

The Beach Stone-Curlew (*Esacus magnirostris*) in the Sydney Basin and South East Corner Bioregions of New South Wales

MATTHEW MO

NSW Department of Primary Industries, Elizabeth Macarthur Agricultural Institute, Woodbridge Road, Menangle, New South Wales 2568 (matthew.mo@dpi.nsw.gov.au)

Published on 16 December 2016 at <http://escholarship.library.usyd.edu.au/journals/index.php/LI>

Mo, M. (2016). The beach stone-curlew (*Esacus magnirostris*) in the Sydney Basin and South East Corner bioregions of New South Wales. *Proceedings of the Linnean Society of New South Wales* **138**, 69-81.

The beach stone-curlew (*Esacus magnirostris*) has only been resident in New South Wales since the 1970's. Here, records of the beach stone-curlew from the Sydney Basin and South East Corner bioregions were analysed. The earliest record was an individual sighted on The Entrance in 1959, with no subsequent records until 1978. The majority of records in the study area occurred in the last two decades. Some records are isolated; however others indicate that a bird may have stayed in an area for up to months at a time. Examples include individuals seen at the Long Reef Aquatic Reserve, Botany Bay/Kurnell Peninsula, the Royal National Park, the Shoalhaven district and Merimbula. Based on the timing proximity of some records in 2015, records from four locations in Sydney in the space of two months may have been the same individual. Few sightings of more than one bird were recorded. Merimbula was the southern extremity of beach stone-curlews in the study area. The known breeding population in the state was restricted to the North Coast bioregion prior to the recent observations of a breeding pair in Port Stephens.

Manuscript received 21 August 2016, accepted for publication 29 November 2016.

KEY WORDS: dispersion, distribution, movements, threatened species, vagrant

INTRODUCTION

The beach stone-curlew (*Esacus magnirostris*) (Fig. 1) is listed as critically endangered in New South Wales (NSW) under the Threatened Species Conservation Act 1995 (TSC Act). This large shorebird, usually seen singly or in pairs, is found from Southeast Asia to northern Australia (Blakers *et al.* 1984; Freeman 2003; Trainor 2005), occurring exclusively in coastal littoral habitats, such as river mouths, mudflats, sandbars and beaches (Clancy 1986; Garnett 1992). In Australia, the population was reported as stable by Garnett and Crowley (2000), however, authors have been divided over whether it is declining (Garnett 1993; Watkins 1993) or increasing in NSW (Smith 1991).

Until recently, the known breeding population in NSW was restricted to the North Coast bioregion (Clancy and Christiansen 1980; Clancy 1986; Hole *et al.* 2001). Beach stone-curlews are seldom located south of the Manning River, which was the southern extremity of Rohweder's (2003) study on the NSW population. They are considered a rare vagrant to the

Sydney Basin bioregion and more southerly locations (Hoskin *et al.* 1991; Schulz and Ransom 2010). The occurrence of beach stone-curlews in these parts often draws the attention of bird observers keen to experience the rarity.

In this paper, I review the occurrence of the beach stone-curlew in the Sydney Basin and South East Corner bioregions of NSW. This work is important in understanding the ecology of this threatened species in the southern parts of its distribution.

METHODS

Records of beach stone-curlews sighted in the Sydney Basin and South East Corner bioregions of New South Wales (study area; Fig. 2) were collated. This paper follows the bioregion definitions set out by the NSW National Parks and Wildlife Service (2003). The Sydney Basin bioregion is the region encompassed by the Hunter region in the north to the Shoalhaven region in the south, and the South East Corner bioregion encompasses the remainder of the NSW coastline south of the Sydney Basin bioregion.

BEACH STONE-CURLEWS IN SOUTH EASTERN NEW SOUTH WALES



Figure 1. A beach stone-curlew (*Esacus neglectus*) sighted at Merimbula, South East Corner of New South Wales, in March 2016. Photo, John Bundock.

