

**BELL BAY PULP MILL
PEER REVIEW OF FAUNA STUDIES**

Gunns Ltd

BRETT LANE & ASSOCIATES PTY LTD
Ecological Research & Management
605 Nicholson Street, North Carlton
P O Box 592, North Carlton, Vic. 3054
Ph. (03) 9387 5008
Fax. (03) 9387 6115

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CONTENTS

1. EXECUTIVE SUMMARY	1
2. INTRODUCTION.....	3
3. REVIEW OF FAUNA REPORTS.....	4
3.1. Investigation scope and process	4
3.2. Sources of information and field methods	4
3.3. Findings.....	7
3.3.1. Desktop review	7
3.3.2. Habitats	10
3.3.3. Field surveys	10
3.4. Implications under legislation and policies	11
3.4.1. EPBC Act-listed species.....	11
3.4.2. Tasmanian TSP Act-listed species	12
3.4.3. Tasmanian RFA-listed species	12
3.4.4. Other species of conservation significance.....	13
3.4.5. Summary	13
3.5. Impacts and mitigation measures	13
3.5.1. Nationally listed threatened species (EPBC Act)	13
3.5.2. State listed threatened species (TSP Act)	14
3.5.3. Fauna of State conservation significance	18
4. EAGLE NESTING REPORT	20
5. MASKED OWL REPORT	21
6. REFERENCES	23

1. EXECUTIVE SUMMARY

Development of a new pulp mill is proposed by Gunns Limited, to be situated at Bell Bay, on the shores of the Tamar Estuary in northern Tasmania. The proposal consists of three main components, a water supply pipeline from Trevallyn near Launceston, the pulp mill itself, and an effluent pipeline and outfall 3 km offshore in Bass Strait.

Freehills Lawyers on behalf of Gunns Limited, commissioned Brett Lane & Associates Pty Ltd to carry out an independent peer review of the fauna assessment work done by GHD and others for the proposed Bell Bay Pulp Mill, work that was documented in the Draft Integrated Impact Assessment (Draft IIS).

This review has regard to the extent to which the following legislation and policy requirements have been addressed:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Tasmanian Threatened Species Protection Act 1995* (TSPA);
- Other fauna of conservation significance listed by DPIWE (2004).

The scope of this review was mainly a desktop review of the fauna reports in the Draft IIS, supplemented by brief field visit to check fauna habitats along the corridor of the proposed development over three days in September 2006.

Aspects particularly focused upon were:

- whether the sources of information were comprehensive and field methods for collecting data were appropriate; and,
- whether this information was used to inform the regulatory processes, i.e. to recommend appropriate mitigation measures for threatened species potentially affected by the development, bearing in mind the legislative and policy context.

Desktop review by GHD in the Draft IIS gave a reasonably comprehensive description of the terrestrial fauna and ecological attributes of the study region including almost all key threatened species that are likely to occur there. The main deficiency of the GHD report is its presentation rather than content, which made it difficult to extract the key information required by the respective regulators. Separation of those species listed as threatened at national level (EPBC Act) from those threatened only at state level (TSP Act) would have presented this information more clearly, and this approach is adopted in this report.

Some minor omissions were evident, such as treating a few species as significant at state level rather than at nationally level (e.g. Tasmanian Devil and Little Tern) and omitting to mention some listed species such as Giant Freshwater Crayfish and some migratory bird species listed under the EPBC

Act. Invertebrates could have been dealt with in more detail although it is recognized that many are poorly known.

Field methodology was in most cases appropriate to adequately survey the presence or absence of key species. This is true of mammal trapping, invertebrates at the pulp mill site itself (but not the water supply pipeline or most of the effluent pipeline), bird observation (except marine and migratory species covered elsewhere) and nest searches for Wedge-tailed Eagle and White-bellied Sea-Eagle.

Some targeted searches were considered inadequate: Green and Gold Frog (the September survey was conducted too early and in conditions too cold to expect to find this species), and probably the Masked Owl search (methodology good, except that more time was probably required to be sure the species was absent from the pulp mill area). Reptile trapping was limited by rocky terrain, however there are unlikely to be any threatened reptiles affected by the development.

Some marine and migratory birds are covered in the report, however it is accepted that GHD's brief was coverage of terrestrial and freshwater species, and that marine and migratory species are covered elsewhere.

Fauna habitats are described adequately, although perhaps some of the exotic habitats described could have been combined, since these generally offer lower value to native wildlife. Specific reference to TasVeg communities in some cases could have assisted in identifying sites of potential importance to threatened species such as Swift Parrot.

Recommended mitigation measures are described under each of the key species and consist of avoiding or minimizing clearance of known habitat and further study into the local distribution and ecology of some invertebrates and key threatened mammal species.

The Green and Gold Frog search was inadequate to detect the species, however, the mitigation measure of avoiding or minimizing destruction of its habitat of vegetated wetlands and watercourses, is appropriate.

The reports on the eagle nest searches and the Masked Owl searches are covered in separate sections. One Wedge-tailed Eagle nest was found within 1 km, but not within line of sight of the project footprint and therefore no mitigation is required. No Sea-Eagle nests were discovered.

The Masked Owl call playback searches were probably too brief to detect the species, however sufficient effort was expended to detect potential nest sites. Given the area of habitat to be cleared relative to the owl's average estimated territory size of 180 hectares, the species is unlikely to be placed at significant risk by the project.

2. INTRODUCTION

Freehills Lawyers, on behalf of Gunns Ltd, has engaged Brett Lane & Associates Pty Ltd to prepare an independent peer review of the fauna assessment work done by GHD and others for the proposed Bell Bay Pulp Mill, near George Town in northern Tasmania. The reports in which the original work is documented are:

- 'Report for Northern Tasmanian Pulp Mill IIS: Terrestrial Fauna Report', report to Gunns Limited (GHD 2006);
- 'Eagle Nest Search Proposed Pulp Mill and Associated Infrastructure Survey Report', by Gunns Limited (Weeding 2005);
- 'Survey for Tasmanian Masked Owl on proposed Pulp Mill site', report to Gunns Limited by EcoTas (Wapstra 2006)

The three reports all formed part of Volume 13 of the Draft IIS, "Bell Bay Pulp Mill Draft Integrated Impact Statement Volumes 1-18", July 2006: Gunns Limited, [Launceston, Tasmania].

This peer review has had regard to the extent to which the following legislation and policy requirements have been addressed:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Tasmanian Threatened Species Protection Act 1995* (TSPA);

The status of all threatened fauna species under these instruments is provided in Appendix 1.

In this review, particular attention was paid to two aspects:

- Whether the information gathered to inform the response to an implementation of the policy and legislative requirements was valid and collected in an appropriate fashion; and
- Whether that information has been used appropriately to guide the design, and proposed construction and operation of the pulp mill.

For this review, a site inspection was conducted from 25th to 27th September 2006. This involved checking each part of the pulp mill site and the associated water supply and effluent pipeline corridors for their land use and the occurrence of remnant ecosystems, as well as ground-truthing information in the reports. The timing of the site inspection in early spring was not seasonally ideal for all species such as reptiles and frogs and some of these species may have been difficult to detect at that time. However, the inspection did not aim to duplicate the work of the original surveys, rather it aimed to gain an appreciation of the key ecological issues for the purposes of reviewing the existing studies. In this respect, the inspection was considered adequate in scope and comprehensive in geographic coverage.

The review is provided in the following section.

3. REVIEW OF FAUNA REPORTS

This review is presented under the following headings:

- Investigation scope;
- Sources of information and field methods;
- Findings; and
- Application of Legislation and Policies.

3.1. Investigation scope and process

The fauna investigations for the project had the following aims:

- To describe fauna species and their habitats in the study region;
- To identify threatened fauna and other species of conservation significance and their habitats in the study region, including those covered by the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the state *Threatened Species Protection Act 1995* (TSP Act) and Tasmanian Regional Forest Agreement (TRFA);
- To identify potential impacts upon fauna of conservation significance or their habitats in the study area, and propose mitigation measures.

