 m high. The Big Punchbowl is about 500 m across, several others are about 200m, and the two smallest are about 100 m across. The depressions contain fresh water after periods of heavy rain, but appear to be dry for much of the time. Evidence in the form of progressive vegetation growth around the margins of the Big Punchbowl suggests the wetted area has been shrinking for a considerable period, with the present water margin well inside the actual raised rim. A small amount of water was present at the eastern side in March 2015.

The Big Punchbowl Reserve is relatively flat only rising to 34m ASL at the highest point. The area contains a diverse range of predominantly ephemeral freshwater wetlands that vary in size, depth, the relative extent and duration of inundation and in floristic composition. The combination of marine, estuarine, littoral and freshwater environments in the vicinity provides a huge diversity of habitat for terrestrial fauna especially waterbirds, and coastal and littoral invertebrates. CFEV recognises much of the area of interest to be in the very high- high range for Conservation Management Priority (Figure 10).



PRELIMINARY GEOLOGICAL MAP OF THE BIG PUNCHBOWL – LONG POINT AREA

QUATERNARY		CAINOZOIC (TERTIARY)	
	Coastal complex – salt marsh, sedgeleand, sand flat, lagoon deposits, tidal deposits etc.		Siliceous sandstone, grit and fine conglomerate, yellow to brown, typically iron-stained, poorly bedded, rich in granite-derived quartz. Mostly fluvial.
	Wind-blown sand as irregular sand sheets		
	Dune sand, including older dunes	JURASSIC	
	Probable deflation basins, with shallow peaty to sandy soils, intermittent fresh water		Dolerite

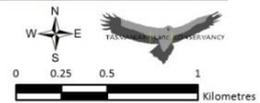
K D Corbett

Figure 9 Geology of The Big Punchbowl and Long Point Reserves and immediate area (Corbett 2015).



Big Punchbowl - freshwater ecosystem values (CFEV)

- | | |
|-----------------------|--|
| Long Point Reserve | Conservation Management Priority (CFEV) |
| Big Punchbowl Reserve | VH |
| wetland | H |
| floodplain | M |
| streams | L |



Drawn TLC, NAME, DATE, base data (C) TheList, Client data TLC

Figure 10 Freshwater ecosystem values of The Big Punchbowl and Moulting Lagoon complex.

Invasive Pests

There are a number of invasive weeds and exotic fauna on the Big Punchbowl Reserve and *Phytophthora* root rot fungus has been confirmed from soil samples collected at several sites in November 2014. Small localised outbreaks of gorse *Ulex europaeus* and Californian thistle *Cirsium arvense* occur mainly on the coast as a legacy of stock grazing, soil disturbance and the movement of vehicles along roads. These are already being treated. Fallow deer *Dama dama* and European rabbit *Oryctolagus cuniculus* are widespread across the reserve and threaten the diversity of the wetlands and the regeneration of woodlands (Locke 2002). Fallow deer damage young and emergent vegetation and are also responsible for over-browsing and trampling of grasslands and succulent grasses and herbs in marshland and wetlands. This invasive species is partly protected in Tasmania and can only be destroyed under permit either during the recreational hunting season or for crop protection purposes. As the Freycinet Peninsular is outside the core range of this species, control measures will be supported by DPIPWE.

Feral cats *Felis catus* have been identified on camera during fauna monitoring as have the introduced house mouse *Mus musculus* and black rat *Rattus rattus*. Alleged sightings of the European red fox *Vulpes vulpes* by members of the public in the Freycinet area, have yet to be positively confirmed.

While little is known of invasive invertebrate pests, the bumblebee *Bombus terrestris* and European wasp *Vespula germanica* occur on the reserve and compete for nectar resources which can potentially impact on native fauna especially woodland birds. Ecological information is lacking on these two species on the reserve.

Scientific Studies

There have been a number of scientific studies, surveys and monitoring activities undertaken on or near The Big Punchbowl Reserve, in recent times. These include:

- Flora of the Big Punchbowl Lagoon (J. Smith PhD Thesis, UTAS, Appendix A)
- Long-term monitoring of eagle nest sites (in collaboration with FPA)
- Geological survey of The Big Punchbowl and Long Point Reserves – Keith Corbett (March 2015)
- Tasmanian Devil Facial Tumour Disease monitoring (conducted by the STTDP, E Dewar and M Jones)
- Survey for the New Holland Mouse in the Coles Bay area (B. Lazenby, report to DPIPWE)
- Survey for the Tasmanian Chaostola skipper in the Freycinet area (P. Bell, report to DPIPWE)
- Moulting Lagoon Game Reserve annual bird counts – PWS and Tasmanian Bird Report

More information on these studies is available from the TLC.

