

A review of the Sooty Oystercatcher on the Hunter Region coastline of New South Wales, Australia

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Data compiled from annual bird reports by the Hunter Bird Observers Club, and from surveys archived in the BirdLife Australia national database, Birddata, were used to review the history and current status of the Sooty Oystercatcher *Haematopus fuliginosus* along the Hunter Region coastline of New South Wales. The Hunter population is stable and comprises approximately 150 birds. Small, scattered groups of birds were found to occur along many rocky sections of the region's coastline. Two major mainland concentrations were identified; one was based at the Newcastle Rock Platforms (with peak counts 48-52 birds in recent years) and the other in Port Stephens (with peak counts 31-52 birds in recent years). Another population of 20-30 birds is based offshore, on Broughton Island.

A timeline of offshore sightings and breeding records was assembled in order to quantify local nesting activity by Sooty Oystercatcher. There are several breeding records from Cabbage Tree Island and occasional reports of breeding from within the Broughton Island Group and elsewhere.

Findings from the Hunter Region data were compared with studies conducted on southern (Wollongong to the Victorian border) and northern (South Ballina Beach to Sawtell) sections of the NSW coast. Similarities relating to population growth, habitat selection, breeding behaviour and social behaviour were found and are discussed.

INTRODUCTION

The Sooty Oystercatcher *Haematopus fuliginosus*, a species endemic to Australia, occurs in widespread, low-density populations along rocky mainland coasts and offshore islands all around Australia (Marchant & Higgins 1993; Geering *et al.* 2007). There are two phenotypically similar sub-species, *H. f. ophthalmicus* and *H. f. fuliginosus*. While not listed as threatened nationally the nominate subspecies *H. f. fuliginosus*, which predominates south of the Tropic of Capricorn, is listed as Rare in Queensland and South Australia, Near Threatened in Victoria and Vulnerable in NSW, where a low population is distributed within a limited ecological habitat (NSW Scientific Committee 2008; Harrison 2009; NPWS 2018).

Compared to its international counterparts the Sooty Oystercatcher is one of the least studied oystercatchers in the world (Harrison 2009). Inconsistent survey efforts have produced a largely uninformative database, making long-term population trends difficult to predict (Harrison 2009; Hansen *et al.* 2014). Their dependence upon rugged habitat along the coastal mainland, and

breeding territory on rocky offshore islands, makes finding and monitoring nests difficult and hazardous. As a result, nests are seldom found and rarely studied, and data related to nest behaviour and chick survival remain elusive (Marchant & Higgins 1993; Ens & Underhill 2014; Hansen *et al.* 2014). Oystercatchers generally, are a long-lived species (possibly 40 years) with a suggested adult survival rate of 90%, but their longevity is offset by low clutch size, high chick mortality, slow transition to adulthood (estimates range from 3.6 to 6.9 years) and limited breeding habitat (Newman 1992; Harrison 2009; Ens & Underhill 2014).

Maturing birds must relocate to non-territorial areas that provide conditions required for young birds to achieve breeding status (Ens & Underhill 2014; Hansen *et al.* 2014). How and where young birds manage to find safe areas in which to spend their adolescent years is not well understood, some locations may be far removed from natal breeding territories (Ens & Underhill 2014; Hansen *et al.* 2014). Estuarine habitats, which provide shelter and nutritional diversity, may play an important role in the early development of oystercatchers (Hansen *et al.* 2014).

National distribution and population trends

National survey data indicate that population density is more concentrated in northern Tasmania, the Bass Strait islands and southern Victoria (Close 2008; Hansen *et al.* 2014). An estimated total population of 4,000 birds, which was proposed in 1993, was unchanged in 2018 (Watkins 1993; Delany & Scott 2006; Wetlands International 2018).

Small groups of Sooty Oystercatcher occur along the entire NSW coastline, particularly in locations where offshore islands occur in close proximity to rocky coastal headlands (Marchant & Higgins 1993; NSW Scientific Committee 2008; Cooper *et al.* 2014; Hansen *et al.* 2014). Based on previous population estimates (Watkins 1993; Delany & Scott 2006), the NSW Scientific Committee estimated that the state's population in 2008 was 600-800 birds, of which 400 birds were thought to be mature, and with the breeding population estimated to be less than 200 birds (NSW Scientific Committee 2008).

