

RESIDENT AND MIGRATORY BIRDS OF COASTAL MARSHLAND HABITATS IN THE BAY OF SHOALS AND WESTERN COVE AREA OF KANGAROO ISLAND, SOUTH AUSTRALIA

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ABSTRACT

Wetland habitats of State and National significance have been identified in or adjacent to the Bay of Shoals and Western Cove on the north coast of Kangaroo Island. These coastal marshland habitats provide significant refuge and foraging resources for a range of migratory bird species as well as breeding habitat for sedentary species.

At least 65 species of birds are known to frequent these habitats, 12 of which are of conservation significance under South Australian wildlife protection legislation as Rare (7) or Vulnerable (5). A further 19 species have special recognition under international migratory bird protection agreements.

INTRODUCTION

The sheltered north-eastern coastline of Kangaroo Island features several shallow tidal bays which have relatively protected shorelines with sandy-mud tidal flats in the supra-littoral zone and extensive submerged sea grass (*Posidonia* and *Heterozostera* spp.) meadows nearby (Womersley and Edmonds 2002). These include the Bay of Shoals and the adjacent Western Cove in Nepean Bay, which includes the Cygnet River estuary. Both bays have extensive areas of tidal flats (c. 20 km² combined), which are emergent or just covered at low tide, providing foraging habitat for large numbers of seabirds and shorebirds, including significant migratory species. This coastline and the adjacent Gulf St Vincent generally have two low tides each 24 hour period and during summer these occur mainly in daylight hours (Womersley and Edmonds 2002), thereby extending the foraging opportunity for the range of bird species that rely on tidally exposed habitat.

In both bays there are extensive tidally inundated samphire communities (*Sclerostegia* and *Sarcocornia* spp.) and chenopod marshland associations (*Maireana* and *Nitraria* spp.). Busby Islet Conservation Park in the Bay of Shoals is comprised of these vegetation associations. The largest area of marshes lies to the east of the Cygnet River estuary, where it extends over c. 5 km of coastline and covers an area of c. 1300 ha (Raines 1993). In winter and spring these marshes and adjacent swamp paper-bark

Melaleuca halmaturorum copses, become further inundated from local catchment run-off and from flooding events in the Cygnet River, forming an extended seasonal wetland that provides foraging and breeding habitat for a variety of waterfowl and other wetland species.

In the Bay of Shoals a broad sandbar and mud-flat formation extends from Cape Rouge on North Cape to a point east of Kingscote, a distance of c. 10 km, completely blocking the bay except for a narrow channel off Beatrice Point (Figure). The sandbar complex was once a series of tidally inundated samphire and chenopod covered islets and sandbars, but Busby Islet is the only remaining vegetated remnant. In the early 1970s nearby Beatrice Islet was destabilized. The mechanical removal and subsequent burning of African boxthorn *Lycium ferocissimum* bushes, followed by a combination of high tides and storm surges that completely eroded the chenopod-covered sand and shell substrate resulted in a bare wave-washed sand spit (Robinson *et al.* 1996). The significance of these islets to seabird conservation was first recognised in 1909 when the area was dedicated as a 'Bird Protection District' under the South Australian *Bird Protection Act, 1900*. Currently, Busby Islet is a Conservation Reserve with Prohibited Area status (South Australian *National Parks and Wildlife Act, 1975*) to minimise human disturbance and protect its significant seabird refuge and breeding rookeries.

The Cygnet River estuary outflow and adjacent marshlands and the Busby and Beatrice Islets sand spit complex in the Bay of Shoals are among the coastal wetlands listed in the *National Directory of Important Wetlands* (Morelli and de Jong 1996).

The aim and focus of this study is to report:

- (i) the bird species that frequent the Bay of Shoals and Western Cove coastal wetland habitats;
- (ii) their regional status and national conservation significance; and
- (iii) their likely habitat preference.

METHODS

Information on the status of resident and migratory bird species and their use of the various habitats in the nominated study area was obtained from published information (e.g. Baxter 1995; Paton, Gates and Pedler 2002), unpublished reports (e.g. Raines 1993; Willoughby, Oppermann and Inns 2001; Dennis 2004) and unpublished observations of regional ornithologists. This information was collated with particular attention to species of conservation significance in South Australia. Species from areas adjacent to the coastline were not included in the study.

