Department of Environment and Conservation

Threatened migratory shorebird habitat mapping project

June 2006

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Prepared by

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Contents

Summary 5
Introduction 4
Methods 5
Accuracy of mapping 6
Changes in species status 6
Shorebird populations - limitations of the project 7
Results 8
Conclusion 9
Figure 1: Priority sites for threatened migratory shorebirds 10
Figure 2: Great Knot 11
Figure 3: Black-tailed Godwit 12
Figure 4: Greater Sand Plover 13
Figure 5: Lesser Sand Plover 14
Figure 6: Terek Sandpiper 15
Figure 7: Sanderling 16
Figure 8: Broad-billed Sandpiper 17
Data sets used during this project 18
Site assessment 19
- Tweed River Estuary 19
- Brunswick River Estuary 20
- Richmond River Estuary 20
- Clarence River Estuary 21
- Hastings River Estuary 22
- Manning River Estuary 23
- Port Stephens and Karuah River Estuary 24
- Hunter River Estuary 25
- Tuggerah Lake 26
- Longreef, Collaroy 26
- Parramatta River Estuary 26
- Botany Bay and Boat Harbour 27
- Windang, Lake Illawarra 28
- Shoalhaven River Estuary 28
- Lake Wollumboola 28
- Moruya River Estuary 29
- Tuross Estuary 29
- Brou Lake 29
- Narooma Estuary 29

References 30

Summary

Important feeding habitats and roosting sites for seven species of migratory shorebirds (waders) were plotted on GIS software using aerial photos as templates. Data for this process were obtained from a variety of sources to provide numbers of birds recorded at each of the sites, although in some instances 'presence only' were recorded where no counts were entered. The habitat mapping was done from first hand experience in the field by the author and/or from local ornithologists with particular skills in shorebird identification and local knowledge of habitats used by shorebirds. The accuracy of the data plotted will not always match the topography, such as shoals, sand spits or shorelines because these are constantly changing (the aerial photos used were up to 10 years old). However this is the most precise shorebird mapping available. The coastline template provided by the DEC GIS Unit was not of sufficient accuracy for the purpose of this project and has not been used in producing shape files in any of the maps, other than to illustrate the whole of coast maps.

Data were sorted and any obvious errors removed before being used. In general only data since 1990 has been used for the purpose of this report because changes in habitats over time may have resulted in population changes. Habitat and species management can only be carried out using the most up to date data and habitat mapping showing current shoreline topography. However as there are no regular population estimates for all coastal estuaries some data over a 15 year period were used to provide a pattern of habitat usage by threatened migratory shorebirds for the whole coast.

There has been no attempt to assess wetland habitats away from the coast or estuarine habitats due to lack of data for inland sites. However the species concerned are largely coastal during their non-breeding seasons, when the birds are in Australia. Lord Howe Island has not been included in this project.

A written assessment and GIS files were produced as part of this project and provided for DEC in CD format. This includes maps for each of the important estuaries and coastal maps illustrating the ranking of importance for each of the seven species of shorebirds outlined in this report. All GIS data was produced using ArcGIS 9.1.

Introduction

This project was commissioned by the NSW Department of Environment and Conservation (DEC) to identify and map all known shorebird feeding habitat and roost sites along coastal NSW, specifically that of the Sanderling Calidris alba, Great Knot Calidris tenuirostris, Greater Sand Plover Charadrius leschenaultii, Lesser Sand Plover Charadrius mongolus, Broad-billed Sandpiper Limicola falcinellus, Black-tailed Godwit Limosa limosa and Terek Sandpiper Xenus cinereus. The result of the project was the production of a series of polygons and data files using ArcGIS 9.1 and Microsoft Excel in electronic format as well as a written report. These depict important shorebird habitats including:

- the known feeding habitat of Sanderling, Great Knot, Greater Sand Plover, Lesser Sand Plover, Broad-billed Sandpiper, Black-tailed Godwit and Terek Sandpiper along the NSW coast;
- the boundaries of key foraging sites of the above species along the NSW coast; and
- the boundaries of roosting sites of the above species along the NSW coast.

Background

Data on shorebirds at most estuaries and beaches have been collected by members of the NSW Wader Study Group, regional bird groups, WWF Australian Shorebird Conservation Project, NHT projects, DEC (including the NRAC resource data) and shorebird specialists over the past ten years. However this data has never been mapped for species-specific sites for the whole of the NSW coastal wetlands.

The Sanderling, Great Knot, Greater Sand Plover, Lesser Sand Plover, Broad-billed Sandpiper, Black-tailed Godwit and Terek Sandpiper are migratory shorebirds listed as threatened species (Vulnerable) on Schedule 2 of the *NSW Threatened Species Conservation Act 1995*.

The reasons for listing these species as threatened include:

- limited distribution
- population reduction to a critical level
- the species is an ecological specialist (depends on particular types of diet or habitat)
- the species concentrates (individuals within populations of the species congregate or aggregate at specific locations)
- the species has poor recovery potential.

Threats to the above migratory shorebird species, as a collective include:

- hydrological changes to estuaries and waterbodies which may modify or remove important areas of suitable habitat;
- disturbance to feeding and roosting sites;
- pollution of estuaries and coastal areas; and
- residential, industrial, tourism or agricultural developments which may reduce or degrade coastal and inland habitat areas.

Identification of the key foraging habitat and roosting sites for threatened migratory shorebirds along the NSW coastline will facilitate informed decision-making for improved habitat management and species conservation.

A key objective of this project also fulfils seven actions of the draft NSW Priorities Action Statement.

Methods

Data searches were made of any known sources of shorebird counts including data sets owned by bird groups, shorebird specialists and the DEC Atlas of NSW Wildlife. Data were collated and checked by shorebird specialists for obvious errors by comparing results with local knowledge.

Where necessary face to face meetings, email and telephone communication were held with relevant people to obtain input on feeding habitat distribution and location of roost sites.

Data were sorted to obtain shorebird counts over recent years for each coastal wetland and, in the case of large estuarine systems, sub sites were identified and mapped.

Digitised aerial photos, provided by DEC, were used to map all known shorebird foraging habitat and roost sites along the NSW coast, noting habitat utilised by threatened migratory shorebirds, specifically Sanderling, Great Knot, Greater Sand Plover, Lesser Sand Plover, Broad-billed Sandpiper, Black-tailed Godwit and Terek Sandpiper.

