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NRM North

**Floodplain Lower Ringarooma
River Ramsar Wetland Site**

Management Plan

June 2008

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1. Introduction

This Plan covers the Ramsar site (as a core area) and also the surrounding zone of influence. Together these form the Floodplain Lower Ringarooma River Ramsar Wetland Site (henceforth referred to as the wetland site). Section 1 outlines the vision, principles and objectives for this Management Plan.

1.1 Vision

The wetland site has significant environmental and cultural values. Parts of this area also support significant agricultural activities (particularly dairying) and mining activities.

Without the appropriate planning, management and monitoring mechanisms, there is a risk that the values associated with the wetland site may be compromised. In order to sustain these environmental and economic values, this Management Plan has been developed with the vision of:

“Promoting the conservation of the internationally important values of the Ramsar wetland site and its ecological character, while allowing for wise use of the wetlands and the national resources it supports”.

1.2 Objectives

The Management Plan has the following key objectives:

- » Use an adaptive management approach as a basis for protecting the sites significant ecological values, particularly in relation to geomorphology, water, flora, fauna and heritage. This includes making amendments to the plan through appropriate consultation with current and future stakeholders (including a comprehensive review at intervals of not more than seven years);
- » To establish and/or maintain appropriate monitoring programs to provide early warning of any detrimental impacts on the values of the wetland site and to make these data freely available;
- » To respond to any threats to the values of the site through a strategic approach; and
- » To allow for current and future uses of the wetland site to continue without compromising the values associated with the internationally significant wetland and ultimately the status of the site as a Ramsar wetland;

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* and Regulations require that the management of Wetlands of International Importance be directed, primarily, at maintaining the ecological characteristics of the site. In order to do so, it is necessary to understand the nature and risks posed by the threats (current and prospective) that may impact on the site, and to then focus the monitoring requirements / management actions at addressing these threats.

1.3 Principles for management

In pursuing the vision, management of the wetland site is based on the following principles:

- » Use an adaptive management approach, such that human uses do not impact negatively on relevant environmental and heritage values;

- » Apply the precautionary approach to decision-making in relation to the site. Where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation;
- » Comply with broader regional, state, national and international policies, initiatives and obligations in relation to possible impacts on environmental values;
- » Implement the Plan in a transparent way that ensures accountability for all decisions;
- » Modify elements of the plan based on the results of relevant monitoring activities;
- » Undertake future amendments to the plan through appropriate consultation with current and future stakeholders, including a comprehensive review at intervals of not more than seven years; and
- » Recognise that the availability of resources, both human and financial, may limit the pursuit of the vision and implementation of this plan. Therefore, prioritise management actions to match available resources, where necessary.

Figure 1 Overview of wetland site



2. Background

2.1 Site description

The Ringarooma wetland system is one of ten in Tasmania listed under the Ramsar on Wetlands (Ramsar Iran (1971), also known as the Ramsar Convention), which are protected under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (DPIW, 2006).

The Ringarooma River originates in the foothills between Ben Nevis (part of the Ben Lomond ranges) and Mount Maurice in the north-east of Tasmania. From this location it flows north for approximately 150 river kilometres before discharging into Bass Strait via Ringarooma Bay, located 9 km north-west of the township of Gladstone between Cape Portland and Waterhouse Point. Average annual rainfall of the area ranges from 625 to 750 mm (RIS 2003a). Map 1 (Appendix A) shows the extent of both the Ringarooma River catchment and the Ramsar site.

The catchment covers an area of approximately 975 km². At its lower end, the catchment encompasses the wetland site, which lies on the sandy flood plain and contains extensive marshlands including Fosters Marshes and a number of shallow lagoons such as Rushy Lagoon, Shantys Lagoon, Blueys Lagoon and Bowlers Lagoon.

The wetland site covers an area of 3,519 hectares. Map 2 (Appendix A) shows the wetland site overlaying aerial images. At its northern edge, the Ramsar site includes the Boobyalla Inlet estuary and parts of both Boobyalla Beach and Murdochs Beach to the east and west of the River mouth respectively. Petal Point is located at the northern end of Murdochs Beach. An extensive sand dune system occurs in the northern part of the site.

The Ramsar site and adjoining areas comprise of a number of private properties and Crown reserves, which are illustrated in Map 3. Properties to the west of the Ramsar site include *East Wyambi* (1235 ha), *Probert & Mather* (454 ha), *Old Boobyalla* (930 ha), *Richard Propsting* (1061 ha) and *Clovelly Tasmania* (1818 ha). Much of the Ramsar site is part of the large *Rushy Pastoral* property (20758 ha) that extends from the east. *Rushy Pastoral* currently leases three commercial dairies within the south of the Ramsar site. The three dairies include *Quinfields*, *Centre View* and *Cygneus*, which comprise approximately 760 ha (22%) of the Ramsar site.

Crown Reserves within or around the Ramsar site includes the Mount Cameron Regional Reserve (reserved under the *Nature Conservation Act 2002*) and a number of Public Reserves (reserved under the *Crown Lands Act 1976*). The Public Reserve includes part of the old Boobyalla township site (along the remains of a port on the Ringarooma River) and the associated Boobyalla Cemetery. The 0.6 ha cemetery reserve is surrounded by private land, on the *Probert & Mather* property. The township reserve consists of 9.8 ha, of which 2.9 ha occur within the Ramsar site.

PWS has management responsibility for Mount Cameron Regional Reserve, under the National Parks and Reserves Management Act 2002. PWS also has some day to day management responsibility (e.g. enforcement) on Public Reserves.

The Crown Land Assessment and Classification (CLAC) project recommended that much of the Public Reserve be proclaimed Conservation Area or included as part of the Cameron Regional Reserve under the *Nature Conservation Act 2002*. The proclamations are yet to be completed.

There are a number of grazing licenses (relevant to the wetland site) that fall largely within the Mount Cameron Regional Reserve. The licences, from north to south, include

- » 021871 Licence Probert & Mather;
- » 004352 Licence East Wyambi P/L; and
- » 012294 Licence Rushy Pastoral Resources.
- » 006192 Licence Rushy Pastoral Resources

The 761 ha DPIW reserve to the north extends from Tomahawk to Waterhouse Point, along the coastline of Ringarooma Bay.

2.2 Ramsar listing

The wetland site was originally listed in November 1982 against the (then) criteria 2(a) and 2(b), which stated that a wetland should be considered internationally important if:

- » 2a - It supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant or animal, or an appreciable number of individuals of any one or more of these species; and
- » 2b – It is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna.

In 1999 the Ramsar criteria were revised. As a result of the revision, the Ramsar site is now listed under criteria 1, 2 and 3:

1. A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region;
2. A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities; and
3. A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Particular characteristics of the wetland that are relevant to each criterion are outlined in Section 2.3. These characteristics are discussed in further detail in Section 3.

At the time of its original listing, the wetland site was the subject of a Ramsar Information Sheet (RIS), a requirement of the Ramsar listing process. Since that time, the RIS has been updated in 1988, twice in 2003 and again in 2005. The updates have provided substantial increases in site information, including the justifications for listing under the specified criteria. Appendix B shows the latest RIS (2005).

The Ramsar Convention on Wetlands requires that for designated Wetlands of International Importance the 'ecological character' of the site be retained. 'Ecological character' is the sum of the biological, physical and chemical attributes of the site and their interactions. There is also an expectation that parties to the Ramsar Convention will establish and maintain monitoring at Ramsar sites so as to allow for early warning of any factors that have the potential to alter the ecological character.

2.3 Criteria for Ramsar Listing of the Site

2.3.1 Criterion 1 (representative/rare/unique wetland type in appropriate biogeographic region)

The site contains good condition, regionally representative examples of wetland systems within a floodplain, with a mosaic of permanent and seasonal marshlands and a large river estuary (Boobyalla Inlet). Boobyalla Inlet is recognised as a Tasmanian estuary with high conservation significance (Edgar *et al*, 1999).

Two vegetation communities recognised as threatened under Tasmanian legislation (DPIW 2007) have been recorded within the site (DPIW 2006);

- » Wetland – vulnerable in Tasmania; and
- » Coast Paperbark (*Melaleuca ericifolia*) swamp forest (rare and endangered in Tasmania).

Within the 'wetland' category, freshwater aquatic sedgeland and rushland, freshwater aquatic herbland, and lacustrine herbland have been identified at the site. Blackwood (*Acacia melanoxylon*) swamp forest has also been recorded at the site and is considered rare within the bioregion (DPIW, 2006). A section of the marshes known as *The Chimneys* is thought to be a remnant of a once more extensive lake system, older than other lakes in the area and potentially containing palynological and palaeobotanical fossils and megafaunal remains (RIS 2005).

2.3.2 Criterion 2 (vulnerable/endangered/critically endangered species or ecological communities)

There are five nationally threatened fauna species listed at the Commonwealth level - principally through the EPBC Act or through international agreements, such as the Japan - Australia Migratory Bird Agreement (JAMBA) and the China - Australia Migratory Bird Agreement (CAMBA). These species include:

- » Growling grass frog, also known as the Green and gold frog (*Litoria raniformis*);
- » Wedge-tailed eagle (*Aquila audax fleayi*);
- » Spotted-tailed quoll (*Dasyurus maculatus maculatus*);
- » Dwarf galaxias (*Galaxiella pusilla*); and
- » Australian grayling (*Prototroctes maraena*).

The site also supports the shiny grass tree (*Xanthorrhoea bracteata*), which is a nationally threatened plant species.

A number of migratory birds have also been recorded from the site, including nine migratory birds listed on CAMBA and/or JAMBA. These are discussed in more detail in Section 3.6.

2.3.3 Criterion 3 (supports populations of plant and/or animals important for regional biodiversity)

Communities listed at the State level include:

- » The vulnerable wetland communities; and
- » The rare and endangered community of *Melaleuca ericifolia* swamp forest.

3. Key Values

Unless specified otherwise, the information in this section is adapted from Newall and Lloyd (2007).

The key values of the wetland site relate to:

- » River and coastal geomorphology;
- » Hydrological inputs and fluctuations;
- » Water quality;
- » Vegetation diversity and significant wetland habitat;
- » A number of threatened species and ecological communities;
- » Numerous indigenous bird species; and
- » Aboriginal and European cultural heritage values.

3.1 Geomorphology

The Ringarooma River originates in a granodiorite massif and passes mostly through granite in its middle reaches and into alluvium in its lower reaches (Nelson 1999). Extensive alluvial tin mining along much of the catchment has led to a massive release of sand and silt into the river.

The sediment load of the Ringarooma River was estimated to include 40 million cubic metres of mine tailings since the late nineteenth century (Knighton 1991). Some of this sediment has been transported to the wetland site, where it has been deposited to form a huge and complex set of levees and sediment splays. The sand component has been progressing downstream in a large wave of sediment, with the finer and less heavy silts being more rapidly washed downstream.

The wave of sediment has changed the stream bed from gravel-dominated to sand-dominated as the river progressively aggraded (built up) with the sediment. The sand aggradation has increased bed height by more than 10 metres in the lower reaches of the Ringarooma River (Knighton 1991). However, upstream supplies of the sediment have gradually been depleted as the sediment is carried downstream by the river. This has led to a subsequent degradation (lowering) of the stream bed. The process of aggradation followed by degradation of the bed is gradually moving downstream.

Newall and Lloyd (2007) explain in detail that the degradation has yet to reach the downstream reaches of the Ringarooma River, where sediment waves continue to pass over a slightly aggrading bed. There is potential for new releases of mining-derived sediment, with at least two mines soon to be opened near Gladstone. This mine is situated on Newhaven Creek, a tributary which enters the Ringarooma River downstream of Gladstone. Further, the majority of the Ramsar site itself is covered by mining tenements, which extend beyond the site and out into Ringarooma Bay.

Localised erosion and aggradation shift the depth, hydrologic regime and even the location of the wetland habitats. A key aspect of this site is that the rate of geomorphic change has been greatly accelerated, and the direction altered, by the massive inputs of mine-derived sediment.