There are indications that the NSW population of Sooty Oystercatcher is increasing. Monitoring by the South Coast Shorebird Recovery Programme found an increased presence of Sooty Oystercatcher along southern sections of the NSW coast, and also identified areas where breeding occurred on associated offshore islands (Dunn & Harris 2009; Jarman 2010). In a PhD thesis focussed on the northern NSW coastline population, Harrison (2009) suggested the possibility that the northern population was expanding. A study of threatened species in the Hunter Region concluded that the local Sooty Oystercatcher population was stable and perhaps increasing (Roderick & Stuart 2016). Also, data from both the NSW and Australian Atlas show an increase in Reporting Rates, which supports an assumption of population stability and perhaps population increase in NSW (Cooper *et al.* 2014; BirdLife Australia: accessed 20 August 2018).

Objectives of the present study

Early records for Sooty Oystercatchers along the Hunter coast were sparse and therefore were unlikely to have had any major impact on the national and state population estimates established in 1991 and reassessed in 2008 (Watkins 1993; NSW Scientific Committee 2008). However, in the past 10-15 years, a more regular survey effort has suggested the existence of a significant, and stable

or increasing, Hunter Region population (Stuart 1994-2017; Roderick & Stuart 2016). The aim for the present study was to assess more carefully the status of Sooty Oystercatcher in the Hunter Region. By locating and collating current and archival data, the study aims to: describe the known history of the Sooty Oystercatcher in the Hunter Region; assess population trends and seasonal movements; detail the known local breeding areas; document observed behavioural characteristics. Finally, by comparing the study's findings with research conducted in other coastal regions, the study aims to enhance overall understandings about the status of the Sooty Oystercatcher along coastal NSW.

METHODS

Study area

The study area comprises approximately 200 km of coastline lying from just north of the Manning River, near Harrington (31°52'35"S; 152°42'09"E), and Bird Island (32°21'45"S; 151°30'13"E), near The Entrance. Bird Island lies slightly south of the boundary for the Hunter Region. The coastal geography consists of long sandy beaches interspersed by rocky headlands, rocky outcrops and rock platforms, and three large estuaries (on the lower Manning and lower Hunter Rivers, and in Port Stephens).

Port Stephens, the largest tide-dominated estuary in NSW, has proved to be an important mainland site for Sooty Oystercatcher. It lies approximately equidistant from the northern and southern study boundaries. The Port Stephens estuary is divided into two distinct basins: a western fluvial basin and an eastern marine basin. It is a very popular tourist destination, and hence the disturbance potential is high.

Another important mainland roost site is the Newcastle Rock Platforms. These are located south of the mouth of the Hunter River, adjacent to the major city of Newcastle, with a population of approximately 600,000 people (World Population Review: accessed 22 February 2019). The Rock Platforms are a year-round recreation area; again, the disturbance potential there is high.

The study area also includes offshore islands, from the Broughton Island group (located at 32°36'17"S; 152°18'24"E) south to Bird Island. The islands have areas ranging between 0.9 ha and 132 ha, and elevations ranging from 10 m to 123 m. Most are extensively vegetated, and all lie within 4 km of the mainland. Details about the offshore islands are presented in **Table 1**.

Data sources and data management

All known Hunter records were tabulated and the comments of survey participants were considered in an effort to establish the extent of the current Hunter population, their movement patterns, and their behavioural characteristics. Data for the Hunter Region polygon were retrieved from Birddata (<https://birddata.birdlife.org.au>) and exported to an Excel spreadsheet. The spreadsheet then was supplemented with data for Sooty Oystercatcher published in the Hunter Region Annual Bird Report series (Stuart 1994-2017) and by my own observations. A general literature search was conducted to assemble specific species information. Studies conducted to the north and south of the Hunter study area were examined for similarities

related to population size, habitat, nesting, and behavioural characteristics.

Data from the “Seabird Island” series published in the journal *Corella* (see specific references in later sections, including in **Table 3**) together with comments from visiting birdwatchers were used to develop an historical timeline for Sooty Oystercatcher on offshore islands. The primary focus of these island visits always was the study of nesting seabirds, but references to Sooty Oystercatcher were found in some report addendums listing “Other Birds”.