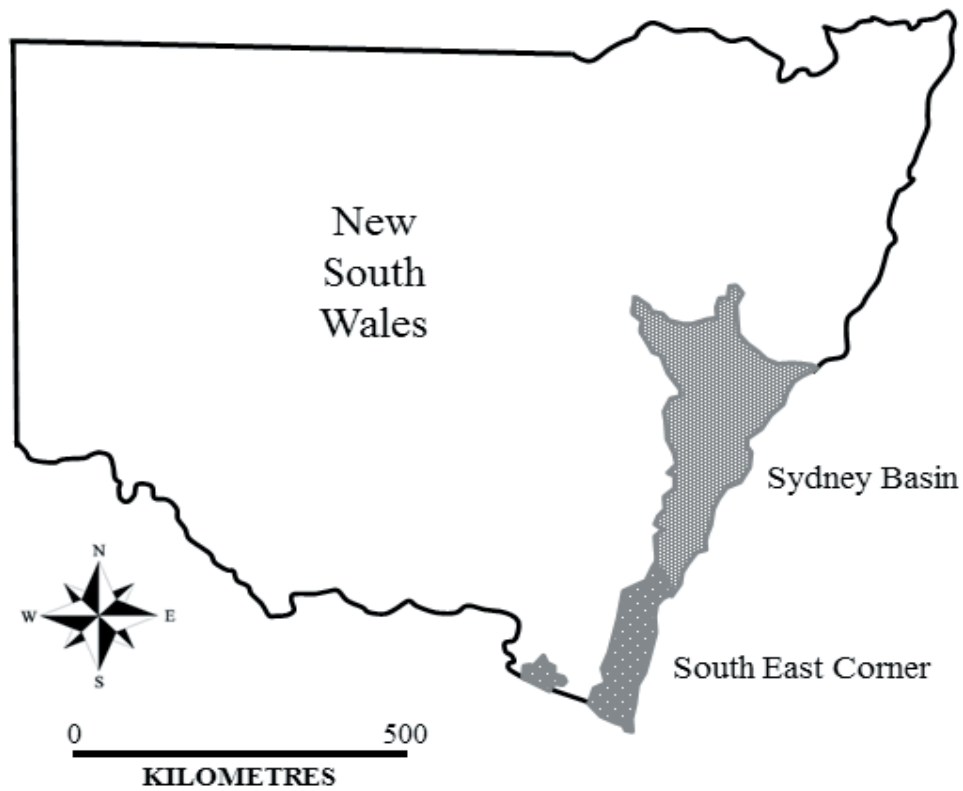


Figure 2. The Sydney Basin and South East Corner bioregions in the context of New South Wales.

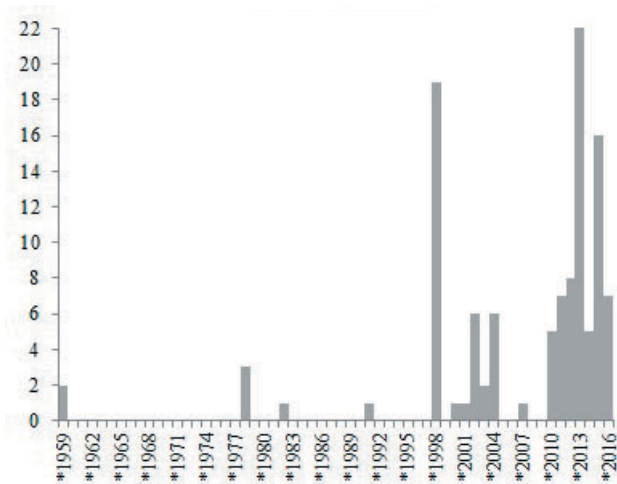


Figure 3. Beach stone-curlew (*Esacus neglectus*) records in the Sydney Basin and South East Corner bioregions of New South Wales.

Information was sought from databases such as the Atlas of Living Australia (ALA 2016), the Atlas of NSW Wildlife (OEH 2016), the Cumberland Birds Observers Club (CBOC) database, the Eurobodalla Natural History Society (ENHS) database, the Far South Coast Birdwatchers Inc. (FSCB) database and Birddata. The latter is maintained by BirdLife Australia, which functions as a web portal for members to submit bird sighting information. In addition, this organisation (formerly the Royal Australasian Ornithologists Union, then Birds Australia) also administers the Historical Bird Atlas, which is a collection of records from between 1629 and 1976 sourced from museum collections, published literature and unpublished sources such as personal notebooks. The organisation has conducted two nation-wide atlas surveys, the first of which (Blakers *et al.* 1984) included records relevant to this study.

Additional information was retrieved from online posts by bird observers to websites such as Birding-Aus (2016) and Eremaea Birdlines (2016), as well as personal communications.

RESULTS

Records of the beach stone-curlew in the study area have accumulated mostly in the last two decades (Fig. 3). The increase in recent records may be due to the increasing number of observers and the ease of reporting observations on internet-based databases. The first record was in 1959 (discussed below), after which there was a 19-year period until subsequent records (Table 1). Figure 4 shows some

of the locations the beach stone-curlew has been recorded within the study area.

Central Coast

The earliest record on the Central Coast was a single beach stone-curlew sighted at The Entrance North on 27 December 1959 (Blakers *et al.* 1984; Table 1). On the same day, it was also recorded at Norah Head, 8 km north (Wilson 1961; Stringfellow 1962). There were no subsequent sightings until 7 September 1991 when one individual was seen at Tuggerah Lake (Eremaea Birdlines 2016).

Another sporadic record occurred at Stockton sandspit in the Hunter Wetlands National Park on 5 December 2002, with a subsequent record at this locality on 3 October 2015. In 2013, the Entrance was visited by at least one beach stone-curlew, sighted on 12 October and 22 November (Eremaea Birdlines 2016).

Port Stephens

Since 2011, a pair of beach stone-curlews (presumably the same pair) have been reliably viewed at Soldiers Point and Dowardee Island, Port Stephens (Morris *et al.* 2011; Murray 2013, 2014; Birding-Aus 2016). They appear to reside on Dowardee Island, where they have been observed at least five times (Morris *et al.* 2011; Eremaea Birdlines 2016), flying over to Soldiers Point, mainly to feed at low-tide, where most sightings were recorded (Murray 2013; ALA 2016). On the mainland, the beach stone-curlews drink and bathe from a stormwater outlet. When disturbed by people, they flew back to Dowardee Island.

The pair had bred successfully for at least four summers (HBOC 2015). Each year, the beach stone-curlews become absent from Soldiers Point from October to February, reappearing on the mainland in late summer with a near-independent fledgling (Murray 2013). Breeding is thought to occur on Dowardee Island (Murray 2013), although no actual signs of nesting have been reported to date.

On 20 March 2015, one individual was observed at Lemon Tree Passage (Eremaea Birdlines 2016), which is presumably one of the pair from Dowardee Island. The distance between these two locations is only 3 km.

Northern Sydney

There are records of a beach stone-curlew at Dee Why Lagoon for 3 November 2010 (Eco Logical Australia 2011; Birding-Aus 2016). Three years later, an individual beach stone-curlew was seen in

BEACH STONE-CURLEWS IN SOUTH EASTERN NEW SOUTH WALES

Table 1. Records of the beach stone-curlew (*Esacus neglectus*) in the Sydney Basin and South East Corner bioregions.