These aims are considered to be appropriate for a pulp mill proposal. Their scope is considered adequate to generate information to enable relevant biodiversity legislation and policy to be addressed in the development assessment process.

3.2. Sources of information and field methods

To achieve these aims, the following existing information was accessed:

- The EPBC Act Protected Matters Search Tool (a listing of EPBC Act listed species that are known from nearby records or for which an assessment indicated the potential occurrence of their habitats on or near the site);
- The DPIWE Threatened Species Unit database;
- The Birds Australia Atlas of Australian Birds;
- *Threatened Fauna Handbook* (Bryant and Jackson 1999);
- Forestry Practices Authority (FPA) *Threatened Fauna Manual*;
- Tasmanian Parks and Wildlife Service and Department of Primary Industries, Water and Environment GIS (Natural Values Report) (GTSpot 2005); and
- Fauna related sections of several reports for projects such as Basslink, Tasmanian Gas Project and Four Mile Creek Wildlife Sanctuary.

The sources accessed are considered appropriate and adequate existing information on the ecological attributes of the site and its surroundings to identify the likelihood of occurrence of species and other features of conservation significance and/or covered by applicable biodiversity legislation.

The distinction has been made between the study region and the study area. The 'region' refers to the broader environment in which the project is located used for the purposes of reviewing existing information on fauna (up to 5 km for the project footprint). The 'area' refers to the development sites, including the pulp mill site and associated water supply and effluent routes, and other infrastructure (e.g. wharf), up to 500m from the project footprint.

Coverage of such species is provided in the species lists within the fauna report (GHD 2006). A number of species listed under the migratory and marine species provisions of the EPBC Act have been omitted from consideration. Examples are Tasmanian Brown Falcon (*Falco berigora tasmanicus*), Collared Sparrowhawk (*Accipiter cirrhocephalus*), Shining Bronze-cuckoo (*Chrysococcyx lucidus*), Richard's Pipit (*Anthus novaeseelandiae*), Southern Boobook (*Ninox novaeseelandiae*), Welcome Swallow (*Hirundo neoxena*), Tree Martin (*Hirundo nigricans*) and Purple Swamphen (*Porphyrio porphyrio*). These are all terrestrial or freshwater species that have been identified as potentially occurring in or over Commonwealth marine waters, hence their inclusion under the EPBC Act (Declaration by the Minister for the Environment and Heritage under the EPBC Act, s248, 14 August 2000, see <http://www.deh.gov.au/coasts/species/marine-species-list.html>). Whilst they are mostly common and widespread species, they should have been considered in the desktop review part of the GHD report for completeness.

A field investigation was undertaken by GHD (2006) that comprised three stages:

- A fauna and habitat assessment from 21st February – 16th March 2005 that involved investigation of the Bell Bay pulp mill and mill facilities site;
- Initial habitat assessment of the effluent pipeline and outfall area near Five Mile Bluff on 28th and 29th June 2005; and
- Habitat assessment of the water pipeline corridor, effluent pipeline corridor and workers accommodation facility at Georgetown and fauna assessment of the effluent pipeline corridor (outfall area), from 21st to 30th September 2005.

The report indicated that the study area supported a number of patches of indigenous vegetation and fauna habitats, and that it was likely to support populations of a number of rare or threatened species. Based on the site inspection undertaken for this review, these initial findings are considered accurate.

Fauna assessments of the pipeline and effluent corridors were undertaken in late September, a time of year appropriate for ascertaining the occurrence of many vertebrate fauna species, including migratory birds that would be detectable in the study area. The fauna assessment for the Bell Bay pulp mill and mill facilities site took place in late February into March. This timing is less suitable than spring for surveying some fauna (because many birds call less frequently after they have finished breeding), but nevertheless good for detection of most fauna, including migratory birds.

The fauna surveys included a range of field methods. The report documents the following field methods:

- Light-trapping and pitfall trapping for sampling invertebrates;
- Overnight trapping for mammals using Elliott Traps and cage traps;
- 'Faunatech' hair funnels used for sampling small mammals;
- Pitfall trapping for small mammals, reptiles and amphibians;
- Spotlight surveys for arboreal and terrestrial mammals, birds and amphibians;
- Area searches targeting birds of conservation significance;
- Targeted census methods for Wedge-tailed Eagle, Masked Owl and Green and Gold Frog were used;
- Incidental records of all fauna were included.

Anabat® recorders were not used to sample for bat fauna, however it is recognized that there are no threatened species of bats regularly occurring in Tasmania and consequently searches for this group may not be justified.

It is considered that the effort expended on Elliott and cage trapping, hair funnel sampling and spotlighting surveys for mammals was adequate to sample for the fauna targeted by these methods (including the New Holland Mouse). The choice of trapline sites in the area where the Pulp Mill and associated infrastructure is to be located is appropriate and covers a representative range of fauna habitats affected.

No trapping was undertaken along the water supply pipeline.

Trapping was undertaken along the effluent pipeline route near the coast and habitats potentially suitable for the New Holland Mouse there were targeted to maximize the detection of this species in the region (none was detected). Two of the three traplines are located in areas some distance from the proposed outfall pipeline. Assessment of the effluent pipeline route area for the current peer review revealed that the proposed effluent pipeline would affect a very limited area of potentially suitable habitat for the New Holland Mouse. The lack of records from the targeted trapping by GHD, combined with the lack of confirmed records nearby, based on existing information suggests that it may not occur, however its presence cannot be ruled out.

Targeted surveys for birds were in most cases sufficient to detect species of conservation significance and were carried out at the appropriate season for detection. Comments on the Masked Owl search detailed in a separate report (Wapstra 2006) are presented in section 5 below.

Investigation of migratory shorebirds listed under the EPBC Act was not separately examined in the report and this element of fauna survey, for the effluent outfall area in particular, could have been more detailed. The study did not investigate marine species.

It is noted that pitfall trapping for small mammals, reptiles and amphibians, was incomplete due to excessively rocky terrain or potential danger to sheep or cattle. This is a common difficulty with this method. Consideration of alternative methods, such as active searching methods (e.g. rolling over rocks and debris) and refugia sampling for reptiles and frogs may have improved the detection of species. However, as none of the species likely to occur in the area affected by the project is considered threatened (other than the Green and Gold Frog (for which a targeted survey was undertaken), this is not considered a significant limitation.

The call playback and listening surveys used for the Green and Gold Frog are not considered to be adequate to detect them. Based on experience near Melbourne, at least 90 minutes of call playback and listening, and spotlighting on at least two occasions are considered necessary to give a high chance of detecting the species if it is present. It is of interest that the temperatures during the survey (5.3 – 15.6 °C) were at or below the lower end of the range of temperatures during which this species is usually active (>15 °C). Additionally, the species is normally active from October to April, so the late September surveys were probably conducted slightly too early to detect the species with reliability. The implications of this are considered later.

No sampling for invertebrates was conducted on or near the water supply pipeline corridor, where several of the threatened invertebrates have been recorded nearby. Sampling methods and timings were considered adequate for the pulp mill site, however it is noted that conditions were probably too cold to obtain representative sampling of invertebrates along the effluent pipeline corridor.

3.3. Findings

The report describes the site in terms of the 'study region', within 5 km of the pipeline corridors or pulp mill site, and the 'study area', within 500 meters of the corridors or pulp mill site. These limits are acceptable. There is a need to 'cast the net' widely in the initial, desktop review stage of a fauna study, because of the paucity of detailed data available for more geographically restricted study areas, particularly the specific development footprint. Therefore a 5 km radius of a study area may be needed to produce a base list of species that may occur in the more restricted area within 500 meters of the project footprint.

