



Australian Government

**Department of Sustainability, Environment,
Water, Population and Communities**

Corner Inlet Ramsar site

Ecological Character Description

June 2011

Chapters 7 – 8 and Appendices

Other chapters can be downloaded from:

www.environment.gov.au/water/publications/environmental/wetlands/13-ecd.html

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8 GLOSSARY

Acceptable change, means the variation that is considered acceptable in a particular measure or feature of the ecological character of the wetland. Acceptable variation is that variation that will sustain the service, component or process to which it refers.

Aquatic/marine fauna, the context of this report relates to fauna species that spend all or the majority of their life cycle in or underwater. As such this grouping primarily relates to fish, marine reptiles, aquatic mammals such as dugong and cetaceans, and aquatic/marine invertebrates.

Ecological character, defined under Resolution IX.1 Annex A: 2005 of the Ramsar Convention as, the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time.

Epiphytes, means algae, larger in size than periphyton, that grows on seagrass leaves.

IMCRA bioregion, refers to the Interim Marine and Coastal Regionalisation for Australia (Mesoscale) to the 200 m interisobath and derived from biological and physical data, (for example, coastal geomorphology, tidal attributes, oceanography, bathymetry and intertidal invertebrates).

Microphytobenthos, means the surface biofilms of photosynthetic micro-algae and bacteria.

National ECD Framework, refers to the document entitled, 'National Framework and Guidance for Describing the Ecological Character of Australia's Ramsar Wetlands – Module 2 of the National Guidelines for Ramsar Wetlands – Implementing the Ramsar Convention in Australia' (DEWHA 2008) and its successive documents as endorsed by the Natural Resource Management (NRM) Ministerial Council.

Periphyton, means thin biofilms of microbes growing on seagrass leaves.

Ramsar Nomination Criteria, refers to the nine criteria for the listing of a site as internationally significant under the provisions of the Ramsar Convention. Also referred throughout the report as the nomination criteria for the site.

Resident species, in the context of waterbirds, are species that remain permanently in Australia but undertake localised migrations often in response to seasonal or climatic events.

Sedimentation, means the process of deposition of sediment of any size. This is often colloquially referred to as siltation, but this term implies that only silt-sized material is deposited.

Shorebirds, as used in this report, refers to both resident and migratory species which are ecologically dependent upon wetlands from the following families: Scolopacidae; Burhinidae; Haematopodidae; Recurvirostridae; Charadriidae; and Glareolidae. Shorebirds form a sub-set of the waterbird grouping.

Values, means the perceived benefits to society, either direct or indirect that result from wetland functions. These values include human welfare, environmental quality and wildlife support.

Waterbirds, as used in this report, refers to those species which are ecologically dependent upon wetlands from the following families: Anseranatidae, Anatidae, Podicipedidae, Ardeinidae, Phalacrocoracidae, Pelecanidae, Ardeidae, Threskiornithidae, Ciconiidae, Gruidae, Rallidae, Scolopacidae, Rostratulidae, Jacanidae, Burhinidae, Haematopodidae, Recurvirostridae, Charadriidae, Gullinidae, Laridae and Sternidae (after Kingsford and Norman 2002; Wetlands International 2006). Only those species of gulls (Laridae) and terns (Sternidae) which make extensive use of shallow, inshore waters or inland wetlands are included. Whilst at least some other species of other families traditionally regarded as “seabirds” (that is, Spheniscidae, Procellariidae, Sulidae, Fregatidae, Stercorariidae and Alcidae) also make use of shallow, inshore waters (and thus could be therefore be considered as waterbirds), these have not been included in the waterbird group (following precedent within Wetlands International 2006).

Wetlands, is used in this report in the context of the definition under the Ramsar Convention which includes, areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.

Wetland-dependent terrestrial fauna, in the context of this report relates to fauna species that occur within or otherwise are dependent on wetland habitats but do not spend the majority of their life cycle underwater (for example, non-aquatic species). As such this grouping primarily relates to birds, amphibians such as frogs, non-aquatic mammals such as water mouse, non-aquatic reptiles and terrestrial invertebrates.

Wetland flora, in the context of this report relates to flora species that are characterised as wetland or wetland-dependent species or populations.

Wetland ecosystem components, as defined in the National ECD Framework, are the physical, chemical and biological parts or features of a wetland.

Wetland ecosystem processes, as defined in the National ECD Framework, are the dynamic forces within the ecosystem between organisms, populations and the non-living environment. Interactions can be physical, chemical or biological.

Wetland ecosystem benefits or services (includes the term ecosystem services), as defined in the National ECD Framework, are the benefits that people receive from wetland ecosystems. In general, benefits and services are based on or underpinned by wetland components and processes and can be direct (for example, food for humans or livestock) or indirect (for example, wetland provides habitat for biota which contribute to biodiversity).

APPENDIX A: DETAILED METHODOLOGY

This ECD report has been prepared by a consultant study team led by BMT WBM Pty Ltd under contract with the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). This has occurred with input from a Project Steering Committee made up of officials from DSEWPaC, the Victorian Department of Sustainability and the Environment (DSE), Parks Victoria (Parks Victoria), the Gippsland Coastal Board (GCB), the Department of Defence (DoD) and the West Gippsland Catchment Management Authority (WGCMA).

This report updates and replaces an unpublished draft ECD document for the site prepared by the Ecos Consortium (Ecos unpublished). However, the draft Ecos document was regarded as an important source of technical information about the site and where appropriate, figures, data analysis and conclusions drawn from the draft Ecos document have been referenced in this ECD report.

A1 Steering Committee

A Steering Committee was created as part of the study and was chaired independently. The organisations represented on the Steering Committee were as follows:

Department or Organisation
Independent Chair
Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)
Department of Sustainability and Environment (DSE)
Parks Victoria
Department of Defence
Gippsland Coastal Board
West Gippsland Catchment Management Authority

A2 Methodology – Information Collation and Review Stage

The first step in ECD preparation as outlined in the National ECD Framework is to identify the wetland services/benefits, wetland components and wetland processes present in the Ramsar site. These key terms are defined in Section 3 of the Report and the Glossary. This was initiated by undertaking a process of information collation and literature review.

As part of the information collation phase, literature and existing data relevant to the study area (site boundary and surrounds) were collated and reviewed. Relevant existing information was sourced from the following:

- published scientific papers
- database records (EPBC, DSE, etc.)
- quantitative data (Birds Australia, Victorian EPA, etc.)
- mapping products supplied by the DSE and Parks Victoria (vegetation and wetland mapping)

- management plans, strategies and other policy documents
- grey literature from internet searches and other sources of data.

Each article of information was collated to a cursory level sufficient to determine its relevance to the study. The collected information was then reviewed to prioritise and identify information of direct relevance to the ECD.

As part of the information collation phase, key information sources to be used in the study were presented to the project Steering Committee and gaps were identified on the basis of these reviews. In some cases, additional information was supplied directly by Steering Committee representatives.

A3 Selection of Critical Components, Processes and Services/Benefits

A wide range of ecosystem components, processes and services/benefits were seen as being represented within the Ramsar site. Following the method within the National ECD Framework, the assignment of a given wetland component, process or service/benefit as critical was determined with reference to the following criteria:

- The component, process or service/benefit is an important determinant of the uniqueness of the site, or is widely accepted as representing a particularly outstanding example of an environmental value supported by the site.
- The component, process or service/benefit is important for supporting one or more of the Ramsar Nomination Criteria under which the site was listed.
- A change in a component, process or service/benefit is reasonably likely to occur over short or medium times scales (less than 100 years).
- A change to the component, process or service/benefit would result in a fundamental change in ecological values of the site.

The views of the Steering Committee were also considered in the assignment of critical elements. Justification for inclusion of critical and supporting components, processes or services/benefits is provided in the body of this report.

In selecting key species/groups that underpin critical components, the following methods were considered:

Flora Species

In nominating particular wetland flora species or communities for consideration under the critical components, the following considerations were applied:

- Species should generally occur in aquatic environments (for example, macrophytes) or are otherwise considered to be wetland-associated species or communities.
- Species or communities should be listed as threatened (that is, vulnerable or endangered) at the national (threatened under EPBC Act) and/or international (IUCN) level or are considered to be particularly noteworthy or critical from a regional biodiversity perspective (refer to Nomination

Criterion 3). This includes species or communities that are perceived by the authors to be iconic to the site, or are designated as threatened under Victorian legislation (endangered or vulnerable at a State/Territory scale).

Fauna Species

In nominating particular fauna species/groups for consideration under the critical components, the following considerations were applied:

1. Species should generally occur in aquatic or marine environments or are otherwise considered to be wetland-dependent terrestrial species (refer Glossary for definitions of these terms and Appendix C for list of species).
2. Species should be either:
 - designated as threatened (for example, endangered or vulnerable) at a national scale (under the EPBC Act) or international scale (under IUCN Red List)
 - particularly noteworthy or critical from a regional biodiversity perspective. This includes species that are perceived by the authors to be iconic to the site, or are designated as threatened under Victorian Legislation (endangered or vulnerable at a State/Territory scale).
3. Given the boundaries of the Ramsar site are largely confined to near-shore areas or internal waters, emphasis has been placed on inclusion of those species that use the site as core habitat, have significant population numbers and spend a large proportion of their life cycle within the site boundaries. This excludes vagrant species of conservation significance such as whales, sharks and migratory seabirds that may only occur in the Ramsar site infrequently but for which species records within the site exist.

A4 Derivation of Limits of Acceptable Change

Limits of Acceptable Change were derived using a staged approach as follows:

- determine values of the site. These represent the critical components and/or services/benefits
- identify critical processes underpinning site values
- describe patterns in natural variability in critical components, processes and services/benefits indicators
- define the relative magnitude of acceptable change. The relative magnitude of acceptable change was determined on the basis of (i) an assessment of criticality of the site to the maintenance of species populations or habitats, based on known or likely patterns in geographic distribution, abundance and criticality of the site to maintaining the survival of a species; (ii) patterns (short-term and long-term) in natural variability; and (iii) a qualitative assessment of the vulnerability of changes outside bounds of natural variability
- derive specific limits of acceptable change. The broad relative magnitude of acceptable change definitions was used to describe specific limits of acceptable change.

The specific values of the site was determined on the basis of (i) known or likely patterns in the distribution and abundance of species and habitats that comprise the critical components, processes and services/ benefits of the site, and (ii) expert opinion and/or empirical data describing the criticality of the site to maintaining the survival of a species. Three levels of criticality were derived based on these factors (Least, Moderate and Highest Concern), as described in Table A-1 below.