Count data were examined for each of the coastal wetlands. Sites were then ranked based on the maximum counts over the past ten years using a scale of 1 to 4, 1 being the lowest ranking of importance and 4 the highest. For example, a count of five or less individuals of any one species ranked as 1, while counts of more than 101 individuals of any one species ranked as 4, as shown in Table 1.

Table 1:

Count (of each species)	Ranked per species
1 - 5 birds	1
6 - 20 birds	2
21 - 100 birds	3
101+ birds	4

Wetland sites were then ranked in order of importance based on the ranking for each species, as shown in Table 2. For example four species with a ranking of 4 provided a total site score of 16. The maximum site score was based on the site ranking for all species at any one site. For example, if seven species each ranked as 4 (>101 individuals for each species) this would provide a site score of 28, and an overall site ranking of 6 (see Table 2). The Clarence River estuary scored highest at 18 and therefore had a ranking 4.

Table 2:

Species ranking based on table 1	Overall site ranking (count x species)
1 - 5	1
6 - 10	2
11 - 15	3
16 - 20	4
21 - 25	5
26 - 30	6

Whole of coast maps were produced showing ranking for each species as well as an overall ranking for all species using the size of spheres, as shown in Figures 1-7.

Accuracy of mapping

The degree of accuracy of mapping the extent of feeding habitat was governed to a large extent on the maps and aerial photos that were available for use as templates. Although topographic maps are drawn from aerial photos the information on the map is what is interpreted by the person responsible for plotting the information on the maps. The majority of shorebird habitat is sub-tidal and as a consequence is rarely mapped, unless it happens to be part of a major sand bar.

Coastlines are largely delineated by the high tide mark. This in itself is variable depending on whether the tide is high at the time the photograph was taken and whether the tides are spring tides or neap tides at that time. Furthermore the accuracy of the coastline drawn depends on the dedication of the cartographer and at which scale the map is drawn.

The coastline provided by DEC for this project was of little use for drawing polygons to the degree of accuracy that would be required by local government or for drawing boundaries of reserves or conservation areas. It is for this reason that high resolution aerial photos were used during this project. The shape files provided match the intertidal areas that are visible on aerial photos and to a large extent will match features that appear on topographic maps.

Changes in species status

There has been a general decline in the numbers of some species of migratory shorebirds, listed as threatened (Vulnerable) on Schedule 2 of the NSW Threatened Species Conservation Act 1995. Some species have declined over their former range along the coast of NSW while others have declined over the whole of the south east of Australia, or Australia as a whole. Species that have only declined locally may suggest that local impacts on habitat and/or level of disturbance are likely responsible. This theory has been reinforced by the decline in common species that occur over the same range, for example the Red-necked Stint has declined in the Sydney and Newcastle regions but has remained stable over the rest of the south east of Australia.

Shorebird populations – limitations of this project

Much of the data available in database form is from incidental observations by conservation agency staff, researchers, environmental consultants, bird watchers and other interested people. This data can be useful in identifying the presence of a species in a particular location but often does not include numbers of birds present nor does it necessarily reflect the overall population of an a particular area of wetland.

Within this study, the frequency of observations of birds at many locations reflects the presence of interested observers at the time and may not provide and indication of relative abundance for that species. Exceptions to this are regular surveys carried out by members of bird groups or agencies that specifically target waders. Fortunately most of the major coastal estuaries have been subject to some form a structured wader studies providing a reasonably accurate assessment of these sites.

The number of polygons drawn at each estuary varies depending on the size of the estuary and area of available feeding habitat. The number and size of roost sites also varies between estuaries and may include both neap tide roost sites and spring tide roost sites. It is important that the number of birds at all roost sites within an estuary are not added together to provide a total number for an estuary unless they were counted simultaneously on the same day. The numbers of birds attached to each polygon does however reflect the importance of the area within the polygon and the feeding habitat or roost site represented by the polygon.

Observations of birds at roost sites will generally be higher than those made within feeding habitat because a large proportion, if not all, of the birds found in the estuary may congregate at roost sites during high tide when feeding habitat is covered by the tide. At low tide birds may be widely distributed over a whole estuarine wetland system when only a proportion of the birds are visible at any one time. Likewise some high tide roost counts within an estuarine system or at beaches will vary depending on whether counts were made during spring tides or neap tides. During neap tides more roosting sites are available and birds are likely to be dispersed between sites whereas during spring high tides all but one or two suitable sites may be covered during by the tide. Spring high tide roost sites will therefore attract larger numbers of shorebirds. Unless time and date are recorded at the time of a count it will not be possible to determine whether counts were made during a spring high tide period.

Counts at feeding sites provide important information about the habitat area used by shorebirds but unless produced as part of a comprehensive study covering a whole wetland system may not provide boundaries that are useful for delineating important areas for management or conservation purposes.

Results

Using the data obtained during this project each coastal wetland was ranked in order of importance based on how many threatened shorebird species were using the site and the population size of each species occurring at the site (as shown in Tables 1 and 2). The final ranking was then calculated using the scores shown in Table 3.

Although the Hunter River estuary is considered the most important site in NSW for migratory shorebirds on the whole, the Clarence River estuary ranked highest for threatened migratory shorebird species. This is partly due to the decline in the numbers of some species of shorebirds at the Hunter due to habitat degradation over the past 20 years. The Richmond and Hunter estuaries were ranked second in importance for the seven threatened migratory shorebird species of this study.

Sites of importance to the seven threatened migratory shorebirds of this study are shown for each species in the accompanying figures, as well as a map showing the overall ranking taken from Table 3.

Table 3. Ranking of coastal wetlands in importance for threatened migratory shorebirds based on count data

Site	rank	BTG	GKn	GSP	LSP	TSP	San	BBS	score
Tweed	**2**	0	2	1	2	1	0	0	6
Brunswick	**1**	0	0	0	0	2	0	0	2
Richmond	**3**	0	3	3	3	3	3	0	15
Clarence	**4**	4	4	3	4	2	1	0	18
Sandon	**1**	0	1	0	1	0	1	0	3
Corindi/Station	**1**	0	1	1	0	0	1	0	3
Hastings	**2**	0	1	1	3	1	0	0	6
Manning	**1**	0	1	0	1	0	2	0	4
Wallace Lake	**1**	0	0	0	1	0	0	0	1
Port Stephens	**2**	3	0	0	3	1	0	0	7
Hunter	**3**	4	3	0	2	3	0	2	14
Tuggerah Lake	**1**	1	1	0	2	0	0	0	4
Longreef	**1**	0	1	0	1	0	1	0	3
Parramatta	**1**	1	1	0	0	0	0	0	2
Botany Bay	**1**	0	1	0	1	2	1	0	5
Lake Illawarra	**1**	0	1	0	1	1	0	0	3
Shoalhaven	**2**	1	1	0	1	1	1	1	6
Lake Wollumboola	**2**	0	1	1	3	1	1	1	7
Moruya	**2**	0	2	1	1	2	0	0	6
Tuross	**1**	1	1	0	0	1	1	0	4
Brou Lake	**1**	0	1	0	0	1	0	0	2
Narooma	**1**	0	1	0	0	1	0	0	2