Species taxonomy, nomenclature and assigned conservation status (as scheduled in the South Australian *National Parks and Wildlife Act*,

1975) follow Horton (2000) and the species listing sequence follows Christidis and Boles (1994).

Study area

The study area included: tidally exposed mudflats; intertidal and supra-littoral areas in the Bay of Shoals and Western Cove on the north-eastern coastline of Kangaroo Island; the Cygnet River estuary; and the seasonally and tidally inundated samphire/chenopod marshes in both bays (Figure).

RESULTS

The Table sets out the bird species that are frequently recorded within the nominated study area, and designates their preferred habitats,

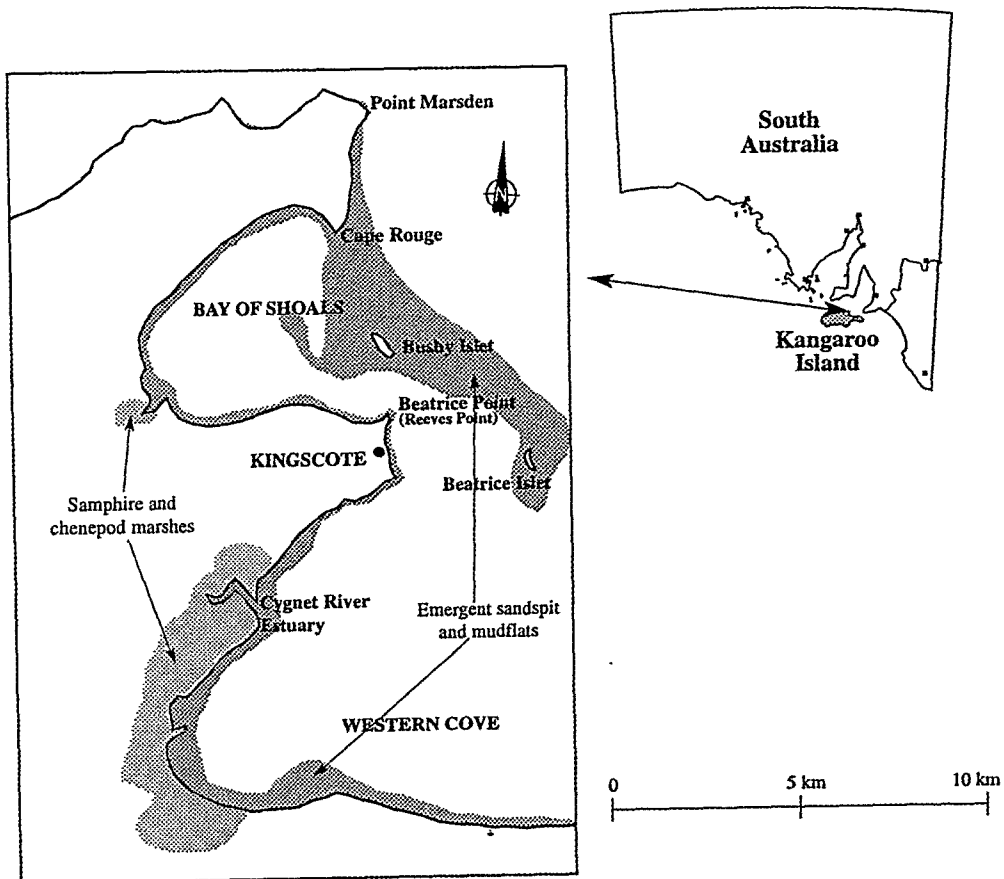


Figure. Map with 1 km² grid overlay showing the area of tidal flats and marshes in the Bay of Shoals and in Western Cove adjacent to the Cygnet River estuary.

Table. Wetland and coastal bird species found in the Bay of Shoals and Western Cove area on Kangaroo Island, their preferred habitat and conservation status. Notes are provided on the seasonal behavior and abundance of each species.

Preferred habitat(s): **Sgm** = shallow submerged sea-grass meadows; **Cyg** = Cygnet River estuary; **Int** = intertidal; and **Mar** = seasonally and tidally inundated marshes.

Conservation status: **V** = Vulnerable, i.e. 'species likely to move into the Endangered category in the near future if the causal factors continue to operate', and **R** = Rare, i.e. as 'species that occur in small numbers that are not at present Endangered or Vulnerable but are at some risk' (South Australian *National Parks and Wildlife Act, 1975*; Robinson, Hutchinson, and Casperson 2000); and International protection agreements - **J/C** = Japan Australia Migratory Bird Agreement (JAMBA) and China Australia Migratory Bird Agreement (CAMBA).