Table A-1 Categories Describing Importance of the Site to Maintaining Habitats and Species that Underpin the Critical Services/Benefits and Components

Distribution and criticality to populations	Abundant	Uncommon
Widespread globally and nationally, life-history functions supported in many areas elsewhere (species).	1a	2b
High diversity feature (habitat and community descriptor).	1b	2c
Habitat specialist with disjunct and very limited number of populations globally and nationally (species).	3a	3d
May be widespread nationally or regionally but is a critical breeding, staging or feeding site that is critical to survival of population (habitat and species).	3b	3e
Limited to bioregion but found in numerous basins, and is not known to be critical to survival of a species (habitat and species).	2a	3f
Limited to bioregion, found in a small number of basins and has limited distribution in the site (species).	3c	3g

Where least concern = 1 (green), of concern = 2 (yellow), most concern = 3 (orange)

The relative magnitude of acceptable change was then determined based on:

- The categories describing site values/importance described in Table A-1 above.
- Whether species/habitats that underpin the critical components or services/benefits are known or likely to be highly sensitive/intolerant to changes in environmental conditions.
- Known/likely patterns in natural temporal variability of indicators in the short-term (based on inter-annual cycles or episodic disturbance) and long-term (based on processes operating over time scales measured in decades).
- A high level qualitative assessment of the consequences associated with changes in parameters outside natural variability was undertaken. Five consequence categories were derived, and are based in part on general risk categories developed by the SCFA – FRDC Project Team (2001) for the Risk Assessment Process for Wild Capture Fisheries (Version 3.2) (refer Table A-2).
- Consideration of patterns in natural variability, site values/importance and the consequence ratings for assessing sensitivity to change were used to derive three relative magnitudes of acceptable change categories: (i) no change; (ii) small change; (iii) moderate to large change. These are shown in Table A-3.

Table A-2 Defining Impact Magnitude

Category	Habitat affected/modified	Key species	Ecosystem functioning
Major	greater than 60 per cent habitat	Mortality likely local extinction.	Total ecosystem collapse.
High	30 to 60 per cent	Mortality may affect recruitment and capacity to increase.	Measurable impact to functions, and some functions are missing/ declining/ increasing outside historical range and/or facilitate new species to appear.
Moderate	five to 30 per cent	Mortality within some spp. Levels of impact at the maximum acceptable level.	Measurable changes to ecosystem components but no loss of functions (no loss of components).
Minor	less than five per cent	Affected but no impact on local population status (for example, stress or behavioural change to individuals).	Keystone species not affected, minor changes in relative abundance.
Negligible	less than one per cent	No impact.	Possible changes, but inside natural variation.

Table A-3 Magnitude of Acceptable Change Categories for LAC Indicators

Impact Significance	Level 3 species or habitat	Level 2 species or its habitat		Level 1 species or its habitat			
		Short-term, localised	Long-term or multiple areas	Short-term, localised	Short-term, multiple areas	Long-term, localised	Long-term, multiple areas
Major	No change	No change	No change	No change	No change	No change	No change
High	No change	No change	No change	Moderate change	No change	No change	No change
Moderate	No change	Small change	No change	Moderate change	Small change	Small change	No change
Minor	No change	Moderate change	Small change	Moderate change	Moderate change	Moderate change	Small change

APPENDIX B: NLWRA (2001) DATABASE RESULTS FOR ESTUARIES IN THE IMCRA BIOREGION

STATE	ESTUARYNAME	DLAT	DLONG	CONDITION	CLASSIFICATION	BARRIER_BACKB ARRIER	CENTRAL_ BASIN	FLUVIAL_BAYHE AD_DELTA	FLOOD_EBB_DELTA	INTERTIDAL_FL ATS	MANGROVE	SALTMARSH_SALTFL AT	TIDAL_SANDBANKS	CHANNEL
VIC	CORNER INLET	-38.781	146.484	largely unmodified	tide dominated	10.71301			10.81198	387.10413	18.59332	65.51435	6.89234	163.49541
VIC	WESTERN PORT BAY	-38.429	145.216	modified	tide dominated			4.13857	3.46703	90.57019	15.36289	29.65951	3.69584	577.74547
VIC	ANDERSON INLET	-38.65	145.721	modified	wave dominated	0.4693		0.83757	2.71268	13.25415	0.96114	5.58578	0.21311	7.7043
VIC	SHALLOW INLET	-38.871	146.184	largely unmodified	wave dominated	2.99533			0.42845	7.04799		11.67968	0.11473	2.98393
VIC	JACK SMITH LAKE	-38.497	147.04	near pristine	wave dominated		1.27068	0.14518	0.91885	6.17077		5.17006		0.53759
VIC	MALLACOOTA INLET	-37.569	149.763	near pristine	wave dominated	0.86063	19.76209	1.87327	0.95698	3.86887		1.00609	0.06924	5.77364
NSW	CLYDE RIVER/BATEMANS BAY	-35.747	150.255	largely unmodified	tide dominated			5.20938	1.24143	3.68788	0.90927	1.35359	0.02039	45.55038
NSW	JERVIS BAY	-35.107	150.787	largely unmodified	tide dominated	0.17871		1.0786	0.07506	3.28999	1.87997	3.5002	0.13338	120.71644
VIC	BARWON RIVER	-38.286	144.501	modified	wave dominated	0.3792	8.33747	0.48088	0.43088	1.91563	0.22153	11.98214		2.02118
VIC	SYDENHAM INLET	-37.781	149.017	largely unmodified	wave dominated	0.54957	9.91461	0.67093	0.1674	1.44033		7.11582		0.94002
VIC	LAKE TYERS	-37.859	148.088	largely unmodified	wave dominated	0.30295	7.49772	0.44372	0.83073	1.29182		1.58591		2.04442
VIC	SNOWY RIVER	-37.805	148.557	modified	wave dominated	0.99424	5.03053	0.38535	0.31979	1.2373		6.04228		3.87305
NSW	SAINT GEORGES BASIN	-35.184	150.594	modified	wave dominated	16.06281	34.54946	3.75395	0.56961	1.22626	0.09454	0.93989	0.27947	2.65214
NSW	LAKE BROU	-36.137	150.124	largely unmodified	wave dominated	0.50971	1.74297	1.76547	0.531	0.95947		0.00604		0.27808
NSW	CULLENDULLA CREEK	-35.703	150.209	largely unmodified	tide dominated				0.20505	0.9198	0.1182	0.24258		0.19495
NSW	SHOALHAVEN/CROOKHAVEN RIVER	-34.9	150.763	extensively modified	river dominated	3.00039	1.43382	101.68148	4.4895	0.84879	3.21867	2.62498		19.69845
NSW	MORUYA RIVER	-35.905	150.151	modified	wave dominated		0.3791	2.37487	1.70689	0.79536	0.08839	0.35583	0.73518	2.15223
NSW	DURRAS LAKE	-35.639	150.305	near pristine	wave dominated	0.18495	2.29098	0.38839	0.24	0.78469		0.36093		0.36584
VIC	GLENELG RIVER	-38.061	140.984	modified	wave dominated	0.05892	0.40564		0.15887	0.74842		0.66133		0.66276
NSW	TUROSS LAKE	-36.067	150.132	modified	wave dominated	0.53911	5.62781	17.69419	1.74876	0.55731	0.27517	0.93264	0.89186	5.34083
NSW	BEGA RIVER	-36.706	149.984	modified	wave dominated	1.79346	0.37899	1.29864	0.34935	0.5358	0.04052	0.02586	0.12513	2.73705
NSW	PAMBULA LAKE	-36.948	149.916	largely unmodified	wave dominated		1.50871	4.97362	0.66084	0.52338	0.26755			1.35659
NSW	TABOURIE LAKE	-35.438	150.411	modified	wave dominated	1.32074	0.71653	0.31927	0.28981	0.47685		0.40452		0.53255
NSW	WAGONGA INLET	-36.214	150.132	modified	wave dominated	0.13062	4.17188	1.22045	1.54613	0.42762	0.06338	0.01459		0.53121
VIC	HOPKINS RIVER	-38.399	142.509	modified	river dominated	0.04896	0.25273		0.03891	0.4208		0.30376		1.32503
VIC	TAMBOON INLET	-37.779	149.148	largely unmodified	wave dominated	0.30325	5.74239	0.40109	0.01528	0.38371		1.66415	0.08147	0.97658
VIC	WINGAN INLET	-37.749	149.513	near pristine	wave dominated	0.06507		0.11934	0.28279	0.37995		0.73667		0.71609
NSW	SWAN LAKE	-35.201	150.561	largely unmodified	wave dominated	1.67602	4.12464		0.9245	0.37213		0.08629		0.18055
NSW	TWOFOLD BAY / EDEN	-37.078	149.947	modified	tide dominated	1.24387	0.53852	4.17022	1.33063	0.35338	0.02259	0.30641	0.2425	34.45343
NSW	LAKE CONJOLA	-35.269	150.508	modified	wave dominated	1.85494	4.64153	0.61758	0.77924	0.33817	0.31331	0.03405		0.80382
VIC	MOYNE RIVER	-38.384	142.242	modified	wave dominated		0.8029	0.26745	0.02379	0.31764		0.50733	0.01364	0.27154
NSW	WOLLUMBOOLA LAKE	-34.94	150.776	largely unmodified	wave dominated	2.6167	4.93458	0.76852	0.55523	0.31638	0.04439			0.21167
NSW	MERIMBULA LAKE	-36.896	149.922	modified	wave dominated	2.99472	2.26939	0.56467	2.02111	0.30402				0.4263
NSW	NARRAWALLEE INLET	-35.302	150.475	largely unmodified	wave dominated	0.58307			0.20642	0.2777	0.24737	0.71278		0.40903
NSW	BERMAGUI RIVER	-36.425	150.065	modified	wave dominated	0.20377	0.19928	0.97496	0.39799	0.27543	0.43458	0.3467		0.63618
NSW	COILA LAKE	-36.048	150.139	modified	wave dominated	1.50359	6.1651	0.70075	0.38347	0.27522		0.05586		0.10125
NSW	MINNAMURRA RIVER	-34.628	150.861	modified	river dominated	0.40948			0.09312	0.27489	0.93543	0.52907		0.3727
NSW	MEROO LAKE	-35.484	150.391	near pristine	wave dominated	0.15579	0.63311	0.30066		0.25367		0.39106		0.15577
NSW	TOMAGA RIVER	-35.837	150.185	largely unmodified	river dominated	0.15074		0.4281	0.09261	0.2407	0.19049	0.50033		0.69287
VIC	FITZROY RIVER	-38.263	141.85	modified	wave dominated	0.0538				0.20277			0.0259	0.57285
NSW	WAPENGO LAGOON	-36.635	150.021	largely unmodified	wave dominated		1.02044	1.81334	1.2867	0.18518	0.32905	0.31372		0.37153
NSW	WALLAGOOT LAKE	-36.795	149.959	largely unmodified	wave dominated	0.83244	3.10318	0.78572	0.81916	0.18359				0.26742
NSW	NADGEE LAKE AND INLET	-37.469	149.973	near pristine	wave dominated	0.19439	0.7555	0.06369	0.22166	0.17326		1.08824		0.04352
NSW	BERRARA CREEK	-35.209	150.548	largely unmodified	wave dominated				0.02972	0.15943			0.10808	0.23421
VIC	ANGLESEA RIVER	-38.413	144.191	modified	river dominated	0.02066			0.01919	0.15637				0.11086
VIC	BARHAM RIVER	-38.766	143.668	modified	wave dominated	0.01129				0.14536				0.13568
NSW	TOWAMBA RIVER	-37.112	149.913	largely unmodified	wave dominated	0.19625		3.42478	0.90409	0.12922		0.24554	0.2425	1.45473
NSW	CURRAMBEEN CREEK	-35.037	150.671	largely unmodified	river dominated	0.17871				0.11391	1.36417	0.79421	0.15286	0.54301
NSW	BURRILL LAKE	-35.39	150.445	largely unmodified	wave dominated	0.66203	3.39179	0.86128	0.20873	0.11232		0.0596	0.20922	0.33052