Geographical and topographical details relating to offshore islands were sourced from the “Seabird Island” series and National Parks & Wildlife Service websites. Latitudes, longitudes and distances were calculated using Google Earth.

Table 1. Details of islands located off the Hunter Region coastline and the estimated flying distances to mainland destinations*.

Island Name	Area (ha)	Altitude (m)	Vegetation (ha)	Distance [#] (km)				References
				Main-land	Port Stephens	Hunter Estuary	New-castle Rock Pt	
Broughton Is Group:				3.8	25.4	59.9	60.7	
Broughton	132	91	117					Carlile <i>et al.</i> 2012
Little Broughton	27.4	98	19					Carlile <i>et al.</i> 2013c
Looking Glass	4	69	~1					Carlile <i>et al.</i> 2013a
Gandja-Baa	1.4	31	0.4					Carlile <i>et al.</i> 2013e
North Rock	2.4	23	1					Carlile <i>et al.</i> 2013d
Inner Rock	0.9	10	0.3					Carlile <i>et al.</i> 2013b
Cabbage Tree	26.3	123	veg.	1.6	15.3	49.1	49.7	Priddel & Carlile 2004b
Boondelbah	9.3	55	veg.	2.1	15.6	48.1	49.5	Priddel & Carlile 2004a
Little	4	Unknown	veg.	3.2	16.8	47.4	49.1	NSW Dept.Primary Ind 2018
Moon	2.25	10	0.36	0.7	56.7	22.4	20.0	NSW NPWS 2005
Bird (Central Coast)	7.3	20	veg.	1.5	74.4	40.5	37.7	Lane 1973

* Flying distance from Broughton Island and other islands within the archipelago was measured from the centre of Broughton Island. Soldiers Point was selected as the approx. mid-estuary destination point for the Port Stephens Estuary. (Google Earth: accessed 15 December 2018)

Flying distance measured from the centre of each island to the nearest mainland point, and to the three major mainland groups of Sooty Oystercatcher.

RESULTS

Early Hunter Region records were found to be scarce. The Sooty Oystercatcher was not mentioned in an extensive bird list compiled during a visit to Port Stephens in November 1928, when the entire length of the Myall River, the Port Stephens Estuary and Cabbage Tree Island were surveyed (Chisholm & Cayley 1929). However, the 1928 expedition did not visit Broughton Island where a sighting of one bird was later reported in January 1931 (Horden & Horden 1931). In 1987, when Lane identified the top twenty Sooty

Oystercatcher sites in Australia, ranked on the presence of 20+ birds, no site on the Hunter coast was mentioned, and Hunter Region reports remained sporadic until 2008 (Lane 1987; Stuart 1994-2017).

The Hunter Bird Observers Club began shorebird surveys in the Hunter Estuary in 1999. By 2008 the survey programme had expanded to include the Port Stephens and Manning estuaries to the north, and the Lake Macquarie coastline to the south (Stuart 1994-2017; Stuart *et al.* 2013). In **Table 2 I**

Table 2. Annual highest counts for Sooty Oystercatcher at regularly monitored locations on the Hunter Region coastline (2004-2017)*.

Year	North Coast	South Coast	Tomaree Head to Birubi	Port Stephens Estuary	Hunter Estuary	Newcastle Rock Platforms	Offshore Islands	Total	% of Total Aust. Est. Pop. (4,000)	% of Total NSW Est. Pop. (800)
2004	6	N/A	N/A	18	5	N/A	N/A	29	0.58	2.88
2005	5	5	N/A	5	8	N/A	8	31	0.33	1.63
2006	20	N/A	N/A	9	10	N/A	N/A	39	0.48	2.38
2007	N/A	9	N/A	11	11	N/A	6	37	0.55	2.75
2008	2	3	16	14	22	23	2	82	1.88	9.38
2009	4	1	12	13	21	36	7	94	2.18	10.88
2010	8	N/A	10	24	22	39	13	116	2.53	12.63
2011	8	N/A	16	19	12	38	14	107	2.38	11.88
2012	6	2	13	28	12	42	34	137	2.58	12.88
2013	4	N/A	9	42	7	48	20	130	2.70	13.50
2014	8	6	8	37	18	49	10	136	3.00	15.00
2015	5	2	8	52	18	49	24	158	3.23	16.13
2016	12	N/A	9	42	9	52	30	154	2.80	14.00
2017	1	N/A	9	31	14	49	20	124	2.63	12.88