The findings of the report are split into two parts, one relating to fauna identified in the desktop review and those recorded in the field assessment.

3.3.1. Desktop review

The desktop review section of the GHD report identifies most of the key threatened terrestrial fauna that might be affected by the pulp mill development. The review examines both invertebrate and vertebrate fauna that may be affected by the development. The desktop review section summarises the diversity of species likely to occur and comments on key threatened species that are confirmed or may be present in the region. The

report (Tables 3 and 18) identifies the following Commonwealth listed threatened fauna species as having been recorded in the study region (within 5 km of the project footprint):

- Green and Gold Frog;
- Wedge-tailed Eagle (Tasmanian);
- Swift Parrot;
- Tasmanian Devil;
- Spotted-tailed Quoll; and,
- Eastern Barred Bandicoot.

With the exception of the bandicoot, the foregoing species, together those listed below area considered threatened at the state level and were identified as having been recorded in the study region:

- Cataract Gorge (Plomley's Trapdoor) Spider;
- Hydrobiid Snail (Cataract Gorge);
- Cataract Gorge Snail;
- Striped Marsh Frog;
- Great Crested Grebe;
- Grey Goshawk;
- White-bellied Sea-Eagle;
- Eastern Curlew;
- Fairy Tern; and
- Masked Owl (Tasmanian).

The Tasmanian Devil (*Sarcophilus harrisi*) was listed only as a threatened species at state level in the GHD fauna report, whereas it has recently been listed by the Commonwealth as a threatened species, possibly since the preparation of the GHD report. At least one other species should have been considered, the Little Tern (*Sterna albifrons*) (endangered in Tasmania), since there are two records in the Birds Australia Atlas for the Tamar estuary, including one close to Georgetown. This species is mentioned as a species of conservation significance in Tasmania, but is in fact a listed threatened species under the TSP Act.

One additional state-listed threatened species, the New Holland Mouse, was predicted (by habitat modeling) to occur within the study area, although there are no records for the study region. The GHD report states that one further frog species, 34 bird species and four mammal species were identified as being of conservation significance, in addition to the threatened species recorded from the study region. It can be difficult to deduce which additional species these are from the tables or appendices supplied. Appendix 1 of this report sets out a full list of fauna of conservation significance that may be

affected by the pulp mill project, their conservation status and their predicted occurrence in the three component parts of project.

Some discrepancies in the number of frog species recorded or predicted in the study region are apparent in the GHD report. Tables 14 and 18 list eight species of frogs recorded or predicted to occur in the study region. The Striped Marsh Frog (*Limnodynastes peronii*) should also have been included to make the total nine, as it was included in Table 3 and section 4.1.2 stated it has been recorded 'just outside the study area' at Curries River Reservoir.

Field work for this review also detected the presence of several species within the study area that were not predicted to occur there in the GHD report (Table 17), although most of these species were predicted to occur in the study region (Table 18). These species were: Shy Albatross (*Thalassarche cauta*), Australasian Gannet (*Morus serrator*), Hooded Plover (*Thinornis rubricollis*), Crested Tern (*Sterna bergii*) and Blue-winged Parrot (*Neophema chrysostoma*). The GHD field surveys recorded one additional species, the Red-necked Stint (*Calidris ruficollis*), and the Tawny-crowned Honeyeater (*Phylidonyris melanops*) was recorded in the study area both by GHD and during this review, although neither was predicted in Table 17. Further to these it is expected that species such as Little Penguin (*Eudyptula minor*) and Black-faced Cormorant (*Phalacrocorax fuscescens*) will also occur in the study area. Most fauna surveys fail to detect the complete complement of native fauna species in a region so the differences in species detected are to be expected and are not exceptional for fauna surveys. This is the reason for analysing fauna records from a wider region than an affected area and deducing presence based on habitat preferences and habitat occurrence in the affected area.

Of invertebrates, the Giant Freshwater Crayfish (*Astacopsis gouldi*) is listed in the EPBC Act Protected Matters Search Tool as potentially occurring in the study region. It is not covered in the GHD Fauna report. The draft recovery plan for this species indicates it has not been recorded from the Tamar catchment (Threatened Species Unit 2005). It is therefore unlikely to be affected by the project. The Mt Arthur Burrowing Crayfish (*Engaeus orramakunna*) is also predicted by the EPBC Act Protected Matters Search Tool to occur in the study region. The species is restricted to a limited area around Mt Arthur (Bryant and Jackson 1999) and therefore is not expected to occur within the study region.

Taken together, the desktop review identified almost all of the threatened terrestrial fauna likely to occur in the study area. Some migratory and marine species listed under the EPBC Act were overlooked. The exceptions are presented in Appendix 1, which tabulates all species of fauna conservation significance that may regularly occur in the study region.

The desktop review was sufficient to identify most of the key terrestrial threatened species that may occur in the area affected by the proposed pulp mill development. The exception is migratory shorebirds, which are discussed in general terms in Section 5.5.3 of the report but which have not been adequately covered at a species level.

3.3.2. Habitats

Nineteen habitat types were identified in the GHD (2006) report as occurring in the study area, some of which may support populations of rare and threatened fauna species. Of these, almost half refer to habitat types dominated by exotic plant species. Some of these habitats could have been combined rather than dealt with separately, since they are highly modified from original intact native vegetation and tend to support fewer indigenous or threatened species. Habitats that potentially support significant indigenous flora or fauna populations (with examples listed within parentheses) are:

- Exotic grassland with nearby wooded areas (e.g. Bennett's Wallaby, Tasmanian Pademelon, Banded Lapwing, Masked Lapwing, Richard's Pipit, Forest Raven, White-fronted Chat and Welcome swallow);
- Heathland (e.g. Swamp Antechinus, Tawny-crowned Honeyeater, possibly New Holland Mouse);
- Drainage Lines (e.g. Tasmanian Native-hen, Grey Goshawk, Spotted Marsh Frog, Common Froglet, Striped Marsh Frog, Banjo Frog, Green and Gold Frog).
- Coastal marshlands and sedgelands (e.g. Water Rat, Tasmanian Native-hen, frogs including Green and Gold Frog);
- Coastal Dune Mosaic (e.g. Crescent Honeyeater, Tawny-crowned Honeyeater);
- Native Grassland (e.g. Eastern Barred Bandicoot, Tasmanian Bettong);
- Woodland (e.g. Eastern Barred Bandicoot, Tasmanian Bettong, Tasmanian Devil, Eastern Quoll Spotted-tailed Quoll, large variety of birds, Mountain Dragon and other reptiles);
- Sandy Beaches (Hooded Plover, Pied Oystercatcher, possibly Fairy Tern);
- Tall Forest (e.g. Spotted-tailed Quoll, Tasmanian Devil, Masked Owl, Green Rosella);
- Creeks and Wet Gullies (e.g. Common Froglet).

Field assessment for this review indicated that the report identified all habitats present in the study area with the exception of marine inshore waters of Bass Strait. The classification of habitats is appropriate and the information presented on them is considered to be accurate.

3.3.3. Field surveys

Given the limited time in which to carry out field surveys, it is inevitable that not all species present in an area will be recorded. This is a common limitation of most fauna surveys, which is usually overcome through a combination of reviewing existing information and correlating the habitat preferences of species with the habitats present in the area of interest. This approach to overcoming such limitations has been adopted in the GHD (2006) report.

A total of 77 species of vertebrates was recorded in the study area during fieldwork for the GHD fauna report. This included eight birds and four mammals of conservation significance. Locations where these were observed are pinpointed on air photos in the report. The full list of species observed is tabulated in Table 6 of the report. Taken together with the desktop review the results of the field survey are sufficient to identify the key areas and habitats for the threatened fauna species (excluding marine species and migratory shorebirds) that are likely to be affected by the pulp mill development and to assess the probability of their occurrence.