NLWRA (2001) DATABASE RESULTS FOR ESTUARIES IN THE IMCRA BIOREGION

STATE	ESTUARYNAME	DLAT	DLONG	CONDITION	CLASSIFICATION	BARRIER_BACKB ARRIER	CENTRAL_ BASIN	FLUVIAL_BAYHE AD_DELTA	FLOOD_EBB_DELTA	INTERTIDAL_FL ATS	MANGROVE	SALTMARSH_SALTFL AT	TIDAL_SANDBANKS	CHANNEL
NSW	WONBOYN RIVER	-37.25	149.966	largely unmodified	wave dominated	0.2825	0.97631	0.09755	1.07487	0.10481		0.65773		1.64798
NSW	MOLLYMOOK CREEK	-35.334	150.475	largely unmodified	wave dominated					0.09467		0.01012		0.01652
VIC	PAINKALAC CREEK/AIREYS INLET	-38.467	144.094	largely unmodified	wave dominated	0.00711				0.0945		0.0111		0.09726
VIC	SAINT GEORGE RIVER	-38.569	143.965	near pristine	wave dominated					0.08793	0.03006	0.02087		0.00301
VIC	SKENES CREEK	-38.725	143.712	modified	wave dominated				0.01003	0.08013				0.01602
NSW	MERINGO CREEK AND LAGOON	-35.978	150.15	largely unmodified	wave dominated	0.14685	0.06903		0.04137	0.07878	0.00909			
VIC	THOMPSON CREEK	-38.305	144.377	modified	wave dominated	0.12177			0.0156	0.07182		2.86322		0.41139
NSW	MURRAH LAGOON	-36.495	150.054	largely unmodified	wave dominated	0.53265	0.05888	2.90903	0.1061	0.06789		0.02009		0.82762
NSW	NELSON LAGOON	-36.691	149.994	largely unmodified	wave dominated	0.15487	0.18358	0.44907	0.31058	0.0613	0.2174	0.44009		0.29826
NSW	TERMEIL LAKE	-35.462	150.395	near pristine	wave dominated	0.04461	0.35115	0.13238	0.05896	0.04778		0.25146		0.11481
VIC	TIDAL RIVER	39.035822	146.31218	largely unmodified	wave dominated	0.07508			0.06019	0.0445		0.05981		0.06227
VIC	SHERBROOK RIVER	-38.644	143.057	largely unmodified	wave dominated	0.00711				0.04393				0.02863
NSW	BUNGA LAGOON	-36.547	150.055	largely unmodified	wave dominated	0.13795	0.08782	0.08158	0.01469	0.04194				0.03391
NSW	CONGO CREEK AND LAGOON	-35.953	150.157	largely unmodified	wave dominated	0.12132			0.04457	0.03597		0.03765		0.10791
NSW	BARAGOOT LAKE	-36.471	150.065	largely unmodified	wave dominated	0.31216	0.47082	0.18258	0.05383	0.034				
NSW	TILBA TILBA LAKE	-36.339	150.1	largely unmodified	wave dominated	0.48394	0.79475	0.18942	0.2176	0.0331		0.04784		0.13862
NSW	NANGUDGA LAKE	-36.261	150.143	largely unmodified	wave dominated	0.2069	0.32358	0.05481	0.34174	0.03304				0.18646
VIC	GELLIBRAND RIVER	-38.707	143.157	modified	wave dominated	0.011	0.07912		0.03474	0.03161		2.05052		0.18932
VIC	RED RIVER	-37.727	149.563	near pristine	wave dominated	0.06418	0.05363	0.04748	0.03546	0.02974		0.11225		0.1093
NSW	ULLADULLA HARBOUR/MILLARDS CREEK	-35.357	150.485	extensively modified	wave dominated					0.02968				0.56358
NSW	CURALO LAGOON	-37.048	149.921	extensively modified	wave dominated	0.37575	0.42143	0.24083	0.25225	0.02855	0.02259	0.03181		0.12632
VIC	ERSKINE RIVER	-38.532	143.979	largely unmodified	wave dominated	0.00723				0.028	0.04256			0.02529
VIC	JAMIESON RIVER	-38.596	143.919	largely unmodified	wave dominated	0.02147			0.01896	0.02787				0.03154
NSW	LAKE TAROURGA	-36.115	150.134	near pristine	wave dominated	0.07245	0.24628	0.00344	0.02597	0.02786		0.04619		0.01747
VIC	YEERUNG RIVER	-37.791	148.775	near pristine	wave dominated	0.05276			0.00133	0.0256		0.06841		0.19176
NSW	WILLINGA LAKE	-35.5	150.391	near pristine	wave dominated	0.0897	0.13455	0.01145	0.01307	0.0238		0.31957		0.14063
NSW	WALLAGA LAKE	-36.365	150.079	largely unmodified	wave dominated	0.53982	7.50976	2.0683	1.76145	0.01965				0.45843
NSW	KIANGA LAKE	-36.2	150.132	modified	wave dominated	0.16067	0.1449		0.01417	0.01629				0.01947
NSW	CROOKED RIVER AND LAGOON	-34.772	150.815	largely unmodified	wave dominated	0.11955			0.02292	0.01598				0.23154
VIC	WYE RIVER	-38.635	143.891	largely unmodified	wave dominated	0.01752				0.01493		0.00245		0.02124
NSW	MERRICA RIVER	-37.297	149.951	near pristine	wave dominated	0.04198			0.02814	0.01446		0.00292		0.09435
NSW	CANDLAGAN CREEK AND LAGOON	-35.842	150.179	largely unmodified	river dominated	0.04712			0.04391	0.01441	0.03652	0.09934		0.11528
VIC	MERRI RIVER	-38.361	142.478	extensively modified	wave dominated				0.01938	0.01427				0.21102
NSW	MIDDLE LAGOON	-36.656	150.008	largely unmodified	wave dominated	0.32455	0.40076	0.41676	0.11697	0.01236	0.01644			0.17806
NSW	NULLICA RIVER	-37.092	149.872	largely unmodified	wave dominated	0.58832	0.09868	0.40679	0.13602	0.01134				0.26109
NSW	BACK LAGOON	-36.883	149.929	modified	wave dominated	0.33253	0.32766	0.14619	0.02481	0.0103				0.1042
VIC	KENNETT RIVER	-38.667	143.862	largely unmodified	wave dominated	0.01909				0.00919		0.00634		0.02245
NSW	NERRINDILLAH CREEK	-35.229	150.532	largely unmodified	wave dominated	0.05933			0.00912	0.00789	0.00786			0.05682
VIC	EASBY CREEK	-37.741	149.522	near pristine	wave dominated	0.01979			0.01414	0.0066		0.00634		0.04645
VIC	PORT CAMPBELL RIVER	-38.632	142.98	largely unmodified	tide dominated	0.01002			0.00965	0.00518		0.09131		0.0794
VIC	WILD DOG CREEK	-38.734	143.689	largely unmodified	wave dominated	0.01145				0.00452				0.02128
VIC	SPRING CREEK	-38.341	144.32	modified	river dominated	0.00868				0.00259		0.01262		0.072
NSW	CUTTAGEE LAKE	-36.495	150.054	largely unmodified	wave dominated	0.23647	1.10023	0.52849	0.09272					0.23334
VIC	SURREY RIVER	-38.26	141.704	largely unmodified	wave dominated	0.03366						0.32999		0.18336
NSW	CORUNNA LAKE	-36.288	150.133	largely unmodified	wave dominated	0.26975	1.79917	0.23851	0.25567					0.17244
NSW	LAKE MUMMUGA	-36.162	150.129	largely unmodified	wave dominated	0.22124	1.26345	0.17027	0.29737		0.02549	0.06433		0.11977
NSW	WERRI LAGOON	-34.728	150.839	modified	wave dominated	0.67116	0.19309		0.05174					0.0283
NSW	KIOLOA LAGOON	-35.549	150.383	largely unmodified	wave dominated	0.15608			0.02296			0.00399		0.02549
VIC	ELLIOT RIVER	-38.794	143.618	no assessment	wave dominated	0.00503								0.00834

APPENDIX C: FAUNA SPECIES LIST

Note – the following species have been recorded at the site. These lists include wetland-dependent and terrestrial species.