*Main data are based on HBOC Annual Bird Reports 2004-2017 (Stuart 2005-2018). Highest counts for Port Stephens are based upon land and water-based surveys plus counts carried out by the author. N/A: no data available

have compiled data from the Annual Bird Reports for the main Hunter Region sites monitored from 2004 until 2017, the date of the most recent available Bird Report. Although it was rare that all sites were monitored in any given year, the data indicate a regional population of approximately 150 birds. That figure is equivalent to ~3% of the estimated total Australian population of 4,000 birds and more than 15% of the estimated NSW population of 800 birds. (Watkins 1993; Delany & Scott 2006; Wetlands International 2018).

Table 2 indicates that the population of Sooty Oystercatcher in the Hunter Region is increasing. Numbers have risen from occasional sightings, usually of 1-10 birds, to regular counts of larger numbers. There have been two major and regular mainland concentrations of birds – at the Newcastle Rock Platforms and in Port Stephens.

The largest aggregation of Sooty Oystercatcher has been at the Newcastle Rock Platforms where the highest monthly counts each year are now of 48-52 birds (**Table 2**). The group is mainly comprised of adult birds, but the size and composition of the flock varies in conjunction with the breeding season (Herbert 2007; R. Nicholas pers. comm.). **Figure 1**, which presents the recorded highest count for each month at the site, shows how the population of Sooty Oystercatcher at the Newcastle Rock Platforms varies during the year.

Numbers within the Port Stephens estuary have increased to more than 30 birds, making them the second largest group in the region (**Table 2**). Sooty Oystercatcher numbers generally were higher in the quieter, inner (western) fluvial basin, where they occur in small groups. Birds in the estuary's outer (eastern) marine basin were usually found in pairs (**Figures 2 and 3**)

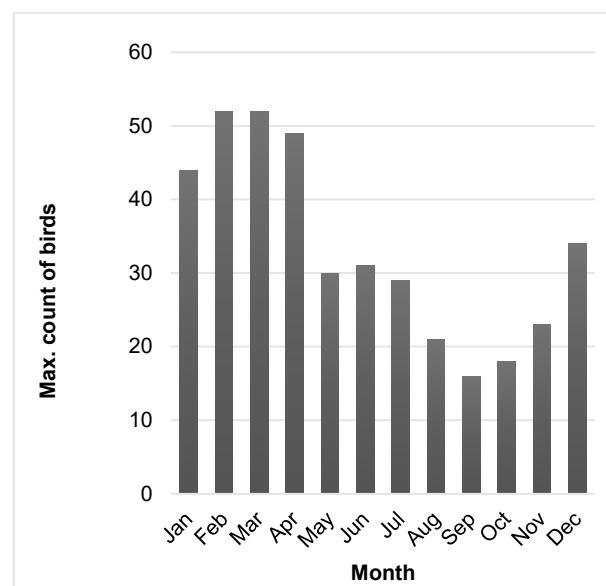


Figure 1. Maximum monthly counts for Sooty Oystercatcher at the Newcastle Rock Platforms, 1993-2017 (Source: Hunter Region Annual Bird Report series (Stuart 1994-2017)).

Although some sections of coastline with difficult access still remain unchecked, small scattered groups of Sooty Oystercatchers were regularly encountered along many of the rocky sections of the region’s coastline. The importance of offshore islands should be noted, in particular Broughton Island where twice-yearly surveys from 2012 (Stuart *et al.* 2017) recorded increasing numbers of birds (**Table 2**).