3.4. Implications under legislation and policies

The implications of findings under legislation and policies have not been presented in a way that enables ready separation of species of national environmental significance from those of state or other conservation significance, according to the respective legislation. Most of the required information to enable assessment against the requirements of relevant biodiversity legislation is nonetheless included in the report. The following legislation and policies are relevant and have been considered:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); and,
- Tasmanian *Threatened Species Protection Act 1995* (TSPA).

These are considered separately below.

3.4.1. EPBC Act-listed species

Threatened species

All nationally threatened terrestrial fauna species listed under the EPBC Act have been considered (see Appendix 1 of this report for conservation status). The desktop review revealed the Tasmanian populations of the following species as potentially affected by the proposed pulp mill:

- Spotted-tailed Quoll;
- Tasmanian Devil;
- Eastern Barred Bandicoot;
- Wedge-tailed Eagle;
- Swift Parrot; and,
- Green and Gold Frog.

All these species, except the Eastern Barred Bandicoot are also covered under the TSP Act.

Migratory and marine-overfly species

All non-marine migratory species listed under the EPBC Act (covered by the Japan Australia Migratory Bird Agreement - JAMBA, China Australia Migratory Bird Agreement - CAMBA and Bonn Convention international treaties), have

been flagged in the GHD (2006) report. However, they have not been considered in great detail, with little information presented on their occurrence in the study region or in the study area.

The migratory and marine overfly species are summarized in tables 15, 16 and 18 of the report. The report does not provide much detail on how the proposal has met the requirements of the EPBC Act in relation to listed migratory species, particularly migratory shorebirds and sea birds. Brett Lane & Associates Pty Ltd (2006) has prepared an impact assessment that considers these marine and migratory species.

3.4.2. Tasmanian TSP Act-listed species

In addition to threatened species listed under the EPBC likely to occur in the study region, species threatened at the state level under the TSP Act that may occur in the study region and may be affected by the pulp mill development are listed below. Their conservation status is listed in Appendix 1.

- New Holland Mouse;
- Grey Goshawk;
- White-bellied Sea-Eagle;
- Eastern Curlew;
- Great Crested Grebe;
- Little Tern;
- Fairy Tern;
- Masked Owl;
- Striped Marsh Frog;
- Glossy Grass Skink;
- Cataract Gorge Snail;
- Hydrobiid Snail (Cataract Gorge);
- Cataract Gorge Spider;
- Broad-striped Ghost Moth;
- Marrawah Skipper; and,
- Chaostola Skipper.

Several of these (White-bellied Sea-Eagle, Eastern Curlew, and Fairy Tern) are also listed under the EPBC Act as migratory species.

3.4.3. Tasmanian RFA-listed species

It is noted that additional species that are covered under protection measures in the Tasmanian Regional Forest Agreement are considered in the fauna report. These include hollow-nesting birds, such as Australian Owlet-nightjar, Yellow-tailed Black Cockatoo, Green Rosella and Eastern Rosella.

3.4.4. Other species of conservation significance

Also considered in the GHD (2006) report are some species that are neither threatened nor rare under TSP Act but are nevertheless of conservation significance in Tasmania (DPIWE 2004). These include Hooded Plover (also listed under EPBC as a marine overfly species), Dusky Moorhen and Tasmanian Froglet.

3.4.5. Summary

In summary, the desktop fauna assessment included consideration of most fauna species of conservation significance, listed on relevant biodiversity legislation and agreements likely to occur on or near the project footprint. This list of species covered is almost comprehensive. The few exceptions relate to listed migratory species that generally occur or are likely to occur adjacent to the project footprint and study area in small numbers.

The findings in the report are considered to be accurate and adequate to identify key fauna species affected by the project. The key deficiency of the report is lack of detailed consideration of the occurrence and likely impacts on migratory shorebirds and marine species of the Tamar Estuary and Bass Strait respectively. These species are covered in a separate impact assessment report prepared by Brett Lane & Associates Pty Ltd (2006).

3.5. Impacts and mitigation measures

This section addresses whether the fauna report covers adequately the impacts upon listed threatened species in the study area and the effectiveness of the mitigation measures proposed to reduce impacts on these species from all direct and indirect impacts of the proposed pulp mill.

As noted above in the desktop survey, most threatened species have been covered in the report, and this applies also to the impacts and mitigation measures. Some species however are covered in a generic manner and the detail presented is not sufficient to gain an understanding of the overall impacts upon these species. This applies in particular to invertebrates, mammals and frogs. We therefore present summaries of each national and state listed threatened species to address these concerns.

3.5.1. Nationally listed threatened species (EPBC Act)

Although survey techniques for the **Green and Gold Frog** were not considered adequate to find the species (see above), this review identified few areas of habitat suitable for the species along the study area corridors. Therefore the fauna report's recommendation to avoid areas of potential habitat (vegetated freshwater wetlands and watercourses) is an appropriate precautionary measure. An additional threat that may be affecting populations of this species in Tasmania is the presence of Mosquitofish (*Gambusia holbrooki*), which is thought to prey upon tadpoles of the Green and Gold Frog (Tyler 1997) and is present within the study region (i.e. the Tamar River). The pulp mill is unlikely to significantly increase this threat.

Potential impacts of the project on the **Tasmanian Wedge-tailed Eagle** were dealt with in a separate report (Weeding 2005) that is discussed later.

Potential impacts on the **Swift Parrot** were considered in the GHD (2006) report. The report correctly stated that this species is usually not dependent upon forests or woodlands in northern Tasmania, except in years when its main food resource, Blue Gum (*Eucalyptus globulus*), fails (Higgins 1999). Swift Parrots occur in the study area occasionally. It is suggested that improved linkages of information from flora report on mapping the abundance and extent of the main potential foraging resources for the parrot (Blue Gum and Black Gum *Eucalyptus ovata*) in the study area would lead to a better understanding of the significance or otherwise of the study area in providing for this species' requirements. To this extent, reference to TasVeg mapping could provide useful information on the extent of *E. ovata* in the study area.

Treatment of the impacts upon and mitigation measures for **Spotted-tailed Quoll** (*Dasyurus maculatus*), **Tasmanian Devil** and **Eastern Barred Bandicoot** (*Perameles gunnii*) is lacking detail. There is limited information presented on the regional and a statewide status of these species to place the impacts of the development footprint in their wider perspective.

A suggested improvement to the GHD (2006) report would be the provision of information on the overall population and home ranges of these species, and hence estimates of how many animals of each species may be affected by the pulp mill project. It is recognised that this information may not yet exist and would require detailed investigations.

As indicated previously, the **Giant Freshwater Crayfish** and **Mt Arthur Burrowing Crayfish** are both unlikely to occur near the study area and would therefore not be affected by the proposed pulp mill development. No other invertebrate fauna species listed under the EPBC Act is likely to occur in the study region.

3.5.2. State listed threatened species (TSP Act)

Tasmania lists some species that frequent estuaries and inshore (shallow) marine waters as threatened. These species are: White-bellied Sea-Eagle, Eastern Curlew, Little Tern and Fairy Tern. The risk of bioaccumulation of contaminants from prey is unlikely to be significant in these species (Brett Lane & Associates Pty Ltd 2006; Toxikos Pty Ltd 2006).

The **Striped Marsh Frog** (*Limnodynastes peronii*) was mentioned in the desktop review as having occurred in the study region (at Curries River Reservoir) but not within the study area. It was predicted to occur in the effluent pipeline corridor. Listed as 'rare' under the TSPA, it was not discussed in detail in the impacts and mitigation section of the GHD (2006) report. However, the impacts on this species would be similar to the Green and Gold Frog, and the mitigation measures the same, given that they occupy much the same habitats.

Treatment of impacts and mitigation measures for **New Holland Mouse** (*Pseudomys novaehollandiae*) and **Glossy Grass Skink** (*Pseudemoia rawlinsoni*) are adequate, considering these species have yet to be recorded from the study region.