Regional status: **Res** = resident (may be somewhat nomadic within region); **Mig** = migratory (breeds on other continents); **Occ** = occasionally recorded; **br** = breeds within the study area.

Species	Habitat(s)	Conservation status	Regional status	Notes
Musk Duck	Sgm, Cyg	R	Res	Gathers in 'rafts' (>50) over sea-grass meadows and in the Cygnet River estuary during autumn-winter.
<i>Biziura lobata</i>	Sgm, Cyg, Int, Mar	-	br-Res	Gathers in large numbers (e.g. >1200 Jan. and Feb. 2002) in the Bay of Shoals and Cygnet River estuary post-breeding season, forages over intertidal flats and shallow sea-grass meadows at mid- to high tide, breeds in small numbers on Busby Islet and near Cygnet River estuary and adjacent samphire marshes.
<i>Cygnus atratus</i>	Cyg, Int, Mar	-	br-Res	Breeds near Cygnet River estuary and adjacent samphire marshes.
Australian Shelduck	Cyg, Int, Mar	-	br-Res	Breeds near Cygnet River estuary and adjacent samphire marshes.
<i>Tadorna tadornoides</i>	Cyg, Int, Mar	-	br-Res	Breeds near Cygnet River estuary and adjacent samphire marshes.
Pacific Black Duck	Cyg, Mar	R	br-Res	Breeds near Cygnet River estuary and adjacent samphire marshes.
<i>Anas superciliosa</i>	Cyg, Int, Mar	-	br-Res	Breeds near Cygnet River estuary and adjacent samphire marshes, flocks of 300-400 seen in Western Cove late summer and early winter.
Australasian Shoveler	Cyg, Int, Mar	-	br-Res	Breeds near Cygnet River estuary and adjacent samphire marshes, flocks of 'several hundred' in both bays, mainly autumn-winter (Baxter 1995).
<i>Anas gracilis</i>	Cyg	-	br-Occ	Breeds near Cygnet River estuary, most often seen on the nearby effluent ponds.
Chestnut Teal	Sgm, Cyg, Int	-	Res	Rafts of 50-100 birds common in autumn-winter in both bays (Baxter, 1995).
<i>Anas castanea</i>	Sgm, Cyg	R	Occ	Single birds usually recorded in winter in Western Cove.
Pink-eared Duck	Sgm	-	br-Res	Breeds on Busby Islet and around shoreline of both bays (c. 100 nests).
<i>Malacorhynchus membranaceus</i>	Sgm, Cyg, Int	-	br-Res	Breeds in small numbers (10-20 nests) on Busby Islet.
Hoary-headed Grebe	Sgm, Cyg, Int	-	br-Res	Significant rookery on Busby Islet with c. 800 nests in some seasons (Baxter 1995).
<i>Poliiocephalus poliocephalus</i>	Sgm, Cyg	-	br-Res	
Great Crested Grebe	Sgm, Cyg, Int	-	br-Res	
<i>Podiceps cristatus</i>	Sgm, Cyg, Int	-	br-Res	
Little Penguin	Sgm, Cyg, Int	-	br-Res	
<i>Eudyptula minor</i>	Sgm, Cyg, Int	-	br-Res	
Little Pied Cormorant	Sgm, Cyg, Int	-	br-Res	
<i>Phalacrocorax melanoleucos</i>	Sgm, Cyg, Int	-	br-Res	
Black-faced Cormorant				
<i>Phalacrocorax fuscescens</i>				

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Table (continued)