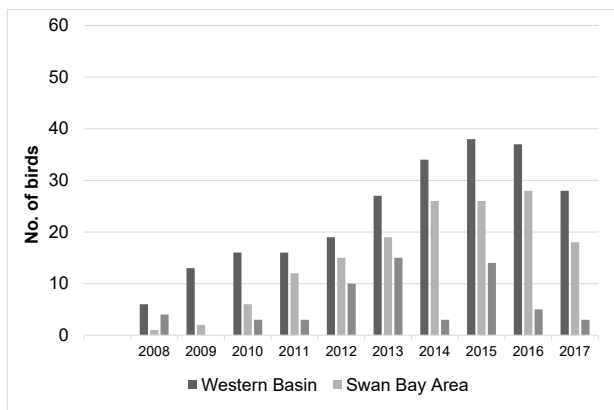


Figure 2. Population distribution of Sooty Oystercatcher in the Port Stephens estuary in summer (Sources: Hunter Bird Observers Club unpublished data and the author’s personal records).

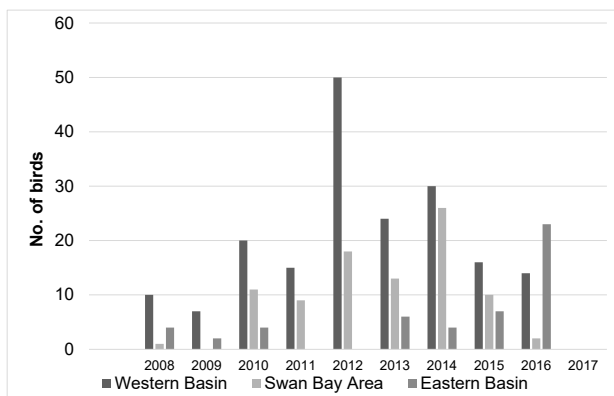


Figure 3. Population distribution of Sooty Oystercatcher in the Port Stephens estuary in winter (Sources: Hunter Bird Observers Club unpublished data and the author’s personal records).

A timeline of records from offshore islands is presented in **Table 3**, along with details of any reports about birds breeding. Birds appear to have bred often on Cabbage Tree Island, with occasional reports of breeding within the Broughton Island Group and elsewhere.

DISCUSSION

Lane (1987) provides a reference point from which to anchor three decades (1987-2017) of Sooty Oystercatcher records in the Hunter Region, and to examine the resulting data against the backdrop of an ever expanding human population attracted to the Hunter coast by opportunities for commerce, tourism and retirement. During those thirty years the Sooty Oystercatcher population has risen from occasional sightings of 1 to 10 birds to regular counts of approximately 150 birds (**Table 2**).

Distribution of Sooty Oystercatcher in the Hunter Region

Sooty Oystercatcher is found along much of the mainland coast within the study area as well as in estuaries and on offshore islands. The main sites are detailed below.

Newcastle Rock Platforms

The largest concentration of Sooty Oystercatcher in the region has been at the Newcastle Rock Platforms. Intermittent monitoring revealed that their numbers increased steadily over 1987-2006, from 1-8 birds in 1987 to 11-26 birds in 2006 (Herbert 2007). Regular monitoring since 2008 has revealed a further population increase, and consistently high counts at the site now suggest a population in the non-breeding season of ~50 birds (**Table 2**). The group is mainly comprised of adult birds, but the size and composition of the flock varies in conjunction with the breeding season (Herbert 2007; R. Nicholas pers. comm.).

Sooty Oystercatchers are the main foraging shorebirds on the Newcastle Rock Platforms and their year-round persistence may indicate that, to date, the location’s roosting and foraging opportunities offset the effects of human disturbance (Herbert 2007). While this adaptive behaviour may be seen as conducive to long-term survival, it should also be noted that shorebird roosting and foraging is dictated by the tide-cycle at a specific habitat. The cumulative stress from frequent disturbance, particularly when that disturbance disrupts and restricts foraging time, may be detrimental (Herbert 2007; Harrison 2009).

Port Stephens estuary

Early records of 1-3 birds in the estuary prior to 1994, and the highest counts of 10+ birds between 1994 and 2000, may not be a reliable reflection of the Sooty Oystercatcher population during that time,

Table 3. A timeline of sightings and breeding records for Sooty Oystercatcher on islands off the Hunter Region coastline.