Areas that remain relatively unaffected by this mining-induced sedimentation include Bowlers Lagoon (a dune-barred lake in the sand sheet behind Boobyalla Beach) and some deflation hollows with associated lunettes.

The Ringarooma River discharges into an estuary that includes a wave dominated delta. Mine-derived sediments have filled the estuary and now large sand flats exist where once large ships were able to traverse.

Typical of wave dominated delta estuaries, the Ringarooma estuary has a direct connection between river and sea, via a channel flanked by a low-lying vegetated floodplain. The channel is kept open by the relatively high river velocities and a dune barrier partially constricts the estuary entrance, preventing it from expanding into a large, open estuary. The 'mature' nature of wave dominated deltas means that they have been mostly filled by sediments. In the case of the Ringarooma estuary, this 'maturation' has probably been created prematurely through an increased rate of sediment yield from the catchment as a result of tin mining.

A unique aspect of the site within the region may be a section of the marshes known as *The Chimneys*. *The Chimneys* may represent the remnants of a once more extensive lake system thought to be older than other lakes in the area (being situated well within known Pleistocene dunefields). If so, it is of considerable interest from a geoscientific perspective, providing potential sites for palynological and palaeobotanical investigation. *The Chimneys* may also have important subfossil potential such as megafaunal remains.

Beyond the estuary, the sandy shoreline (that extends eastwards towards Petal Point and westwards towards Tomahawk) is backed by large volume dunes (DTAE, 2007). Such dunes can become mobile when exposed through loss of vegetation. A number of extensive sand blowouts occur in the northern part of the wetland site.

Figure 2 *The Chimneys* marshes



3.2 Hydrology

Newall and Lloyd (2007) attributes the hydrology of the site to tidal and river flows. Local groundwater is particularly influenced when water (that is discharged from the Ringarooma River during flood events) is prevented from re-entering the river channel due to the presence of natural levees adjacent to the channels. The trapped water maintains the surface water of the nearby wetlands and also replenishes the local groundwater thereby sustaining more distant wetlands, such as Bowlers Lagoon. Most of the wetland is above the tidal limit and is mostly influenced by inflows from the Ringarooma River. The hydrology also is influenced by mining-related sediment deposition and water trapping described above. The estuary mouth is generally open and therefore the estuary always experiences tides.

River flow fluctuations influence a number of important biotic responses, such as seed germination, triggers for breeding (for birds, fish, frogs), success of breeding, and provision of food.

The hydrology of the site is not well documented. However, comprehensive information is available upstream in the Ringarooma River. There is useful hydrological flow data from the Ringarooma River at Moorina, approximately 20 km upstream of the site (Graham 1999) and also from several of its tributaries. Additionally, there is some water depth data for Rushy Lagoon (Read and Graham 2000). However, data on the hydrologic regime within the site, such as specific timing, volumes, extent of inundation and drying regime of the wetlands is not available.

Despite the lack of wetland specific data for the site, flow patterns of the lower Ringarooma River can provide clear indications of flow inputs to the floodplain wetlands. The seasonal flow patterns of the Ringarooma River follow the rainfall patterns, with highest flows in the winter/spring months and lowest in late summer to early autumn. From Moorina in the mid-catchment, Graham (1999) has shown that there are average monthly flows of approximately 16-18 m³/s from July to September, compared to February and March recorded average monthly flows of approximately 2 m³/s.

At nearby Bridport (approximately 45 km southwest of the site), rainfall has averaged 723 mm since records have been kept (13 years). Rainfall peaks in winter (the June average is nearly 95 mm), extending through spring, with lowest rainfall in the late summer – early autumn (February average rainfall is just over 30 mm).

Read and Graham (2000) note that the actual volume of water taken from the Lower Ringarooma River during the lower flow months (December through to April) is a small proportion of the flow in the River and therefore current water extraction rates are unlikely to impact significantly on the ecosystem of the Lower Ringarooma River and associated wetland areas. However, there remains a risk that extractions during periods of low flow rates could result in degradation of water quality, increases in sedimentation and subsequent impacts on flora and fauna values.

The freshwater wetland complex is surface water dominated. Local groundwater appears to be controlled by river flows and overflows, with the surface water generally recharging the local groundwater. The hydrology of the wetland site is therefore dependent on the Ringarooma River and several small tributaries. Local groundwater inflows from the river are thought to be important to the wetlands but these are unmeasured. Stream flow events allow for fish passage along the river for important fish species that utilise both the freshwater reaches and wetlands and the estuarine or marine habitat.

Currently, water extractions and river regulation are not significant issues. Within the site, one or more dams are proposed which will potentially impact on the input of freshwater tributaries to the wetland system. New dam developments near the wetland would require a referral under the *EPBC Act* and the

Department of Environment, Water, Heritage and Arts would be required to make an assessment of the potential impacts under this Act. Water extraction rights have also been allocated upriver, including some for hydroelectric purposes.

Figure 3 Sediment gradually being transported further into the wetland site



3.3 Water quality

According to Newall and Lloyd (2007), there is a lack of water quality data from within the site for either the wetland habitats or river. However, water quality data is being collected further upstream the Ringarooma River at Gladstone and for the Boobyalla River at Waterhouse Road. This data provides some information on the quality of water that enters the wetland site from the river.

The data from the Ringarooma River at Gladstone is indicative of high quality waters for a lowland river in south-eastern Australia. The water is high quality for an aquatic ecosystem with low electrical conductivity and turbidity, and high dissolved oxygen concentrations.

Phosphorus and nitrogen are typically the two major nutrients associated with excessive growths of algae and other water plants. Phosphorus concentrations are well below the Australia & New Zealand Environment and Conservation Council (ANZECC) default trigger values, whereas nitrogen concentrations slightly exceed the default.

While nutrients are critical to allow for the high biological production levels of the wetland site, inputs of elevated nutrient concentrations to the wetland have the potential to turn the site eutrophic. This can lead to algal blooms and oxygen deficits in the water column, with potentially severe impacts on the aquatic fauna.

Figure 4 Part of the extensive lake system within the wetland site



3.4 Agriculture

The Ramsar site and adjoining areas support a number of grazing enterprises which have traditionally supported beef, fine wool and lamb production (dryland). Properties to the west of the Ramsar site (including *East Wyambi*, *Probert & Mather*, *Old Boobyalla* and *Clovelly Tasmania*) largely continue with these traditional enterprises.

However, the large property of *Rushy Pastoral* has recently intensified agricultural activities in some parts of the large property. *Rushy Pastoral* currently leases three commercial dairies within the south of the Ramsar site. The three dairies include *Quinfields*, *Centre View* and *Cygneus*, which comprise approximately 760 ha (22%) of the Ramsar site. Map 3 (Appendix A) illustrates the proximity of these dairies.

Centre pivot irrigators operate on all three dairy farms, with water from a large dam that is filled during the winter period by pumping and channels from the Ringarooma River. Herd sizes are approximately 500 each at *Quinfields* and *Centre View*, with approximately 600 cows at *Cygneus*. Although the three dairy farms are operated by different share-farmers, their procedures are similar (Armstrong and Badcock, 2007 and 2008).

Originally designed for 300 cows, the effluent systems currently process effluent from herd sizes that are at least double this number. In recognition of this issue, land managers on *Rushy Pastoral* have recently participated in the DairyTas Best Practice Dairy Effluent Management in Tasmania project. A key outcome of this project has been the reports by Armstrong and Badcock (2007 and 2008), which provided the recommendations outlined in Section 7.2.

Total daily effluent flow is estimated at 30,000 litres/day for *Cygneus* and 20,000 litres/day each for *Quinfields* and *Centre View*, which is considerably higher than industry averages. This high level of effluent flow is also due to cows being held in the yards for longer than usual (four-hour milking time), as well as the additional input from plate coolers and vacuum pumps (Armstrong and Badcock, 2007).

Treated effluent is pumped to around 35 hectares on each dairy, applied through a stationary sprinkler (moved manually) or a travelling effluent irrigator (Armstrong and Badcock, 2007). There is a risk that sprinklers can become bogged in wet areas, resulting in concentrated effluent applications. Further, effluent pumps suffer frequent breakdowns resulting in overflows of effluent and natural drainage lines.

Waterlogging of soils during the wetter parts of the year (between April and October) increases the risk of faecal matter flowing into drainage lines that lead into the wetland areas of the Ramsar site. Marsh Creek and Mayfield Creek are the two main creeks that flow through the dairying area into the Ramsar wetland (Sheriff, 2007).

Figure 5 Stock grazing next to wetland areas



3.5 Vegetation

According to Newall and Lloyd (2007), the size, shape and species composition of the wetlands is largely related to the amount of water present and the length of time for which water is present each year.

The wetland complex contains a shallow mosaic of temporary and permanent wetlands with low nutrients, clear-water, neutral pH and low salinities. The vegetation consists of emergent and submerged leaf macrophytes within the areas of standing water, grading through sedgeland and heathland to swamp forests. The diversity of fauna at the site is dependent on the wide range of habitat.

DPIW (2006) conducted a vegetation survey based on TASVEG, which is a Tasmania-wide vegetation map, produced by the Tasmanian Vegetation Mapping Program (TVMP). The TVMP use 154 distinct vegetation communities to produce TASVEG at a scale of 1:25,000. Non-forest community types include grasslands, heathlands, scrub, wetlands and saltmarshes as well as riparian and coastal vegetation, woodlands and forest remnants. According to DPIW (2006), the site consists of a number of wetland types, including:

- » Type Xf wetlands (freshwater, tree-dominated wetlands), including coast paperbark (*Melaleuca ericifolia*) swamp forest (NME, TASVEG code) and blackwood (*Acacia melanoxylon*) swamp forest (NAF);
- » Type W wetlands (shrub-dominated wetlands), including scented paperbark (*Melaleuca squarrosa*) scrub (SMR), coastal heathland (SCH) and lowland sedgy heathland (SHL);
- » Type-Tp wetlands (permanent freshwater marshes/pools; ponds (below eight hectares), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season), including freshwater aquatic herbland, lacustrine herbland, and lowland grassy sedgeland; and
- » Type-Ts wetlands (seasonal/intermittent freshwater marshes/pools on inorganic soils), including freshwater aquatic rushland and sedgeland.

The floodplain areas also contain black peppermint (*Eucalyptus amygdalina*) coastal forest and woodland, which is not classified as a wetland type. Dieback of this vegetation type is widespread, particularly in the small isolated remnants.

The coast paperbark swamp forest, located along the Ringarooma River and Boobyalla River, was identified by DPIW (2006) as 'vulnerable' in Tasmania and is classified by DPIW (2008) as 'rare and endangered'. The Blackwood swamp forest is considered rare within the Flinders Bioregion. The freshwater aquatic herbland, lacustrine herbland and lowland grassy sedgeland are all within the 'wetland' category and this entire category is classified as vulnerable in Tasmania. Map 3 (Appendix A) illustrates the extent of threatened vegetation communities associated with the wetland site.

It is likely that many of the habitat and community types present today and at the time of listing were present at the site prior to mining impacts. As geomorphic processes fill in depressions at one location and create new ones elsewhere on the site, wetland vegetation shifts, creating a mosaic of community types, with differing ages and attributes. This dynamic nature of the vegetation is a common feature of floodplain wetlands and it is likely that the rapid input of the mining sediment increased the rate of change rather than completely changing the direction of the wetland's evolution.

In addition to the rare or threatened plant communities, threatened flora species known to occur on the site include:

- » Purple loosestrife (*Lythrum salicaria*, vulnerable, TSPA), found in the more open areas of the Coast Paperbark swamp forest, and also in the wetland communities;
- » Ribbon weed (*Vallisneria americana*, rare, TSPA), in the freshwater aquatic herbland community;
- » Native gypsywort (*Lycopus australis*, endangered, TSPA), found in the lacustrine herbland communities;
- » Shiny grasstree (*Xanthorrea bracteata*, vulnerable, TSPA) in the coastal heathland; and
- » Erect marshflower (*Villarsia exaltata*, rare, TSPA), which was not recorded by DPIW (2006) but is reported elsewhere (DPIW undated b) as occurring in *The Chimneys* and being found in stationary to slow-flowing water to a depth of 50 cm.