ALA = Atlas of Living Australia, CBOC = Cumberland Bird Observers Club, EB = Eremaea Birdlines, ENHS = Eurobodalla Natural History Society, FSCB = Far South Coast Birdwatchers Inc., HBA = Historical Bird Atlas, OEH = Office of Environment and Heritage, NSW Atlas of Wildlife

Location	Date	Source
<i>Central Coast</i>		
The Entrance North	27 Dec 1959	Blakers <i>et al.</i> 1984
Norah Head	27 Dec 1959	Wilson 1961, Stringfellow 1962
Tuggerah Lake	7 Sep 1991	EB
Stockton Sandspit	5 Dec 2002	Birdata
The Entrance	12 Oct 2013	EB
The Entrance	22 Nov 2013	EB
Stockton Sandspit	3 Oct 2015	EB
<i>Port Stephens</i>		
Dowardee Island	20 Jan 2011	EB; HBOC
Soldiers Point	22 May 2011	EB; HBOC
Dowardee Island	24 May 2011	Birdata
Dowardee Island	2 Aug 2011	Birdata
Dowardee Island	11 Aug 2011	EB
Dowardee Island	14 Aug 2011	Morris <i>et al.</i> 2011
Soldiers Point	26 Mar 2012	Birdata
Soldiers Point	3 Jul 2012	Birdata
Soldiers Point	16 Aug 2012	Birdata
Soldiers Point	18 Aug 2012	EB
Soldiers Point	26 Aug 2012	Birdata
Soldiers Point	28 Aug 2012	EB
Soldiers Point	12 Oct 2013	ALA
Soldiers Point	29 Mar 2014	EB
Lemon Tree Passage	20 Mar 2015	EB
<i>Northern Sydney</i>		
Brooklyn	n/d	HBA
Dee Why Lagoon	3 Nov 2010	CBOC, Birding-Aus; Eco Logical Australia 2011
Manly	14 Oct 2013	OEH
Long Reef Aquatic Reserve	23 Nov 2013	CBOC, EB
Kissing Point Park, Putney	14 Nov 2015	CBOC, EB
Long Reef Aquatic Reserve	28 Nov 2015	EB
Long Reef Aquatic Reserve	29 Nov 2015	EB
Long Reef Aquatic Reserve	4 Dec 2015	CBOC
Long Reef Aquatic Reserve	5 Dec 2015	CBOC, EB
Long Reef Aquatic Reserve	6 Dec 2015	CBOC, EB
Long Reef Aquatic Reserve	7 Dec 2015	EB
Long Reef Aquatic Reserve	8 Dec 2015	EB
Long Reef Aquatic Reserve	9 Dec 2015	CBOC

M. MO

Long Reef Aquatic Reserve	11 Dec 2015	EB
Long Reef Aquatic Reserve	12 Dec 2015	CBOC
<i>Botany Bay/Kurnell Peninsula</i>		
Towra Point Nature Reserve*	1982	OEH
Bonna Point, Kurnell	2 Jun 1998	CBOC, EB
Towra Point Nature Reserve	Dec 2001	Birding-Aus
Metromix Swamp, Kurnell	29 Nov 2003	CBOC
Boat Harbour, Kurnell	20 Dec 2003	CBOC
Towra Point Nature Reserve	27 Jan 2004	CBOC
Boat Harbour, Kurnell	3 Feb 2004	CBOC
Towra Point Nature Reserve	7 Feb 2004	OEH
Boat Harbour, Kurnell	3 Mar 2004	CBOC
Towra Point Nature Reserve	February 2010	OEH 2013
Towra Point Nature Reserve	20 Nov 2010	CBOC, OEH
Towra Point Nature Reserve	Nov 2011	OEH 2013
Taren Point Shorebird Reserve	16 Nov 2015	CBOC, EB
Near Sydney Airport	18 Nov 2015	CBOC
<i>Royal National Park</i>		
Era Beach	1998-1999	DECCW 2011
Bundeena	4 Apr 1998	ALA
Bundeena	30 May 1998	CBOC
Bundeena	14 Jun 1998	CBOC, Birding-Aus
Bundeena	21 Jun 1998	CBOC
Bundeena	28 Jun 1998	CBOC
Maiainbar and Bundeena	3 Jul 1998	CBOC
Royal National Park	4 Jul 1998	Birding-Aus
Bundeena	5 Jul 1998	CBOC
Bundeena	11 Jul 1998	CBOC
Bundeena	25 Jul 1998	ALA
Bundeena	27 Jul 1998	CBOC
Bundeena	13 Aug 1998	ALA, CBOC
Bundeena	14 Aug 1998	CBOC
Bundeena	27 Nov 1998	ALA, CBOC
Port Hacking	2000	Breen 2007, Birding-Aus, EB
Maiainbar and Bundeena	8 Mar 2004	CBOC
Bundeena	12 Mar 2004	CBOC
Deeban Spit, Maianbar	6 Nov 2010	ALA, CBOC, EB
Bundeena	14 Nov 2010	ALA, CBOC
<i>Illawarra</i>		
Thirroul	28 Feb 1998	OEH
Windang	30 Jan 2013	Birdata, EB; Cocker 2013
Windang	14 Oct 2014	EB