Mammal List

common name	Latin name
agile antechinus	<i>Antechinus agilis</i>
swamp antechinus	<i>Antechinus minimus</i>
dog	<i>Canis lupus</i>
eastern pygmy-possum	<i>Cercartetus nanus</i>
Gould's wattled bat	<i>Chalinolobus gouldii</i>
chocolate wattled bat	<i>Chalinolobus morio</i>
spot-tailed quoll	<i>Dasyurus maculatus</i>
cat	<i>Felis catus</i>
water rat	<i>Hydromys chrysogaster</i>
southern brown bandicoot	<i>Isodon obesulus obesulus</i>
European hare	<i>Lepus europeus</i>
eastern grey kangaroo	<i>Macropus giganteus</i>
house mouse	<i>Mus musculus</i>
lesser long-eared bat	<i>Nyctophilus geoffroyi</i>
Gould's long-eared bat	<i>Nyctophilus gouldi</i>
European rabbit	<i>Oryctolagus cuniculus</i>
koala	<i>Phascolarctos cinereus</i>
common ringtail possum	<i>Pseudocheirus peregrinus</i>
New Holland mouse	<i>Pseudomys novaehollandiae</i>
grey-headed flying-fox	<i>Pteropus poliocephalus</i>
bush rat	<i>Rattus fuscipes</i>
swamp rat	<i>Rattus lutreolus</i>
black rat	<i>Rattus rattus</i>
yellow-bellied sheath-tail bat	<i>Saccolaimus flaviventris</i>
white-footed dunnart	<i>Sminthopsis leucopus</i>
short-beaked echidna	<i>Tachyglossus aculeatus</i>
white-striped freetail bat	<i>Tadarida australis</i>
common brushtail possum	<i>Trichosurus vulpecula</i>
large forest bat	<i>Vespadelus darlingtoni</i>
southern forest bat	<i>Vespadelus regulus</i>
little forest bat	<i>Vespadelus vulturnus</i>
common wombat	<i>Vombatus ursinus</i>
red fox	<i>Vulpes vulpes</i>
black wallaby	<i>Wallabia bicolor</i>

Reptile List

Common Name	Latin Name
tree dragon	<i>Amphibolurus muricatus</i>
lowland copperhead	<i>Austrelaps superbus</i>
eastern three-lined skink	<i>Bassiana duperreyi</i>
white-lipped snake	<i>Drysdalia coronoides</i>
swamp skink	<i>Egernia coventryi</i>
swamp skink	<i>Egernia coventryi</i>
southern water skink	<i>Eulamprus tympanum tympanum</i>
garden skink	<i>Lampropholis guichenoti</i>
McCoy's skink	<i>Nannoscincus maccoyi</i>
metallic skink	<i>Niveoscincus metallicus</i>
tiger snake	<i>Notechis scutatus</i>
red-bellied black snake	<i>Pseudechis porphyriacus</i>
southern grass skink	<i>Pseudemoia entrecasteauxii</i>
glossy grass skink	<i>Pseudemoia rawlinsoni</i>
weasel skink	<i>Saproscincus mustelinus</i>
blotched blue-tongued lizard	<i>Tiliqua nigrolutea</i>
common blue-tongued lizard	<i>Tiliqua scincoides</i>

Amphibian List

Common name	Latin Name
common froglet	<i>Crinia signifera</i>
common froglet	<i>Crinia signifera</i>
Victorian smooth froglet	<i>Geocrinia victoriana</i>
southern bullfrog (ssp. unknown)	<i>Limnodynastes dumerilii</i>
	<i>Limnodynastes dumerilii insularis</i>
spotted marsh frog (race unknown)	<i>Limnodynastes tasmaniensis</i>
southern brown tree frog	<i>Litoria ewingii</i>
growling grass frog	<i>Litoria raniformis</i>
southern toadlet	<i>Pseudophryne semimarmorata</i>

Avifauna List

Common Name	Latin Name
yellow-rumped thornbill	<i>Acanthiza chrysorrhoa</i>
striated thornbill	<i>Acanthiza lineata</i>
yellow thornbill	<i>Acanthiza nana</i>
brown thornbill	<i>Acanthiza pusilla</i>
eastern spinebill	<i>Acanthorhynchus tenuirostris</i>
collared sparrowhawk	<i>Accipiter cirrhocephalus</i>
brown goshawk	<i>Accipiter fasciatus</i>
common myna	<i>Acridotheres tristis</i>
Australian reed-warbler	<i>Acrocephalus australis</i>
common sandpiper	<i>Actitis hypoleucos</i>
Australasian darter	<i>Anhinga novaehollandiae</i>
European skylark	<i>Alauda arvensis</i>
azure kingfisher	<i>Alcedo azurea</i>
chestnut teal	<i>Anas castanea</i>
grey teal	<i>Anas gracilis</i>
Australasian shoveler	<i>Anas rhynchotis</i>
Pacific black duck	<i>Anas superciliosa</i>
red wattlebird	<i>Anthochaera carunculata</i>
little wattlebird	<i>Anthochaera chrysoptera</i>
regent honeyeater	<i>Anthochaera phrygia</i>
Australasian pipit	<i>Anthus novaeseelandiae</i>
fork-tailed swift	<i>Apus Pacificus</i>
wedge-tailed eagle	<i>Aquila audax</i>
cattle egret	<i>Ardea ibis</i>
intermediate egret	<i>Ardea intermedia</i>
eastern great egret	<i>Ardea modesta</i>
white-necked heron	<i>Ardea Pacifica</i>
short-tailed shearwater	<i>Ardenna tenuirostris</i>
ruddy turnstone	<i>Arenaria interpres</i>
dusky woodswallow	<i>Artamus cyanopterus</i>
hardhead	<i>Aythya australis</i>
musk duck	<i>Biziura lobata</i>
sulphur-crested cockatoo	<i>Cacatua galerita</i>
long-billed corella	<i>Cacatua tenuirostris</i>
fan-tailed cuckoo	<i>Cacomantis flabelliformis</i>
brush cuckoo	<i>Cacomantis variolosus</i>
chestnut-rumped heathwren	<i>Calamanthus pyrrhopygius</i>
sharp-tailed sandpiper	<i>Calidris acuminata</i>
sanderling	<i>Calidris alba</i>
red knot	<i>Calidris canutus</i>
curlew sandpiper	<i>Calidris ferruginea</i>
pectoral sandpiper	<i>calidris melanotos</i>
red-necked stint	<i>Calidris ruficollis</i>
great knot	<i>Calidris tenuirostris</i>
gang-gang cockatoo	<i>Callocephalon fimbriatum</i>
yellow-tailed black-cockatoo	<i>Calyptorhynchus funereus</i>
European goldfinch	<i>Carduelis carduelis</i>
European greenfinch	<i>Carduelis chloris</i>
Cape Barren goose	<i>Cereopsis novaehollandiae</i>
double-banded plover	<i>Charadrius bicinctus</i>

Common Name	Latin Name
greater sand plover	<i>Charadrius leschenaultii</i>
lesser sand plover	<i>Charadrius mongolus</i>
red-capped plover	<i>Charadrius ruficapillus</i>
whiskered tern	<i>Chlidonias hybridus</i>
white-winged black tern	<i>Chlidonias leucopterus</i>
Australian wood duck	<i>Chenonetta jubata</i>
silver gull	<i>Chroicocephalus novaehollandiae</i>
Horsfield's bronze-cuckoo	<i>Chrysococcyx basalis</i>
swamp harrier	<i>Circus approximans</i>
golden-headed cisticola	<i>Cisticola exilis</i>
banded stilt	<i>Cladorhynchus leucocephalus</i>
red-browed treecreeper	<i>Climacteris erythrops</i>
grey shrike-thrush	<i>Colluricincla harmonica</i>
black-faced cuckoo-shrike	<i>Coracina novaehollandiae</i>
common cicadabird	<i>Coracina tenuirostris</i>
white-throated treecreeper	<i>Cormobates leucophaeus</i>
Australian raven	<i>Corvus coronoides</i>
little raven	<i>Corvus mellori</i>
forest raven	<i>Corvus tasmanicus</i>
stubble quail	<i>Coturnix pectoralis</i>
brown quail	<i>Coturnix ypsilophora</i>
grey butcherbird	<i>Cracticus torquatus</i>
pallid cuckoo	<i>Cuculus pallidus</i>
black swan	<i>Cygnus atratus</i>
laughing kookaburra	<i>Dacelo novaeguineae</i>
varied sittella	<i>Daphoenositta chrysoptera</i>
cape petrel	<i>Daption capense</i>
mistletoebird	<i>Dicaeum hirundinaceum</i>
emu	<i>Dromaius novaehollandiae</i>
little egret	<i>Egretta garzetta</i>
white-faced heron	<i>Egretta novaehollandiae</i>
black-shouldered kite	<i>Elanus axillaris</i>
black-fronted dotterel	<i>Elseyaornis melanops</i>
galah	<i>Eolophus roseicapilla</i>
eastern yellow robin	<i>Eopsaltria australis</i>
white-fronted chat	<i>Epthianura albifrons</i>
red-kneed dotterel	<i>Erythrogonyx cinctus</i>
little penguin	<i>Eudyptula minor</i>
brown falcon	<i>Falco berigora</i>
nankeen kestrel	<i>Falco cenchroides</i>
Australian hobby	<i>Falco longipennis</i>
peregrine falcon	<i>Falco peregrinus</i>
crested shrike-tit	<i>Falcunculus frontatus</i>
lesser frigatebird	<i>Fregata ariel</i>
Eurasian coot	<i>Fulica atra</i>
southern fulmar	<i>Fulmarus glacialisoides</i>
Latham's snipe	<i>Gallinago hardwickii</i>
dusky moorhen	<i>Gallinula tenebrosa</i>
black-tailed native-hen	<i>Gallinula ventralis</i>
buff-banded rail	<i>Gallirallus philippensis</i>
gull-billed tern	<i>Gelochelidon nilotica</i>
musk lorikeet	<i>Glossopsitta concinna</i>
magpie-lark	<i>Grallina cyanoleuca</i>

Common Name	Latin Name
Australian magpie	<i>Gymnorhina tibicen</i>
sooty oystercatcher	<i>Haematopus fuliginosus</i>
pied oystercatcher	<i>Haematopus longirostris</i>
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>
whistling kite	<i>Haliastur sphenurus</i>
grey-tailed tattler	<i>Heteroscelus brevipes</i>
black-winged stilt	<i>Himantopus himantopus</i>
little eagle	<i>Hieraaetus morphnoides</i>
white-throated needletail	<i>Hirundapus caudacutus</i>
welcome swallow	<i>Hirundo neoxena</i>
tree martin	<i>Hirundo nigricans</i>
caspian tern	<i>Hydroprogne caspia</i>
kelp gull	<i>Larus dominicanus</i>
Pacific gull	<i>Larus Pacificus Pacificus</i>
swift parrot	<i>Lathamus discolor</i>
Lewin's rail	<i>Lewinia pectoralis</i>
yellow-faced honeyeater	<i>Lichenostomus chrysops</i>
white-eared honeyeater	<i>Lichenostomus leucotis</i>
white-plumed honeyeater	<i>Lichenostomus penicillatus</i>
bar-tailed godwit	<i>Limosa lapponica</i>
black-tailed godwit	<i>Limosa limosa</i>
northern giant-petrel	<i>Macronectes halli</i>
pink-eared duck	<i>Malacorhynchus membranaceus</i>
superb fairy-wren	<i>Malurus cyaneus</i>
noisy miner	<i>Manorina melanocephala</i>
little grassbird	<i>Megalurus gramineus</i>
brown-headed honeyeater	<i>Melithreptus brevirostris</i>
white-naped honeyeater	<i>Melithreptus lunatus</i>
little pied cormorant	<i>Microcarbo melanoleucos</i>
Jacky winter	<i>Microeca fascinans</i>
Australasian gannet	<i>Morus serrator</i>
satin flycatcher	<i>Myiagra cyanoleuca</i>
leaden flycatcher	<i>Myiagra rubecula</i>
red-browed finch	<i>Neochmia temporalis</i>
orange-bellied parrot	<i>Neophema chrysogaster</i>
blue-winged parrot	<i>Neophema chrysostoma</i>
southern boobook	<i>Ninox novaeseelandiae</i>
eastern curlew	<i>Numenius madagascariensis</i>
whimbrel	<i>Numenius phaeopus</i>
nankeen night heron	<i>Nycticorax caledonicus</i>
olive-backed oriole	<i>Oriolus sagittatus</i>
blue-billed duck	<i>Oxyura australis</i>
olive whistler	<i>Pachycephala olivacea</i>
golden whistler	<i>Pachycephala pectoralis</i>
rufous whistler	<i>Pachycephala rufiventris</i>
fairy prion	<i>Pachyptila turtur</i>
spotted pardalote	<i>Pardalotus punctatus</i>
striated pardalote	<i>Pardalotus striatus</i>
house sparrow	<i>Passer domesticus</i>
Australian pelican	<i>Pelecanus conspicillatus</i>
scarlet robin	<i>Petroica boodang</i>
flame robin	<i>Petroica phoenicea</i>
pink robin	<i>Petroica rodinogaster</i>