The DPIW survey was not conducted across the entire site. Other unmapped vegetation communities recorded as occurring on the site (RIS 2005) include:

- » Saltmarsh (AUS);
- » Coastal grass and herbfield (GHC);
- » Coastal scrub (SSC);
- » Coastal wattle (*Acacia longifolia*) coastal scrub (SAC); and
- » Drooping she-oak (*Allocasuarina verticillata*) forest (NAV).

Within Tasmania, saltmarsh vegetation communities qualify for two of the Biodiversity Criteria developed by the National Forest Policy Statement Implementation Sub-committee - a joint committee of ANZECC (Australia and New Zealand Environment and Conservation Council) and MCFFA (Ministerial Council on Forestry, Fisheries and Aquaculture). These criteria are:

- » Criterion (1); as less than 3% of the pre-1750 distribution of saltmarsh vegetation is protected in the Comprehensive Adequate and Representative (CAR) reserve system and
- » Criterion (5); as they are a habitat for migratory species which are also often rare, vulnerable or endangered.

Although saltmarsh communities are not currently listed as threatened within Tasmania, these communities serve a critical ecological function and are at risk due to their low reservation status.

There are numerous blocks of native vegetation that occur within predominantly cleared paddocks. There are no covenants on any of the larger blocks, and the smaller blocks within paddocks are generally not fenced from stock. Stock currently have access to most areas of native vegetation, as evidenced from trampling and grazing of native vegetation.

In a site managed for conservation purposes, the increased extent of irrigated pasture has led to the loss of a number of native vegetation communities, accompanied by the establishment of large areas of introduced grasses and other weeds. This threat is potentially high as it has already encroached onto a substantial part of the site. Grazing cattle exacerbate the spread of weeds, with seeds often attaching to the cattle hair and being transported to new areas.

Weeds of particular concern include six weeds declared under the Weed Management Act 1999, which is the principal legislation concerned with the management of significant weeds in Tasmania. Based on data from DTAE (2007) and literature from Sheriff (2007), the declared weeds include:

- » Gorse (*Ulex europeaus*), which is generally lightly scattered in some of the cleared areas and the estuarine section of the wetland site.
- » Crack willow (*Salix fragilis*), which is located along parts of the riparian margins of the Ringarooma River and adjoining wetlands.
- » Blackberry (*Rubus fruticosus*), particularly in areas around the estuarine section of the wetland site.
- » African boxthorn (*Lycium ferocissimum*), particularly along dune systems along Boobyalla beach and the estuarine section of the wetland site.
- » Ragwort (*Senecio jacobaea*), which is lightly scattered within the dairy areas of the wetland site.

Spanish heath (*Erica lusitanica*) is also known to occur on *Rushy Pastoral*.

Other weeds include marram grass (*Ammophila arenaria*), sea spurge (*Euphorbia paralias*), pampas grass (*Cardaria selbana*) and Radiate pine (*Pinus radiata*). Marram grass occurs on most of the beach/dune sections. Sea spurge occurs in the estuarine section and along part of Murdochs beach, towards Tomahawk. Radiate pine is recorded in the estuary section. Cape pond weed (*Aponogeton distachyos*) occurs in some lagoons.

3.6 Fauna

According to Newall and Lloyd (2007) and further information from DTAE (2007), the site supports a high diversity of species, with 150 species of flora and 34 species of waterbirds. There are a number of threatened fauna species:

- » Four species listed as **rare** under the TSPA, including the spotted-tailed quoll (*Dasyurus maculatus maculatus*), little tern (*Sterna albifrons*), fairy tern (*Sterna nereis*) and dwarf galaxias (*Galaxiella pusilla*).
- » Four species listed as **vulnerable** under the TSPA, including the white-bellied sea eagle (*Haliaeetus leucogaster*), growling grass frog (*Litoria raniformis*), Tasmanian devil (*Sarcophilus harrisii*) and white fronted tern (*Sterna striata*); and
- » Two species listed as **endangered** under the TSPA, including the wedge-tailed eagle (*Aquila audax fleayi*), eastern curlew (*Numenius madagascariensis*) and New Holland mouse (*Pseudomys novaehollandiae*).

The wedge tailed eagle is also listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. Species listed as Vulnerable under the *EPBC Act* include the dwarf galaxias, the growling grass frog, the Tasmanian devil and the eastern barred bandicoot (*Perameles gunnii gunnii*).

The Tasmanian spotted-tailed quoll is dependant on threatened habitat including blackwood swamp forest, coastal heathland and black peppermint coastal forest. The site also provides important habitat for Tasmanian mudfish (*Neochanna cleaveri*), Tasmanian whitebait (*Lovettia seali*) and Australian grayling (*Prototroctes maraena*) at critical/vulnerable stages of their life cycle.

Particular waterbirds recorded within the wetland site include the Australasian shoveler (*Anas rhynchotis*) as well as numerous migratory bird species listed on the China - Australia Migratory Bird Agreement (CAMBA) and also listed on the Japan - Australia Migratory Bird Agreement (JAMBA). These include;

- » Cattle egret (*Ardea ibis*);
- » Great egret (*Ardea alba*);
- » Latham's snipe (*Gallinago hardwickii*);
- » Curlew sandpiper (*Calidris ferruginea*);
- » Red-necked stint (*Calidris ruficollis*);
- » Caspian tern (*Sterna caspia*);
- » Greenshank (*Tringa nebularia*);
- » Bar-tailed godwit (*Limosa lapponica*);
- » Ruddy Turnstone (*Arenaria interpres*);
- » Little tern (*Sterna albifrons*);
- » Fairy tern (*Sterna nereis*);
- » White fronted tern (*Sterna striata*);
- » Grey tailed tattler (*Heterosclerus brevipes*);

- » Eastern curlew (*Numenius madagascariensis*);
- » Red knot (*Calidris canutus*);
- » Pacific golden plover (*Pluvialis fulva*);
- » Sharp tailed sandpiper (*Calidris acuminata*); and
- » Whimbrel (*Numenius phaeopus*);

Other waterbirds known to occur within the wetland site include:

- » Hooded plover (*Thinornis rubricollis*);
- » Blackfronted Dotterel (*Elseyaornis melanops*); and
- » Red-capped plover (*Charadrius ruficapillus*).

Much of the important habitat for waterbirds extends from the wetland/estuarine area through to Petal Point, particularly along the shoreline and fore dunes.

3.7 Heritage

Unless specified otherwise, the information in this section is adapted from Clark (2007).

The physical characteristics of the Ramsar site and the surrounding landscape have shaped human land use of the area. This includes use of the land by Aboriginal people over tens of thousands of years, along with land use by European settlers within the last 200 years.

According to a search conducted through the Tasmanian Aboriginal Site Index (TASI) in May 2007, there were no known records of Aboriginal cultural heritage sites within the Ramsar site. This finding does not imply that no Aboriginal sites are present within the study area. Other evidence from informal surveys and relevant studies indicate that it is highly likely that Aboriginal sites occur within the study area. To date, no surveys or management activities have been undertaken regarding Aboriginal cultural heritage within the Ramsar area. While shell middens are unlikely to occur in the Ramsar site due to a lack of rocky headlands, swamp areas such as this are likely to have other Aboriginal artefacts associated with gathering of foods such as waterbirds, bird eggs and tubers.

It is known from previous studies that Aboriginal heritage sites do occur within a few kilometres of the Ramsar site. These include shell middens on the coast and artefact scatters. Two studies by Kee (1991) and Cosgrove (1985) in nearby environments similar to the Ramsar wetlands have found Aboriginal artefacts, implying that these are highly likely to occur within the Ramsar site. At a site in the nearby *Rushy Pastoral* property with some similarities to the Ramsar site, the study by Cosgrove found that in all dunes with proximity to watercourses or former watercourses, Aboriginal artefacts were located. Sheriff (2007) reported that there are three aboriginal relic sites on the *Rushy Pastoral* property known by the landholders on *Rushy Pastoral*.

In relation to European settlement, the area was progressively settled for grazing purposes from the 1830's and intensified around Boobyalla in the 1860's. A search of the Conserve database (Forestry Tasmania) was conducted on May 2007. This search revealed one European cultural heritage site record within the Ringarooma Ramsar Wetland.

The known historic site within the Ramsar area is the location of the township of Boobyalla, along the remains of a port on the Ringarooma River. The port originated in the 1870's for the transport of tin from the mines further inland (i.e. the Mt Cameron, Gladstone, Garibaldi, Thomas Plains and Moorina areas)

to the smelters in Launceston. The township of Boobyalla contained an excellent port, three hotels, a police station, store, school and houses. A small cemetery was located about three kilometres south of the old port. By the early 1900's, the township and associated infrastructure gradually declined into ruin. Over a number of decades, bushfires destroyed the last traces of the town. Boobyalla was de-gazetted as a town in 1987 (Beswick et al, 1988).

Small reserves on the *Probert & Mather* property are proclaimed for the protection of the township and cemetery. The 0.6 ha cemetery reserve is surrounded by private land, approximately 700m west of the Ramsar site. The township reserve consists of 9.8 ha, of which 2.9 ha occur within the Ramsar site. The township is unreserved public land, whereas the cemetery is an informal reserve.

Within the Ramsar site, the area known as *The Chimneys* previously contained huts and chimneys. These sites have now fallen into disrepair and consist of piles of stones. There are a further two historic sites recorded within 2km of the boundary of the Ramsar area, to the southeast (Forestry Tasmania). These sites are mining features associated with Marsh Creek.

Figure 6 The Boobyalla cemetery



4. Threats

4.1 Background

A number of key threats are identified, based on key wetland values associated with:

- » Water and geomorphic values;
- » Flora and fauna values; and
- » Heritage values.

These threats are discussed in more detail below. Information was largely sourced from Newell and Lloyd (2007), with supporting information from Armstrong and Badcock (2007), Sheriff (2007) and Clark (2007).

4.2 Key threats to water and geomorphic values

Table 1 summarises the key threatening processes associated with geomorphic and water values.

Table 1 Key threats to water and geomorphic values

Threat	Description
Water extraction and/or dam building.	Water extractions (in the local area as well as in the upper catchment areas) could potentially impact upon environmental flows into the wetland system.
Stock access.	Stock impact on soil/sediment structure through trampling, exposure through overgrazing and modification of surface drainage through the development of stock tracks.
Public access to wetland and dune areas.	Increased visitation (particularly by 4WD's, motorbikes and quad-bikes) and resultant tracks are damaging vegetation and thereby exposing fragile dune systems and wetland areas to erosion.
Drainage and development of wetland areas.	Intensification of agricultural practices is leading to an increased network of drainage lines in and around the wetland. Drainage of wetland and estuarine areas could also lead to exposure of acid sulphate soils, which can impact on water quality. Water quality is threatened by nutrient runoff into wetland areas through excessive or poorly treated dairy effluent. The effluent systems are currently below industry standard.
Climate change	Climate change constitutes significant hazards to coastal and wetland values, including rising sea levels, storm surge and increased wind erosion. This is of particular concern in coastal/dune areas. Rising sea levels have the potential to create a salt water intrusion beyond the estuary and into much of the wetland.
Upstream activities relating to mining, agriculture and forestry.	Activities relating to mining and forestry have the potential to increase sediment loads. In particular, past mining practices have lead to the ongoing progression of fine sands into the wetland. Point-source (discharges) and non-point source (e.g. stock faeces/urine; soil erosion) inputs to the wetland catchment from upstream activities relating to agriculture, mining and forestry can result in reduced water quality and increased turbidity.

4.3 Key threats to flora and fauna values

Table 2 summarises the key threatening processes associated with flora and fauna values.