BEACH STONE-CURLEWS IN SOUTH EASTERN NEW SOUTH WALES

Shoalhaven

Orient Point	9 Jan 1978	Blakers <i>et al.</i> 1984
Shoalhaven Heads	1 Feb 1978	OEH
Comerong Island Nature Reserve	1 Feb 1978	OEH
Orient Point	4 May 1998	OEH
Shoalhaven Heads	3 Feb 2002	OEH
Comerong Island Nature Reserve	24 Feb 2002	OEH
Orient Point	25 Feb 2002	Birding-Aus
Baileys Island, Gerroa	1 Nov 2007	Birdata
Orient Point	17 Oct 2012	EB
Lake Wollumboola	27 Jan 2013	OEH
Orient Point	5 Feb 2013	EB
Lake Wollumboola	10 Feb 2013	D. Paton, pers. comm
Orient Point	17 Feb 2013	EB
Shoalhaven Heads	27 Feb 2013	EB
Orient Point	1 Jun 2013	EB
Orient Point	17 Jul 2013	OEH
Comerong Island Nature Reserve	1 Dec 2013	EB
Orient Point	1 Jul 2014	OEH
Culburra Beach	15 Jul 2014	OEH
Comerong Island Nature Reserve	3 Nov 2014	EB

South East Corner

Merimbula	1 Sep 1998	Birdata
Durras North, Murramarang National Park	29 Dec 1998	OEH
Moruya	2002	Morgan 2013; ENHS
Mogareeka Inlet	17 Dec 2002	Birdata
Wallaga Lake	2012	Morgan 2013; ENHS
Burrill Lake	2 Jan 2013	EB
Lake Tabourie	21 Oct 2013	OEH
Tuross Head	2 Dec 2013	Morgan 2013; ENHS
Lake Tabourie	10 Dec 2013	OEH
Toragy Point, Moruya Heads	16 Dec 2013	EB
Burrill Lake	20 Dec 2013	EB
Spencer Park, Merimbula	24 Oct 2015	Birding-Aus
Spencer Park, Merimbula	26 Oct 2015	SCRS 2015
Spencer Park, Merimbula	15 Mar 2016	FSCB
Spencer Park, Merimbula	17 Mar 2016	ALA
Spencer Park, Merimbula	19 Mar 2016	Birding-Aus
Spencer Park, Merimbula	2 Apr 2016	ALA
Spencer Park, Merimbula	25 Apr 2016	Birding-Aus
Spencer Park, Merimbula	6 May 2016	FSCB
Spencer Park, Merimbula	15 May 2016	FSCB

*Reported as a bush stone-curlew, probably erroneously referring to beach stone-curlew

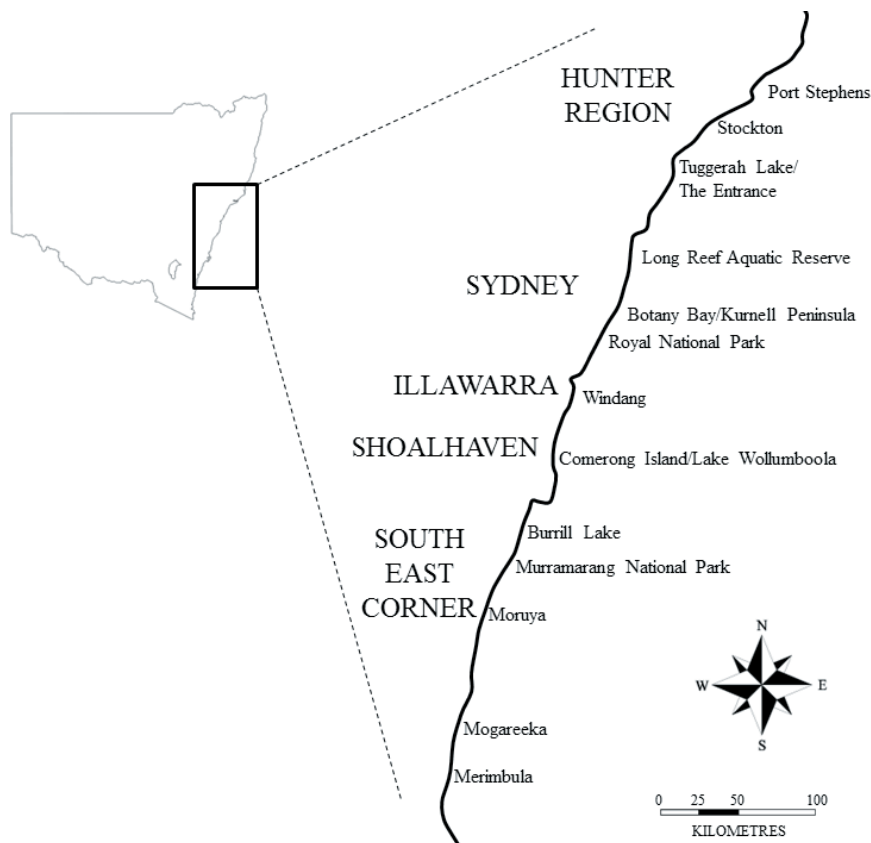


Figure 4. Map of the study area showing some locations where beach stone-curlews *Esacus neglectus* have been recorded.



Figure 5. Rock platform and beach at the Long Reef Aquatic Reserve, Colaroy. Photo, M. Mo

the area, first at Manly on 14 October 2013 (OEH 2016), then at Long Reef Aquatic Reserve (Fig. 5) on 23 November 2013 (Eremaea Birdlines 2016). Possibly, the same individual was sighted in both records.

An individual was reliably located at Long Reef Aquatic Reserve from 28 November to 12 December 2015. Just prior to these sightings, a beach stone-curlew (possibly the same individual) was also seen along the Parramatta River at Putney on 14 November. The observer at Putney remarked that the bird was “quite relaxed”, feeding on crabs within 20 m of the boat ramp (Eremaea Birdlines 2016). These records came after the record at Stockton sandspit.

There is also an undated record from Brooklyn in the Historical Bird Atlas.