Common Name	Latin Name
ground parrot	<i>Pezoporus wallicus</i>
great cormorant	<i>Phalacrocorax carbo</i>
black-faced cormorant	<i>Phalacrocorax fuscescens</i>
little black cormorant	<i>Phalacrocorax sulcirostris</i>
piebald cormorant	<i>Phalacrocorax varius</i>
common bronzewing	<i>Phaps chalcoptera</i>
brush bronzewing	<i>Phaps elegans</i>
common pheasant	<i>Phasianus colchicus</i>
tawny-crowned honeyeater	<i>Phylidonyris melanops</i>
New Holland honeyeater	<i>Phylidonyris novaehollandiae</i>
crescent honeyeater	<i>Phylidonyris pyrrhoptera</i>
yellow-billed spoonbill	<i>Platalea flavipes</i>
royal spoonbill	<i>Platalea regia</i>
crimson rosella	<i>Platycercus elegans</i>
eastern rosella	<i>Platycercus eximius</i>
glossy ibis	<i>Plegadis falcinellus</i>
Pacific golden plover	<i>Pluvialis fulva</i>
grey plover	<i>Pluvialis squatarola</i>
tawny frogmouth	<i>Podargus strigoides</i>
great crested grebe	<i>Podiceps cristatus</i>
hoary-headed grebe	<i>Poliiocephalus poliocephalus</i>
purple swamphen	<i>Porphyrio porphyrio</i>
Australian spotted crane	<i>Porzana fluminea</i>
spotless crane	<i>Porzana tabuensis</i>
eastern whipbird	<i>Psophodes olivaceus</i>
great-winged petrel	<i>Pterodroma macroptera</i>
fluttering shearwater	<i>Puffinus gavia</i>
red-necked avocet	<i>Recurvirostra novaehollandiae</i>
grey fantail	<i>Rhipidura albiscarpa</i>
willie wagtail	<i>Rhipidura leucophrys</i>
rufous fantail	<i>Rhipidura rufifrons</i>
white-browed scrubwren	<i>Sericornis frontalis</i>
beautiful firetail	<i>Stagonopleura bella</i>
great skua	<i>Stercorarius skua</i>
common tern	<i>Sterna hirundo</i>
white-fronted tern	<i>Sterna striata</i>
little tern	<i>Sternula albifrons</i>
fairy tern	<i>Sternula nereis</i>
southern emu-wren	<i>Stipiturus malachurus</i>
piebald currawong	<i>Strepera graculina</i>
grey currawong	<i>Strepera versicolor</i>
spotted turtle-dove	<i>Streptopelia chinensis</i>
common starling	<i>Sturnus vulgaris</i>
Australasian grebe	<i>Tachybaptus novaehollandiae</i>
Australian shelduck	<i>Tadorna tadornoides</i>
crested tern	<i>Thalasseus bergii</i>
black-browed albatross	<i>Thalassarche melanophrys</i>
hooded plover	<i>Thinornis rubricollis</i>
Australian white ibis	<i>Threskiornis molucca</i>
straw-necked ibis	<i>Threskiornis spinicollis</i>
sacred kingfisher	<i>Todiramphus sanctus</i>
rainbow lorikeet	<i>Trichoglossus haematodus</i>
wood sandpiper	<i>Tringia glareola</i>

Common Name	Latin Name
common greenshank	<i>Tringa nebularia</i>
marsh sandpiper	<i>Tringa stagnatilis</i>
common blackbird	<i>Turdus merula</i>
painted button-quail	<i>Turnix varia</i>
Pacific barn owl	<i>Tyto javanica</i>
masked lapwing	<i>Vanellus miles</i>
banded lapwing	<i>Vanellus tricolor</i>
terek sandpiper	<i>Xenus cinereus</i>
bassian thrush	<i>Zoothera lunulata</i>
silveryeye	<i>Zosterops lateralis</i>

Waterbird List

Common Name	Latin Name
common sandpiper	<i>Actitis hypoleucos</i>
chestnut teal	<i>Anas castanea</i>
grey teal	<i>Anas gracilis</i>
Australasian shoveler	<i>Anas rhynchotis</i>
Pacific black duck	<i>Anas superciliosa</i>
Australasian darter	<i>Anhinga novaehollandiae</i>
cattle egret	<i>Ardea ibis</i>
intermediate egret	<i>Ardea intermedia</i>
eastern great egret	<i>Ardea modesta</i>
white-necked heron	<i>Ardea Pacifica</i>
short-tailed shearwater	<i>Ardenna tenuirostris</i>
ruddy turnstone	<i>Arenaria interpres</i>
hardhead	<i>Aythya australis</i>
musk duck	<i>Biziura lobata</i>
sharp-tailed sandpiper	<i>Calidris acuminata</i>
sanderling	<i>Calidris alba</i>
red knot	<i>Calidris canutus</i>
curlew sandpiper	<i>Calidris ferruginea</i>
pectoral sandpiper	<i>calidris melanotos</i>
red-necked stint	<i>Calidris ruficollis</i>
great knot	<i>Calidris tenuirostris</i>
Cape Barren goose	<i>Cereopsis novaehollandiae</i>
double-banded plover	<i>Charadrius bicinctus</i>
greater sand plover	<i>Charadrius leschenaultii</i>
lesser sand plover	<i>Charadrius mongolus</i>
red-capped plover	<i>Charadrius ruficapillus</i>
whiskered tern	<i>Chlidonias hybridus</i>
white-winged black tern	<i>Chlidonias leucopterus</i>
Australian wood duck	<i>Chenonetta jubata</i>
silver gull	<i>Chroicocephalus novaehollandiae</i>
banded stilt	<i>Cladorhynchus leucocephalus</i>
black swan	<i>Cygnus atratus</i>
little egret	<i>Egretta garzetta</i>
white-faced heron	<i>Egretta novaehollandiae</i>
black-fronted dotterel	<i>Elsayornis melanops</i>
red-kneed dotterel	<i>Erythronyctes cinctus</i>

Common Name	Latin Name
little penguin	<i>Eudyptula minor</i>
Eurasian coot	<i>Fulica atra</i>
oriental pratincole	<i>Glarecola maldivarum</i>
Latham's snipe	<i>Gallinago hardwickii</i>
dusky moorhen	<i>Gallinula tenebrosa</i>
black-tailed native-hen	<i>Gallinula ventralis</i>
buff-banded rail	<i>Gallirallus philippensis</i>
gull-billed tern	<i>Gelochelidon nilotica</i>
sooty oystercatcher	<i>Haematopus fuliginosus</i>
pied oystercatcher	<i>Haematopus longirostris</i>
grey-tailed tattler	<i>Heteroscelus brevipes</i>
black-winged stilt	<i>Himantopus himantopus</i>
Caspian tern	<i>Hydroprogne caspia</i>
kelp gull	<i>Larus dominicanus</i>
Pacific gull	<i>Larus Pacificus Pacificus</i>
Lewin's rail	<i>Lewinia pectoralis</i>
bar-tailed godwit	<i>Limosa lapponica</i>
black-tailed godwit	<i>Limosa limosa</i>
pink-eared duck	<i>Malacorhynchus membranaceus</i>
little pied cormorant	<i>Microcarbo melanoleucos</i>
Australasian gannet	<i>Morus serrator</i>
eastern curlew	<i>Numenius madagascariensis</i>
whimbrel	<i>Numenius phaeopus</i>
nankeen night heron	<i>Nycticorax caledonicus</i>
blue-billed duck	<i>Oxyura australis</i>
Australian pelican	<i>Pelecanus conspicillatus</i>
great cormorant	<i>Phalacrocorax carbo</i>
black-faced cormorant	<i>Phalacrocorax fuscescens</i>
little black cormorant	<i>Phalacrocorax sulcirostris</i>
pied cormorant	<i>Phalacrocorax varius</i>
yellow-billed spoonbill	<i>Platalea flavipes</i>
royal spoonbill	<i>Platalea regia</i>
glossy ibis	<i>Plegadis falcinellus</i>
Pacific golden plover	<i>Pluvialis fulva</i>
grey plover	<i>Pluvialis squatarola</i>
great crested grebe	<i>Podiceps cristatus</i>
hoary-headed grebe	<i>Poliiocephalus poliocephalus</i>
purple swamphen	<i>Porphyrio porphyrio</i>
Australian spotted crane	<i>Porzana fluminea</i>
spotless crane	<i>Porzana tabuensis</i>
red-necked avocet	<i>Recurvirostra novaehollandiae</i>
common tern	<i>Sterna hirundo</i>
white-fronted tern	<i>Sterna striata</i>
little tern	<i>Sternula albifrons</i>
fairy tern	<i>Sternula nereis</i>
Australasian grebe	<i>Tachybaptus novaehollandiae</i>
Australian shelduck	<i>Tadorna tadornoides</i>
crested tern	<i>Thalaseus bergii</i>
hooded plover	<i>Thinornis rubricollis</i>
Australian white ibis	<i>Threskiornis molucca</i>
straw-necked ibis	<i>Threskiornis spinicollis</i>
wood sandpiper	<i>Tringia glareola</i>
common greenshank	<i>Tringa nebularia</i>

Common Name	Latin Name
marsh sandpiper	<i>Tringa stagnatilis</i>
masked lapwing	<i>Vanellus miles</i>
banded lapwing	<i>Vanellus tricolor</i>
Terek sandpiper	<i>Xenus cinereus</i>

APPENDIX D: BIRD COUNT DATA ANALYSIS

Approach

Three data-sets were available for review in this study:

- DSE Fauna database records outlined in the file titled “fauna100_cornerinlet_ramsar_dd94”. This database has count data for fauna species recorded at stations within the Corner Inlet Ramsar site;
- Birds Australia database records (summary only), as outlined in the file titled “BA_shorebird_count_areas_aust”. This database has a total count of various bird species recorded at stations located throughout Australia. Times are pooled, so temporal trends can not be determined from the data.
- Birds Australia Atlas data. The Atlas contains species records at monitoring locations in the Ramsar site. These data show number of records (not always counts) at each sampling station at various times. Data were provided for the New Atlas (1999-2008) and Old Atlas (1977-1984).