Aboriginal History

Tasmania's Aborigines were once divided into nine tribes with each tribe consisting of a number of bands ranging from 5-15 people (Ryan, 2012). Tasmania's east coast was occupied by the Oyster Bay Tribe (Paredarmerme) that consisted of 10 bands, approximating 600-700 people in total. The band on the Freycinet Peninsular was known as *Toorernomairremener*. Around August to October the bands would reside on the coast at places like Moulting Lagoon and Schouten Island as these were important areas for food and resources. As spring approached most of the bands would move inland, some to the Ben Lomond Tier and others to the Northern Midlands. However, the Linetemairrener people remained at the lagoon all year round. Some would return at the end of January to the coast for sealing and mutton birding, returning to the Midlands in March. The inland areas were important hunting grounds; mainly possum and wallaby as well as ceremony and trading. Wildlife around Moulting Lagoon, particularly black swan eggs, was an important food source for Aboriginal people (Ryan, 2012).

While no specific indigenous surveys have been undertaken yet it is highly likely that The Big Punchbowl formed part of the extensive lagoon network that provided food, shelter and other resources on a seasonal and more permanent basis.

Aboriginal stone artefacts which included sharpened flakes and heavier core-stone-like pieces, and of several different rock types, including hornfelsed mudstone, cherty silica, and fine-grained dolerite have been identified on the reserve (Corbett 2015). Some out-of-place pieces of dolerite up to 20 cm across have also been noted. A number of the artefacts were located around the shore of the Big Punchbowl, several on the access track to this area, and others scattered over a wider area.

European History

Whaling parties, tin and coal miners and pastoralists lived and worked on the Freycinet Peninsula since the early years of European settlement. Old mine shafts, abandoned farmers' huts and the remains of whalers' camps form part of the area's rich cultural heritage. Freycinet was first named by Abel Tasman in 1642, when navigating the east coast of Tasmania named Schouten Island and the peninsula Vanderlyn's Eylandt (believing it to be a chain of islands). This myth was dispelled during the visit of Nicholas Baudin, the French explorer, in 1802-03. The Freycinet brothers were senior officers on Baudin's expedition, although it is unclear which one the peninsula was named after. The majestic beauty of Freycinet's granite mountains and white, sandy beaches have also long been admired by naturalists, artists and writers.

The Big Punchbowl Reserve has been used as a base camp for duck shooters accessing the Moulting Lagoon Game Reserve more widely. This is evidenced by a number of duck hides and spent cartridges in the coastal corridor. Duck hunting is a legally permitted activity in Moulting Lagoon area and a duck shooting camp was established on The Big Punchbowl toward Breakfast Point. This camp was used for many years and was well maintained until dismantled in 2014 (Fig 11).

The reserve contains remnants of other small base camps for recreation or harvest (e.g. wallaby, rabbit, deer, etc.) and four bee hives were stationed in the small gravel quarry for small scale honey production but removed in late 2014. The property has become increasingly attractive to those wanting to access the east coast and Freycinet area in search of orchids, bird watching and for small scale camping and recreational use of the general area.

Past Management

The Big Punchbowl property has been owned by the Flack family for many decades during which time it has been grazed, partly drained and used as a source of firewood at varying levels of intensity.



Fig 11 Duck shooters camp removed from the reserve in 2014.

MANAGEMENT PLAN OVERVIEW

The management plan developed for The Big Punchbowl Reserve is outlined in the vision, targets and strategies shown below and contained in a separate document (The Big Punchbowl Reserve Management Plan, TLC 2015). The plan was reviewed by the TLC's Science and Planning Advisory Council, approved by the TLC Board and is available via the TLC web site (www.tasland.org). The TLC uses an adaptive management framework and utilises Miradi software to generate the management plan, to record monitoring of progress towards goals and objectives and to generate annual work plans based on the results of previous implementation and monitoring.