Table 2 Key threats to flora and fauna values

Threat	Description
Sedimentation.	Vegetation community loss or change through sedimentation, particularly through ongoing downstream progression of fine sands generated by mining activities in the past, present and future.
Public access to wetland and dune areas.	Increased visitation (particularly by 4WD's, motorbikes and quad-bikes) is increasing the risk of erosion, fire hazards and spread of weeds/pathogens. Vegetation is being degraded through vehicle impacts (particularly in very fragile areas such as saltmarshes) and collection of wood for camp fires. Bird nesting sites and sand fauna are also being impacted by vehicles.
Weed infestation.	There are six declared weed species as well as a number of environmental weeds. Although limited in extent, the declared weeds (particularly gorse) have the potential to spread significantly though the wetland site.
Water extraction and/or dam building.	Excessive levels of water extraction in the local area as well as in the upper catchment areas could potentially reduce the water inputs into the wetland system, thereby impacting on flora and fauna values.
Loss or conversion of vegetation.	Conversion of sedge or rush land to improved pasture, particularly in the Fosters Marshes area. Remnant woodlands are suffering severe dieback.
Pests	Cats and exotic aquatic species have the potential to significantly impact on flora and fauna values. <i>Phytophthora cinnamomi</i> (particularly in heathland areas) and other pathogens are also potentially significant threats.
Duck shooting	Duck shooting also has the potential to impact upon native fauna.
Stock access to wetland areas and uncleared areas.	Physical damage to wetland communities and bush run areas through uncontrolled stock (trampling and foraging), particularly in the Fosters Marshes area. Lucastrine herblands, which occurs at the margins of wetlands, are particularly vulnerable.
Acid sulphate soils	Drainage of wetland and estuarine areas could also lead to exposure of acid sulphate soils, which can impact on flora and fauna values
Salinity	Although salinity has the potential to impact on native flora and fauna values, the potential problem is a whole-of-catchment issue that is beyond the scope of this management plan.

4.4 Key threats to heritage values

Table 3 summarises the key threatening processes associated with heritage values.

Table 3 Key threats to heritage values

Threat	Description
Sedimentation.	Burial of sites from sedimentation from past tin mining activities.
Public access to wetland and dune areas.	Increased visitation (particularly by 4WD's, motorbikes and quad-bikes) is increasing the risk of damage to heritage sites, particularly through vehicle impacts and exposure of soils/dune systems associated with heritage values.
Mining.	Impacts from mining excavations.
Agricultural practices and mining.	Impacts through clearing, stock trampling and irrigation practices.

Figure 7 Stock impacts within the wetland site



5. Knowledge Gaps

5.1 Background

A number of knowledge gaps have been identified, based on key wetland values associated with:

- » Water and geomorphic values;
- » Flora and fauna values; and
- » Heritage values.

These knowledge gaps are discussed in more detail below. Note that the identified knowledge gaps were also ranked to assist in the prioritisation process of monitoring requirements / management actions outlined in Section 6.

Information was largely sourced from Newell and Lloyd (2007), with supporting information from Armstrong and Badcock (2007), Sheriff (2007) and Clark (2007).

5.2 Knowledge gaps relating to water and geomorphic values

Table 4 lists the knowledge gaps associated with geomorphic and water values.

Table 4 Knowledge gaps - hydrologic/geomorphic values

Knowledge gap	Description	Priority
River geomorphic features	There is a lack of information of river and wetland geomorphic features in relation to baseline condition and the rate of change of landforms and sedimentation impacts.	Very high
Coastal geomorphic features	There is a lack of information on coastal geomorphic features in relation to the rate of change of dune systems and coastal features.	Very high
Inundation records	Inundation records for each wetland are not available, including coverage and depths over time.	Very high
Engineering requirements for green water recycling	Further investigations are required for injecting effluent into the irrigation stream and recycling green water from the storage pond to the nozzles on the backing gate.	Very high
Baseline conditions for water quality	There is currently insufficient data available in the wetlands to define baseline conditions and trigger levels for water quality at the site. Data collected by the Northern Waterway Assessment Team (for the Ringarooma River at Gladstone and for Boobyalla River at Waterhouse Road) should be used to assist in addressing this knowledge gap.	High
Baseline data for water volumes	There is currently insufficient data available to quantify volumes, depths, flow rates or seasonal and annual variations for the wetlands directly.	Very high

Knowledge gap	Description	Priority
Acid sulphate soils	Location and extent of acid sulphate soils within the site are poorly understood.	High
Storm event water quality	Storm event water quality is not documented for the site.	Medium
Baseline condition of fossil material	The baseline condition of the nature of the fossil material, its quality and its quantity are all unknown.	Medium
Substrate	Type and extent of impacts on substrate are unknown.	Medium
Climate variability	Estimate of climatic variability for the region is poorly understood, particularly in relation to delivery of rainfall.	Medium
Groundwater	Contributions from groundwater are unknown.	Low

5.3 Knowledge gaps relating to flora and fauna values

Table 5 lists the knowledge gaps associated with flora and fauna values

Table 5 Knowledge gaps - flora and fauna values

Knowledge gap	Description	Priority
Fauna	Baseline information for faunal distributions and condition across the site is poorly understood. Although there have been assessments conducted by DPIW (2006), DTAE (2007) and Sheriff (2007), significant areas of the site are not yet surveyed. There remains insufficient information for: <ul style="list-style-type: none"> » Mammals, amphibians, in terms of complete species lists and abundances; » Fish and macro-invertebrates, in terms of habitat use at different stages of their life-cycle and abundances at any time; and » Waterbirds and migratory birds, in terms of the population sizes of each species and their use of the site (e.g. nesting, feeding, resting). 	High
Flora	Baseline information for vegetation species lists and distributions across the site is incomplete. Although there have been assessments conducted by DPIW (2006), DTAE (2007) and Sheriff (2007), significant areas of the site are not yet surveyed.	High
Rare species	There is insufficient mapping of vulnerable, rare or threatened species with information on habitat preferences and tolerances. Although habitat values have been identified by DTAE (2007) along the coastal and estuarine margins of the site, information further inland is limited.	High
Habitat	There is no map of habitats across site with particular reference to vulnerable, rare or threatened species' requirements.	High

5.4 Knowledge gaps relating to heritage values

Table 6 summarises the knowledge gaps associated with heritage values.

Table 6 Knowledge gaps relating to heritage values

Knowledge gap	Description	Description
Extent and location of Aboriginal heritage.	No surveys have been undertaken regarding Aboriginal cultural heritage within the site	Very High
Lack of updates in the PWS register	The known historic sites (both on crown land) are the township of Boobyalla and the associated Boobyalla Cemetery. These sites are not identified in the PWS register or any leasing arrangement;	High

6. Limits of Acceptable Change

6.1 Background

Limits of acceptable change are defined as the range of variation in the components, processes and benefits/services that can occur without causing a change in the ecological character of the site. Identification of these limits is crucial and will assist management of the site, by defining 'ecological boundaries' that cannot be crossed without impacting on its ecological character. For example, assessment of a proposed catchment land use will need to consider whether that proposed land use could lead to a 'limit of acceptable change' being breached.

Despite incomplete baseline information, limits of acceptable change need to be defined based on current, available data. These limits can be refined as more data is obtained. Given the lack of quantitative data on natural or current rates of change, limits of acceptable change are based on the longer term (10 years or more) and are generally derived from Newall and Lloyd (2007), with supporting information from Armstrong and Badcock (2007), Sheriff (2007) and Clark (2007). The long term limits incorporate the precautionary principle of no long term change, while enabling active management to prevent further impacts.

6.2 Maintaining hydrologic values

Limits of acceptable change for maintaining hydrologic values include the following:

- » No loss of water volumes sufficient to significantly alter flow component magnitude/frequency within the bounds of natural 10-year variability; and
- » No reduction of water quality through changes in oxygen concentration, nutrient concentration, suspended particulate matter, turbidity and salinity/EC. Achieve local/regional trigger values as derived using the ANZECC 2000 approach.

6.3 Maintaining geomorphic values

Limits of acceptable change for maintaining geomorphic values include the following:

- » No more than 10% loss of required landforms or cross section depth for maintenance of wetlands;
- » Landscape diversity maintained;
- » No acceleration of dune movement within or around site;
- » No loss or degradation of coastal features, apart from impacts arising through sea level rise; and
- » No loss of potential paleobotanical material through desiccation and no disturbance of the material through stock or human trampling.

6.4 Maintaining fauna values

Limits of acceptable change for maintaining fauna values include the following:

- » No loss of any rare or threatened species of fauna beyond that expected from natural variability, migration and seasonal influences;
- » No net loss of fauna species;
- » Relative to present populations, no significant change in mean population size of any abundant bird species;
- » No net reduction of population sizes of fish species within the site during critical/vulnerable stages of their lifecycle;
- » Relative to present populations, no net reduction in population sizes of any waterbird species and migratory bird species; and
- » No sustained changes in community composition and populations of common fauna groups.

6.5 Maintaining flora values

Limits of acceptable change for maintaining flora values include the following:

- » No loss of any rare or threatened species plant species beyond that expected from natural variability;
- » No net loss of plant species;
- » No loss of more than 10% of any vegetation, wetland or habitat type, over the site as a whole. Migration of vegetation or wetland communities may follow natural geomorphic changes, but diversity and mosaic must be maintained; and
- » No sustained changes in community composition and abundance of common flora groups;

6.6 Maintaining heritage values

Limits of acceptable change for maintaining heritage values include the following:

- » Aboriginal heritage values are conserved and managed in cooperation with the Aboriginal community; and
- » Significant historic heritage values are conserved and communicated to visitors.

7. Prioritised actions

7.1 Background

Based on relevant key threats (Section 4) and knowledge gaps (Section 5), key actions (i.e. monitoring requirements and/or management actions) are presented within a number of key categories, summarised in Table 7 and then presented in detail in the remainder of this section. Note that Categories 1 to 6 are asset-based, and Categories 7 to 11 are issue-based. The issue-based categories are linked to one or more asset-based categories.

Given the complex nature of the land tenures and stakeholders involved in the wetland site, it is recommended that a Management Advisory Group (MAG) be established with responsibility for monitoring performance of the implementation of this plan and advising where adaptive management may be necessary. It is recommended that Dorset Council, NRM North and DPIW immediately establish the MAG, which would involve other key stakeholders, including a representative of the Aboriginal Heritage Office and PWS. Upon establishment, the MAG would be expected to meet at least annually, with the flexibility of meeting as urgent issues arise.

Table 7 Summary of categories of prioritised actions

Category Number	Category description	Relevant section
1	Maintaining substrate and geomorphology values	7.2
2	Maintaining environmental flows	7.3
3	Maintaining water quality	7.4
4	Maintaining fauna	7.5
5	Maintaining native vegetation and habitat	7.6
6	Protecting heritage values	7.7
7	Managing public access	7.8
8	Managing grazing	7.9
9	Managing weeds	7.10
10	Managing pests and diseases	7.11
11	Treating dairy effluent	7.12

To assist with implementation/scheduling, each action is allocated a ranking as follows:

- » Very High priority actions require attention as soon as possible, to address existing or potential threats or to clarify responsibilities;
- » High priority actions are those imperative to achieving strategy outcomes, but are not urgent;
- » Medium priority actions are those that are necessary to achieve the strategy outcomes; and

- » Lower priority actions are desirable to achieve strategy outcomes but can wait until resources become available.

Actions were ranked with the following assumptions:

- » Priority ratings are indicative and will help guide annual implementation plans;
- » Priority ratings are not “absolute” but rather consider each action in comparison with all other Strategy actions. “Lower” priority actions are still “a priority”; and
- » Actions can be undertaken ahead of the suggested timeframes where opportunities arise.

7.2 Maintaining substrate and geomorphology values

Table 8 lists the prioritised actions for maintaining substrate and geomorphology. These actions address threatening processes and knowledge gaps in Table 1 (Section 4) and Table 4 (Section 5) respectively. The actions address the limits of acceptable change for maintaining geomorphic values (Section 6.3).