Conclusion

Data available for this project was from a variety of sources. The most useful source of data was that collected as part of shorebird studies carried out by the NSW Wader Study Group, the Hunter Bird Observers Club, the WWF Shorebird Conservation Project (Clarence estuary) and the NRAC data for the northern coast of NSW. The absence of data for some sites does not necessarily mean an absence of shorebirds at these sites but could be a result of lack of observers on a regular basis. The efforts by a few dedicated members of the NSW Wader Study Group, in association with local bird groups have provided the bulk of the useful data used in this study. However there is still a lot of data yet to be entered due to a lack of resources.

This project clearly shows that a decline in the number of threatened shorebird species observed has been the result of loss of habitat at some of the major coastal wetlands, for example the Hunter estuary and Botany Bay. Extensive declines in the numbers of shorebirds in the Parramatta River estuary are less obvious from recent studies because habitat loss occurred at an earlier stage i.e. during the past 40 to 50 years, when few count data were available.

This project has identified and mapped important habitat for threatened migratory shorebird species that will be useful in providing data prior to the assessment of Development Applications by local, state and Federal Governments. However imminent, large scale development projects planned for the Hunter River estuary and Botany Bay, and incremental losses at other coastal wetlands, will result in further significant losses of threatened species unless there is legislation in place that can prevent or offset such losses.

It is recommended that:

DEC provide resources to update the available data on threatened migratory shorebirds and encourage the continuation of regular surveys by shorebird experts; and, the results of this study be used to clearly demonstrate the need for the protection of important habitat for migratory shorebirds in coastal NSW as a matter of urgency.

Figure 1:

Priority sites for threatened migratory shorebirds

Figure 2:
Great Knot

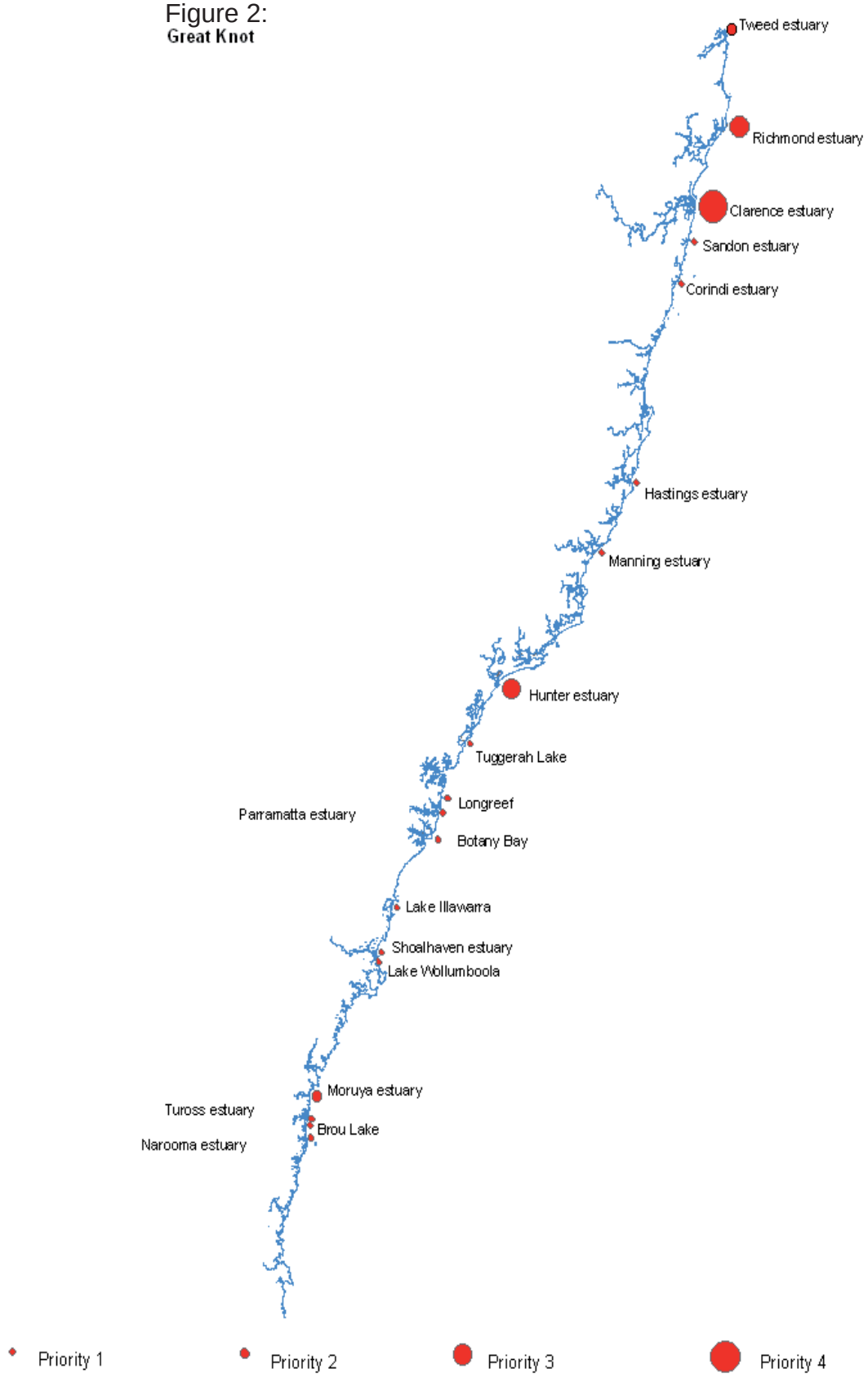


Figure 3:
Black-tailed Godwit

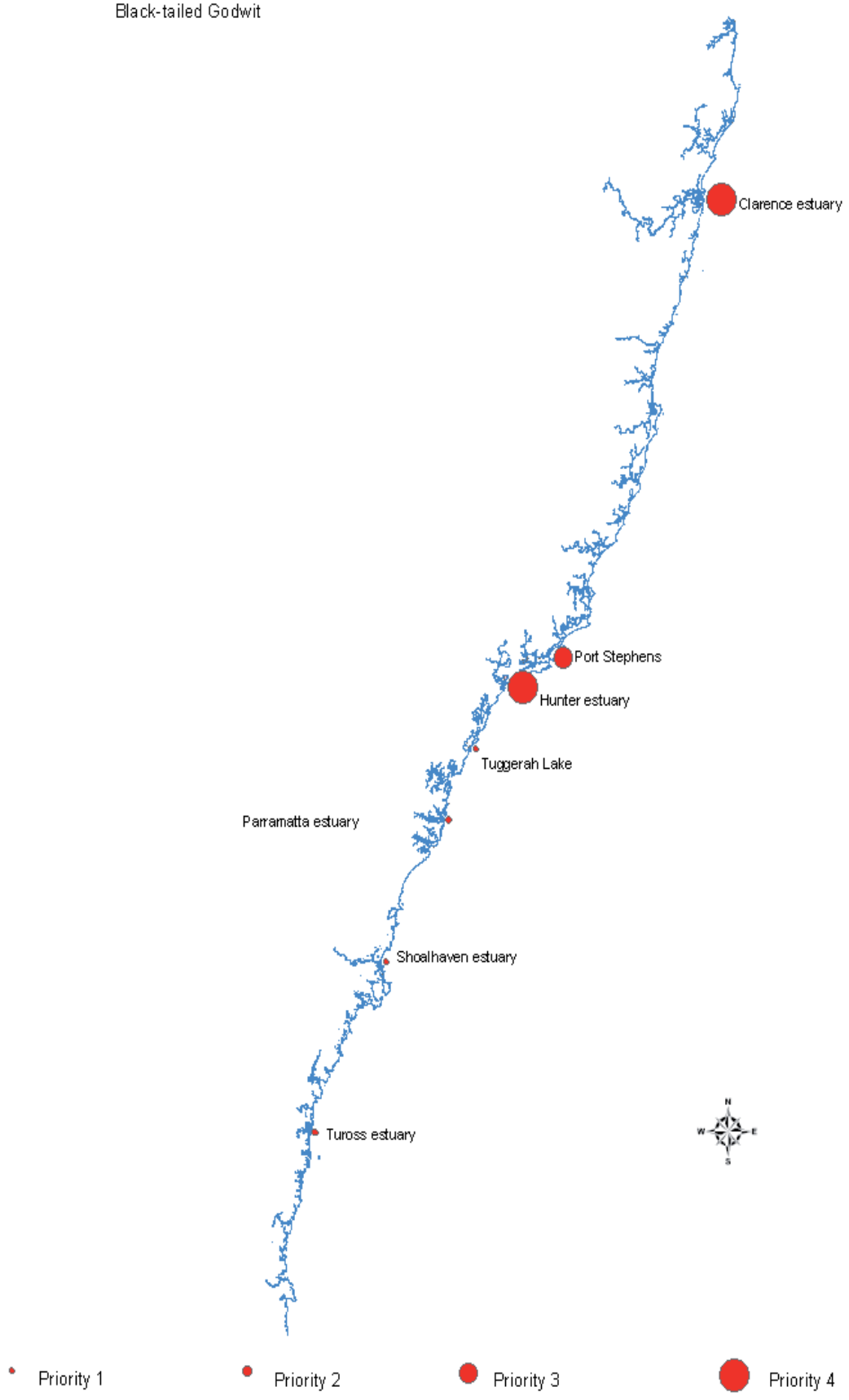


Figure 4:
Greater Sand Plover

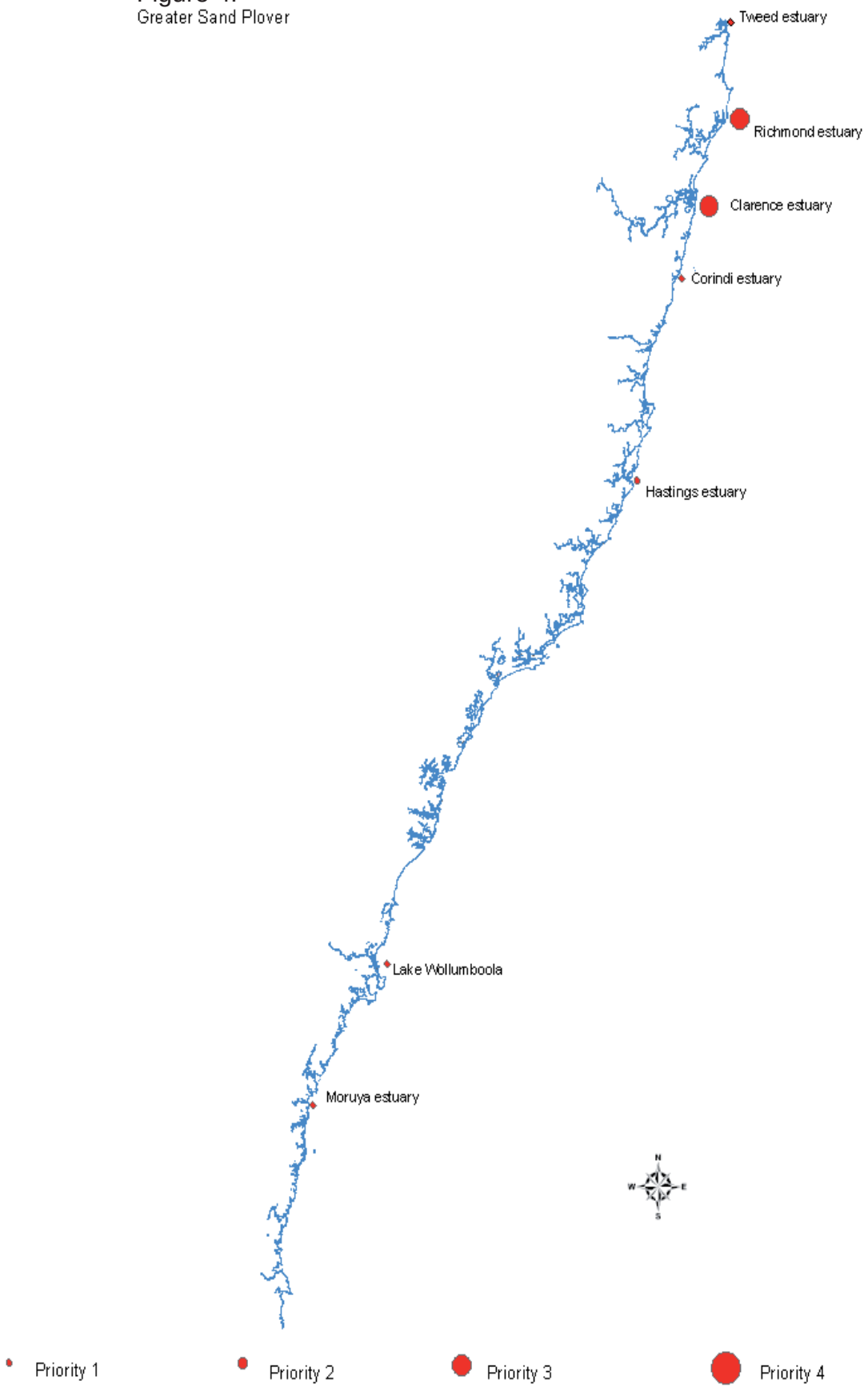


Figure 5:
Lesser Sand Plover

Figure 6:

Terek Sandpiper

Figure 7:
Sanderling

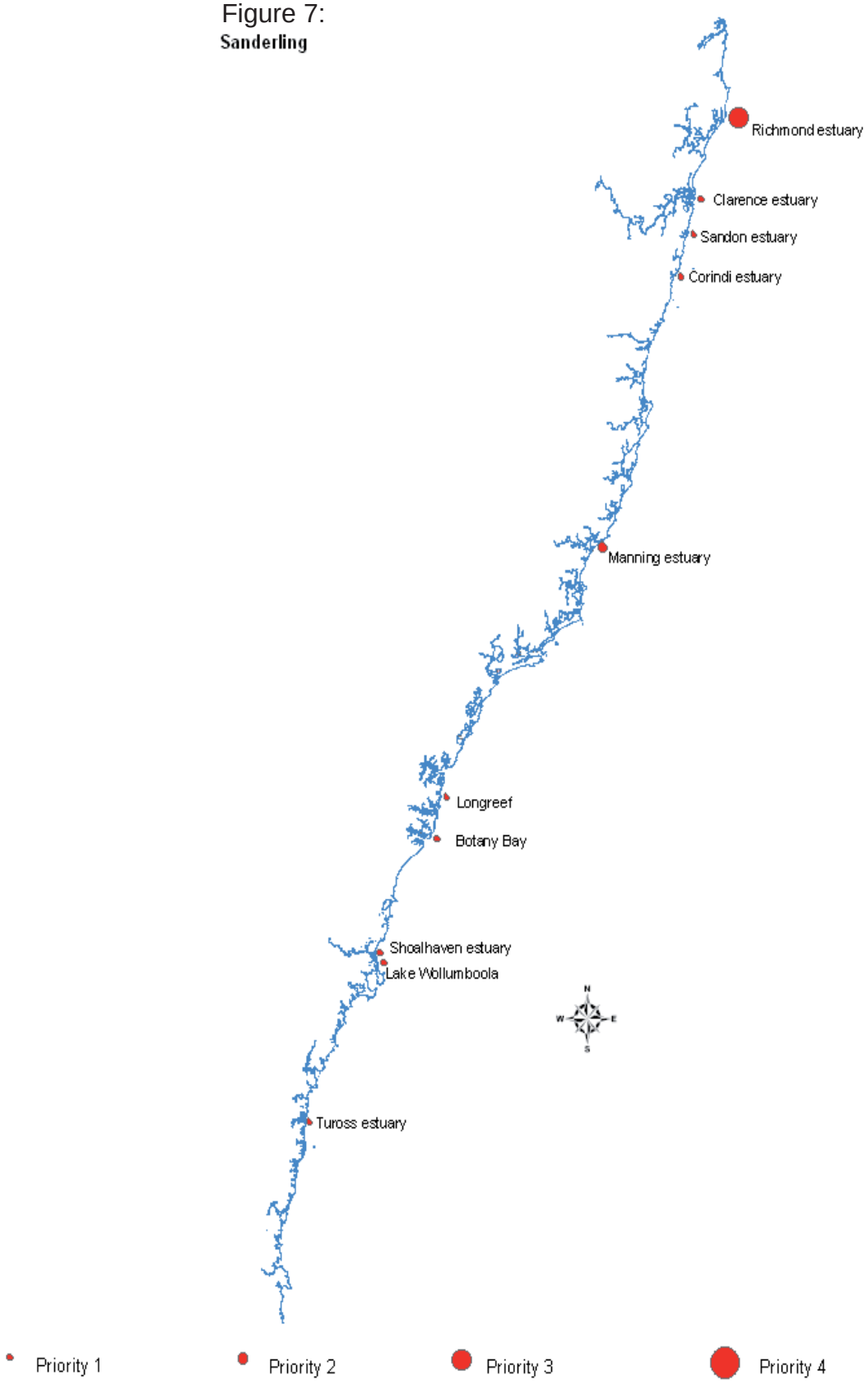


Figure 8:
Broad-billed Sandpiper

Data sets used during this project

DEC Atlas of NSW Wildlife
The DEC Atlas of NSW Wildlife database provides a large number of observations from a variety of sources. However the database has limitations in providing useful data for this project due to the lack of abundance provided from some sources; based on presence only. Project based data provided the most useful data but this was lacking, with the exception of the NRAC data collected in 1994 by the Grafton Office.

Birds Australia (Atlas of Australian Birds I and II)
The Birds Australia database based on the Atlas of Australian Birds provides presence only data. Frequency of observations from this database has a limited value in providing information on the importance of an area for threatened migratory shorebird populations.

Hunter Bird Observers Club (HBOC)
This is a comprehensive database for shorebirds in the Hunter River estuary since April 1999 based on detailed counts made simultaneously at all known roost sites in the estuary on a monthly basis. The HBOC also provide an annual report covering all bird species found within their area.

NSW Wader Study Group (NSW WSG)
The data collected by the NSW Wader Study Group provides comprehensive monthly counts for shorebirds in Botany Bay, the Parramatta River estuary, Hastings River, Richmond River, Hunter River estuary (in association with the HBOC) and less frequent counts at a number of other sites in coastal and near coastal sites in NSW such as the Shoalhaven.