Species	Habitat(s)	Conservation status	Regional status	Notes
Pied Cormorant <i>Phalacrocorax varius</i>	Sgm, Cyg, Int	-	Br Res	Significant rookery on Busby Islet with c. 400 nests in some seasons (Baxter 1995).
Little Black Cormorant <i>Phalacrocorax sulcirostris</i>	Sgm, Cyg	-	Res	Widespread in small numbers.
Australian Pelican <i>Pelecanus conspicillatus</i>	Sgm, Cyg, Int	-	Br Res	Breeds on Busby Islet with 20-30 nests in late summer and through winter (Baxter 1995).
White-faced Heron <i>Egretta novahollandiae</i>	Cyg, Int, Mar	-	Res	Widespread, sometimes in loose flocks of >20 foraging over mudflats, in samphire marshes and tidal pools adjacent to the Cygnet River estuary.
Little Egret <i>Egretta garzetta</i>	Cyg, Int, Mar	-	Occ	Small numbers in samphire marshes, on mudflats and tidal pools, also at Beatrice Point.
Eastern Reef Egret <i>Egretta sacra</i>	Int	R	Occ	Single birds frequently seen foraging around shoreline of Western Cove, particularly near Kingscote and the Cygnet River estuary.
Great Egret <i>Ardea alba</i>	Int, Mar	J/C	Occ	Usually single birds in flooded samphire or on mudflats adjacent to the Cygnet River estuary and in Western Cove.
Nankeen Night Heron <i>Nycticorax caladonicus</i>	Cyg, Int	-	Res	Roosts in mature paper-bark tea-tree copses on the Cygnet River estuary and southern shore of the Bay of Shoals, forages nocturnally in inter-tidal zone.
Australian White Ibis <i>Threskiornis molucca</i>	Cyg, Int, Mar	-	Br Res	Widespread, flocks of >20 forage over mudflats, in samphire marshes and tidal pools adjacent to the Cygnet River estuary, breeds on Busby Islet, >100 nests in 1988-90.
Royal Spoonbill <i>Platalea regia</i>	Cyg, Int	-	Res	Frequently seen in Cygnet River estuary and on adjacent tidal flats/pools.
Yellow-billed Spoonbill <i>Platalea flavipes</i>	Cyg, Int	-	Res	Frequently seen in Cygnet River estuary and on adjacent tidal flats/pools.
Osprey <i>Pandion haliaetus</i>	-	R	Res	Frequently seen hunting in the Bay of Shoals, an important foraging habitat; the nearest nest site is <10 km from Busby Islet.
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>	-	V	Res	Frequently seen hunting over seabird rookeries on Busby Islet, or over concentrations of waterfowl at the Cygnet River estuary; the nearest nest site is <10 km from Busby Islet (Dennis and Lashmar 1996).
Swamp Harrier <i>Circus approximans</i>	-	-	Res	Frequently seen hunting over seabird rookeries on Busby Islet, or over concentrations of waterfowl and waders at the Cygnet River estuary, the nearest nest site is <10 km distant.
Peregrine Falcon <i>Falco peregrinus</i>	-	R	Res	Frequently seen hunting over seabird rookeries and Common Starling <i>Sturnus vulgaris</i> roosts on Busby Islet, or over concentrations of waterfowl and waders at the Cygnet River estuary; the nearest nest site is <10 km from Busby Islet.
Australian Spotted Crane <i>Porzana fluminea</i>	Cyg, Mar	-	Br Occ	Occasionally breeds in samphire marshes in wetter years, often seen foraging near the Cygnet River estuary.
Spotless Crane <i>Porzana tabuensis</i>	Cyg, Mar	-	Occ	Few records, one seen in samphire marshes near the Cygnet River estuary in January 2002.
Bar-tailed Godwit <i>Limosa lapponica</i>	Cyg, Int	J/C	Mig	Appears in mixed flocks at roosts at Cape Rouge and foraging over mudflats in the Bay of Shoals and Western Cove, particularly near the Cygnet River estuary.

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Table (continued)