Botany Bay/Kurnell Peninsula

In 1982, a bird reported as a bush stone-curlew (*Burhinus grallarius*) was seen in the Towra Point Nature Reserve. Given the habitat where the sighting occurred, the record was probably erroneously referring to a beach stone-curlew (OEH 2013). Since then, a number of irregular sightings have occurred at the Woollooware Shorebird Lagoon, Pelican Point, Towra Spit Island and Towra Beach (Murray and Dessmann 2012; OEH 2013). One beach stone-curlew was

BEACH STONE-CURLEWS IN SOUTH EASTERN NEW SOUTH WALES

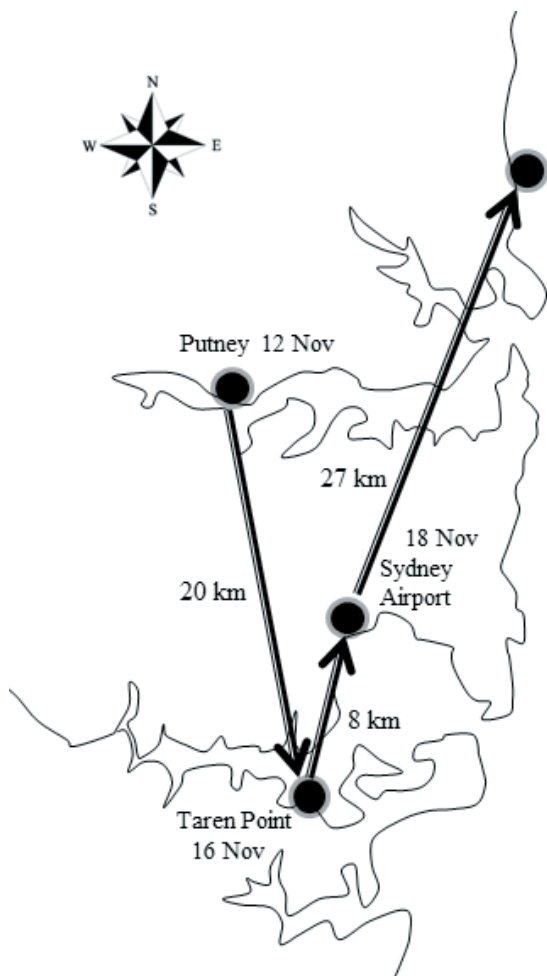


Figure 6. Movements of the beach stone-curlew *Esacus neglectus* in Sydney between November and December 2015, assuming the records were represented by the same individual.

sighted on Bonna Point, Kurnell on 2 June 1998 (Eremaea Birdlines 2016), which coincided with the period of time that an individual was regularly sighted in the northern portion of the Royal National Park (discussed below). There was a further sighting in the Towra Point Nature Reserve in December 2001 (Birding-Aus 2016).

From November 2003 to March 2004, at least one beach stone-curlew was observed at various locations on the Kurnell Peninsula on at least six occasions. The first of these records was made at the Metromix Swamp on 29 November 2003. There were at least three sightings at Boat Harbour on the southern end of the Peninsula in December 2003 and February and March 2004. The remainder of the sightings were recorded at the Towra Point Nature Reserve (OEH 2016). Further sightings in this vicinity followed in

February and November 2010 and November 2011 (OEH 2013, 2016), which may be different individuals given the great length of time between records.

Most recently, one beach stone-curlew was recorded at the Taren Point Shorebird Reserve on 16 November 2015 (Eremaea Birdlines 2016), which represents the most westerly record of this species in Botany Bay. It was not found there the following day (W.A. Hewson, pers. comm). On 18 November, it was seen near Sydney Airport (presumably the same individual). These two records came just after the record at Putney and precede the records from the Long Reef Aquatic Reserve within the same month (mentioned above; Eremaea Birdlines 2016). These records may be the same individual briefly moving between these locations (Figure 6).

Royal National Park

Clarke and Dolby (2014) refer to the beach stone-curlew amongst the shorebird assemblage in the Royal National Park; however Schulz and Magarey (2012) associated it with vagrant status. One individual was observed on the mudflats at Bundeena near the Bonnie Vale camping ground (Fig. 7) on at least 14 occasions between April and November 1998 (ALA 2016; Birding-Aus 2016). It was also seen at least once at Deeban Spit, Maianbar (Fig. 8), which is less than 1 km to the west on the other side of Cabbage Tree Basin. During this time and into 1999, a beach stone-curlew was also sighted further south at Era Beach from 1998 to 1999 (DECCW 2011), possibly the same individual. The following year, there was an isolated sighting of a beach stone-curlew near Bundeena (Breen 2007; Eremaea Birdlines 2016; Birding-Aus 2016).

There was a second occurrence of a beach stone-curlew in Maianbar and Bundeena between 8 and 12 March 2004. These records came just days after the period of time an individual was repeatedly sighted at the Towra Point Nature Reserve and Boat Harbour (OEH 2016), which are only 6 km north, suggesting that the same bird had moved. A third occurrence of an individual in the same locality was recorded on 6 and 14 November 2010 (ALA 2016; Eremaea Birdlines 2016). The beach stone-curlew was sometimes seen foraging in associations with Australian pied oystercatchers (*Haematopus longirostris*), another threatened species. One week after it supposedly moved on, there was the record in the Towra Point Nature Reserve (mentioned above; OEH 2016).

Illawarra and Shoalhaven

The earliest NSW records of beach stone-curlew south of Sydney were an individual sighted at



Figure 7. Mangrove-lined sand flats at the Bonnie Vale camping ground, Bundeena. Photo, M. Mo.