The **Great Crested Grebe** (*Podiceps cristatus*) is listed as rare under the TSP Act. It inhabits open waters, particularly lakes, large rivers and estuaries. The species has been recorded from the Tamar estuary (Bryant and Jackson 1999). It is unlikely to be affected by the development because there will be minimal disturbance to its preferred habitat. Minimal disturbance to riparian vegetation near the Tamar crossing point may assist this species, if it is present in the area.

The **White-bellied Sea-Eagle** (*Haliaeetus leucogaster*) is listed as vulnerable in Tasmania under the TSP Act and it is dealt with in the eagle nest search report (Weeding 2005). No nests were found in the study area. This species is found along coasts and in the Tamar estuary, including in the Launceston area. The species probably eats mainly fish, although there appear to be no published data on its diet from Tasmania. The extent to which it could be affected by bioaccumulation of contaminants is detailed by Toxikos Pty Ltd (2006).

The **Grey Goshawk** (*Accipiter novaehollandiae*) is listed as endangered in Tasmania under the TSP Act. Its population has been estimated at less than 110 breeding pairs (Bryant and Jackson 1999). It prefers areas of Blackwood (*Acacia melanoxylon*) (Bryant and Jackson 1999) but is also known to inhabit areas of old growth Paperbark (*Melaleuca ericifolia*) (GHD 2006). Such habitat occurs in linear stands on the water supply pipeline corridor. The recommendation in the GHD (2006) report that clearance of paperbark stands along the water supply pipeline corridor be avoided to minimize impacts upon this species is considered an effective mitigation measure for this species. However the impacts are unlikely to be significant, as the Grey Goshawk tends to inhabit areas of extensive, contiguous forest (Bryant and Jackson 1999).

The **Eastern Curlew** (*Numenius madagascariensis*) is listed as endangered in Tasmania under the TSP Act. It has suffered a significant decrease in its population in Tasmania over recent decades (Reid and Park 1993). This migratory shorebird is usually present in spring and summer in estuarine mudflat areas. Eleven birds were observed during fieldwork for this review just north of Georgetown on the Tamar River, 25 September 2006. Its diet consists mainly of crabs and small molluscs (Higgins and Davies 1996). The possible effects of bioaccumulation of contaminants are likely to be minimal as indicated by Brett Lane & Associates (2006).

The **Little Tern** (*Sterna albifrons*) is mentioned earlier in this report in the desktop review section. This species is listed as endangered under the TSP Act but was not discussed in the GHD (2006) report. It is also a listed migratory species under the EPBC Act. It has been recorded near the entrance to the Tamar Estuary. In Tasmania, this species is a breeding spring-summer visitor, spending the winter outside the state, possibly as far

north as the northern hemisphere (Higgins and Davies 1996). Nesting by this species has not been recorded from the study region. It inhabits sandy shorelines, mudflats and shallow inshore waters. Its diet is primarily small fish (Higgins and Davies 1996). The possible risks of bioaccumulation of contaminants are likely to be lower for this inshore species (Brett Lane & Associates 2006) than for species that spend most of their foraging time in offshore marine waters (e.g. Little Penguin, the subject of detailed examination by Toxikos [2006]).

The **Fairy Tern** (*Sterna nereis*) is listed as rare under the Tasmanian TSP Act. Its movements are poorly known. In Tasmania, it may be partly migratory, present mainly in spring and summer (Higgins and Davies 1996). Its habitat and diet and potential impacts from the development are likely to be the same as for the Little Tern.

The **Tasmanian Masked Owl** (*Tyto novaehollandiae castanops*) was covered by the GHD report through a habitat assessment and searches. Further targeted work was conducted by Wapstra (2006) whose findings are discussed later in this report.

The **Cataract Gorge Spider**, also known as **Plomley's Trapdoor Spider** (*Migas plomleyi*) is endemic to Tasmania, from where it is known only from the vicinity of Cataract Gorge, Launceston, where it was discovered in 1987. It is not listed under the EPBC Act but is listed as rare under the Tasmanian TSP Act. It is threatened by flooding, burning, trampling and urban development of its mossy habitat (Bryant and Jackson 1999). More information is required on the distribution and ecological requirements of this species in the study area, in the vicinity of the water supply pipeline, to inform a more accurate impact assessment and to develop effective mitigation measures, if needed.

The **Cataract Gorge Snail** also known as **Jungerman's Snail** (*Pasmaditta jungermanniae*) is endemic to Tasmania, where it is found in the vicinity of Cataract Gorge, in moss on rock faces. The species is listed as rare under the Tasmanian TSP Act, but is not listed under the EPBC Act. It is adversely affected by a loss of wet mossy habitat, and burning or clearing of such habitat. There is some disagreement over the species' classification, with some authorities considering it a variant of the common and widespread *Planilaoma luckmanni* (Bryant and Jackson 1999). Further work on the occurrence of this species' habitat in the vicinity of the water supply pipeline route is warranted prior to construction. More information is required on the distribution and ecological requirements of this species in the study area, in the vicinity of the water supply pipeline, to inform a more accurate impact assessment and to develop effective mitigation measures, if needed.

The **Cataract Gorge Hydrobiid Snail** (*Beddomeia launcestonensis*) is listed as rare under the TSP Act, but is not listed under the EPBC Act. It is one of a group of freshwater snails that generally occur on small waterbodies and are intolerant to disturbance (Bryant and Jackson 1999). Little is known about this species, which has been recorded at Cataract Gorge and the South Esk River downstream of Trevallyn Dam ((Bryant and Jackson 1999). It is suggested that retention and enhancement of riparian vegetation and woody debris,

weed management, restricted use of chemicals and careful planning and design of barriers such as culverts, could assist in conserving rare snails (Bryant and Jackson 1999). The occurrence of this species on the water supply pipeline is not known. This species is fully aquatic and due to the small changes in flows anticipated any effects upon this species by the project would be unlikely.

The **Broad-striped Ghost Moth** (*Fraus latistria*) is endemic to Tasmania, where it was last recorded in 1985. It is listed as rare in Tasmania's TSP Act but is not listed nationally. It is known from five locations of which Launceston is one. The precise location at Launceston is not documented and so this moth is not included in the list of species previously recorded from the study region. Its habitat requirements at Launceston are not documented and this colony may have disappeared due to urban development. Near Hobart, the species is known from Black Peppermint (*Eucalyptus amygdalina*) and Banksia (*Banksia marginata*) woodland with an understorey of heath and sedges (Bryant and Jackson 1999; Threatened Species Unit 2000). Since this species is very poorly known and all locations from where it has been recorded are important, consideration should be given to further survey work on the water supply pipeline corridor. Such work should occur in March or April when the species is on the wing (Threatened Species Unit 2000), and should be carried out in habitats matching those reported for the species elsewhere. If this is impractical in the light of the apparent scarcity and lack of records of the species in the last 20 years, clearance of potential habitat for the species along water supply pipeline should be minimised.

The **Marrawah Skipper** (*Oreisplanus munionga larana*) is a Tasmanian subspecies restricted to sites in the far north-west of the state that contain Swamp Paperbark (*Melaleuca ericifolia*) with a ground layer of its food plant, the sedge *Carex appressa*. The subspecies is listed as endangered on Tasmania's TSP Act, but the species is not listed nationally. There is a low probability that the Marrawah Skipper occurs in the study area for the pulp mill project, however in common with mitigation for the Grey Goshawk, clearance of areas of *Melaleuca ericifolia* with *Carex appressa* understorey should be minimised.