Species	Habitat(s)	Conservation status	Regional status	Notes
Whimbrel	Int	V, J/C	Mig	Small numbers forage over exposed tidal flats and roost at Cape Rouge or Busby Islet on high tide.
<i>Numenius phaeopus</i>				
Eastern Curlew	Int	V, J/C	Mig	Small numbers forage over exposed tidal flats and roost at Cape Rouge or Busby Islet on high tide.
<i>Numenius madagascariensis</i>				
Marsh Sandpiper	Cyg, Mar	J/C	Mig	Small numbers forage in mixed flocks in samphire marshes.
<i>Tringa stagnatilis</i>				
Common Greenshank	Cyg, Int, Mar	J/C	Mig	Common species, many over-winter in the Cygnet River estuary and samphire marshes.
<i>Tringa nebularia</i>				
Common Sandpiper	Cyg	J/C	Mig	Most often single birds in the Cygnet River estuary or on the nearby effluent ponds.
<i>Actitis hypoleucos</i>				
Grey-tailed Tattler	Int	J/C	Mig	In small flocks, forages at water's edge at high tide, particularly in the Bay of Shoals.
<i>Heteroscelus brevipes</i>				
Ruddy Turnstone	Int	J/C	Mig	Most often seen in mixed flocks roosting at Cape Rouge or at Beatrice Point.
<i>Arenaria interpres</i>				
Red Knot	Int	J/C	Mig	Occasionally sighted in mixed flocks.
<i>Calidris canutus</i>				
Sanderling	Int	J/C	Mig	Rarely sighted; two in Bay of Shoals in October 2002.
<i>Calidris alba</i>				
Red-necked Stint	Cyg, Int, Mar	J/C	Mig	The most abundant of the migratory wader species, often in large (>200) flocks.
<i>Calidris ruficollis</i>				
Sharp-tailed Sandpiper	Cyg, Int, Mar	J/C	Mig	Most common sandpiper, forages widely over tidally exposed flats and at the Cygnet River estuary.
<i>Calidris acuminata</i>				
Curlew Sandpiper	Cyg, Int, Mar	J/C	Mig	Often in mixed flocks with Sharp-tailed Sandpiper, but much less numerous.
<i>Calidris ferruginea</i>				
Bush Stone-curlew	Cyg, Mar	V	^B -Res	Forages on beaches in both bays on dusk and after dark.
<i>Burhinus grallarius</i>				
Pied Oystercatcher	Cyg, Int	-	^B -Res	Breeds just above high tide line on sand/shell beaches in both bays, forages over exposed tidal flats.
<i>Haematopus longirostris</i>				
Sooty Oystercatcher	Int	-	Res	Often in large (>50) mixed flocks with Pied Oystercatchers at roost sites on Cape Rouge and Beatrice Point.
<i>Haematopus fuliginosus</i>				
Black-winged Stilt	Mar	-	^B -Res	Common, breeds throughout samphire marshes in spring.
<i>Himantopus himantopus</i>				
Banded Stilt	Int, Mar	-	Occ	Flocks sometimes at roosting sites with other species, most likely en route to inland saline lakes near the Bay of Shoals.
<i>Cladorhynchus leucocephalus</i>				
Red-necked Avocet	Cyg, Mar	-	Occ	Small numbers forage in samphire marshes, particularly in late summer when other habitats dry out.
<i>Recurvirostra novaehollandiae</i>				
Pacific Golden Plover	Cyg, Int	J/C	Mig	Appears in mixed flocks early in the migration season, often with Grey Plover, foraging at water's edge on exposed tidal flats.
<i>Phinialis fulva</i>				
Grey Plover	Cyg, Int	J/C	Mig	Common, foraging at water's edge on exposed tidal flats in both bays and roosting at high tide in flooded samphire marshes nearby.
<i>Pinivialis squatarola</i>				

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Table (continued)