Figure 8. Sand flats at Deeban Spit, Maianbar. Photo, M. Mo

BEACH STONE-CURLEWS IN SOUTH EASTERN NEW SOUTH WALES

Orient Point in the Shoalhaven district on 9 January 1978 (Blakers *et al.* 1984) and an individual that was sighted at Shoalhaven Heads on 1 February 1978 and at the Comerong Island Nature Reserve on the same day (OEH 2016). The first subsequent record for the Illawarra and Shoalhaven districts was from Thirroul on 28 February 1998, preceding another record from Orient Point on 4 May 1998 (OEH 2016). The temporal isolation of these records also suggests the same individual was being located.

A further cluster of sightings occurred in February 2002. Another beach stone-curlew was seen at Shoalhaven Heads on 3 February 2002, with subsequent sightings one day apart at the Comerong Island Nature Reserve and Orient Point toward the end of the month (Birding-Aus 2016; OEH 2016). An isolated sighting of a bird at Baileys Island, Gerroa was recorded on 1 November 2007.

Between October 2012 and November 2014, 14 sightings of the beach stone-curlew were recorded in the Illawarra and Shoalhaven districts, with no more than seven months interval between records. The first record was at Orient Point on 17 October 2012 (Eremaea Birdlines 2016). During its time in the local area, this beach stone-curlew moved mostly between locations from Shoalhaven Heads south to Lake Wollumboola (Eremaea Birdlines 2016; OEH 2016; D. Paton, pers. comm). There was some disturbance from unleashed dogs and fishermen collecting worms from the mudflats (D. Paton, pers. comm). At Lake Wollumboola, it was sometimes close to an Australian pied oystercatcher nest, which prompted it to be mobbed by the brooding adults (OEH 2015). The beach stone-curlew was also seen further north at Windang on at least two occasions (Cocker 2013; Eremaea Birdlines 2016). It was eventually found dead at Orient Point in November 2014 (D. Paton, pers. comm).

South East Corner

The earliest records in the South East Corner bioregion were two records in 1998 that were four months apart. One beach stone-curlew was sighted in Merimbula on 1 September 1998, with the subsequent sighting in Durras North in the Murrumbidgee National Park, 140 km north, on 29 December 1998 (OEH 2016). There were no other known occurrences in the region until a sighting at Moruya in 2002 (Morgan 2013), and one further sighting at Mogareeka Inlet on 17 December 2002.

In 2013, a single beach stone-curlew was located at Wallaga Lake (Morgan 2013). The following year, a cluster of sightings was reported in various locations

in the South East Corner bioregion. One individual was sighted at Burrill Lake, south of Ulladulla, on 2 January 2013. It was foraging close to a nesting colony of little terns (*Sternula albifrons*) and was observed being aggressively mobbed by parent birds. The observer returned to the site later in the day to find it had moved on (Eremaea Birdlines 2016). From October to December 2013, sightings were received from Lake Tabourie twice (OEH 2016), Tuross Head (Morgan 2013) and a second sighting for Burrill Lake (Eremaea Birdlines 2016). On 16 December 2013, a pair of beach stone-curlews was recorded at Toragy Point at Moruya Heads (Eremaea Birdlines 2016). These records did not follow any one direction chronologically, sporadically appearing up and down the coastline.

A beach stone-curlew was reported twice in the same week at Spencer Park, Merimbula in October 2015 (SCRS 2015; Birding-Aus 2016). Merimbula is the southern extremity of beach stone-curlew sightings in NSW. One bird was first observed on 24 October 2015, but was not located the following day (Birding-Aus 2016). It was however seen at the site by another observer on 26 October (SCRS 2015).

A second cluster of sightings at Spencer Park occurred between March and May 2016 (ALA 2016; Birding-Aus 2016). A representative of Far South Coast Birdwatchers Inc. warned people through the local newspaper to minimise disturbance to the bird (Anon. 2016). The beach stone-curlew sought refuge in the mangroves behind the beach, moving onto the sand flats to forage (J. Bundock, pers. comm). There was some concern that the influx of holidaymakers over the Easter season could potentially cause the bird to move off. During this time, a second beach stone-curlew joined the first individual (Birding-Aus 2016). The two individuals were first sighted together on 25 April. The last date either bird was recorded was 15 May.

DISCUSSION

The beach stone-curlew has only been resident in northern NSW since the 1970's (Morris *et al.* 1981). It appears to be expanding its distribution southward along the east coast of Australia (Marchant and Higgins 1993). In 1925, an individual seen in Moreton Bay, Queensland, at the mouth of the Brisbane River was the most southerly recorded sighting at the time (Mayo 1925). The first record in NSW was a beach stone-curlew sighted in Tweed Heads in 1930 (Marchant and Higgins 1993), with no subsequent record until 1959, which was the individual sighted at The Entrance (Wilson 1961; Stringfellow 1962),

mentioned in this paper. In 2001, the state population was thought to be 12 individuals (Hole *et al.* 2001).

Movements in the beach stone-curlew are not well known. They probably never disperse far from the coast (Amiet 1957). Pairs can be present in the same location for several years. Examples include the breeding pairs present at Red Rock between 1976 and 1986 (Clancy 1986), the mouth of the Manning River between 1998 and 2001 (Hole *et al.* 2001) and Port Stephens (Murray 2014), as mentioned in this paper.