VISION	The Big Punchbowl Reserve is managed for its wetland and woodland values and to enhance the Moulting Lagoon Ramsar site.
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CONSERVATION TARGETS	GOALS
Wetland Complex	The 2014 condition of the wetlands and their threatened species are maintained or improved
Coastal Woodland	The condition of the woodland flora and fauna community is improved from 2014
Moulting Lagoon	Maintain or improve 2014 conservation values of Moulting Lagoon
SOCIAL TARGETS	GOALS
Community Engagement	Community are engaged with the Reserve and region
Indigenous Values	The indigenous values of the reserve are known and protected
Regional Enhancement	Reserve conservation contributes to the local region
STRATEGIES	OBJECTIVES
Site development plan	Conservation targets are not degraded by recreational use of the reserve
Community engagement	Reserve visitation over 100 people/year (TBA)
Weed management	By 2017 existing weeds are controlled
Feral pest management	By 2020, impacts from feral pests are reduced
Fire Management	No unauthorised fires start on the reserve
Improve understanding of fauna	By 2020, species of conservation significance are managed effectively
Protect Indigenous Values	By 2017, indigenous values are known and better protected
Strengthen regional capacity	Management strategies are shared regionally whenever possible Reserve derived income supplements reserve costs by 5% annually Reserve expenditure contributes to the Freycinet region
Build Resilience to Climate Change	The impact of climate change on conservation targets is being addressed

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Appendix A Flora of the Big Punchbowl Lagoon (J Smith PhD Thesis UTAS)

Appendix VIII-a BIG PUNCHBOWL: presence/absence summary of species found in the present study compared with previous vegetation studies.

- * = introduced species; P= perennial; A = annual; B = biennial; lines indicate categories of the present study
 ✓ = germinated between field surveys; underline = dominant within either seed bank or extant vegetation study of the present study or in the extant vegetation at time of the past surveys; ✓ = greater than 5% cover; ✓* = between 1-5% cover; (a) species found in the seed bank of summer 1997 and winter 1997;
 (b) number of seasons the species was present during field surveys between 1997 and 1998;
 (c) Jamie Kirkpatrick and Chris Harwood 1978 survey (Kirkpatrick and Harwood, 1981); (d) vegetation survey by the author in August 1995; (e) vegetation survey in summer 1999 by Micha Visoiu (Visoiu, 2000);
 (f) JS 1997-1998 - species observed by the author in the wetland between 1997 and 1998;
 (g) field germination observed during the present study 1997-1998.

	FG	Life cycle	(a)	(b)	(c)	(d)	(e)	(f)	(g)
			Seed Bank	Seasons present extant	K+H 1978	JS 1995	Visoiu 1999	JS 1997-98	Field germination
<i>Baumea rubiginosa</i>	Atle	P	✓	8	✓	✓	✓	✓	
<i>Isolepis fluitans</i>	Ar	P	✓	4	✓	✓			✓
<i>Chara preissii</i>	S	A	✓	2					✓
<i>Nitella subtilissima</i>	S	P	✓	2					✓
<i>Potamogeton tricarinatus</i>	Ar	P	✓	2	✓				✓
<i>Utricularia dichotoma</i>	Atle	P	✓	2					✓
<i>Nitella spp.</i>	S	P	✓	1					✓
<i>Juncus bufonius</i>	Atls	A	✓		✓	✓			
<i>Juncus pallidus</i>	T	P	✓		✓	✓		✓	
<i>Vellerophyton dealbatum*</i>	T	A	✓		✓				
<i>Isolepis inundata</i>	Atle	P	✓		✓	✓			
<i>Schoenus fluitans</i>	Ar	P	✓		✓				
<i>Myriophyllum simulans/varifolium</i>	Ar	P	✓					✓	
<i>Agrostis avenacea</i>	Atle	A		7		✓		✓	✓
<i>Eucalyptus sp.</i>	T	P		3		✓			✓
<i>Acetosella vulgare*</i>	T	P		1				✓	✓
<i>Trifolium sp.*</i>	T	A		1				✓	✓
<i>Scleranthus biflorus</i>	T	P		8				✓	
<i>Scaevola hookeri</i>	Atls	P		4	✓	✓	✓	✓	
<i>Villarsia reniformis</i>	Ar	P		8	✓	✓	✓	✓	
<i>Leptospermum scoparium</i>	T	P		8	✓	✓	✓	✓	
<i>Leptocarpus tenax</i>	Atls	P		7	✓	✓	✓	✓	
<i>Triglochin procerum</i>	Ar	P		6		✓		✓	
<i>Chorizandra enodis</i>	Atle	P		5	✓	✓		✓	
<i>Eleocharis sphacelata</i>	Ar	P		2				✓	
<i>Gonocarpus micranthus</i>	Atls	P		2	✓	✓		✓	
<i>Dayeulia quadrifseta</i>	T	P		1			✓	✓	
<i>Banksia marginata</i>	T	P		1		✓		✓	
<i>Isolepis producta</i>	Ar	P			✓				
<i>Potamogeton ochreateus</i>	Ar	P			✓				
Species total			13	22	14	13	7	24	10