The Shorebird Habitat Mapping Project for West Gippsland (Clemens *et al.* 2007) provides a comprehensive description of trends in waterbird abundance in Corner Inlet based on Birds Australia count data. Clemens *et al.* (2007) also contained a larger data-set than supplied to the study team for this project. Readers should refer to Clemens *et al.* (2007) for a description of trends in shorebird abundance based on the Birds Australia data.

The analysis below is based on bird count data from the DSE database. A range of indicator species were selected for the assessment, as follows: black swan, grey teal, chestnut teal, pied oyster catcher, curlew s and piper, red-necked stint, bar-tailed godwit, eastern curlew, sooty oystercatcher and double-banded plover.

These species were selected on the basis that they (i) meet the one per cent of the total population criterion (see nomination criteria 6); and/or (ii) are species that utilise the range of freshwater and coastal types found within the site; and/or (iii) are sensitive to changes associated with some key threats (for example, pied oyster catcher is sensitive to disturbance by humans and foxes); and/or (iv) were identified in Ecos (unpublished) as having a decline in abundance within the site. Note that other species are also identified as meeting the one per cent population criterion at the site, but data for these species were extremely limited and were therefore excluded from analyses.

For each species, the following was derived:

- plots of the maximum and average numbers of individuals recorded in each year (stations pooled). Note the average number of individuals is defined as the average number of individuals counted at a monitoring station at different sampling occasions within a year. This count is not standardised and there is great variability in numbers of stations sampled within and among years.
- descriptive statistics for count data for each year (shows number of records/episodes (not counts) per year), as well as average abundance per year (stations pooled) (Tables D1 to D15). The first column in these summary tables is the year of the surveys. Within each year, the mean (and standard deviation and standard error) number of birds recorded on each survey occasion

was calculated. The “Count” column is the number of survey occasions within each year in which the species was recorded (equivalent to reporting rate). The minimum and maximum values are the lowest and highest number of birds recorded in each year.

Key Trends

Figure D1 and D3 shows that there was great year to year variability in counts of the key waterbird species black swan, grey teal and chestnut teal. Based on summary statistics presented in Tables A to C and Figure D1:

- maximum and average annual counts were higher in the period pre-1993 than after this period. In particular, the period 1985 to 1993 had high numbers of all three species.
- the reporting rate (that is the number of sampling sites and episodes per year; the “Count” column), which is a coarse measure of sampling effort, was lower in the post-1992 period for these species. This suggests that ‘changes’ over time for these species were at least partly a response to differences in sampling effort.
- there was no clear association between annual flows from the Tarra River at Yarram (ML/day) and average bird counts.

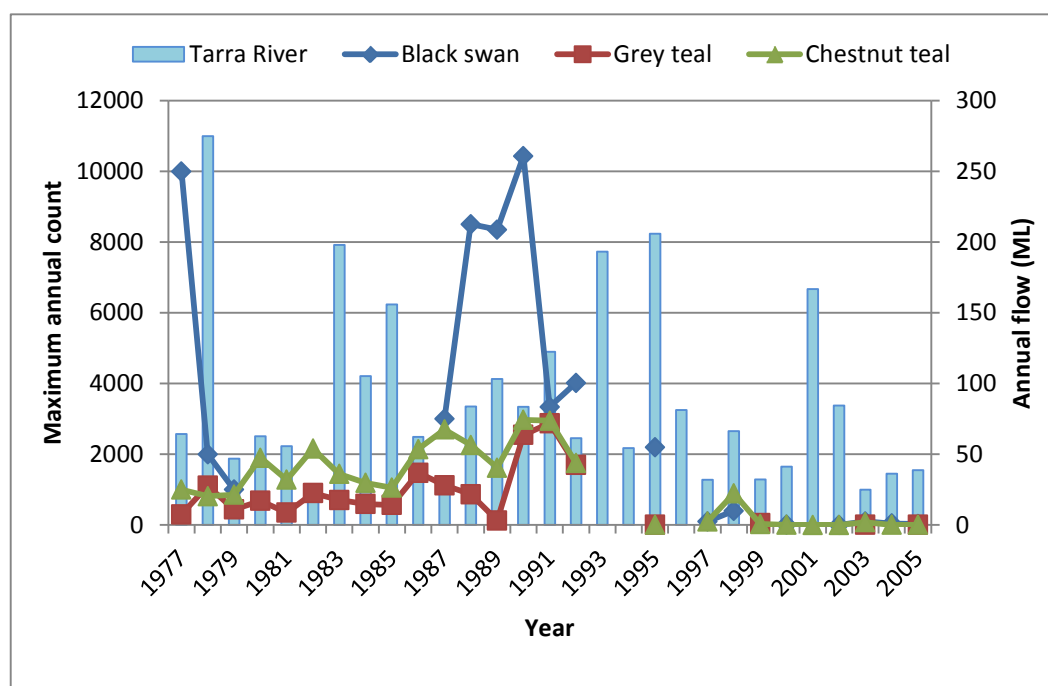


Figure D1 Maximum Annual Count of Black Swan, Chestnut Teal and Grey Teal Based on DSE (unpublished) Fauna Database Records. Average Annual Flow (ML/day) from the Tarra River at Yarram Monitoring Station (Source: Victorian Water Resources Data Warehouse) are Superimposed

Figure D2 shows the maximum annual count of selected marine shorebird species. Similar to trends for black swan and the two species of teal, counts were highly variable over time, with highest counts occurring in the period between 1985 and the early 1990's.

It is important to note the following when interpreting data:

- A variety of sampling methods have been used with varying levels of sampling effort applied;
- There are no metadata describing sampling effort at each station over time;
- Over time, there has been a change in species targeted in surveys. For example, there has been greater scientific interest and therefore survey effort given to Fairy Tern. While counts of this species have been higher in recent years compared to prior to listing, it is likely that this could relate to differences in sampling effort over time.
- Therefore, data cannot be scaled as counts per unit effort in its existing format.

For these reasons, it is not possible to derive empirical indices describing changes in bird abundance over time or among stations based on DSE data. Systematic sampling using standardised count methods would be required to develop appropriate bird abundance metrics.

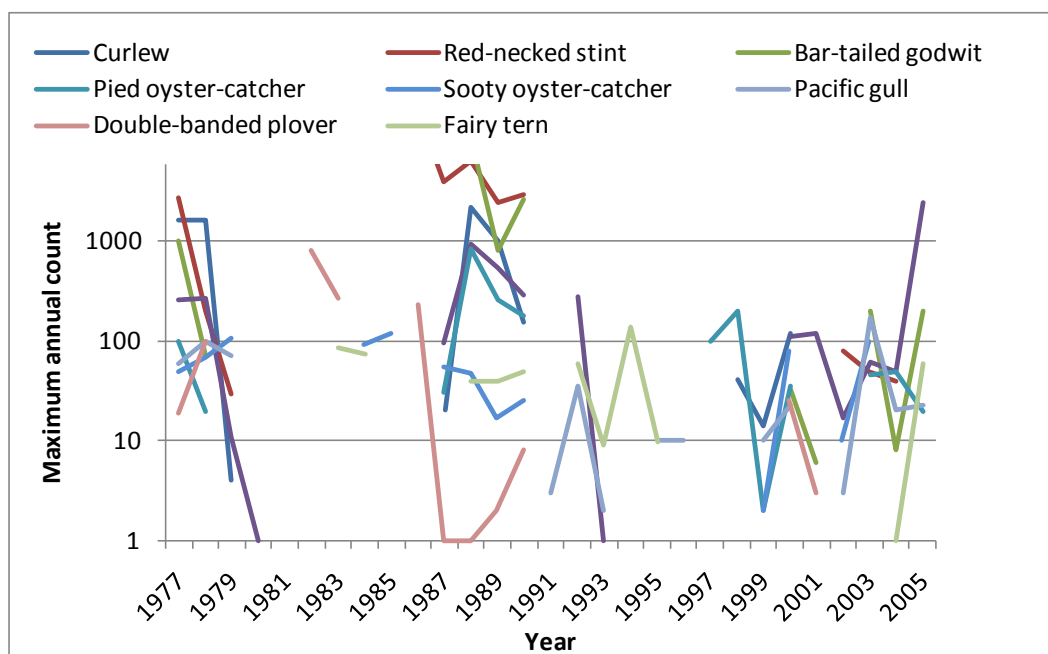


Figure D2 Maximum Annual Count of Selected Marine Shorebird Species Based on DSE (unpublished) Fauna Database Records