Much of the data collected by the NSW Wader Study Group is still in hard copy form and was not available for use for this project. It would be possible to extract this data if funding was made available for someone to enter the data onto a database.

Cumberland Bird Observers Club
The Cumberland Bird Observers Club database provides bird data for the County of Cumberland including species, date, time and relevant abundance based on a mapping grid system to within one degree of accuracy.

Eurobodalla Natural History Society
Annual reports are produced by the Eurobodalla Natural History Society providing numbers birds seen as well as noting when no birds were recorded for each species found in the shire.

Pegler 1993 - 2003
Joy Pegler made monthly counts of the waterbirds of Lake Wollumboola between September 1993 and July 2003. These results were produced in a report by Keating and Pegler (NPWS unpublished report July 2003).

Site assessment

Site maps have been produced for each of the more significant estuaries and all sites are listed in order geographic location from north to south. Sites that have few records over the past ten years for only one species are mentioned in text only.

Tweed River Estuary

The Tweed River estuary is a large complex of bays and tidal mudflats which are largely accessible only by boat, although the main roost sites have been in sight of vantage points from the shores. Comprehensive counts at the estuary were carried out on at least a monthly basis between early 1994 and 2003 by Mr Eddy Kleiber, a keen amateur birdwatcher from Tweed Heads. No regular surveys of the Tweed appear to have been carried out since 2001.

Small numbers of threatened migratory shorebird species have been recorded at Duraby Creek, Shallow Bay and Terranora Broadwater. Important roost sites are located at Kerosene Inlet, Tony's Island and South Beach. Tony's Island may be under threat as a shorebird roost site due to the spread of mangroves across the island. South Beach was significantly modified during the installation of the pumping station as part of the sand nourishment project at Tweed Heads. Fewer shorebirds use the site since the modification of the beach.

The Tweed River estuary has been subject to housing and industrial development, including road works over the past 20 years which has had negative impacts on shorebird habitat.

Regular monthly or fortnightly shorebird counts were carried out by local ornithologists between early 1994 and early 2003. The site was visited by the NRAC team of four ornithologists during October and November 1994.

Brunswick River

The Brunswick River provides roosting and feeding habitat at the mouth of Marshall's Creek on the north side of the Brunswick River entrance, along Simpson's creek running south from the river mouth. There is small area of feeding habitat in the river west (upstream) of the highway bridge.

Apart from the study by the NRAC team in 1994 no extensive shorebird studies are known to have been carried out for this river system. Based on available data counts, up to nine Terek Sandpiper were recorded at Marshall's Creek during the period 2000/01 (Oil Spill Response Atlas).

Richmond River Estuary

The Richmond River estuary provides important feeding habitat and roost sites and was listed as a Priority 2 site by Smith (1991). Threatened migratory shorebirds found in the estuary include Sanderling, Great Knot, Greater Sand Plover, Lesser Sand Plover, and Terek Sandpiper. Recent counts of these species appear relatively constant over the past 20 years when NSW Wader Study Group data is compared with historical data, i.e. Smith 1991. Regular counts have been undertaken at the Richmond River estuary by members of the NSW Wader Study Group and some of this data has been used for this project.

Clarence River Estuary

The Clarence estuary is the largest and most complex estuarine wetland system of the NSW coast and is considered one of the most important estuaries in NSW for migratory shorebirds. This site was ranked highest during this project for threatened migratory shorebirds.

Recent counts of Greater Sand Plover, Lesser Sand Plover, and Terek Sandpiper appear to be similar to those made over the past 20 years however recent counts of Great Knot in this estuary are substantially greater than historical counts mentioned by Smith (1991) with counts of up to 269 in 2003 compared with a maximum count of 153 during the period 1970-90 (Smith 1991).

Hastings River Estuary

Shorebird feeding habitat in the Hastings is mainly in the vicinity of the lower reaches of Limeburners Creek and from the mouth of Maria River downstream to Pelican Island. Pelican Island provides the main roost site for most species of migratory shorebirds. Regular counts of shorebirds have been carried out in the estuary since 1985 by members of the Hastings Birdwatchers and the NSW Wader Study Group. Counts of between 50 and 96 Lesser Sand Plovers were recorded from 1985 to 1999 however numbers declined to between 10 and 14 birds after 1999 and seemed to coincide with a decline in numbers of other shorebirds not covered in this report.

Manning River Estuary

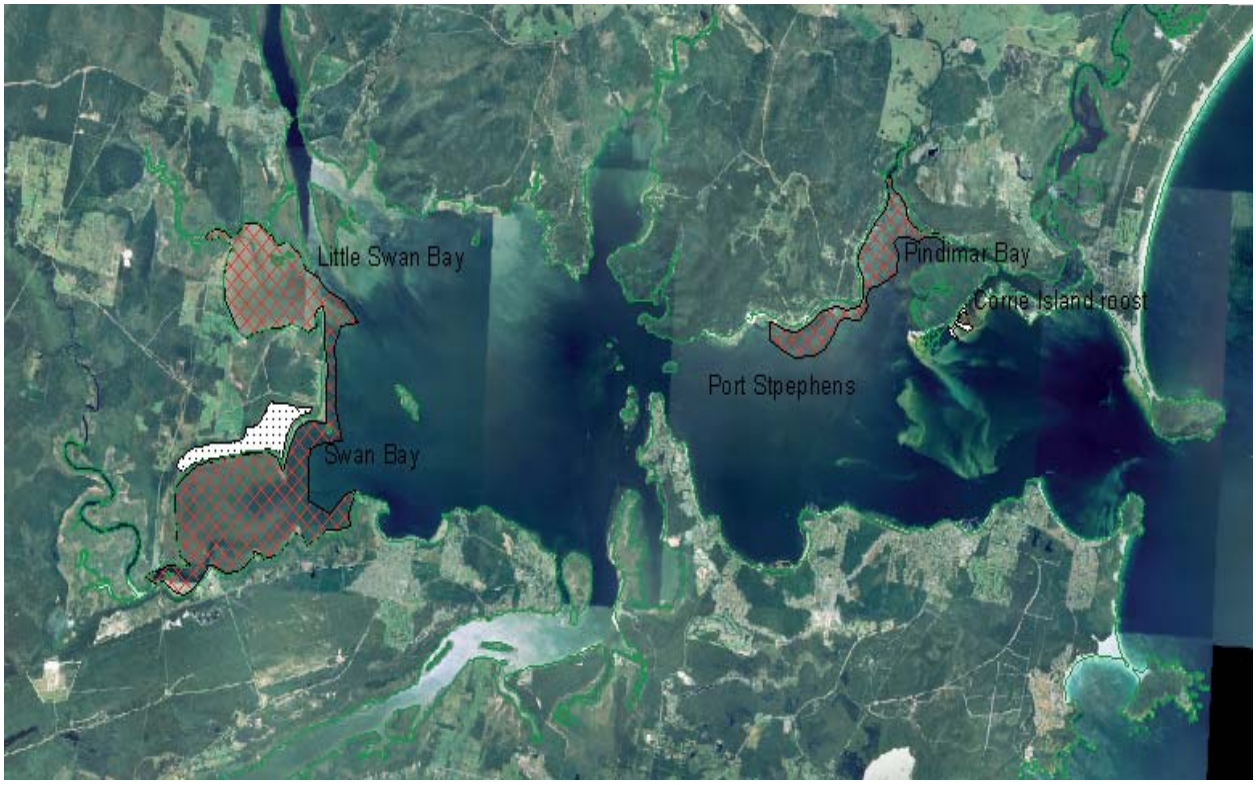
The Manning River divides to form two arms of the river; the north arm then divides again forming Scott's Creek. The river mouths of the main arms of the river form important estuarine habitats for migratory shorebirds as well as other threatened species such as the Little Tern and the Beach Stone-curlew. The north arm enters the sea at Harrington forming a small estuary characterised by a sand spit that moves from time to time resulting in the mouth of the river moving between the northern and southern sides of the estuary. This estuary provides important habitat for Sanderling, an occasional Great Knot and Lesser Sand Plover, as well as nesting habitat for Little Terns.