The **Chaostola Skipper** (*Antipodia chaostola leucophaea*) is found in Tasmania. Other subspecies are found in Victoria and New South Wales. It is listed as endangered in Tasmania under the TSP Act but is not listed under Commonwealth legislation. The species is restricted to a few known sites in Tasmania, namely, Kingston, Huonville, Knocklofty, Coningham and near Royal George. There is a recent unconfirmed record from near Coles Bay. The Chaostola Skipper is dependent on dry eucalypt forest containing its food plant *Gahnia radula* (Bryant and Jackson 1999). No areas of potentially suitable habitat with clumps of *Gahnia radula* were identified in the vicinity of the Bell Bay pulp mill project footprint, and there are as yet no records away from Tasmanian east coast locations, so on current information, it is considered unlikely that the Chaostola Skipper occurs in the development

area. It is considered here as DPIW officers indicated that it may occur in the area.

3.5.3. Fauna of State conservation significance

This section covers impacts and mitigation measures for most of species of state conservation significance well.

Four species of geometrid moth (*Chrysolarentia* spp.) are predicted to occur within 5 km of the water supply pipeline. These are included as a group of specialised alpine moths of conservation significance by Bryant and Jackson (1999) and Appendix 7 of DPIWE (2004). *C. epitecta* is endemic to Tasmania. These species occur in a number of populations within Tasmania and the development footprint is comparatively restricted. These species are therefore unlikely to be significantly affected by the pulp mill project.

This section of the GHD does not include commentary on the **Sooty Oystercatcher** (*Haematopus fuliginosus*), in view of the inclusion of Pied Oystercatcher (*H. longirostris*). It is noted that the Sooty Oystercatcher is not listed by DPIW as fauna of conservation significance but this species was recorded in nationally significant numbers (>1% of their total world population) in the Tamar Estuary in the 1980's (Lane 1987; Watkins 1993).

The **Little Tern** was included in this section, whereas it is listed as endangered in Tasmania and therefore should have been discussed under the section dealing with State-listed threatened species.

The same comments as noted above for Spotted-tailed Quoll about the desirability of up-to-date information on populations and home ranges apply to the **Eastern Quoll** (*Dasyurus viverrinus*), **Tasmanian Bettong** (*Bettongia gaimardi*) and **Long-nosed Potoroo** (*Potorous tridactylus*). This would enable the potential impacts on populations of these mammals of conservation significance to be better placed in their overall context.

The foregoing discussion has focused on species listed in national and state legislation. A further group of species, included in Appendix 1, occurs in the study region. This group includes a range of forest and wetland species of limited distribution or narrow habitat dependence in Tasmania. Some but not all of these have been considered in the GHD (2006) report. The species of concern are:

- Australasian Bittern;
- Australasian Shoveler;
- Australasian Gannet;
- Australian Hobby;
- Australian Owlet-nightjar;
- Australian Pelican;
- Bar-tailed Godwit;
- Caspian Tern;

- Cattle Egret;
- Common Greenshank;
- Curlew Sandpiper;
- Dusky Moorhen;
- Eastern Rosella;
- Flame Robin;
- Great Egret;
- Green Rosella;
- Grey Plover;
- Grey-tailed Tattler;
- Hardhead;
- Hooded Plover;
- Latham's Snipe;
- Little Penguin;
- Pacific Gull;
- Painted Button-quail;
- Peregrine Falcon;
- Pied Oystercatcher;
- Red Knot;
- Red-necked Stint;
- Ruddy Turnstone;
- Satin Flycatcher;
- Short-tailed Shearwater;
- Swamp Harrier;
- Tawny-crowned Honeyeater;
- Terek Sandpiper;
- Whimbrel;
- Whistling Kite; and
- Yellow-tailed Black Cockatoo.

Impacts on the forest habitats of these species are considered to be limited in extent and therefore the effects of the project on the Tasmanian populations of these species are not considered significant. Impacts on wetlands from the project are negligible, as most of the works will be confined to terrestrial areas.

4. EAGLE NESTING REPORT

The report on the nesting of the Tasmanian Wedge-tailed Eagle in the study region (Weeding 2005) is included as part of volume 13 of the Draft IIS report. The scope of the eagle nesting report was to find any nests of the Tasmanian Wedge-tailed Eagle or the White-bellied Sea-Eagle, within 1 km of the proposed pulp mill or associated infrastructure. These two species are of conservation significance: the Wedge-tailed Eagle population is listed as endangered under both state and Commonwealth legislation; and the Sea-Eagle is listed as vulnerable at the state level and as a listed migratory and marine overfly species under the Commonwealth EPBC Act.

The methodology used in the desktop and field phases of the surveys were comprehensive and appropriate for rapid assessment. The helicopter search method has been used successfully throughout Tasmania to locate and document eagle nests. Areas of potential habitat were targeted by way of forest height data and vegetation mapping, the method used to develop helicopter search routes elsewhere in the state. The methods used are considered best practice for this kind of survey and most eagle nests in the area searched would have been located. In this respect the investigation provides an accurate basis for assessing impacts and developing mitigation measures, if needed.

One Wedge-tailed Eagle nest was found within 1 km of the development footprint about 660 m north of the study area. This nest is separated by a ridgeline from the pulp mill infrastructure areas and is therefore unlikely to be affected by pulp mill construction or operation activities. Normally a 500 metre breeding season activity exclusion zone between forestry activities and Wedge-tailed Eagle nests applies in Tasmania, or a 1 km if the nest is in direct line of sight. Given that the nest is not in direct line of sight of the proposed works or the pulp mill, an impact on this breeding pair is considered a low probability.

No nest of the White-bellied Sea-Eagle was found and therefore no impacts upon this species' nesting activities are expected.

5. MASKED OWL REPORT

The Masked Owl report (Wapstra 2006) is included as part of volume 13 of the Draft IIS report. The scope of the report is to document the potential habitat of Masked Owl in the pulp mill area, to search for birds in the same area and to suggest mitigation measures to minimize disturbance of the species in the pulp mill area.

The study area for the report covers only the pulp mill site and nearby infrastructure, and does not cover the water supply pipeline or effluent pipeline corridors. The effluent pipeline corridor has little habitat suitable for the Masked Owl, however, parts of the water supply pipeline have potential habitat that could have been surveyed, although it is acknowledged that the impacts of water supply pipeline construction are brief and temporary, and therefore of limited concern. GHD personnel conducted follow-up searches for Masked Owl after a probable sighting of the species in the pulp mill area.

The call playback survey took place over two nights in mid June, with a further two nights spotlighting. The seasonal timing of the Masked Owl survey is considered appropriate.

The Masked Owl is a large owl that uses forest and woodland. As a predator, it occurs in low population densities. Its home range has been estimated at 1.8 km² (180 ha) in Tasmania and, for the mainland sub-species, from 400 – 1200 ha in south-eastern Australia (Higgins 1999). The actual and predicted distribution of Tasmanian Masked Owls indicates they prefer drier lowland (<600 metres elevation) areas of forest and woodland in northern and eastern Tasmania (Bell and Mooney 2002).

Recent work on related species of large forest owls (Sooty Owl *Tyto tenebricosa* and Powerful Owl *Ninox strenua*) near Eden, New South Wales, indicated that a survey effort of 8 nights for Sooty Owl and 18 nights for Powerful Owl was required to be 90% confident of the presence or absence of the respective species in an area (Wintle et al. 2005). Both of these species, in common with the Masked Owl have large territories – 300 to 1500 ha for Powerful Owl (Higgins 1999) or as high as 4770 ha in drier inland areas (Soderquist et al. 2002) and from 300 to 3000 ha (Higgins 1999), but more commonly 600 to 800 ha (Kavanagh 2002) for Sooty Owl.

Bell and Mooney (2002) conducted listening, call playback and spotlighting surveys at 86 sites across Tasmania and recorded the presence of Masked Owl at 13% of these sites. Even though the Bell Bay pulp mill site is within the core distribution of the Owl (and therefore likely to be at higher densities than average for Tasmania [Bell and Mooney 2002]), the survey effort of two nights spotlighting and two nights call playback may have been insufficient to record the species in surveyed area. The relationship between survey effort and detection probability of the Masked Owl in Tasmania is not known, so it is not known if the survey effort in this case was sufficient to inform the impact assessment for the project. The information above for other large forest owls suggests that a greater survey effort may be appropriate.