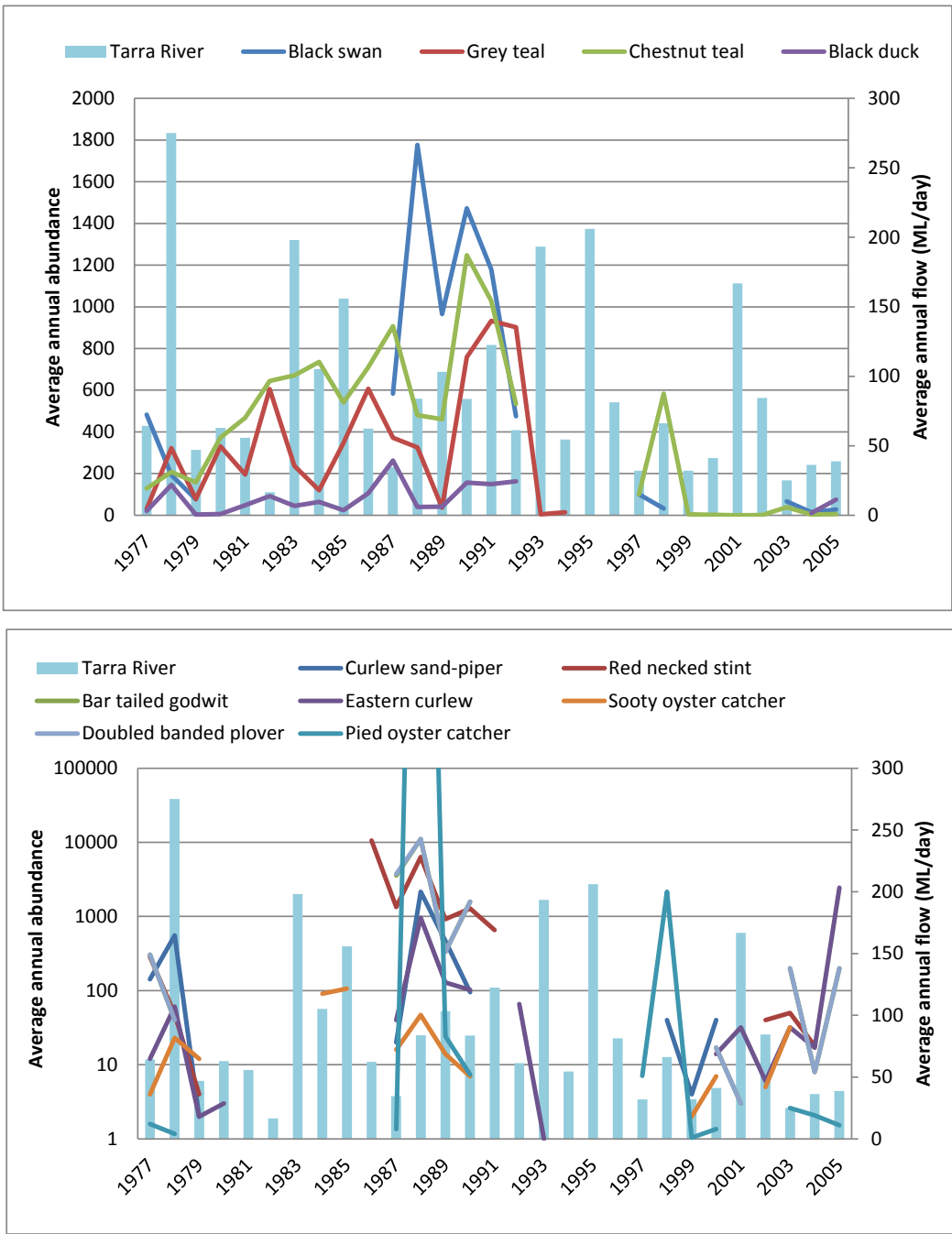


Figure D3 Average Bird Count (Per Sampling Occasion Per Station) for the Years 1977 to 2005, Based on DSE (unpublished) Fauna Database Records. Average Annual Flow (ML/day) from the Tarra River at Yarram Monitoring Station (Source: Victorian Water Resources Data Warehouse) are Superimposed

Table D1 – Summary Statistics for Black Swan Based on DSE Bird Count Data

Descriptive Statistics**Split By: Yr_st****Inclusion criteria: black swan from fauna100_cornerinlet Ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	426	1373	95	208	0	10438	0
No., 1971	0	*	*	1	0	0	0
No., 1973	0	*	*	1	0	0	0
No., 1974	0	*	*	1	0	0	0
No., 1975	0	*	*	1	0	0	0
No., 1976	0	*	*	1	0	0	0
No., 1977	483	1728	296	34	0	10000	0
No., 1978	193	554	154	13	0	2000	0
No., 1979	76	249	60	17	0	1000	0
No., 1980	0	0	0	5	0	0	0
No., 1981	0	0	0	5	0	0	0
No., 1987	583	933	269	12	0	3000	0
No., 1988	1777	3319	1355	6	15	8507	0
No., 1989	965	1931	468	17	0	8356	0
No., 1990	1473	3027	913	11	0	10438	0
No., 1991	1180	1871	1080	3	100	3340	0
No., 1992	475	967	228	18	0	4020	0
No., 1995	661	738	279	7	10	2220	0
No., 1997	100	*	*	1	100	100	0
No., 1998	210	269	190	2	20	400	0
No., 1999	33	81	20	16	0	300	0
No., 2000	1	3	1	19	0	8	0
No., 2001	0	0	0	6	0	0	0
No., 2002	1	1	1	2	0	2	0
No., 2003	67	58	33	3	0	100	0
No., 2004	14	17	7	5	0	40	0
No., 2005	27	*	*	1	27	27	0

Table D2 – Summary Statistics for Grey Teal Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: Grey teal from fauna100_cornerinlet Ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	335	490	38	167	0	2880	0
No., 1975	0	*	*	1	0	0	0
No., 1977	30	80	19	17	0	300	0
No., 1978	322	444	148	9	0	1108	0
No., 1979	77	130	33	16	0	438	0
No., 1980	331	253	89	8	3	682	0
No., 1981	195	113	38	9	2	349	0
No., 1982	605	169	53	10	377	902	0
No., 1983	237	308	126	6	2	708	0
No., 1984	120	184	61	9	10	592	0
No., 1985	348	152	51	9	140	565	0
No., 1986	606	560	187	9	1	1475	0
No., 1987	372	394	114	12	1	1123	0
No., 1988	326	333	126	7	1	868	0
No., 1989	36	42	15	8	1	128	0
No., 1990	759	728	195	14	8	2550	0
No., 1991	932	1086	362	9	16	2880	0
No., 1992	902	654	327	4	125	1698	0
No., 1995	5	*	*	1	5	5	0
No., 1999	14	26	13	4	0	52	0
No., 2000	0	*	*	1	0	0	0
No., 2002	0	*	*	1	0	0	0
No., 2003	5	*	*	1	5	5	0
No., 2004	0	*	*	1	0	0	0
No., 2005	6	*	*	1	6	6	0

Table D3 – Summary Statistics for Chestnut Teal Based on DSE Bird Count Data**Descriptive Statistics**

Split By: Yr_st

Inclusion criteria: chestnut teal from fauna100_cornerinlet_ramsar_dd9 (imported)

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	529	748	49	229	0	4500	0
No., 1975	0	•	•	1	0	0	0
No., 1976	0	•	•	1	0	0	0
No., 1977	128	272	64	18	0	1000	0
No., 1978	208	312	90	12	0	814	0
No., 1979	158	238	53	20	0	857	0
No., 1980	373	557	161	12	0	1900	0
No., 1981	468	479	144	11	0	1281	0
No., 1982	644	629	199	10	123	2160	0
No., 1983	671	517	195	7	2	1445	0
No., 1984	735	405	135	9	140	1191	0
No., 1985	541	381	121	10	18	1054	0
No., 1986	710	770	222	12	9	2145	0
No., 1987	907	867	217	16	0	2704	0
No., 1988	480	744	206	13	4	2262	0
No., 1989	460	541	150	13	4	1619	0
No., 1990	1247	1129	266	18	2	2973	0
No., 1991	1029	1039	313	11	4	2953	0
No., 1992	533	776	259	9	0	1754	0
No., 1995	8	•	•	1	8	8	0
No., 1997	100	•	•	1	100	100	0
No., 1998	584	425	245	3	100	893	0
No., 1999	5	10	3	9	0	28	0
No., 2000	2	3	2	2	0	4	0
No., 2001	0	0	0	2	0	0	0
No., 2002	1	1	1	2	0	1	0
No., 2003	38	53	38	2	0	75	0
No., 2004	3	4	3	2	0	5	0
No., 2005	6	•	•	1	6	6	0
No., 2006	4500	•	•	1	4500	4500	0

Table D4 – Summary Statistics for Pied Oyster Catcher Based on DSE Bird Count Data**Descriptive Statistics**

Split By: Yr_st

Inclusion criteria: pied oyster from fauna100_cornerinlet_ramsar_dd9 (imported)

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	36	125	9	177	0	1294	0
No., 1905	0	•	•	1	0	0	0
No., 1965	0	•	•	1	0	0	0
No., 1966	0	•	•	1	0	0	0
No., 1971	0	•	•	1	0	0	0
No., 1973	0	•	•	1	0	0	0
No., 1974	0	0	0	6	0	0	0
No., 1975	0	•	•	1	0	0	0
No., 1976	0	0	0	3	0	0	0
No., 1977	12	30	6	25	0	100	0
No., 1978	4	7	2	10	0	20	0
No., 1979	0	0	0	10	0	0	0
No., 1980	0	0	0	3	0	0	0
No., 1981	0	0	0	3	0	0	0
No., 1985	1294	•	•	1	1294	1294	0
No., 1986	0	0	0	3	0	0	0
No., 1987	8	13	6	5	0	31	0
No., 1988	856	•	•	1	856	856	0
No., 1989	83	97	32	9	6	260	0
No., 1990	52	60	16	14	0	180	0
No., 1992	46	63	16	16	2	185	0
No., 1995	62	78	19	16	1	285	0
No., 1997	51	69	49	2	2	100	0
No., 1998	200	•	•	1	200	200	0
No., 1999	2E-1	1	2E-1	13	0	2	0
No., 2000	8	12	3	17	0	36	0
No., 2001	0	0	0	3	0	0	0
No., 2002	0	0	0	2	0	0	0
No., 2003	25	30	22	2	3	46	0
No., 2004	19	27	15	3	2	50	0
No., 2005	11	10	6	3	0	20	0

Table D5 – Summary Statistics for Fairy Tern Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: fairy tern from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	16	28	4	52	0	140	0
No., 1893	0	.	.	1	0	0	0
No., 1899	0	.	.	1	0	0	0
No., 1973	0	.	.	1	0	0	0
No., 1974	0	0	0	5	0	0	0
No., 1976	10	.	.	1	10	10	0
No., 1977	12	21	6	11	0	50	0
No., 1979	0	.	.	1	0	0	0
No., 1980	0	.	.	1	0	0	0
No., 1981	0	0	0	3	0	0	0
No., 1983	44	62	44	2	0	87	0
No., 1987	76	.	.	1	76	76	0
No., 1988	27	19	11	3	5	40	0
No., 1989	14	18	9	4	2	40	0
No., 1990	15	18	7	6	4	50	0
No., 1992	33	39	28	2	5	60	0
No., 1993	5	6	5	2	0	9	0
No., 1994	140	.	.	1	140	140	0
No., 1995	8	3	2	2	6	10	0
No., 1996	0	.	.	1	0	0	0
No., 1997	2	.	.	1	2	2	0
No., 2003	1	.	.	1	1	1	0
No., 2004	60	.	.	1	60	60	0

Table D6 – Summary Statistics for Hooded Plover Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: hooded plover from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	2	2	3E-1	38	0	7	0
No., 1926	0	.	.	1	0	0	0
No., 1977	2	2	1	8	0	7	0
No., 1979	0	0	0	2	0	0	0
No., 1980	0	.	.	1	0	0	0
No., 1981	0	.	.	1	0	0	0
No., 1988	4	.	.	1	4	4	0
No., 1989	2	.	.	1	2	2	0
No., 1990	3	1	1	5	2	5	0
No., 1992	2	.	.	1	2	2	0
No., 1993	3	1	1	2	2	4	0
No., 1995	2	0	0	3	2	2	0
No., 1996	2	.	.	1	2	2	0
No., 1997	2	0	0	2	2	2	0
No., 1998	2	.	.	1	2	2	0
No., 1999	1	1	5E-1	5	0	2	0
No., 2001	3	1	1	2	2	4	0
No., 2004	5	.	.	1	5	5	0