Year	Date	Location	Breeding	Number of birds seen	Reported by	Where Published
1931 1958-1970	Jan	Broughton Is. Moon Is.	Nesting annually	1 1 pair	Horden & Horden Gray & Gwynne	<i>The Emu</i> 31: 21-26 <i>Aust. Bird Bander</i> 12: 36-37
1959	Dec 18-20	Broughton Is.		# unknown	Hindwood & D'Ombraim	<i>The Emu</i> 60:3
1973	Apr 7-9 Dec 10 Dec 8-11	Broughton Is. North Rock Broughton Is.		# unknown 2 birds # unknown	S.G. Lane S.G. Lane S.G. Lane	<i>Aust. Bird Bander</i> 14: 10-13 <i>Aust. Bird Bander</i> 14: 16-17 <i>Aust. Bird Bander</i> 14: 10-13
1995	Dec 4-8	Cabbage Tree Is.		1-5 birds	Alan Morris	HBOC: <i>Ann. Bird Rept</i> No. 3
1996	Dec 13-16	Cabbage Tree Is.		# unknown	Anon.	HBOC: <i>Ann. Bird Rept</i> No. 4
1997	Dec 11-14 Dec 7	Cabbage Tree Is. Moon Is.		6+ birds 1-5 birds	Graeme O'Connor Jim Perry	HBOC: <i>Ann. Bird Rept</i> No. 5 HBOC: <i>Ann. Bird Rept</i> No. 5
1998	Jan	Broughton Is.	Nest	7 birds w. dep. young	Chris Herbert & Liz Crawford	HBOC: <i>Ann. Bird Rept</i> No. 6 1st confirmed breeding record
1999	Jan Dec 10 Dec 10 Dec 22	Broughton Is. Cabbage Tree Is. MLNP ¹ (Broughton Is.?) MLNP ¹ (Broughton Is.?)	Nest	6 birds w. dep. young 1-2 birds 1-2 birds 1-2 birds	Chris Herbert & Liz Crawford Cumberland Bird Observers Cumberland Bird Observers Michael Kearns	HBOC: <i>Ann. Bird Rept</i> No. 7 HBOC: <i>Ann. Bird Rept</i> No. 7 HBOC: <i>Ann. Bird Rept</i> No. 7 HBOC: <i>Ann. Bird Rept</i> No. 7
2000	Feb 17 Mar 23	Broughton Is. Boondelbah Is.	Nesting	1-2 birds # unknown	Keith Laverick Birds Australia Atlas Survey	HBOC: <i>Ann. Bird Rept</i> No. 8 HBOC: <i>Ann. Bird Rept</i> No. 8
2002	Oct 10-12 Nov 22-23 Dec 16-17 Nov 21-24 Dec 2-6 Dec 13-15	Boondelbah Is. Boondelbah Is. Boondelbah Is. Cabbage Tree Is. Cabbage Tree Is. Cabbage Tree Is.		# unknown # unknown # unknown (Presumed recorded on all visits) 1-2 pairs 1-2 pairs 1-2 pairs (Presumed recorded on all visits)	Priddel & Carlile Priddel & Carlile Priddel & Carlile Priddel & Carlile Priddel & Carlile Priddel & Carlile	<i>Corella</i> 28(4): 104-106 <i>Corella</i> 28(4): 104-106 <i>Corella</i> 28(4): 104-106 <i>Corella</i> 28(4): 107-109 <i>Corella</i> 28(4): 107-109 <i>Corella</i> 28(4): 107-109
2003	Feb 27 Feb 27	Boondelbah Is. Cabbage Tree Is.	Reg. nesting	# unknown 1-2 pairs	Priddel & Carlile Priddel & Carlile	<i>Corella</i> 28(4): 104-106 <i>Corella</i> 28(4): 107-109
2005	Jan 9-10	Broughton Is.	Nesting	6-8 birds	Chris Herbert & Liz Crawford	HBOC: <i>Ann. Bird Rept</i> No. 13
2007	Feb 24	Moon Is.		1-5 birds	Cumberland Bird Observers	HBOC: <i>Ann. Bird Rept</i> No. 15
2008	Oct 24-26 Nov Dec 17	Broughton Is. Cabbage Tree Is. Moon Is.	Nest w. egg	6+ birds 1 breeding pair 1-2 birds	Tom Clarke Leone, John Storm Chris Herbert	HBOC: <i>Ann. Bird Rept</i> No. 15 HBOC: <i>Ann. Bird Rept</i> No. 16 <i>The Whistler</i> 2: 49-51
2008-09	Jan 2008 or Oct/Dec 2009	Broughton Is.	Nest w. eggs	1 breeding pair	S. Callaghan pers. comm., reported by A. Stuart	<i>The Whistler</i> 11: 46-53
2009	Apr 7-9 Oct 17-19 Nov 21-23 Dec 3	Broughton Is. Broughton Is. Broughton Is. Broughton Is.		7 birds # unknown # unknown 3 pairs	Tom Clarke Carlile <i>et al.</i> Carlile <i>et al.</i> Ray McLean	HBOC: <i>Ann. Bird Rept</i> No. 17 <i>Corella</i> 36(4): 97-100 <i>Corella</i> 36(4): 97-100 HBOC: <i>Ann. Bird Rept</i> No. 17
2010	Sep 14-16 Oct 23 Oct 1-2 Dec 20-21 Oct 1-2 Dec 20-21	Broughton Is. Moon Is. Little Broughton Is. Little Broughton Is. North Rock North Rock		13 birds 1-2 birds # unknown # unknown # unknown # unknown	Chris Herbert & Liz Crawford Allan Richardson Carlile <i>et al.</i> Carlile <i>et al.</i> Carlile <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 18 HBOC: <i>Ann. Bird Rept</i> No. 18 <i>Corella</i> 37(2): 41-43 <i>Corella</i> 37(2): 41-43 <i>Corella</i> 37(2): 44-46 <i>Corella</i> 37(2): 44-46