There have been few detailed studies on the diet of the beach stone-curlew, which is mainly understood from opportunistic observations. The records mentioned in this paper that contain some notes on feeding are almost entirely observations of beach stone-curlews hunting soldier crabs (*Mictyria* spp.) (Murray 2013; Birding-Aus 2016; Eremaea Birdlines 2016; D. Paton, pers. comm). Previous authors also recorded soldier crabs in the diet (Clancy 1986; Geering 1988; Woodall and Woodall 1989; Mellish and Rohweder 2012). The apparent significance of soldier crabs to the diet may be biased toward the increased visibility of this type of prey. Further studies are needed to confirm whether soldier crabs actually comprise the majority of the diet. Hole *et al.* (2001) introduced the possibility of beach stone-curlews raiding eggs of other ground-nesting birds, especially when crabs were few. The evidence for this was total breeding failure in little terns and red-capped plovers (*Charadrius ruficapillus*) coinciding with the period of time beach stone-curlews occurred nearby and beach stone-curlew tracks indicating their visitation of nests. This may account for observations at Lake Wollumboola and Burrill Lake of beach stone-curlews being mobbed by nesting birds (OEH 2015; Eremaea Birdlines 2016). Perhaps coincidentally, both these accounts occurred in January 2013.

Observations of breeding activity in Port Stephens (Murray 2014) are of great significance. Previously, the most southerly known breeding pair of beach stone-curlews was the pair at the mouth of the Manning River (Hole *et al.* 2001). The breeding pair at Port Stephens represents the only breeding individuals known in the Sydney Basin bioregion. The records presented in this paper were predominately sightings of single individuals. Excluding the birds at Port Stephens, pairs were seen in only two occurrence events. These were the beach stone-curlews at Toragy Point in December 2013 (Eremaea Birdlines 2016) and Merimbula in April 2016 (Birding-Aus 2016). The potential for the formation of breeding pairs in either account is not known.

The main threats to the beach stone-curlew include habitat destruction, low reproductive rate and increased predator populations (Marchant and Higgins 1993; Hole *et al.* 2001). Disturbance by beach users has also been a concern (NSW Scientific Committee 2008; Anon. 2016), however high visitation to beaches inhabited by beach stone-curlews may not necessarily have a significant impact, at least not in parts of Australia where the species is regularly reported (Freeman 2003). Clancy (1986) also noted that nests were being raided by egg-collectors. A proposed expansion of the marina at Soldiers Point in 2014 became contentious due to the residence of the beach stone-curlews at the site (Vernon 2014; HBOC 2015). The construction was proposed to take place on the beach where the birds regularly forage.

The regular observations on the beach stone-curlews at Port Stephens offers an excellent opportunity to study aspects of their ecology that are not well understood, such as fledgling diets, development of hunting behaviour, daily foraging patterns and seasonality of breeding events (Marchant and Higgins 1993; Mellish and Rohweder 2012). The patterns of records indicate that beach stone-curlew sightings in the Sydney Basin and South East Corner bioregions may increase in the future. Information on the ecology of the beach stone-curlew is therefore important to species management in this new extension of distribution.

ACKNOWLEDGEMENTS

I thank Alan Morris, Duade Paton, Barbara Jones, W. Ashley Hewson and John Bundock for useful discussions and the Cumberland Bird Observers Club and Far South Coast Birdwatchers Inc. for extracting sighting records. I also acknowledge all observers that have contributed to various databases. Elouise Sciacca, Peter and Antonia Hayler and Richele West are thanked for supporting this paper. Useful comments from two anonymous referees improved the manuscript.

REFERENCES

- Amiet, L. (1957). A wader study of some Queensland coastal localities. *Emu* 57, 236-254.
- Anonymous. (2016). 'Please give rare bird space.' Merimbula News. 21 March 2016. <http://www.merimbulanewsweekly.com.au/story/3802895/please-give-rare-bird-space>
- Atlas of Living Australia (ALA). Database available at <http://www.ala.org.au>. Accessed 1 August 2016.