Table D7 – Summary Statistics for Caspian Tern Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: caspian from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	10	26	3	78	0	140	0
No., 1905	0	•	•	1	0	0	0
No., 1973	0	•	•	1	0	0	0
No., 1975	0	•	•	1	0	0	0
No., 1976	0	•	•	1	0	0	0
No., 1977	2	6	1	20	0	26	0
No., 1978	1	1	1	8	0	4	0
No., 1979	1	1	1	3	0	2	0
No., 1980	0	0	0	4	0	0	0
No., 1981	0	•	•	1	0	0	0
No., 1987	1	1	5E-1	2	0	1	0
No., 1988	27	29	14	4	1	54	0
No., 1989	15	22	13	3	1	40	0
No., 1990	27	28	12	5	5	58	0
No., 1991	140	•	•	1	140	140	0
No., 1992	10	•	•	1	10	10	0
No., 1993	56	76	54	2	2	110	0
No., 1994	112	•	•	1	112	112	0
No., 1995	11	13	7	3	2	25	0
No., 1998	0	•	•	1	0	0	0
No., 1999	0	0	0	4	0	0	0
No., 2000	0	0	0	3	0	0	0
No., 2001	0	0	0	4	0	0	0
No., 2002	0	•	•	1	0	0	0
No., 2004	2	1	1	2	1	3	0
No., 2005	5	•	•	1	5	5	0

Table D8 – Summary statistics for Crested Tern based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: crested from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	50	178	16	126	0	1200	0
No., 1973	0	•	•	1	0	0	0
No., 1974	0	•	•	1	0	0	0
No., 1975	0	•	•	1	0	0	0
No., 1977	69	228	52	19	0	1000	0
No., 1978	13	24	7	13	0	80	0
No., 1979	5	12	5	6	0	30	0
No., 1980	0	0	0	4	0	0	0
No., 1981	0	0	0	5	0	0	0
No., 1987	3	4	3	2	0	6	0
No., 1988	72	101	36	8	2	286	0
No., 1989	75	108	63	3	10	200	0
No., 1990	65	99	38	7	0	220	0
No., 1991	1200	•	•	1	1200	1200	0
No., 1992	11	14	5	7	1	40	0
No., 1993	262	391	226	3	8	712	0
No., 1995	60	57	40	2	20	100	0
No., 1996	0	•	•	1	0	0	0
No., 1997	337	574	332	3	0	1000	0
No., 1999	2	4	2	6	0	10	0
No., 2000	5	12	3	15	0	35	0
No., 2001	0	0	0	5	0	0	0
No., 2002	8	14	8	3	0	24	0
No., 2003	26	42	19	5	2	100	0
No., 2004	4	2	1	3	2	5	0
No., 2005	50	71	50	2	0	100	0

Table D9 – Summary Statistics for Curlew sandpiper Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: curlew from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	247	496	68	53	0	2160	0
No., 1977	142	441	122	13	0	1605	0
No., 1978	558	902	521	3	25	1600	0
No., 1979	2	3	2	2	0	4	0
No., 1980	0	•	•	1	0	0	0
No., 1981	0	•	•	1	0	0	0
No., 1987	20	•	•	1	20	20	0
No., 1988	2160	•	•	1	2160	2160	0
No., 1989	467	462	267	3	200	1000	0
No., 1990	95	44	22	4	50	150	0
No., 1992	376	471	178	7	5	1100	0
No., 1995	448	549	224	6	5	1500	0
No., 1998	40	•	•	1	40	40	0
No., 1999	4	7	4	4	0	14	0
No., 2000	40	62	25	6	0	120	0

Table D10 – Summary Statistics for Red-necked Stint Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: red neck from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	755	2313	229	102	0	19900	0
No., 1898	0	•	•	1	0	0	0
No., 1975	0	•	•	1	0	0	0
No., 1976	0	•	•	1	0	0	0
No., 1977	285	694	163	18	0	2757	0
No., 1978	48	77	31	6	0	200	0
No., 1979	4	11	4	7	0	30	0
No., 1980	0	0	0	2	0	0	0
No., 1981	0	0	0	3	0	0	0
No., 1986	10588	13170	9312	2	1275	19900	0
No., 1987	1345	2299	1328	3	0	4000	0
No., 1988	6320	•	•	1	6320	6320	0
No., 1989	921	949	335	8	20	2500	0
No., 1990	1283	1175	480	6	200	3000	0
No., 1992	657	898	284	10	25	2500	0
No., 1995	1494	2467	712	12	14	8500	0
No., 1999	0	0	0	4	0	0	0
No., 2000	26	50	17	9	0	150	0
No., 2001	0	0	0	2	0	0	0
No., 2002	40	57	40	2	0	80	0
No., 2003	50	•	•	1	50	50	0
No., 2004	18	19	11	3	4	40	0

Table D11 – Summary Statistics for Bar-tailed Godwit Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: bar tailed godwit from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	1036	2465	299	68	0	13120	0
No., 1973	0	.	.	1	0	0	0
No., 1974	10000	.	.	1	10000	10000	0
No., 1975	0	.	.	1	0	0	0
No., 1976	0	.	.	1	0	0	0
No., 1977	305	458	118	15	0	1000	0
No., 1978	40	42	30	2	10	70	0
No., 1979	0	.	.	1	0	0	0
No., 1980	0	.	.	1	0	0	0
No., 1987	3751	6307	3153	4	0	13120	0
No., 1988	11070	.	.	1	11070	11070	0
No., 1989	333	338	138	6	0	800	0
No., 1990	1589	915	346	7	20	2600	0
No., 1992	609	488	184	7	110	1400	0
No., 1995	1980	2285	933	6	2	6000	0
No., 1999	0	0	0	5	0	0	0
No., 2000	17	19	10	4	0	33	0
No., 2001	3	4	3	2	0	6	0
No., 2003	200	.	.	1	200	200	0
No., 2004	8	.	.	1	8	8	0
No., 2005	200	.	.	1	200	200	0

Table D12 – Summary Statistics for Eastern Curlew Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: eastern curlew from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	86	274	23	140	0	2445	0
No., 1905	0	.	.	1	0	0	0
No., 1971	0	.	.	1	0	0	0
No., 1974	0	.	.	1	0	0	0
No., 1975	0	.	.	1	0	0	0
No., 1977	12	54	11	23	0	258	0
No., 1978	61	84	21	16	0	270	0
No., 1979	2	4	2	7	0	11	0
No., 1980	3E-1	1	3E-1	4	0	1	0
No., 1981	0	0	0	3	0	0	0
No., 1982	670	.	.	1	670	670	0
No., 1985	1630	.	.	1	1630	1630	0
No., 1987	40	47	24	4	0	97	0
No., 1988	955	.	.	1	955	955	0
No., 1989	129	190	67	8	10	550	0
No., 1990	102	106	40	7	5	290	0
No., 1992	66	84	25	11	0	280	0
No., 1993	1	0	0	2	1	1	0
No., 1995	140	147	39	14	1	460	0
No., 1997	2	.	.	1	2	2	0
No., 1999	0	0	0	7	0	0	0
No., 2000	14	39	14	8	0	110	0
No., 2001	32	52	21	6	0	120	0
No., 2002	6	10	6	3	0	17	0
No., 2003	21	35	20	3	0	61	0
No., 2004	17	21	10	5	1	50	0
No., 2005	2445	.	.	1	2445	2445	0

Table D13 – Summary Statistics for Sooty Oyster-catcher Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: sooty from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	12	24	2	129	0	118	0
No., 1959	0	0	0	2	0	0	0
No., 1975	0	•	•	1	0	0	0
No., 1976	0	•	•	1	0	0	0
No., 1977	4	12	3	16	0	48	0
No., 1978	23	25	8	10	0	67	0
No., 1979	12	35	12	9	0	105	0
No., 1980	0	0	0	4	0	0	0
No., 1981	0	0	0	6	0	0	0
No., 1984	91	•	•	1	91	91	0
No., 1985	106	18	13	2	93	118	0
No., 1987	16	22	10	5	1	55	0
No., 1988	47	•	•	1	47	47	0
No., 1989	14	4	2	5	6	17	0
No., 1990	7	8	3	9	2	25	0
No., 1992	14	14	5	8	1	35	0
No., 1995	14	19	5	13	1	70	0
No., 1999	2E-1	1	2E-1	9	0	2	0
No., 2000	7	20	5	16	0	80	0
No., 2001	0	0	0	4	0	0	0
No., 2002	5	7	5	2	0	10	0
No., 2003	32	47	23	4	1	100	0
No., 2005	0	•	•	1	0	0	0

Table D14 – Summary Statistics for Double-banded Plover Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: doubled banded plover from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	44	129	19	48	0	800	0
No., 1975	0	•	•	1	0	0	0
No., 1977	3	6	2	12	0	19	0
No., 1978	34	56	32	3	0	99	0
No., 1979	0	0	0	6	0	0	0
No., 1980	0	•	•	1	0	0	0
No., 1981	0	•	•	1	0	0	0
No., 1982	800	•	•	1	800	800	0
No., 1983	244	33	23	2	220	267	0
No., 1986	118	95	43	5	15	226	0
No., 1987	1	•	•	1	1	1	0
No., 1989	2	•	•	1	2	2	0
No., 1990	8	•	•	1	8	8	0
No., 1992	12	12	7	3	2	25	0
No., 1999	0	•	•	1	0	0	0
No., 2000	11	13	6	5	0	25	0
No., 2001	0	0	0	2	0	0	0
No., 2002	8	11	8	2	0	15	0

Table D15 – Summary Statistics for Pacific Gull Based on DSE Bird Count Data**Descriptive Statistics****Split By: Yr_st****Inclusion criteria: pacific gull from fauna100_cornerinlet_ramsar_dd9 (imported)**

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum	# Missing
No., Total	7	23	2	169	0	172	0
No., 1965	0	•	•	1	0	0	0
No., 1966	0	•	•	1	0	0	0
No., 1971	0	•	•	1	0	0	0
No., 1973	0	•	•	1	0	0	0
No., 1974	0	•	•	1	0	0	0
No., 1975	0	•	•	1	0	0	0
No., 1976	0	0	0	3	0	0	0
No., 1977	4	13	3	24	0	60	0
No., 1978	15	32	8	18	0	100	0
No., 1979	5	19	5	13	0	70	0
No., 1980	0	0	0	5	0	0	0
No., 1981	0	0	0	6	0	0	0
No., 1987	27	47	17	8	0	140	0
No., 1990	0	0	0	2	0	0	0
No., 1991	3	•	•	1	3	3	0
No., 1992	13	14	5	8	0	35	0
No., 1993	2	1	1	2	1	2	0
No., 1995	10	•	•	1	10	10	0
No., 1997	10	•	•	1	10	10	0
No., 1998	0	•	•	1	0	0	0
No., 1999	1	3	1	15	0	10	0
No., 2000	2	7	1	25	0	23	0
No., 2001	0	0	0	8	0	0	0
No., 2002	1	1	1	4	0	3	0
No., 2003	34	61	20	9	0	172	0
No., 2004	6	7	3	7	0	20	0
No., 2005	12	16	12	2	0	23	0