Species	Habitat(s)	Conservation status	Regional status	Notes
Red-capped Plover	Cyg, Int, Mar	-	B ^r Res	Common, breeds just above high tide line on the low dunes both sides of the Cygnet River estuary, forages over exposed tidal flats.
<i>Charadrius ruficapillus</i>				
Double-banded Plover	Cyg, Int	-	Mig	Only migratory species that travels east-west across the Tasman Sea to breed in New Zealand, arrives in small numbers in the study area in late summer/autumn, departs in winter.
<i>Charadrius bitorquatus</i>				
Lesser Sand Plover	Cyg, Int	J/C	Mig, Occ	Small numbers, occasionally in mixed flocks with Red-necked Stint.
<i>Charadrius mongolus</i>				
Greater Sand Plover	Cyg, Int	J/C	Mig, Occ	Few sightings in Bay of Shoals.
<i>Charadrius teschenaultii</i>				
Hooded Plover	Cyg, Int	V	Res	Small flocks in non-breeding season, forages on mudflats and roosts on weed banks.
<i>Thinornis rubricollis</i>				
Masked Lapwing	Cyg, Mar	-	B ^r Res	Common, breeds in samphire marshes.
<i>Vanellus miles</i>				
Pacific Gull	Sgm, Cyg, Int	-	B ^r Res	Common, breeds communally (6-10 nests) on Busby Islet.
<i>Larus pacificus</i>				
Silver Gull	Sgm, Cyg, Int	-	B ^r Res	Abundant, breeds on Busby Islet, coincident with other species' breeding events.
<i>Larus novaehollandiae</i>				
Caspian Tern	Sgm, Cyg,	J/C	B ^r Res	Common, breeds in small numbers on Busby Islet.
<i>Sterna caspia</i>				
Crested Tern	Sgm, Cyg,	-	Res	Common, forages widely in both bays and roosts in considerable numbers on Cape Rouge and at Beatrice Point.
<i>Sterna bergii</i>				
Fairy Tern	Sgm, Cyg,	V	B ^r Occ	Uncommon in recent years, formerly recorded breeding on Barclay Point in Western Cove.
<i>Sterna nereis</i>				
Whiskered Tern	Cyg, Mar	-	Occ	Few sightings along shoreline in Western Cove and foraging over samphire marshes.
<i>Chlidonias hybridus</i>				
Rock Parrot	Mar	R	Occ	Late summer visitor, leaves in winter, feeds in chenopod shrubland and samphire marshes adjacent to Cygnet River estuary.
<i>Neophaema petrophila</i>				
Superb Fairy-wren	Mar	-	B ^r Res	Common, breeds in chenopod shrubland and nearby coastal vegetation.
<i>Malurus cyaneus</i>				
White-fronted Chat	Mar	-	B ^r Res	Common, breeds in chenopod shrubland adjacent to Cygnet River estuary and nearby samphire marshes.
<i>Ephialtira albifrons</i>				
Little Grassbird	Mar	-	B ^r Res	Common in chenopod shrubland adjacent to Cygnet River estuary and nearby samphire marshes.
<i>Megalururus gramineus</i>				

conservation status in South Australia, regional status, and conservation status under international protection agreements. In addition, notes are provided on the seasonal behaviour and abundance of each species.

DISCUSSION

Species of significance

Of the 64 bird species recorded in the Bay of Shoals and Western Cove area, seven are scheduled as Rare in South Australia (*National Parks and Wildlife Act, 1975*). These are the Musk Duck *Biziura lobata*, Australasian Shoveler *Anas rhynchotis*, Great Crested Grebe *Podiceps cristatus*, Eastern Reef Egret *Egretta sacra*, Osprey *Pandion haliaetus*, Peregrine Falcon *Falco peregrinus* and Rock Parrot *Neophema petrophila* (Table). Of these the Australasian Shoveler only is known to breed within the study area. The two raptor species, Osprey and Peregrine Falcon, breed within 10 km of Busby Islet and are likely to rely heavily on prey resources found in the Bay of Shoals and Western Cove area.

A further five species found in the study area have even higher conservation significance and are scheduled as Vulnerable in South Australia (*National Parks and Wildlife Act, 1975*). These are the White-bellied Sea-Eagle *Haliaeetus leucogaster*, Eastern Curlew *Numenius madagascariensis*, Bush Stone-curlew *Burhinus grallarius*, Hooded Plover *Thinornis rubricollis* and Fairy Tern *Sterna nereis* (Table). Of these, the Bush Stone-curlew and the Hooded Plover are known to breed immediately adjacent the study area. A pair of White-bellied Sea-Eagles has a nesting site within 10 km of Busby Islet and is regularly seen hunting over the seabird rookeries there. The Fairy Tern was last recorded breeding on Barclay Point in Western Cove in 1984 (T. Dennis unpubl. data).

Nineteen bird species, or one third of those recorded in the Table, are listed on international migratory bird protection agreements. One of them, the Caspian Tern *Sterna caspia*, has been recorded breeding on Busby Islet (Baxter 1995).

Other wetland and shorebird species with nationally declining populations found in the study area include Musk Duck (Paton *et al.* 2002), Nankeen Night Heron *Nycticorax caledonicus*, Yellow-billed Spoonbill *Platalea flavipes* (Olsen and Weston 2004), Curlew

Sandpiper *Calidris ferruginea*, Pacific Golden Plover *Pluvialis fulva* and Double-banded Plover *Charadrius bicinctus* (Barrett *et al.* 2003).