Table 8 Actions for maintaining substrate and geomorphology

Actions	Priority Rating	Leading Agent
Determine rate of change and rate of movement of coastal and river geomorphic features by comparing aerial images taken over time. Utilise DTAE (2007) data in analysis.	Medium	DPIW
Map geomorphic units (landforms) to determine baseline conditions. Some measure of landscape diversity should be developed or adopted for the site. This should include wetlands and coastal/dune features. Assess rate of change of landforms and sedimentation impacts. Monitor sedimentation rates by undertaking studies of cross sections of the river, channels to wetlands and across wetlands to measure levels of aggradation over time.	High	DPIW
Identify areas where acid sulphate soils occur. Avoid any excavation in these areas. Ensure acid sulphate soils issues are incorporated into the Dorset Council Planning Scheme.	High	DPIW, Dorset Council.
Conduct a 5 yearly review (and after each major flood or storm event) of aerial photographs and cross-sections to assess ongoing geomorphic change to geomorphology and dune systems.	Lower	DPIW
Conduct mapping of substrate, with representation of areas with high stock access as well as areas where cattle tracks are formed within and leading to wetland habitat. Measurement criteria to include colour, texture & structure, as well as measures of impacts including photographic records. Conduct a 2 yearly review with focus on vulnerable areas (based on stock access and numbers, and substrate sensitivity).	Lower	DPIW
Install Tasmarc markers to determine rates of change to shorelines.	High	DPIW
Rehabilitate or protect priority areas, particularly where degradation is ongoing.	High	All stakeholders

Further management actions relevant to maintaining substrate and geomorphology include:

- » Managing public access (See Section 7.8); and
- » Managing grazing (See Section 7.9);

7.3 Maintaining environmental flows

Table 9 lists the prioritised actions for maintaining environmental flows. These actions address threatening processes and knowledge gaps in Table 1 (Section 4) and Table 4 (Section 5) respectively. The actions address the limits of acceptable change for maintaining hydrologic values (Section 6.2).

Table 9 Actions for maintaining environmental flows

Actions	Priority Rating	Leading Agent
Ensure that allocated water resources continue to be based on the allowance for environmental flows. This requires that water is only harvested into storages during the specified take period. This will ensure that dam proposals/dam construction is regulated at a sustainable level.	Ongoing	All stakeholders
Assess rates of inundation and recession of flood waters within wetland (e.g. 1:1 year flood events 1:2 year flood events). Also characterise relationship between flows in the Ringarooma River and water regime in Freshwater Zone and Estuary Zone.	Medium	DPIW
Conduct storm-event sampling for wetland systems, including inputs from discharge drains.	Medium	DPIW
Quantify contributions from groundwater through monitoring of groundwater levels.	Lower	DPIW
Collate records of flow rates for filling wetlands, collected through gauge information at strategic points in and around the site.	Medium	DPIW, NRM North
Estimate the climatic variability for the region, particularly in relation to delivery of rainfall. Conduct a 5-yearly update of climatic extremes (95 th percentiles, 99 th percentiles), quartiles and averages.	Lower	DPIW

7.4 Maintaining water quality

Table 10 lists the prioritised actions for maintaining water quality. These actions address threatening processes and knowledge gaps in Table 1 (Section 4) and Table 4 (Section 5) respectively. The actions address the limits of acceptable change for maintaining hydrologic values (Section 6.2).

Table 10 Actions for maintaining water quality

Actions	Priority Rating	Leading Agent
<p>Implement a monthly monitoring program for at least 2 years, including assessment of any inputs from discharge drains and other identifiable sources.</p> <p>Develop wetland water quality triggers for the site or region, using approach described in ANZECC 2000 (including the establishment of water quality monitoring). Trigger values should be established for nutrients (including total and dissolved forms of N and P), dissolved oxygen (including sunrise and sunset measurements), salinity (Electrical Conductivity), turbidity, suspended solids and pH.</p> <p>Continue baseline monitoring program of inputs from discharge drains and other identifiable sources, with 2-5 yearly review to determine options for scaling-down or scaling-up.</p>	Very High	NRM North, Landholders
<p>Develop a nutrient budget for the dairy areas. A nutrient budget involves calculating the fertiliser requirements on a paddock by paddock basis, taking into account nutrient inputs and outputs.</p> <p>At intervals of 3 years, soil test paddocks where effluent is spread. If nutrient levels are high, consider implementing practices for reducing nutrient loads in these areas. For example, remove stock and cut hay.</p>	Very High	Landholders

Further management actions relevant to maintaining water quality include:

- » Managing grazing (See Section 7.9); and
- » Treating dairy effluent (see Section 7.12).

7.5 Maintaining fauna values

Table 11 lists the prioritised actions for maintaining fauna values. These actions address threatening processes and knowledge gaps in Table 2 (Section 4) and Table 5 (Section 5) respectively. The actions address the limits of acceptable change for maintaining fauna values (Section 6.4).

Table 11 Actions for maintaining fauna values

Actions	Priority Rating	Leading Agent
Protect threatened fauna values by protecting threatened vegetation communities. This requires establishing or maintaining a stock-proof fencing network similar to that illustrated (marked as red polylines) in Map 3 (Appendix A). Surveys should be based on existing data / historical data.	Very High	All stakeholders
<p>Conduct systematic fauna surveys across site, including but not limited to: fish; mammals; birds; aquatic macroinvertebrates and amphibians.</p> <p>Once baseline established, determine number and abundance of significant species as well as acceptable 2-year variation based on comparison environments, species migratory behaviour and/or life cycle dynamics. For macroinvertebrates, determine the percentage change objectives for each family/class to be established based on known estuarine invertebrate community fluctuations.</p> <p>Conduct a 2-5 yearly repeat of fauna survey, with a focus on locations and abundances of priority species</p>	High	DPIW
Investigate the option of banning duck shooting on public land within the Ramsar site.	High	PWS, DPIW
In regard to issuing duck shooting licences on reserved land, implement a flexible capping system that ensure that there is only limited access through adjoining farm properties. Adjust number of licences according to seasonal variations and number of ducks.	High	PWS, DPIW
Prohibit the use of duck hides and lead shot.	High	PWS

Further management actions relevant to maintaining fauna values include:

- » Managing public access (See Section 7.8); and
- » Managing pests and diseases (See Section 7.11)

7.6 Maintaining native vegetation and habitat

Table 12 lists the prioritised actions for maintaining native vegetation and habitat. These actions address threatening processes and knowledge gaps in Table 2 (Section 4) and Table 5 (Section 5) respectively. The actions address the limits of acceptable change for maintaining vegetation values (Section 6.5).

Table 12 Actions for maintaining native vegetation and habitat

Actions*	Priority Rating	Leading Agent
<p>To ensure that all priority vegetation species/communities are identified and mapped for protection, conduct a quantitative vegetation survey (particularly of wetland, coastal, estuarine and saltmarsh areas) to complete the baseline mapping requirements for vegetation communities, rare species and habitat preferences. Surveys should be based on existing information from surveys already undertaken by DPIW (2006) and DTAE (2007).</p> <p>Conduct a 2-5 yearly repeat survey, with a focus on monitoring changes to the location and extent of priority species</p>	High	DPIW
<p>Protect threatened vegetation communities by establishing or maintaining a stock-proof fencing network similar to that illustrated (marked as red polylines) in Map 3 (Appendix A). Threatened species will also benefit from this area being protected.</p> <p>Also fence and protect coastal heathland and scrub so as to assist in minimising the potential for widespread <i>Phytophthora</i> infestation in these areas.</p>	Very High	All stakeholders
Identify relevant landholders willing to invest in conservation covenants on their properties	Medium	TFGA / DPIW

Further management actions relevant to maintaining native vegetation and habitat include:

- » Managing public access (See Section 7.8);
- » Managing grazing (See Section 7.9);
- » Managing weeds (See Section 7.10); and
- » Managing pests and diseases (See Section 7.11);

7.7 Protecting heritage values

Table 13 lists the prioritised actions for protecting heritage values. These actions address threatening processes and knowledge gaps in Table 3 (Section 4) and Table 6 (Section 5) respectively. The actions address the limits of acceptable change for protecting heritage values (Section 6.6).

Table 13 Actions for protecting heritage values

Actions	Priority Rating	Leading Agent
Facilitate an accredited Aboriginal Heritage Officer to conduct a formal heritage survey and inventory of Aboriginal sites. Ensure that all relevant stakeholders are informed of surveys.	Very High	NRM North / AHO
Assess and manage any Aboriginal sites found, incorporating input from relevant stakeholders into management prescriptions. Seek advice and approvals from the Aboriginal Heritage Office and the Tasmanian Aboriginal Land and Sea Council, particularly if works are proposed near Aboriginal heritage sites.	Very High	NRM North / AHO
Facilitate a heritage specialist to conduct a thorough survey for European cultural heritage. Add details of all known sites to the Tasmanian Heritage Register. Include Boobyalla ruins and the nearby cemetery in the PWS register. Ensure that all relevant stakeholders are informed of surveys.	High	Parks & Wildlife Service / NRM North / Relevant landholders
Fence both the Boobyalla township reserve and cemetery reserve to avoid further impacts from stock.	High	NRM North / PWS
Facilitate an agreement with surrounding landholders to manage the cemetery. Investigate the possibility of establishing/supporting a community historic society for the ongoing management of the cemetery reserve.	High	NRM North / PWS
Monitor for impacts from recreational vehicles on aboriginal heritage values in the dune systems.	High	NRM North / AHO

Further management actions relevant to maintaining heritage values include:

- » Managing public access (See Section 7.8);

7.8 Managing public access

Table 14 lists the prioritised actions for managing public access to the site. These actions should be considered in conjunction with management actions relating to:

- » Geomorphology (Section 7.2);
- » Fauna values (Section 7.5);
- » Native vegetation and habitat (Section 7.6); and
- » Heritage values (Section 7.7).

Table 14 Actions for managing public access

Actions	Priority Rating	Leading Agent
Maintain a low level of public access to the wetland site. Prevent all access of 4WD's, quad-bikes and motorbikes into the Ramsar site, particularly from Petal Point	Very High	PWS
Install educational signs at strategic points to discourage access into sensitive areas of the site. Use cheap and durable plastic laminated signs that can be easily replaced if vandalised.	Very High	PWS
Prohibit recreational vehicles from accessing dune and wetlands areas of Ramsar site.	Very High	PWS
Map and monitor tracks and impacts arising from recreational vehicles.	Very High	DPIW

7.9 Managing grazing

Table 15 lists the prioritised actions for managing grazing. These actions should be considered in conjunction with management actions relating to:

- » Geomorphology (Section 7.2);
- » Water quality (Section 7.4); and
- » Native vegetation and habitat (Section 7.6);

Table 15 Actions for managing grazing

Actions	Priority Rating	Leading Agent
<p>Manage grazing by establishing or maintaining a stock-proof fencing network similar to that illustrated (marked as red polylines) in Map 3. Ideally, exclude cattle from the Fosters Marshes area and other vulnerable/conservation areas. If total exclusion is considered impractical in the Fosters Marshes area, consider the following actions:</p> <ul style="list-style-type: none"> » Fencing cleared land and grazing only this area. » Avoiding further conversion of native areas to improved pasture. » Avoiding the use of fertiliser; and » Avoiding grazing in the winter. 	Very High	All stakeholders
<p>Attempt to capture unauthorised cattle in the areas to be fenced. At the least, ensure that bulls are removed from the feral herd to prevent further breeding.</p>	High	PWS/ DPIW
<p>Ensure that management restrictions are maintained on Aberfoyl, Dry Gut and Nobbies (part of the <i>East Wyambie</i> property), which are leased from the crown for grazing. Apply management restrictions outlined for the Fosters Marshes area (see above).</p>	Very High	Landholders
<p>Avoid over-grazing by removing stock when pasture cover is close to or below 800 kg green Dry Matter/ha (green DM/ha). Adopt a flexible rotational grazing system that allows stocking rates to be adjusted.</p>	High	Landholders
<p>Design an effective network of windbreaks that provides shelter for pasture and stock from prevailing winds.</p>	Lower	Landholders