BEACH STONE-CURLEWS IN SOUTH EASTERN NEW SOUTH WALES

- Birding-Aus. Database available at <http://birding-aus.org>. Accessed 1 August 2016.
- Blakers, M., Davies, S.J.J.F. and Reilly, P.N. (1984). 'The Atlas of Australian Birds.' (Melbourne University Press: Melbourne).
- Breen, D.A. (2007). Systematic conservation assessments for marine protected areas in New South Wales. Ph.D. Thesis, James Cook University, Townsville, Qld.
- Clancy, G.P. (1986). Observations of nesting Beach Thick-knees *Burhinus neglectus* at Red Rock, New South Wales. *Corella* **10**, 114-118.
- Clancy, G.P. and Christiansen, M. (1980). A breeding record of the Beach Stone-curlew at Red Rock New South Wales. *Australian Birds* **15**, 5.
- Clarke, R. and Dolby, T. (2014). 'Finding Australian Birds: a Field Guide to Birding Locations.' (CSIRO Publishing: Collingwood, Vic.)
- Cocker, M. (2013). President's Report. *Illawarra Birding* **18**, 2.
- Department of Environment, Climate Change and Water (DECCW). (2011). The Vertebrate Fauna of Royal and Heathcote National Parks and Garawarra State Conservation Area. NSW Department of Environment, Climate Change and Water, Hurstville, NSW.
- Eco Logical Australia. (2011). Narrabeen Beach Dog Off-leash Exercise Area – Flora and Fauna Assessment. Report for Warringah Council. Eco Logical Australia, Sydney.
- Eremaea Birdlines. Database available at <http://www.ereamae.com>. Accessed 1 August 2016.
- Freeman, A.N.D. (2003). The distribution of Beach Stone-curlews and their response to disturbance on far north Queensland's Wet Tropical Coast. *Emu* **103**, 369-372.
- Garnett, S. (1993). Threatened and Extinct Birds of Australia. Report 82. Royal Australasian Ornithologists Union, Melbourne.
- Garnett, S.T. (1992). Threatened and extinct birds of Australia. RAOU Report 82. Royal Australasian Ornithologists Union, Melbourne.
- Garnett, S.T. and Crowley, G.M. (2000). 'The Action Plan for Australian Birds 2000.' (Environment Australia: Canberra.)
- Geering, D.J. (1988). Some notes on a Beach Thick-knee runner. *Corella* **12**, 22-24.
- Hole, H., Hole, B. and Mardell, C. (2001). Observations of nesting Beach Stone-curlews on the Mid-north Coast of New South Wales, 1998-1999. *Australian Bird Watcher* **19**, 49-54.
- Hoskin E.S., Hindwood K.A. and McGill A.R. (1991). 'The Birds of Sydney.' (Surrey Beatty and Sons Pty Ltd: Chipping Norton, NSW.)
- Hunter Birds Observers Club (HBOC). (2015). Submission on Proposed Soldiers Point Marina Extension – October 2015. Hunter Birds Observers Club, New Lambton, NSW.
- Marchant, S. and Higgins, P.J. (Eds.) (1993). 'Handbook of Australian, New Zealand and Antarctic Birds. Volume 2. Raptors to Lapwings.' (Oxford University Press: Melbourne.)
- Mayo, L.M. (1925). Large-billed Stone-curlew (*Orthorhaphus magnirostris*) in Moreton Bay. *Emu* **25**, 40.
- Mellish, G.F. and Rohweder, D.A. (2012). Reconstructing the diet of the Beach Stone-curlew *Esacus magnirostris* using scat analysis. *Australian Field Ornithology* **29**, 201-209.
- Morgan, J. (2013). What to expect for summer. *Eurobodalla Natural History Society Newsletter* **159**, 3.
- Morris, A., Charles, C. and Blanchflower, S. (2011). Unusual records June-Aug 2011. *Birding New South Wales Newsletter* **247**, 15-18.
- Morris, A.K., McGill, A.R. and Holmes, G. (1981). 'Handlist of the Birds of New South Wales.' (NSW Field Ornithologists Club: Sydney.)
- Murray, J. and Dessmann, J. (2012). Flora and Fauna Assessment – Caltex Refineries (NSW) Pty Ltd – Kurnell Refinery Conversion. Report for URS Australia Pty Ltd. Biosis Pty Ltd, Sydney.
- Murray, T. (2013). Soldiers Point Beach Stone-curlews. *Hunter Bird Observers Club Newsletter* **5**, 13.
- Murray, T. (2014). Soldiers Point Beach Stone-curlew update. *Hunter Bird Observers Club Newsletter* **2**, 8-9.
- NSW National Parks and Wildlife Service (NSW NPWS). (2003). The Bioregions of New South Wales: their Biodiversity, Conservation and History. NSW NPWS, Hurstville, NSW.
- NSW Scientific Committee. (2008). Beach Stone-curlew *Esacus neglectus*. Review of current information in NSW. April 2008. Unpublished report. NSW Scientific Committee, Hurstville, NSW.
- Office of Environment and Heritage (OEH). (2013). The Vertebrate Fauna of Towra Point Nature Reserve. NSW Office of Environment and Heritage, Sydney.
- Office of Environment and Heritage (OEH). (2015). Pied Oystercatchers. *Shorebird Recovery Newsletter South Coast* **2014-2015**, 11-16.
- Office of Environment and Heritage (OEH). Atlas of NSW Wildlife available at <http://www.bionet.nsw.gov.au>. Accessed 1 August 2016.
- Rohweder, D.A. (2003). A population census of Beach Stone-curlews *Esacus neglectus* in New South Wales. *Australian Field Ornithology* **20**, 8-16.
- Sapphire Coast Regional Science Hub (SCRSH). (2015). Beach Stone-curlew. Rare sight. <http://www.atlasoflife.org.au/beach-stone-curlewrare-sighting>
- Schulz, M. and Magarey, E. (2012). Vertebrate fauna: a survey of Australia's oldest national park and adjoining reserves. *Proceedings of the Linnean Society of New South Wales* **134**, B215-B247.
- Schulz, M. and Ransom, L. (2010). Rapid fauna habitat assessment of the Sydney metropolitan catchment area. In 'The Natural History of Sydney'. (Eds D. Lunney, P. Hutchings and D. Hochuli.) pp. 371-401. (Royal Zoological Society of New South Wales: Mosman, NSW.)

- Smith, P. (1991). The Biology and Management of Waders (Suborder Charadrii) in New South Wales. Species management report 9. New South Wales National Parks and Wildlife Service, Hurstville, NSW.
- Stringfellow, D.S. (1962). Bar-shouldered Dove and Frigate-birds in mid-coastal New South Wales. *Emu* **62**, 65.
- Trainor, C.R. (2005). Waterbirds and coastal seabirds of Timor-Leste (East Timor): status and distribution from surveys in August 2002–December 2004. *Forktail* **21**, 61-78.
- Vernon, J. (2014). Concerns over Port Stephens marina expansion. ABC News. <http://www.abc.net.au/news/2014-03-29/concerns-over-port-stephens-marina-expansion/5352974>
- Watkins, D. (1993). 'A National Action Plan for Shorebird Conservation in Australia.' (Australasian Wader Studies Group: Melbourne.)
- Wilson, B. (1961). Beach Curlew in New South Wales. *Emu* **61**, 64.
- Woodall, P.F. and Woodall, L.B. (1989). Daily activity and feeding behaviour of Beach Thick-knee *Burhinus neglectus* on North Keppel Island. *Queensland Naturalist* **29**, 71-75.