Notwithstanding the above, we agree that within the time limits imposed, the survey methods used, involving listening, call playback and spotlighting were appropriate for detecting the Masked Owl. The search for nest trees targeting trees with hollows of >15 cm diameter is also considered appropriate. Bell and Mooney (2002) indicate that 54% of nest records are from White Gum (*Eucalyptus viminalis*) and 27% from Brown-topped Stringybark (*E. obliqua*). Therefore survey effort should concentrate on trees of these species.

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Appendix 1: Species of conservation significance in the Bell Bay Pulp Mill project study region (within 5 km of footprint).

Scientific name	English name	EPBC Act status	TSP Act status	Garnett & Crowley 2000	Conservation significance in Tas.	Predicted or recorded water supply pipeline	Predicted or recorded Pulp Mill	Predicted or recorded effluent pipeline and outfall	Predicted or recorded in study region but not study area (*)	Recorded in study area during field surveys
Invertebrates										
<i>Fraus latistria</i>	Broad-striped Ghost Moth		Rare		yes	yes	no	no	note (1)	
<i>Beddomeia launcestonensis</i>	Cataract Gorge Hydrobiid Snail		Rare		yes	yes	no	no	*	
<i>Pasmaditta jungermanniae</i>	Cataract Gorge Snail		Rare		yes	yes	no	no		
<i>Migas plomleyi</i>	Cataract Gorge Spider		Rare		yes	yes	no	no	*	
<i>Antipodia chaostola leucophaea</i>	Chaostola Skipper		End		yes	no	no	no	note (2)	
<i>Chrysolarentia epicteta</i>	geometrid moth				yes	yes	no	no	*	
<i>Chrysolarentia lucidulata</i>	geometrid moth				yes	yes	no	no	*	
<i>Chrysolarentia mecynata</i>	geometrid moth				yes	yes	no	no	*	
<i>Chrysolarentia vicissata</i>	geometrid moth				yes	yes	no	no	*	
<i>Astacopsis gouldi</i>	Giant Freshwater Crayfish	Vul	Vul		yes	no	no	no		
<i>Oreisplanus munionga larana</i>	Marawah Skipper		End		yes	yes	no	no		
<i>Engaeus orramakunna</i>	Mt Arthur Burrowing Crayfish	Vul	Vul		yes	no	no	no	*	
Amphibians										
<i>Litoria raniformis</i>	Green and Gold Frog	Vul	Vul		yes	yes	no	yes		
<i>Limnodynastes peronii</i>	Striped Marsh Frog	-	Rare		yes	no	no	yes	*	
<i>Crinia tasmaniensis</i>	Tasmanian Froglet	-	-		yes	no	no	yes	*	
Reptiles										
<i>Pseudemoia rawlinsoni</i>	Glossy Grass Skink	-	Rare		yes	yes	no	no	*	
Birds										
<i>Pachyptila desolata</i>	Antarctic Prion	Ma	-		no	no	no	yes	*	

Scientific name	English name	EPBC Act status	TSP Act status	Garnett & Crowley 2000	Conservation significance in Tas.	Predicted or recorded water supply pipeline	Predicted or recorded Pulp Mill	Predicted or recorded effluent pipeline and outfall	Predicted or recorded in study region but not study area (*)	Recorded in study area during field surveys
<i>Stercorarius parasiticus</i>	Arctic Jaeger	Ma	-		no	no	no	note (4)		
<i>Botaurus poiciloptilus</i>	Australasian Bittern	-	-	Vul	yes	yes	no	no		
<i>Morus serrator</i>	Australasian Gannet	Ma	-		yes	no	no	yes		yes
<i>Anas rhynchotis</i>	Australasian Shoveler	-	-		yes	yes	no	no		
<i>Falco longipennis</i>	Australian Hobby	L	-		yes	yes	no	yes		
<i>Aegotheles cristatus tasmanicus</i>	Australian Owlet-nightjar (Tas.)	-	-	Vul	yes	yes	no	no		
<i>Pelacanus conspicillatus</i>	Australian Pelican	Ma	-		yes	yes	yes	yes		yes
<i>Threskiornis molucca</i>	Australian White Ibis	Ma	-		no	yes	no	no	*	
<i>Limosa lapponica</i>	Bar-tailed Godwit	Mi, Ma	-		yes	yes	no	yes	*	
<i>Thalassarche melanophris s.l.</i>	Black-browed Albatross	Vul, Ma	End	NT	yes	no	no	note (4)		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant	Ma	-		no	yes	no	yes		yes
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	Ma	-		no	yes	yes	yes		
<i>Neophema chrystostoma</i>	Blue-winged Parrot	Ma	-		no	yes	yes	yes		yes
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	Ma	-		no	yes	no	no	*	
<i>Daption capense</i>	Cape Petrel	Ma	-		no	no	no	yes	*	
<i>Sterna caspia</i>	Caspian Tern	Mi, Ma	-		yes	no	yes	yes		
<i>Ardeola ibis</i>	Cattle Egret	Mi, Ma	-		yes	yes	no	no		
<i>Acrocephalus (stentoreus) australis</i>	Clamorous Reed Warbler	Mi, Ma	-		no	yes	no	no		
<i>Pelecanoides urinatrix</i>	Common Diving-Petrel	Ma	-		no	no	no	yes		
<i>Tringa guttifer</i>	Common Greenshank	Mi, Ma	-		yes	yes	no	yes	*	
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi, Ma	-		no	yes	no	no		
<i>Sterna bergii</i>	Crested Tern	Ma	-		no	yes	yes	yes		yes
<i>Calidris ferruginea</i>	Curlew Sandpiper	Mi, Ma	-		yes	no	no	yes	*	
<i>Charadrius bicincta</i>	Double-banded Plover	Mi, Ma	-		no	yes	no	yes	*	

Scientific name	English name	EPBC Act status	TSP Act status	Garnett & Crowley 2000	Conservation significance in Tas.	Predicted or recorded water supply pipeline	Predicted or recorded Pulp Mill	Predicted or recorded effluent pipeline and outfall	Predicted or recorded in study region but not study area (*)	Recorded in study area during field surveys
<i>Gallinula tenebrosa</i>	Dusky Moorhen	-	-		yes	yes	no	no		
<i>Numenius madagascariensis</i>	Eastern Curlew	Mi, Ma	End		yes	no	no	yes	*	
<i>Platycercus eximius diemenensis</i>	Eastern Rosella (Tas.)	-	-	NT	yes	yes	yes	yes		
<i>Pachptila turtur s.l.</i>	Fairy Prion	Ma	-		no	no	no	yes	*	
<i>Sterna nereis</i>	Fairy Tern	-	Rare		yes	no	no	yes	*	
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	Ma	-		no	yes	yes	yes		yes
<i>Petroica phoenicea</i>	Flame Robin	-	-		yes	yes	no	yes		
<i>Puffinus gavia</i>	Fluttering Shearwater	Ma	-		no	no	no	note (4)		
<i>Corvus tasmanicus</i>	Forest Raven	Ma	-		no	yes	yes	yes		yes
<i>Podiceps cristatus</i>	Great Crested Grebe	-	Rare		yes	yes	no	no		
<i>Ardea alba</i>	Great Egret	Mi, Ma	-		yes	yes	no	no		
<i>Catharacta skua</i>	Great Skua	Ma	-		no	no	no	note (4)		
<i>Platycercus caledonicus</i>	Green Rosella	-	-		yes	yes	yes	yes		yes
<i>Accipiter novaehollandiae</i>	Grey Goshawk	-	End		yes	yes	no	no		
<i>Pluvialis squatarola</i>	Grey Plover	Mi, Ma	-		yes	no	no	yes	*	
<i>Heteroscelus brevipes</i>	Grey-tailed Tattler	Mi, Ma	-		yes	no	no	yes	*	
<i>Aythya australis</i>	Hardhead	-	-		yes	yes	no	no		
<i>Thinornis rubricollis</i>	Hooded Plover	Mi, Ma	-	Vul	yes	no	no	yes		yes
<i>Chrysococcyx basalis</i>	Horsfield's Bronze-cuckoo	Ma	-		no	yes	no	yes		yes
<i>Larus dominicanus</i>	Kelp Gull	Ma	-		no	yes	no	no	*	
<i>Gallinago hardwickii</i>	Latham's Snipe	Mi, Ma	-		yes	yes	yes	yes		
<i>Egretta garzetta</i>	Little Egret	Ma	-		no	yes	no	yes	*	
<i>Eudyptula minor</i>	Little Penguin	Ma	-		yes	no	no	yes	*	yes
<i>Sterna albifrons</i>	Little Tern	Mi, Ma	End		yes	no	no	yes	*	