7.10 Managing weeds

Table 16 lists the prioritised actions for managing weeds. These actions should be considered in conjunction with management actions relating to:

- » Native vegetation and habitat (Section 7.6);

Table 16 Actions for managing weeds

Actions	Priority Rating	Leading Agent
<p>Eradicate gorse in the entire area within 1 km of the Ramsar site boundary, beginning with outlier infestations and then addressing core infestations. This area overlaps a number of adjoining properties, including all of the three dairies (<i>Cygneus Dairy</i>, <i>Centre View Dairy</i>, <i>Quinfields Dairy</i>) and large portions of <i>East Wyambi</i> and <i>Boobyalla Park</i>. The area also includes Crown land leased by <i>Probert & Mather</i>, <i>East Wyambi</i>, and <i>Rushy Pastoral</i>.</p> <p>Utilise mapping information identified by Sheriff (2007) for the three dairies.</p>	Extremely High	Landholder / Crown Lands / PWS / NRM North
<p>Manage gorse on remaining sections of adjoining properties, including <i>East Wyambi</i>, <i>Probert & Mather</i> and <i>Rushy Pastoral</i>.</p>	High	Landholders
<p>Manage gorse on Crown Land extending beyond 1km of the Ramsar site boundary, particularly on Mt Cameron Reserve.</p>	High	PWS
<p>Eradicate other declared weeds in the entire area within 1 km of the Ramsar site boundary, beginning with outlier infestations and then addressing core infestations. This area overlaps a number of adjoining properties, including all of the three dairies (<i>Cygneus Dairy</i>, <i>Centre View Dairy</i>, <i>Quinfields Dairy</i>) and large portions of <i>East Wyambi</i> and <i>Boobyalla Park</i>. The area also includes Crown land leased by <i>Probert & Mather</i>, <i>East Wyambi</i>, and <i>Rushy Pastoral</i>.</p> <p>Utilise mapping information identified by Sheriff (2007) .</p>	Very High	Landholder / PWS / NRM North
<p>Manage other declared weeds on remaining sections of adjoining properties, including <i>East Wyambi</i>, <i>Boobyalla Park</i> and <i>Rushy Pastoral</i>.</p>	High	Landholders
<p>Manage other declared weeds on Crown Land extending beyond 1km of the Ramsar site boundary, particularly on Mt Cameron Reserve.</p>	High	PWS
<p>Allocate an annual budget for weed control and monitoring and mapping priority weeds on the site, particularly declared weeds.</p>	High	Landholder / NRM North
<p>As part of the vegetation survey, record location and abundance of all weed species encountered on site.</p>	Medium	Landholder / NRM North
<p>Minimise road works, vehicles, machinery and materials into the reserves as a precaution to the spread of weeds.</p>	High	Landholders / PWS.
<p>Wash down any vehicle/machinery entering the reserve from suspected phytophthora infected areas.</p>	High	PWS, Landholders

7.11 Managing pests and diseases

Table 17 lists the prioritised actions for managing pests and diseases. These actions should be considered in conjunction with management actions relating to:

- » Fauna values (Section 7.5); and
- » Native vegetation and habitat (Section 7.6);

Table 17 Actions for managing pests and diseases

Actions	Priority Rating	Leading Agent
Minimise road works, vehicles, machinery and materials into the reserves as a precaution to the spread of <i>Phytophthora</i> .	High	PWS, Landholders
Wash down any vehicle/machinery entering the reserve from suspected <i>Phytophthora</i> infected areas.	High	PWS, Landholders
Continue to implement a game management plan that is in accordance with the DPIW program for assessing alternatives to 1080 baiting.	High	Landholders, DPIW
Implement a feral cat monitoring and control program.	Very High	PWS, Landholders

7.12 Treating dairy effluent

Table 18 lists the prioritised actions for treating dairy effluent. These actions should be considered in conjunction with management actions relating to:

- » Water quality (Section 7.4);

Table 18 Actions for treating dairy effluent

Actions	Priority Rating	Leading Agent
Construct green water ponds. See Section 7.12.1 for details.	Very High	Landholders
Prepare the green water for irrigation. See Section 7.12.2 for details.	Very High	Landholders
Irrigate green water. See Section 7.12.3 for details.	Very High	Landholders
Maintain a safe and effective system. See Section 7.12.4 for details.	Very High	Landholders

7.12.1 Actions for constructing green water ponds

- » Construct suitable ponds for the storage of the green water over the wetter months of the year. Design ponds based on the dimensions suggested in Armstrong and Badcock (2007 and 2008).
- » Reduce the volume of effluent produced and thereby reduce the size of the proposed green water storage ponds. Recommendations include:
 - Installing a footbath to remove sand before cows enter the yard. This will reduce the amount of yard washing;
 - Diverting water from the shed roof, plate cooler and/or vacuum pump from the effluent stream;
 - Diverting stormwater runoff from the yards during the non-milking period;
 - Scraping the yard to remove solids, using a rubber blade mounted on a four-wheel bike; and
 - If piping modifications are practical, consider recycling green water from the storage pond to the nozzles on the backing gate;
- » Ensure that there is a suitable clay core (and clay lining) in the walls of each pond. See Appendix 9.4 in Armstrong and Badcock (2007 and 2008) for detailed construction techniques; and
- » Advise the relevant Council Environmental Health Officers of any proposal to construct an effluent storage pond.

7.12.2 Management actions for preparing the green water for irrigation

- » Rather than installing trenches, install mechanical facilities (such as a screen) to remove the solids from the effluent stream. Static screens are preferable as there are no moving parts and the installations is less costly, compared to screw press screens;
- » Store screened solids on a concrete apron, with any liquid runoff directed back into the tank. Solids can then be spread with a conventional belt spreader when dry;

- » Property owners to inspect good examples of solids separation facilities on other dairies in northern Tasmania, and then develop detailed plans for the installation of these facilities at each dairy that directly impacts on the Ramsar site; and
- » Ensure that screens are maintained in a reliable condition. Adhere to the checklist outlined in Section 7 of Armstrong and Badcock (2007).

7.12.3 Management actions for irrigating green water

- » Inject the green water into the centre pivot irrigation systems so the liquid component of the effluent system can be applied to the irrigation paddocks. Dilute green water to approximately 20:1 (irrigation water to green water). Consider using injection pumps (rather than flow under gravity) to inject the effluent into the irrigation stream. Further investigation is required to determine the most appropriate method;
- » Install a coarse filter in the green water injection pipeline to remove any solids in the green water stream;
- » Ensure that mixing of green water with irrigation water is only possible downstream of off-takes for stock and domestic supplies;
- » Appropriately spread the diluted green water to avoid concentrated applications of nutrients;
- » Direct the green water to centre pivots operating on the least fertile and best drained of the land available for irrigation;
- » Avoid irrigation of effluent when soils are saturated. If parts of a centre pivot remain saturated, avoid injecting effluent when the pivot line passes such areas;
- » Apply fertiliser in conditions that are suitable for sufficient utilisation by pasture. This requires adequate matching of fertiliser applications to pasture requirements; and
- » Consider recycling green water from the storage pond to the nozzles on the backing gate. This option has not been investigated in detail; feasibility would depend primarily on the practicality of making the required piping modifications.

7.12.4 Management actions for ensuring a safe and effective effluent system

- » Avoid spraying diluted effluent over water troughs. Prevent access of young stock to troughs that could receive diluted effluent;
- » Ensure that facilities are maintained in a reliable condition. Adhere to the checklist outlined in Section 7 of Armstrong and Badcock (2007);
- » Ensure that occupational health and safety issues relating to the effluent system are addressed. See Section 6 of Armstrong and Badcock (2007);
- » Allocate appropriate buffers around ponds, solids traps / trenches, pump sumps and irrigation areas. See Section 5.6 in Armstrong and Badcock (2007); and

Conduct appropriate procedures for using, storing and disposing of chemicals and their containers so as to close and rehabilitate the on-farm tip. If this is not possible, use the tip for household waste and not farm waste.

8. Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) recognises Australia's Ramsar sites as being "matters of national environmental significance" and established a Commonwealth process for the assessment of proposed actions that are likely to have a significant impact on such matters. The Act requires that, except in limited circumstances, a person must not take an action that has, will have, or is likely to have a significant impact on the ecological character of a Ramsar wetland, without prior approval from the Australian Government Minister for the Environment, Heritage and the Arts.

Schedule 6 of the *Environment Protection and Biodiversity Conservation Regulations 2000* require the preparation of management plans for each Ramsar site and that such plans satisfy the Australian Ramsar Management Principles. The Australian Ramsar Management Principles provide guidance for site management planning. Their primary purpose is to ensure that the ecological character of the wetland is described and maintained.

Under the EPBC Act the following are of national environmental significance:

- » Species and ecological communities listed as being nationally threatened; and
- » Migratory bird species listed under Australia's bilateral agreements with Japan and China and the Convention on Migratory Species.

The remainder of this section addresses each principle in Schedule 6.

8.1 General Principles

8.1.1 Principle 1.01

The primary purpose of management of a declared Ramsar wetland must be, in accordance with the Ramsar Convention:

- » ***To describe and maintain the ecological character of the wetland; and***
- » ***To formulate and implement planning that promotes:***
 - ***Conservation of the wetland; and***
 - ***Wise and sustainable use of the wetland for the benefit of humanity in a way that is compatible with maintenance of the natural properties of the ecosystem.***

Newall and Lloyd (2007) provide a comprehensive description of the ecological character of the wetland, and provides recommendations for maintaining these values. This management plan provides a summary of the ecological character of the wetland, and integrates management recommendations (Section 7) from a number of sources, particularly Newall and Lloyd (2007).

The prioritised management actions listed in Section 7 provide an integrated list of monitoring and planning requirements that promote the conservation of the wetland site as well as allowing for the continuation of existing agricultural activities in a manner that does not impact on the ecological character of the wetland.

8.1.2 Principle 1.02 and Principle 1.03

Wetland management should provide for public consultation on decisions and actions that may have a significant impact on the wetland; and

Wetland management should make special provision, if appropriate, for the involvement of people who:

- » ***Have a particular interest in the wetland; and***
- » ***May be affected by the management of the wetland.***

Where relevant, management actions presented in Section 7 include requirements for stakeholder consultation.

8.1.3 Principle 1.04

Wetland management should provide for continuing community and technical input.

The management actions provide a framework for strategic management of the wetland that allows for continuing community and technical input. Periodic revision of the management plan (of not more than 7 years) will ensure that information, particularly management actions and limits of acceptable change, remains relevant.

8.2 Management Planning

8.2.1 Principle 2.01

At least 1 management plan should be prepared for each declared Ramsar Site.

This report constitutes the required management plan.

8.2.2 Principle 2.02

A management plan for a declared Ramsar wetland should:

- » ***Describe its ecological character;***

Newall and Lloyd (2007) provide a comprehensive description of the ecological character of the wetland, and provides recommendations for maintaining these values. This management plan provides a summary of the ecological character of the wetland, and integrates management recommendations (Section 7) from a number of sources, particularly Newall and Lloyd (2007).

The prioritised management actions listed in Section 7 provide an integrated list of monitoring and planning requirements that promote the conservation of the wetland site as well as allowing for the continuation of existing agricultural activities in a manner that does not impact on the ecological character of the wetland.

- » ***State the characteristics that make it a wetland of international importance under the Ramsar Convention;***

See Section 2.2 and 2.3.

- » ***State what must be done to maintain its ecological character;***

See the prioritised actions outlined in Section 7.

- » ***Promote its conservation and sustainable use for the benefit of humanity in a way that is compatible with maintenance of the natural properties of the ecosystem;***

The prioritised management actions listed in Section 7 provide an integrated list of monitoring and planning requirements that promote the conservation of the wetland as well as allowing for the continuation of existing agricultural activities in a manner that does not impact on the ecological character of the wetland.