Species recorded in dry herbaceous zone of Big Punchbowl not sampled in the present study

<i>Labellia alata</i>	?				✓				
<i>Hydrocotyle muscosa</i>	Ar				✓				
<i>Elatine gratioloides</i>	Ar				✓				
<i>Littaeopsis polyantha</i>	Atle				✓				
<i>Juncus planifolius</i>	Atle				✓				
<i>Centipeda minima</i>	Atle				✓				
<i>Juncus articulatus*</i>	Atle				✓				
<i>Lepidosperma longitudinale</i>	Atle				✓	✓	✓		
<i>Schoenus maschalinus</i>	Atle				✓				
<i>Plantago coronopus*</i>	Atle				✓				
<i>Gratiola nana</i>	Atle				✓				
<i>Lepyrodia muelleri</i>	Atle				✓		✓		
<i>Centrolepis fascicularis</i>	Atle				✓				
<i>Centella cordifolia</i>	Atle				✓		✓		
<i>Selliera radicans</i>	Atle				✓	✓			
<i>Hypericum japonicum</i>	Atle				✓				
<i>Isolepis cernua</i>	Atle				✓				
<i>Scaevola hookeri</i>	Atle				✓	✓	✓		
<i>Leptocarpus tenax</i>	Atle				✓	✓	✓		
<i>Schoenus nitens</i>	Atle				✓	✓	✓		
<i>Epilobium sp.</i>	T				✓				
<i>Selaginella uliginosa</i>	T				✓	✓	✓		
<i>Euchiton involucreatus</i>	T				✓				
<i>Holcus lanatus*</i>	T				✓				
<i>Leptospermum scoparium</i>	T				✓	✓			
<i>Holcus lanatus*</i>	T				✓				

Appendix B Fauna recorded on The Big Punchbowl Reserve.

Taxon name E – endemic TSPA listed EPBC listed	Taxon scientific name (inc endemic subspecies)	March 2014	Sep 2014	Oct 2014
BIRDS				
Wild Turkey	<i>Meleagris gallopavo</i>	Coles Bay Rd	sighted	
Black Swan	<i>Cygnus atratus</i>	sighted		sighted
Chestnut Teal	<i>Anas castanea</i>	sighted		
Pacific Black Duck	<i>Anas superciliosa</i>	sighted		
Common Bronzewing	<i>Phaps chalcoptera</i>		sighted	sighted
Tawny Frogmouth	<i>Podargus strigoides</i>	calling		
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	sighted		
Great Cormorant	<i>Phalacrocorax carbo</i>	sighted		
Pied Cormorant	<i>Phalacrocorax varius</i>	sighted		
Australian Pelican	<i>Pelecanus conspicillatus</i>	sighted		
White-faced Heron	<i>Egretta novaehollandiae</i>	sighted		
White-bellied Sea-Eagle (TSPA)	<i>Haliaeetus leucogaster</i>	sighted	on nest	on nest
Swamp Harrier	<i>Circus approximans</i>		sighted	sighted
Tasmanian Wedge-tailed Eagle (TSPA, EPBC)	<i>Aquila audax fleayi</i>	sighted	pair sighted	
Brown Falcon	<i>Falco berigora</i>	calling	sighted	nest
Tasmanian Native-hen E	<i>Tribonyx mortierii</i>	sighted	sighted	
Pied Oystercatcher	<i>Haematopus longirostris</i>	sighted		sighted
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	sighted		
Masked Lapwing	<i>Vanellus miles</i>	sighted		
Caspian Tern	<i>Hydroprogne caspia</i>		8 birds	
Crested Tern	<i>Thalasseus bergii</i>	sighted		
Pacific Gull	<i>Larus pacificus</i>	sighted		
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	sighted		
Tasmanian Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus xanthanotus</i>	calling		calling
Tasmanian Green Rosella E	<i>Platycercus caledonicus caledonicus</i>	sighted	calling	calling
Tasmanian Eastern Rosella	<i>Platycercus eximius diemenensis</i>	sighted		sighted
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>		calling	calling
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>		calling	calling
Pallid Cuckoo	<i>Cacomantis pallidus</i>		calling	calling
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	calling		
Tasmanian Superb Fairy-wren	<i>Malurus cyaneus cyaneus</i>	calling		
Tasmanian Scrubwren E	<i>Sericornis humilis</i>	calling		calling
Tasmanian Brown Thornbill	<i>Acanthiza pusilla diemenensis</i>	calling		sighted
Spotted Pardalote	<i>Pardalotus punctatus</i>	calling	calling	
Tasmanian Striated Pardalote	<i>Pardalotus striatus striatus</i>	calling	calling	calling
Tasmanian Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	calling		calling
Yellow-throated Honeyeater E	<i>Lichenostomus flavicollis</i>	calling	calling	calling
Tasmanian Noisy Miner	<i>Manorina melanocephala leachi</i>	calling		
Tasmanian Little Wattlebird	<i>Anthochaera chrysoptera</i>	calling		
Tasmanian Yellow Wattlebird E	<i>Anthochaera paradoxa paradoxa</i>	sighted	calling	calling
White-fronted Chat	<i>Epthianura albifrons</i>	sighted		sighted
Crescent Honeyeater	<i>Phylidonyris pyrrhopterus</i>	calling		
Tasmanian New Holland Honeyeater	<i>Phylidonyris novaehollandiae canescens</i>	sighted		calling