Scientific name	English name	EPBC Act status	TSP Act status	Garnett & Crowley 2000	Conservation significance in Tas.	Predicted or recorded water supply pipeline	Predicted or recorded Pulp Mill	Predicted or recorded effluent pipeline and outfall	Predicted or recorded in study region but not study area (*)	Recorded in study area during field surveys
<i>Tyto novaehollandiae castanops</i>	Masked Owl (Tasmanian)	-	End	End	yes	yes	yes	yes		
<i>Biziura lobatus</i>	Musk Duck	Ma	-		no	yes	no	yes	*	
<i>Macronectes halli</i>	Northern Giant-Petrel	Vul, Ma	Rare	NT	yes	no	no	note (4)		
<i>Pluvialis fulva</i>	Pacific Golden Plover	Mi, Ma	-		no	yes	no	yes	*	
<i>Larus pacificus</i>	Pacific Gull	Mi, Ma	-		yes	yes	no	yes		yes
<i>Turnix varia</i>	Painted Button-quail	-	-		yes	no	yes	no	*	
<i>Cuculus pallidus</i>	Pallid Cuckoo	Ma	-		no	yes	no	yes		yes
<i>Falco peregrinus</i>	Peregrine Falcon	L	-		yes	yes	no	yes	*	
<i>Haematopus longirostris</i>	Pied Oystercatcher	-	-		yes	yes	yes	yes	note (3)	yes
<i>Petroica rodinogaster</i>	Pink Robin	-	-		yes	yes	no	yes	*	
<i>Porphyrio porphyrio</i>	Purple Swamphen	Ma	-		no	yes	no	yes		yes
<i>Calidris canutus</i>	Red Knot	Mi, Ma	-		yes	no	no	yes	*	
<i>Charadrius ruficapillus</i>	Red-capped Plover	Ma	-		no	yes	no	yes	*	
<i>Calidris ruficollis</i>	Red-necked Stint	Mi, Ma	-		yes	yes	no	yes		
<i>Anthus novaeseelandiae</i>	Richard's (Australasian) Pipit	Ma	-		no	yes	no	yes		yes
<i>Arenaria interpres</i>	Ruddy Turnstone	Mi, Ma	-		yes	yes	yes	yes		
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Mi, Ma	-		yes	yes	yes	yes		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi, Ma	-		no	yes	no	yes	*	
<i>Chrysococcyx lucidus plagosus</i>	Shining Bronze-cuckoo	Ma	-		no	yes	yes	yes		yes
<i>Puffinus tenuirostris</i>	Short-tailed Shearwater	Mi, Ma	-		yes	no	no	yes	*	
<i>Thalassarche cauta s.l.</i>	Shy Albatross	Vul, Ma	Vul	Vul	yes	no	no	note (4)		yes
<i>Larus novaehollandiae</i>	Silver Gull	Ma	-		no	yes	yes	yes		yes
<i>Zosterops lateralis</i>	Silvereye	Ma	-		no	yes	yes	yes		yes
<i>Pachyptila belcheri</i>	Slender-billed Prion	Ma	-		no	no	no	yes	*	

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<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	-	-		no	yes	no	yes	note (3)	
<i>Ninox novaeseelandiae leucopsis</i>	Southern Boobook (Tas.)	Ma	-		no	yes	no	no	*	
<i>Macronectes giganteus</i>	Southern Giant-Petrel	End, Ma	Vul	Vul	yes	no	no	note (4)		
<i>Porzana tabuensis</i>	Spotless Crake	Ma	-		no	yes	no	no	*	
<i>Circus approximans</i>	Swamp Harrier	L	-		yes	yes	yes	yes		yes
<i>Lathamus discolor</i>	Swift Parrot	End	End	End	yes	yes	yes	yes		
<i>Philydonyris melanops</i>	Tawny-crowned Honeyeater	-	-		yes	no	no	yes		yes
<i>Xenus cinerea</i>	Terek Sandpiper	Mi, Ma	-		yes	no	no	yes	*	
<i>Hirundo nigricans</i>	Tree Martin	Ma	-		no	yes	yes	yes		yes
<i>Diomedea exulans s.l.</i>	Wandering Albatross	Vul, Ma	End	End	yes	no	no	note (4)		
<i>Aquila audax fleayi</i>	Wedge-tailed Eagle (Tas.)	End	End	End	yes	yes	yes	no		
<i>Hirundo neoxena</i>	Welcome Swallow	Ma	-		no	yes	yes	yes		yes
<i>Numenius phaeopus</i>	Whimbrel	Mi, Ma	-		yes	yes	no	yes	*	
<i>Haliastur sphenurus</i>	Whistling Kite	L	-		yes	yes	no	no	*	
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Mi, Ma	Vul	Vul	yes	yes	yes	yes		
<i>Pelagodroma marina</i>	White-faced Storm-Petrel	Ma	-		no	no	no	note (4)		
<i>Sterna striata</i>	White-fronted Tern	Ma	Vul	Vul	yes	no	no	note (4)		
<i>Hirundapus caudacutus</i>	White-throated Needletail	Mi, Ma	-		no	yes	yes	yes		
<i>Thalassarche chlororhynchos</i>	Yellow-nosed Albatross	Ma	-		no	no	no	note (4)		
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	-	-		yes	yes	yes	yes		
Mammals										
<i>Perameles gunnii</i>	Eastern Barred Bandicoot	Vul	-		yes	yes	yes	yes		
<i>Dasyurus viverrinus</i>	Eastern Quoll	-	-		yes	yes	yes	yes		
<i>Potorous tridactylus</i>	Long-nosed Potoroo	-	-		yes	yes	yes	yes		yes

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<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	End		yes	no	no	yes		
<i>Isoodon obesulus affinis</i>	Southern Brown Bandicoot	-	-		yes	yes	yes	yes		
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	End	Rare		yes	yes	yes	yes		
<i>Bettongia gaimardi</i>	Tasmanian Bettong	-	-		yes	yes	yes	yes		yes
<i>Sarcophilus harissi</i>	Tasmanian Devil	Vul	Vul		yes	yes	yes	yes		

Notes:

End = Endangered

Mi = listed Migratory species under EPBC

Ma = EPBC listed Marine or Marine overfly species

Vul = Vulnerable

NT = near threatened

L = listed

** Some species in Table 18 of GHD report are omitted from this table as they are considered not to occur regularly

e.g. Southern Fulmar *Fulmarus antarcticus* and Blue Petrel *Halobaena caerulea*. Some common ducks and raptors are omitted.

The latter are not of conservation significance, despite being listed under migratory provisions of the EPBC Act.

Species listed in bold type were either not considered or not considered in their correct EPBC category in GHD Fauna report