- » ***State mechanisms to deal with the impacts of actions that individually or cumulatively endanger its ecological character.***

Threatening processes (risks) and knowledge gaps are documented in Section 4 and 5 respectively. These sections discuss threats relating to;

- » Physical loss, modification or encroachment on the wetland;
- » Pollution and nutrient input;
- » Changes to water regimes;
- » Utilisation of resources; and
- » Introduction of invasive species.

Prioritised monitoring/management actions for addressing these threats and knowledge gaps are listed in Section 7.

- » ***State whether the wetland needs restoration or rehabilitation***

A major issue relating to this wetland is that there is a lack of information relating to its baseline condition. Therefore, this management plan presents a list of monitoring requirements to attain an improved understanding of baseline information pertaining to the condition and extent of a range of natural values. Prioritised monitoring/management actions for addressing these threats and knowledge gaps are listed in Section 7.

- » ***If restoration or rehabilitation is needed, explain how the plan provides for restoration or rehabilitation:***

Much of the management/monitoring recommendations focus on improving key baseline information relevant to the wetland. This provides a context for assessing the condition and limits of acceptable change for a range of special values associated with the wetland, which ultimately provides a basis for sound management action planning. There are some recommendations relating directly to restoration and rehabilitation, most of which are subsequent to improved monitoring for baseline data.

- » ***Provide for continuing monitoring and reporting on the state of its ecological character.***

This is one of the principles of management outlined in Section 1.3, and is supported by a range of monitoring requirements on the state of the ecological character of the wetland site.

- » ***Be based on an integrated catchment management approach;***

The Plan draws upon information relevant to the entire Ringarooma River catchment, and present this information in the context of the wetland site.

- » ***Include adequate processes for public consultation on the elements of the plan;***

This is one of the principles of management outlined in Section 1.3.

- » ***Be reviewed at intervals of not more than 7 years.***

This is one of the principles of management outlined in Section 1.3.

8.3 Environmental impact assessment and approval

All of the priority actions outlined in Section 7 are deemed to provide benefits to the protection or maintenance of the ecological character of the Ramsar wetland. Therefore, no environmental impact assessments/approvals are required for these priority actions.

If any future action is deemed to have a potentially significant impact on the ecological character of the Ramsar wetland, the likely environmental impact is required to be assessed;

- » Under a statutory environmental impact assessment and approval process; and
- » In accordance with Principles 3.03 through to 3.06 of Schedule 6 of the *Environment Protection and Biodiversity Conservation Regulations 2000*.

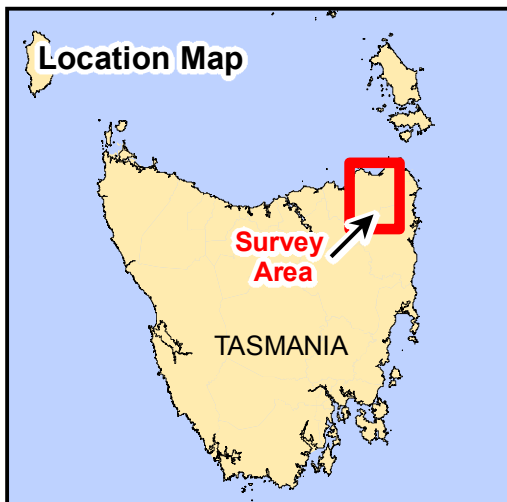
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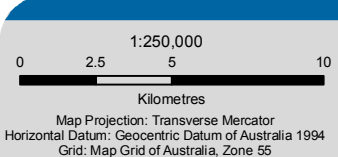
Appendix A

Maps



Legend

- Ramsar site boundary
- Ringarooma River catchment boundary

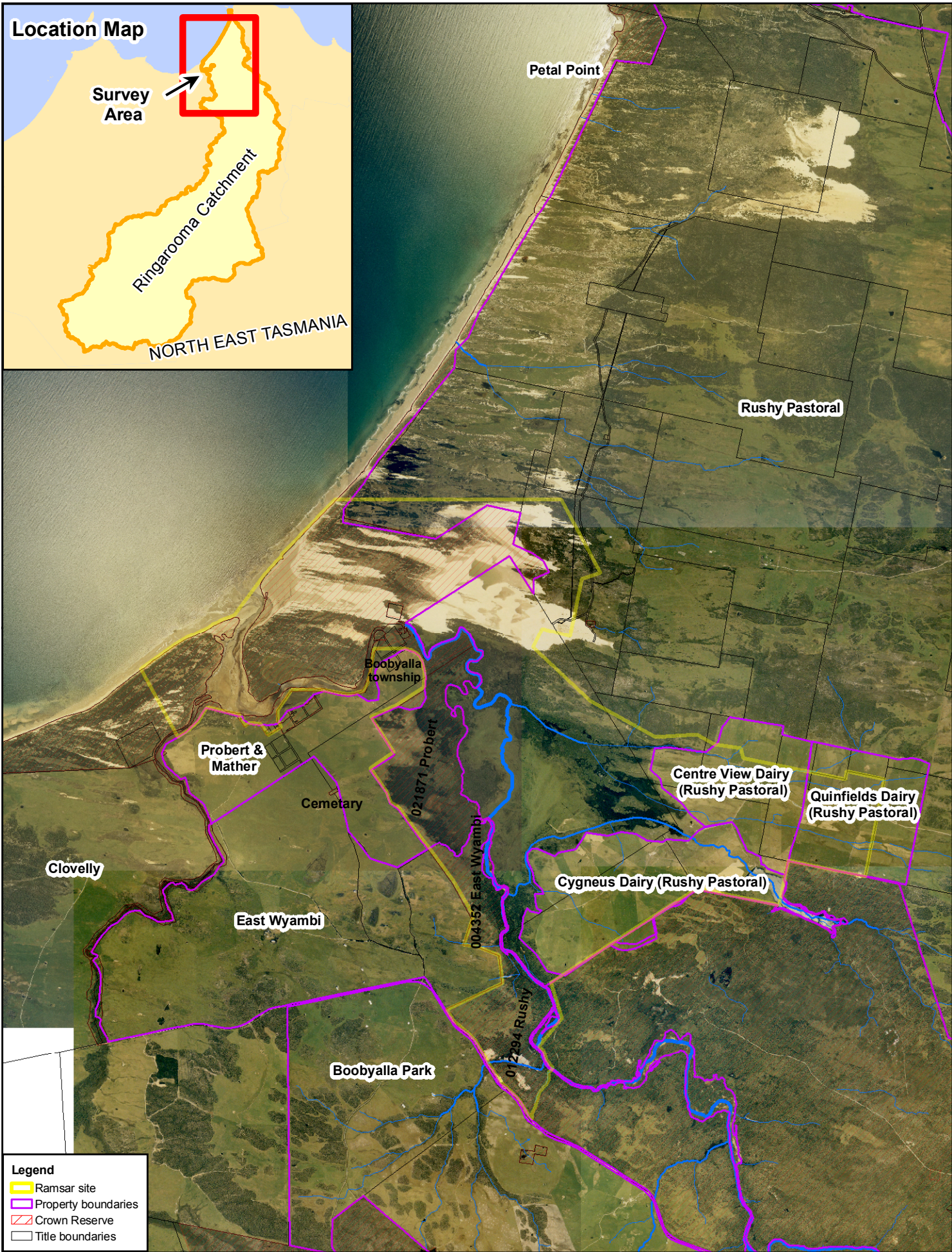


Base Topographic 1:100,000 maps (Forester 8415, Cape Portland 8416, Georges Bay 8515, Swan Island 8516) supplied by TASMAR © State of Tasmania.

NRM North
Management Plan for the Floodplain Lower
Ringarooma River Ramsar Site

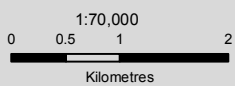
Job Number	32-13641
Revision	REVA
Date	1 July 2008

Location Map



Legend

- ▬ Ramsar site
- ▬ Property boundaries
- ▨ Crown Reserve
- Title boundaries



Orthophotos supplied by
DPIW, State of Tasmania.

NRM North
Floodplain Lower Ringarooma River
Ramsar Site Crown Land
Management Strategy

Job Number	32-13641
Revision	REVA
Date	1 July 2008

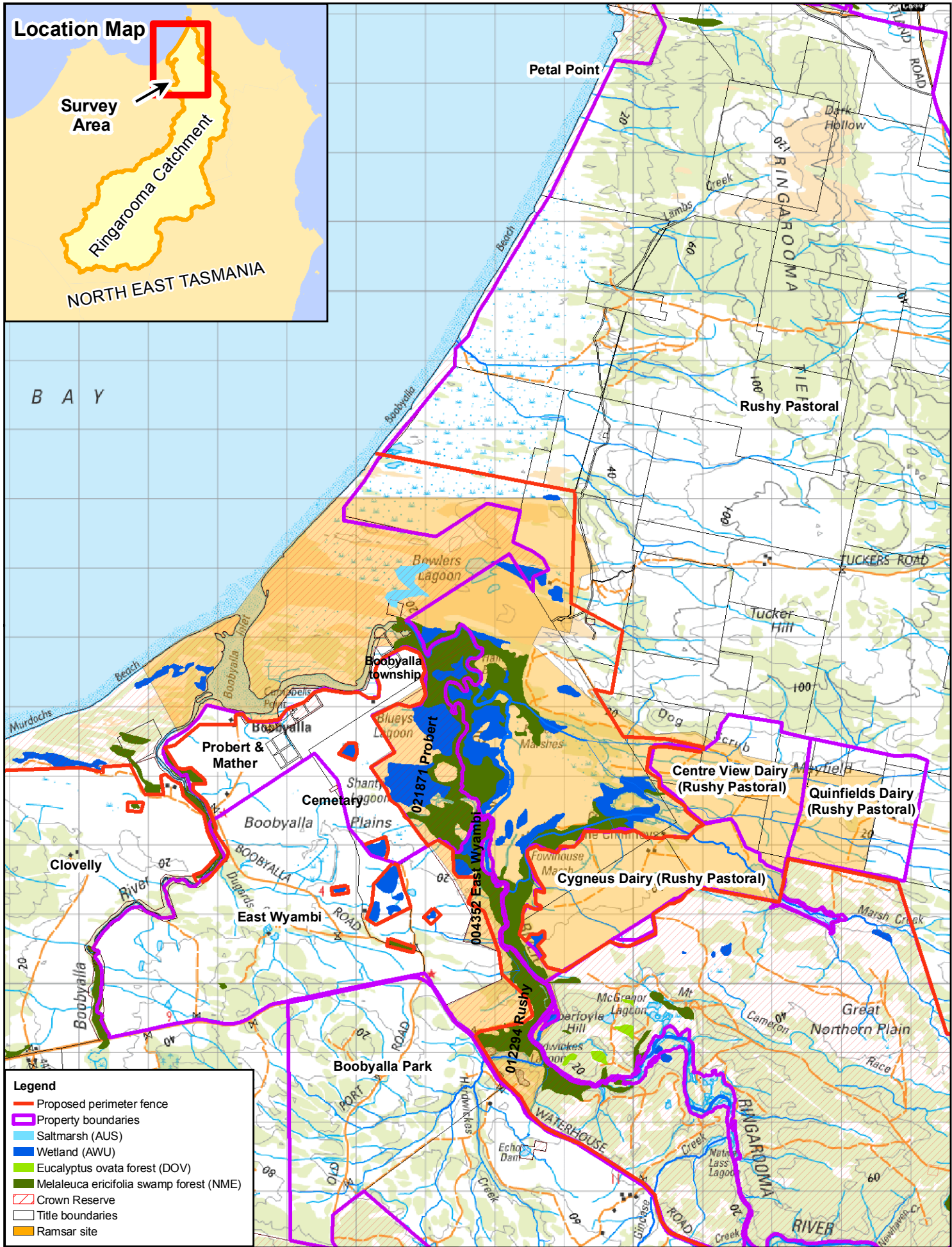
Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

Location Map

Survey Area



Ringarooma Catchment
NORTH EAST TASMANIA



Legend

- Proposed perimeter fence
- Property boundaries
- Saltmarsh (AUS)
- Wetland (AWU)
- Eucalyptus ovata forest (DOV)
- Melaleuca ericifolia swamp forest (NME)
- Crown Reserve
- Title boundaries
- Ramsar site

1:70,000



Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55



Base Topographic 1:100,000 map (Forester 8415) supplied by TASMAR© State of Tasmania.