Habitat dependence

Apart from the importance of the tidally exposed mudflats as foraging habitat for migratory and resident shorebirds, the extensive area of shallow sea-grass meadow in these sheltered bays provides important seasonal foraging habitat for several resident and regionally nomadic water-bird species. For example, aggregations of >1000 Black Swans *Cygnus atratus* have been recorded in the Bay of Shoals, plus an additional >200 at the Cygnet River estuary outflow during summer (Dennis 2004). Also, large-flocks or rafts often numbering 50–100 birds consisting mainly of Hoary-headed Grebes *Poliiocephalus poliocephalus* form on these bays in late autumn and through winter (Baxter 1995). Musk Duck also aggregate at this time in considerable numbers in both bays and single birds are observed ashore on weed banks on the shoreline at high tide after dark when they are possibly roosting. Similarly, flocks of grebes come into very shallow water adjacent to weed banks, but it is not known if they go ashore.

The extensive tidally flooded low shrubland and samphire communities adjacent to both bays provide important habitat and refuge for a large number of invertebrates which in turn provide prey for several common Passerines. These include the White-fronted Chat *Epthianura albifrons*, Superb Fairy-wren *Malurus cyaneus* and Little Grassbird *Megalurus gramineus*, which breed in this habitat.

Marine environment

The shallow bays in the study area contain some of the most sheltered waters in South Australia, supporting extensive areas of sea-grasses and algae beds (Edyvane 1997). These provide habitat and refuge for a wide variety of fish species including the rare Leafy Seadragon *Phycodurus eques* and regionally endemic Vercos Pipefish *Vanacampus vercoi* and Eelblenny *Peronedys anguillaris* (Edyvane 1997).

Common schooling fish, such as South Australian Garfish *Hyporhamphus melanichir*, Yelloweye Mullet *Aldrichetta forsteri*, Tommy Ruff *Arripis georgiana* and Longray Rock Whiting *Siphonathus radiatus*, are abundant

prey species for the many thousands of seabirds which forage and breed in the Bay of Shoals and Western Cove. These include Little Penguin *Eudyptula minor* (c. 100 nests/year; T. Dennis unpubl. data), Black-faced Cormorant *Phalacrocorax fuscescens* (c. 800 nests/year), Pied Cormorant *Phalacrocorax varius* (c. 400 nests/year) and Australian Pelican *Pelecanus conspicillatus* (c. 25 nests/year). On Busby Islet the last species appears spatially limited, resulting in an extended breeding season between April and November (Baxter 1995).

MANAGEMENT AND CONSERVATION ISSUES

Reserves: The samphire marshland habitat in the study area adjacent to the Cygnet River estuary includes an area of Crown Land which was identified and transferred to the Department of Environment and Natural Resources for Conservation Reserve purposes in the early 1990s, but never formally added to the South Australian Reserve estate. This area, and the adjacent tidally inundated marshlands, should be re-assessed for Reserve establishment as it appears that these habitat types are not well represented in the Reserve system elsewhere in South Australia.

National Estate listing: The Register of the National Estate (Australian Heritage Council 2005) listings for Kangaroo Island indicate that Busby Islet and Beatrice Islet Conservation Parks are Registered sites. However, the 'Busby-Beatrice Marine Bird Habitat' and the 'Cygnet River Estuary and Marshes' which includes the defined areas of intertidal foraging habitat nominated by the Royal Australasian Ornithologists' Union as 'Wetlands of National significance' in 1993 (Raines 1993), are listed only under 'Indicative Place'. The definition reads, 'Data provided to or obtained by the Australian Heritage Council or the former Australian Heritage Commission has [*sic*] been entered into the database and the place is at some stage in the assessment process. A decision on whether the place should be entered in the Register has not been made'.

It would appear that a reassessment of the protection offered these significant bird foraging habitats is required.

Habitat degradation: An extensive area (c. 27 km² in 1996) of sea-grass meadow in the

study area is severely degraded and this is thought to be the result of agricultural chemicals and excess nutrients being flushed through the Cygnet River catchment (Edyvane 1997).

Because habitat assessment for National Estate listing of Wetlands of National significance on Kangaroo Island was conducted over a decade ago, the habitat quality within the study area may now need to be re-assessed.

ACKNOWLEDGMENTS

We thank Peter Shaughnessy for constructive comments on an early draft and Birds Australia for project support. This study was funded (in part) by the Marine Protected Areas Branch, Department for Environment and Heritage, South Australia.

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Received 21 February 2005; accepted 6 October 2005