The southern arm and Scott's Creek merge to form a large estuary providing extensive feeding habitat for migratory shorebirds. Few threatened migratory species have been recorded at this wetland, however the estuary is not easily accessed which may result in some species going unobserved. The estuary was the site of the second record of the Kentish Plover (Charadrius alexandrinus) for Australia and the first record for NSW. An occasional observation of Lesser Sand Plover, as late as 2002, has been recorded.

Port Stephens and Karuah River Estuary

Port Stephens has long been known as an important area for migratory bird species such as the Eastern Curlew. However due to its size the estuary has rarely been surveyed in detail for migratory shorebirds. The Hunter Bird Observers Club and members of the NSW Wader Study Group have conducted two extensive surveys of the estuary with logistical assistance from DEC Port Stephens Office during 2004 and 2006. The data used in this project is largely from the 2004 survey.

Swan Bay at the western end of Port Stephens and the northern shoreline near the mouth of the Myall River are important sites for migratory shorebirds. Swan Bay and Little Swan Bay provide important feeding habitat for Lesser Sand Plover (22 individuals in 2004) as well as being one of the most important sites for Eastern Curlew (1% of the world population). Pindimar Bay and Corrie Island, at the mouth of the Myall River, provide important feeding habitat and roost sites for large numbers of migratory shorebirds including the Black-tailed Godwit (50 individuals in 2004), as well as the Pied Oystercatcher (largest site count in NSW).



Hunter River Estuary

The Hunter River estuary has been considered the most important area in NSW for migratory shorebirds according to Smith (1991) and Watkins (1993). However the area has declined in value for nearly all migratory shorebird species over the past 20 years. In 1993 the area was listed as a site of international importance for ten species of shorebirds and an additional three species of national significance (Watkins 1993). Based on regular monthly shorebird counts coordinated by the Hunter Bird Observers Club over the past ten years the area is now considered to be of international importance for two migratory and one non-migratory species of shorebirds. These are; Bar-tailed Godwit (Limosa lapponica), Eastern Curlew (Numenius madagascariensis) and Red-necked Avocet (Recurvirostra novaehollandiae).

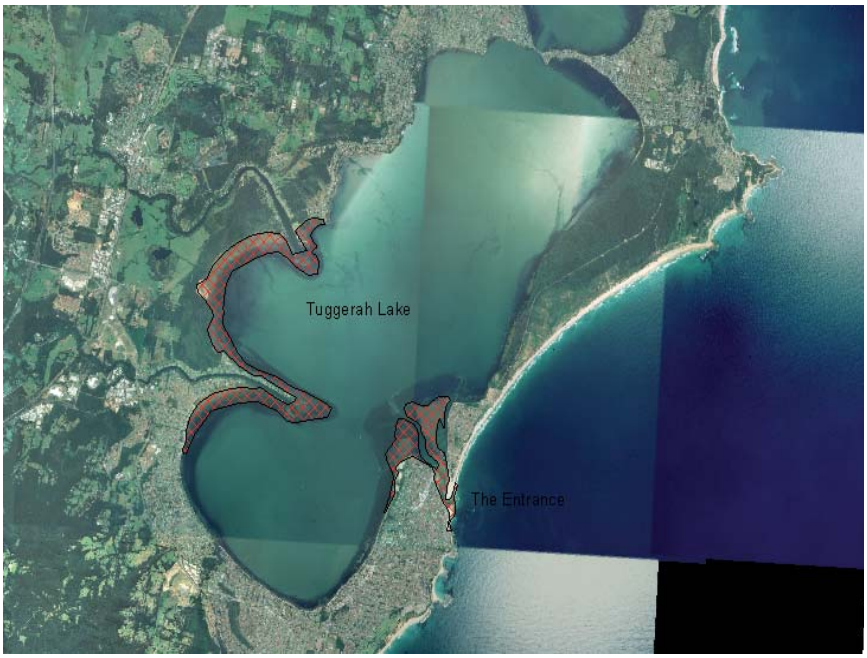
Species of most concern in the estuary are plovers and sandpipers (Lesser Sand Plover, Red-necked Stint, Broad-billed Sandpiper and Curlew Sandpiper). It is likely that habitat conditions for these birds are no longer available due to changes in the estuary over the past 20 to 30 years. Terek Sandpiper have also declined significantly over the past 20 years. Great Knot were observed in small numbers (up to 6 individuals) as well as Lesser Sand Plover (up to 12 individuals) and Broad-billed Sandpiper (up to 3 individuals). The estuary is still the most important site in NSW for the Black-tailed Godwit (up to 200 individuals).

Recent restoration work in the estuary has restored an important roost site at Stockton and has seen the return of small numbers of Pied Oystercatcher to the estuary.