Black-headed Honeyeater E	<i>Melithreptus affinis</i>	calling		calling
Tasmanian Spotted Quail thrush	<i>Cinlosoma punctatum dovei</i>		1 on track	
Tasmanian Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae novaehollandiae</i>	calling		calling
Tasmanian Golden Whistler	<i>Pachycephala pectoralis glaucura</i>	calling		calling
Tasmanian Grey Shrike-thrush	<i>Colluricincla harmonica strigata</i>	calling		calling
Dusky Woodswallow	<i>Artamus cyanopterus</i>			calling
Tasmanian Grey Butcherbird	<i>Cracticus torquatus cinereus</i>	calling	Calling	calling
Tasmanian Australian Magpie	<i>Cracticus tibicen hypoleuca</i>	calling		calling
Tasmanian Black Currawong E	<i>Strepera fuliginosa fuliginosa</i>	calling		calling
Tasmanian Grey Currawong	<i>Strepera versicolor arguta</i>			calling
Tasmanian Grey Fantail	<i>Rhipidura fuliginosa albiscapa</i>	calling	Calling	calling
Southern Forest Raven	<i>Corvus tasmanicus tasmanicus</i>	sighted		sighted
Tasmanian Scarlet Robin	<i>Petroica multicolor leggii</i>	calling		sighted
Tasmanian Dusky Robin E	<i>Melanodryas vittata vittata</i>			calling
Tasmanian Silvereye	<i>Zosterops lateralis lateralis</i>			calling
Tasmanian Tree Martin	<i>Petrochelidon nigricans nigricans</i>		sighted	
Common Blackbird	<i>Turdus merula</i>	calling		
MAMMALS				
Tasmanian Bettong E	<i>Bettongia gaimardi</i>	digging		
Cat (feral)	<i>Felis catus</i>	scats		camera
Common Wombat	<i>Vombatus ursinus</i>	sighted		camera
Echidna	<i>Tachyglossus aculeatus</i>	sighted		camera
Bennett's Wallaby	<i>Macropus rufogriseus</i>	sighted		camera
Tasmanian Pademelon E	<i>Thylogale billardierie</i>			camera
Brush-tailed Possum	<i>Trichosurus vulpecula</i>	scats		camera
Fallow Deer	<i>Dama dama</i>	scats, prints		
European Rabbit	<i>Oryctolagus cuniculus</i>	scats		
Tasmanian devil E (TSPA, EPBC endangered)	<i>Sarcophilus harissii</i>	scats		camera
Spotted-tail quoll (TSPA, EPBC vulnerable)	<i>Dasyurus maculatus</i>			camera
Rodent sp ? Black rat	<i>Rattus rattus</i>			camera
Sheep	<i>Ovis aries</i>			camera
REPTILES				
Blotched Bluetongue	<i>Tiliqua nigrolutea</i>	sighted		
White's Skink	<i>Egernia whitii</i>		sighted	camera
Metallic Skink	<i>Niveoscincus metallicus</i>		sighted	sighted
AMPHIBIANS				
Smooth Froglet	<i>Geocrinia laevis</i>	calling	calling	
Tasmanian Froglet	<i>Crinia tasmaniensis</i>	calling		
Brown Tree Frog	<i>Litoria ewingi</i>	calling		