NRM North
Floodplain Lower Ringarooma River
Ramsar Site Crown Land
Management Strategy

Job Number	32-13641
Revision	REVA
Date	1 July 2008

Map 3

Appendix B
Ramsar Information Sheet (2005)

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.

Note for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Bureau. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

1. Name and address of the compiler of this form:

Department of Primary Industries, Water and
Environment (DPIWE)
GPO Box 44
HOBART, Tasmania 7001

FOR OFFICE USE ONLY.

DD MM YY

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

June 2005

3. Country:

Australia

4. Name of the Ramsar site:

Flood Plain Lower Ringarooma River

5. Map of site included:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps.

a) hard copy (required for inclusion of site in the Ramsar List): *yes* -or- *no*

b) digital (electronic) format (optional): *yes X* -or- *no*

6. Geographical coordinates (latitude/longitude):

Latitude: 40 degrees 53' 00", Longitude: 147 degrees 56' 00".

7. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

Flood Plain Lower Ringarooma River Ramsar site is located on the far north-east coast of Tasmania, 9 km north-west of the township of Gladstone. The sites lies between Cape Portland and Waterhouse Point, extending from Boobyalla Beach inland along the Ringarooma River floodplain. The site is in the Dorset municipality, the population of which was 7339 in 2001 (Australian Bureau of Statistics 2004).

8. Elevation: (average and/or max. & min.)

Less than 20 m ASL.

9. Area: (in hectares)

3519 ha.

10. Overview:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The site is situated on the sandy flood plain of the Lower Ringarooma River which encompasses extensive marshlands of which Fosters Marshes is significant and a number of shallow lagoons; Shantys Lagoon, Blueys Lagoon and Bowlers Lagoon. The Ringarooma River drains out into Ringarooma Bay. The site includes the Boobyalla Inlet estuary and parts of both Boobyalla Beach and Murdochs Beach to the east and west of the River mouth respectively. A mobile sand dune system occurs in the northern part of the site. The flood plain supports a variety of habitats which are significant to a number of species.

11. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8

12. Justification for the application of each Criterion listed in 11. above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1 - The geoscientific significance of the area relates to its age. The Chimneys, a small section in the middle of the marshes, is thought to be older than other lakes in the area (being situated well within known Pleistocene dunefields). If so, it is of considerable interest from a palynological and palaeobotanical perspective. The Chimneys may also have important subfossil potential such as megafaunal remains. The site contains excellent examples of wetland systems for the Flinders Biogeographic Region; a floodplain with a system of permanent and seasonal marshlands; and a large mesotidal river estuary (Boobyalla Inlet). Boobyalla Inlet is recognised as a Tasmanian estuary with high conservation significance (Edgar, Barrett and Graddon 1999).

Criterion 2 - The site supports four nationally threatened fauna species; a population of Green and gold frog (*Litoria raniformis*) (Vulnerable, Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) and vulnerable, Tasmanian *Threatened Species Protection Act 1995* (TSPA)), Wedge-tailed eagle (*Aquila audax fleayi*, Endangered, EPBC and endangered, TSPA), Spotted-tailed quoll (*Dasyurus maculatus maculatus*, Vulnerable, EPBC and rare, TSPA) and Dwarf galaxias (*Galaxiella pusilla*, Vulnerable, EPBC and rare, TSPA) which is threatened due to its limited distribution at unprotected sites.

Criterion 3 - The flood plain supports a number of species which are rare or vulnerable, and are poorly reserved in Tasmania. It is also an important site due to its diverse invertebrate fauna. The series of shallow freshwater lakes in the area, are an important feeding and nesting place for many species of waterbirds. Threatened flora species known to occur on the site are Purple loosestrife (*Lythrum salicaria*, vulnerable, TSPA), Ribbon weed (*Vallisneria americana*, rare, TSPA) and Erect marshflower (*Villarsia exaltata*, rare, TSPA) for which the Chimneys is a key site. Native gypsywort (*Lycopus australis*, endangered, TSPA), which was previously thought to be extinct in Tasmania, has recently been found at the site. Fauna species listed as threatened in Tasmania that have been recorded from the site are Little tern (*Sterna albifrons*, rare, TSPA), Fairy tern (*Sterna nereis*, rare, TSPA) and White-bellied sea eagle (*Haliaeetus leucogaster*, vulnerable, TSPA).

13. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region: Flinders

b) biogeographic regionalisation scheme (include reference citation): Interim Biogeographic Regionalisation for Australia version 5.

14. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The Flood Plain of the Lower Ringarooma is a composite of natural and human disturbance-induced features. Natural features include Bowlers Lagoon, which is a dune-barred lake in the sand sheet behind Boobyalla Beach. Other natural features are some natural deflation hollows and their associated lunettes. However, the bulk of the wet area is artificial. The sediment load of the Ringarooma River has been vastly increased by the input of 40 million cubic metres of mine tailings. Some of this sediment has been transported to the Ramsar site at the mouth of the river, where it has been deposited to form a huge and complex set of levees and sediment splays. These trap water on the floodplain forming extensive wetlands (Jerie pers. comm.).

The area consists of flat plains of Quaternary clays, sands and gravels. Silty clay soil overlays a deep grey sand, with silt content decreasing with depth. The silt is derived from previous tin mining activity in the river catchment. The area is regularly flooded by overflow from the river. The maximum depth of water in The Chimneys is 2-4 m, whilst the maximum permanent depth of water is 0.5-1 m. Water pH is around 5. Average annual rainfall of the area is 625 - 750 mm.

The Chimneys may represent the remnants of a once more extensive lake system.

15. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

Much of the surrounding land has been cleared for agriculture. The land use has recently changed from extensive cattle grazing to intensive dairy production. The pasture is now irrigated and strip grazed which concentrates the deposition of manure.

16. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The hydrology of this site is influenced by tidal flows, river flows and local groundwater. The bulk of the wet area is above the tidal limit and is largely controlled by inflows from the Ringarooma River. The hydrology is influenced by mining-related changes to the river throughout the catchment. The estuary itself is also subject to tidal flows. Local groundwater influences some smaller areas that are separate from the river, such as Bowlers Lagoon (Jerie pers. comm.).

The wetland buffers flood peaks and processes nutrients that would otherwise be deposited in the estuary. It also continues to trap a portion of the mine-related sediment that will continue to be transported down the river for many decades. It is unlikely to trap all the sediment, so some will continue to be transported through the estuary to the coast. In the long term, this sediment trapping in the wetlands is likely to change the form and location of the flooded area, and so has the potential to impact on the Ramsar values of the site (Jerie pers. comm.).

17. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp Ts • U • Va •
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

Tp, M, Ts and F.

18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

The area is dominated by scrub and tussock grassland vegetation, and includes substantial areas of freshwater marsh habitat in the floodplain. The variety of habitats support the following vegetation communities: Saltmarsh, Coastal grass and herbfield, Lowland sedgy heathland, Wet heathland, Coastal heathland, Coastal scrub, *Acacia longifolia* coastal scrub, *Allocasuarina verticillata* forest and *Eucalyptus amygdalina* coastal forest.

The lagoons, marshlands and dunes support a rich variety of invertebrate fauna.

19. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Three vegetation communities recognised as threatened in Tasmania also occur within the site; Wetland, *Melaleuca squarrosa* scrub and *Melaleuca ericifolia* swamp forest.

A number of species found on the flood plain are of botanical interest, these include: *Persicaria praetermissa* (located at less than 20 sites in the State) and *Centipeda elatinoides* which are both poorly reserved in Tasmania. The *Isolepis fluitans* aquatic community present at the site is also poorly reserved.

Within Tasmania, Saltmarsh vegetation communities, which occur on the site, qualify for two of the Biodiversity Criteria developed by Joint ANZECC (Australia and New Zealand Environment and Conservation Council)/MCFFA (Ministerial Council on Forestry, Fisheries and Aquaculture) National Forest Policy Statement Implementation Sub-committee (JANIS). Criteria (1); as less than 3% of the pre-1750 distribution of Saltmarsh vegetation is protected in the Comprehensive Adequate and Representative (CAR) reserve system and Criteria (5); as they are a habitat for migratory species which are also often rare, vulnerable or endangered. Though Saltmarsh communities are not currently listed as threatened within Tasmania, these communities serve a critical ecological function and are at risk due to their low reservation status.

20. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Due to the large area of shallow water, the site is considered to be a good feeding area for dabbling ducks and other waterbirds. The area provides nesting habitat for many species of waterbirds, particularly the Australasian shoveler (*Anas rhynchos*).

A number of migratory birds have been recorded from the site; nine migratory birds listed on the China - Australia Migratory Bird Agreement (CAMBA) and nine species listed on the Japan - Australia Migratory Bird Agreement (JAMBA). These species include: Cattle egret (*Ardea ibis*), Great egret (*Ardea alba*), Latham's snipe (*Gallinago hardwickii*), Curlew

sandpiper (*Calidris ferruginea*), Red-necked stint (*Calidris ruficollis*), Bar-tailed godwit (*Limosa lapponica*), Caspian tern (*Sterna caspia*) and Greenshank (*Tringa nebularia*). Approximately 3 km of beaches are included in the site, from which a number of beach nesting shorebirds have been recorded; Little tern (*Sterna albifrons*, listed on JAMBA and CAMBA), Hooded plover (*Thinornis rubricollis*) and Fairy tern (*Sterna nereis*).

21. Social and cultural values:

e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

There is evidence that the floodplain was used by Aboriginal people. It also has a long history of European occupation and mining exploitation. Currently, limited use is made of the area for activities which include duck shooting and cattle grazing.

22. Land tenure/ownership:

a) within the Ramsar site: An area between the Ringarooma River and the western boundary is included in the Cameron Regional Reserve with approximately 120 hectares of this utilised under temporary grazing licenses and the coastal strip is a Public Reserve but the majority is privately owned.

b) in the surrounding area: Private freehold, Cameron Regional Reserve.

23. Current land (including water) use:

a) within the Ramsar site: Recreational shooting, fishing, bird watching, grazing and wildlife observation.

b) in the surroundings/catchment: : Livestock grazing, bird watching and fishing.

24. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site: The area is disturbed by runoff of nutrients from intensive livestock grazing and associated pivot irrigation. Native vegetation communities have also been invaded by an array of exotic plants. Areas of the site are prone to siltation which has been primarily caused by erosion from mining areas.

b) in the surrounding area: There is a threat of further siltation from old mining activities and eutrophication from agricultural runoff.

25. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

The flood plain is listed on the Convention on Wetlands (Ramsar, Iran, 1971). Replanting of some areas of abandoned mine workings has been carried out, but has been of limited success. Areas of Crown Land have been included in the Cameron Regional Reserve.

Within the Boobyalla Inlet, there is no netting allowed upstream of a line from Campbells Point east to the opposite shore (*Fisheries (Scalefish) Rules 2004*). Campbells Point is located at the mouth of the Ringarooma River.

26. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

A management agreement for the area is intended to be written with the cooperation and consent of local landowners.

27. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

Little work has been carried out in this area. There are no facilities.

28. Current conservation education:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

The area is used by local community groups for observing birds.

29. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Recreational shooting, fishing, bird watching and wildlife observation.

30. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Territorial: Dorset Council. Functional: Landowner/ Parks and Wildlife Service.

31. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Landowner/ Director, Parks and Wildlife Service
GPO Box 1751
HOBART, Tasmania 7001

32. Bibliographical references:

scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

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