Tuggerah Lake

Parts of Tuggerah Lake and the estuarine waters at The Entrance provide important feeding habitat and roosting sites for migratory shorebirds at certain times when lake levels are low. Great Knot (up to 10 individuals) and the Black-tailed Godwit (1 individual) have been recorded at Chittaway Bay and Picnic Point, The Entrance in recent years. The Lesser Sand Plover was previously observed in the area (up to 16 individuals between 1990 and 1995) but have not been observed since.

A proposed development at Picnic Point was recently abandoned by the local council due to concerns for potential impacts on migratory shorebirds in the area. The area is monitored on a regular basis by members of the Central Coast branch of Birding NSW.



Longreef, Collaroy

The extensive rock platform provides feeding habitat and roost sites for relatively small numbers of migratory shorebirds including regular sightings of single individuals of Sanderling, Greater Sand Plover, Lesser Sand Plover and Great Knot. Longreef is protected to some degree as an Aquatic Reserve under the *NSW Fisheries Management Act 1994*. The area is popular with birdwatchers and records of rare shorebirds often appear in annual reports of Birding NSW.

Parramatta River Estuary

Regular counts have been carried out in the Parramatta River estuary since 1992 when studies were carried out for the NSW Government prior to the lead up to the 2000 Olympic Games and have continued to the present date by the NSW Wader Study Group.

The estuarine wetlands provide shorebird feeding habitat at Hen and Chicken Bay, Mason Park, The Waterbird Refuge at Bicentennial Park and the Newington Nature Reserve. However habitat changes have resulted in the decline for most species of shorebirds in the estuary, an exception being the Bar-tailed Godwit whose numbers have remained relatively stable. The only recent record of threatened species covered in this project was one Great Knot at Hen and Chicken Bay in 2005.

Botany Bay and Boat Harbour

Regular counts of shorebirds have been carried out in Botany Bay and Boat Harbour on a monthly basis since 2001 by the NSW Wader Study Group. Prior to this, relatively regular counts were made by various bird groups and reliable data has been available for much of the Bay since the late 1970s.

Small to medium sized shorebirds that were previously found in large numbers in the northern parts of Botany Bay have declined to the extent that very few have been recorded in the Bay in recent years. Lesser Sand Plover were regularly observed in Botany Bay and at Boat Harbour in the 1980s with counts of between 19 and 34 birds. Recent counts have observed 1-4 birds at Boat Harbour, with birds rarely observed in the Bay. Terek Sandpiper had not been observed in the Bay prior to the early 1960s after which small numbers of up to 11 birds were observed on a regular basis. However numbers have declined in the Bay since 2001 when one or two birds have been seen in the southern part of the Bay. Great Knot and Sanderling are regularly observed in small numbers of one to three birds with little change in numbers since counts were recorded for the Bay.

Windang, Lake Illawarra

The entrance to Lake Illawarra at Windang has been recognised as an important site for small numbers of migratory and non-migratory shorebirds (Smith 1991) however changes to Windang estuary and lake shores have reduced the availability of habitat for shorebirds. The extent to which these ongoing works will affect threatened species in the area is unknown.

Recent observations have included sightings of single Great Knot, Lesser Sand Plover and Terek Sandpiper.

Shoalhaven River Estuary

The area of importance to shorebirds includes the Shoalhaven River estuary downstream of Pig Island, including Comerong Island, and the Crookhaven estuary. The Shoalhaven has been recognised as an internationally significant site for Eastern Curlew and nationally important for Pacific Golden Plover, Lesser Sand Plover and Ruddy Turnstone. The Lesser Sand Plover continued to visit the area in relatively large numbers up to the period 1990/95 but have since declined with up to 8 individuals in the period 1995/2000 and only single birds being observed since. Other species have declined in number but the area remains one of the most important sites in NSW for Pacific Golden Plover.

Regular observations have been made in recent years of single individuals of Great Knot, Lesser Sand Plover and Sanderling.

Of particular importance are the large saltmarsh area used as roosting and feeding habitat for migratory shorebird species as well as the beach and dune area as roosting habitat at the mouth of the Shoalhaven River, which is closed except after periods of heavy rain.

Lake Wollumboola

Lake Wollumboola is a barrier lake that is infrequently open to tidal waters after heavy rainfall events cut through the sand bar across the entrance of the lake allowing the lake to drain for tidal waters to enter. During these events, large numbers of shorebirds have been observed on the exposed mudflats. Reports of threatened migratory shorebirds include 29 Lesser Sand Plover, 1 Broad-billed Sandpiper and 4 Black-tailed Godwit in 1991. The lake also provides important nesting habitat for the Little Tern. When open to the sea the lake also provides important feeding habitat for other migratory shorebirds with counts of up to 1000 Red-necked Stint.

When water levels are very low during spring, summer and autumn, counts of shorebirds may reach up to 1000 individuals with small numbers of threatened migratory species present. A study by Pegler (Keating and Pegler 2003) over a ten year period between 1993 and 2003 has provided some useful data for this site.

Moruya River Estuary

The mudflats around Quandolo Island on the south side of the estuary provides important shorebird feeding habitat including up to 10 Great Knot and an occasional single Lesser Sand Plover and Greater Sand Plover. A sand spit adjacent to Quandolo Island also provides a major roost site. Other mudflats used by these shorebirds are Malabar Creek and a small area of mudflat known as The Dress Circle flats.

The rock training wall provides a majore roost site as well as nesting site for Pied Oystercatcher.

Tuross Estuary

The estuary formed by the Tuross River and Tuross Lake provides feeding habitat for up to 200 migratory and non-migratory shorebirds on tidal flats at Horse Island and in the lake entrance. These include up to five Great Knot and occasional sightings of single Lesser Sand Plover. Shorebirds roost at sand spits at Horse Island and the entrance to Tuross Lake. The adjacent beach also provides feeding habitat for up to two Sanderling.

Brou Lake

Habitat at Brou Lake is only available when the lake is open to the sea and water levels are low. The exposed sand flats are then used by up to 100 migratory and non-migratory shorebirds including Lesser Sand Plover on rare occasions. The area is also an important nesting site for the Little Tern and Red-capped Plover.

Wagonga Inlet, Narooma

The tidal sand flats in the estuary formed by the Wagonga Inlet provides feeding habitat for up to 300 migratory shorebirds and is the most important site on the south coast of NSW. Species include regular visits of up to five Great Knot and rare occurrences of solitary Black-tailed Godwits and Terek Sandpiper. The area also provides nesting habitat for Pied Oystercatcher and Red-capped Plover.

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