¹MLNP – Myall Lakes National Park

Continued overleaf

Table 3. A timeline of sightings and breeding records for Sooty Oystercatcher on islands off the Hunter Region coastline (continued)

Year	Date	Location	Breeding	Number of birds seen	Reported by	Where Published
2011	Sep 13-15	Broughton Is.	Nest Nest	14 birds	Tom Clarke <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 19
	Nov 8-10	Broughton Is.		6+ birds	Tom Clarke <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 19
	Nov 3	One Tree Is.		# unknown	Geoff James	HBOC: <i>Ann. Bird Rept</i> No. 19
	Dec 16	Gandja-Baa		1 breeding pair with nestling	Carlile <i>et al.</i>	<i>Corella</i> 37(3): 69-70
2012	May 7-9	Broughton Is.		10 birds	Craig Anderson	HBOC: <i>Ann. Bird Rept</i> No. 20
	Jul 13-24	Broughton Is.		34 birds	Tom Clarke	HBOC: <i>Ann. Bird Rept</i> No. 20
	Aug 31	Broughton Is.		17-20+ birds	Alan Stuart <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 20
	Sep 18-20	Broughton Is.		17-20+ birds (some immat.)	Alan Stuart <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 20
	Dec 17-20	Cabbage Tree Is.	1-2 birds	Tom Clarke	<i>The Whistler</i> 11: 46-53 HBOC: <i>Ann. Bird Rept</i> No. 20	
2013	Apr 7-8	Broughton Is.		9-15 birds	Alan Stuart <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 21
	Sep 23-25	Broughton Is.		20+ birds	Alan Stuart <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 21
	Dec 29	Broughton Is.		9-15 birds	Chris Herbert & Liz Crawford	HBOC: <i>Ann. Bird Rept</i> No. 21
2014	Jan 13	Broughton Is.	Poss. nest	1 pair – defence behaviour	Chris Herbert & Liz Crawford	HBOC: <i>Ann. Bird Rept</i> No. 22
	Mar 24-26	Broughton Is.		10 birds	Alan Stuart <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 22
	Sep 24	Broughton Is.		10 birds	Chris Herbert & Liz Crawford	HBOC: <i>Ann. Bird Rept</i> No. 22
2015	Dec 8-10	Cabbage Tree Is.		1-2 birds	Adam Fawcett	HBOC: <i>Ann. Bird Rept</i> No. 22
	Mar 31	Broughton Is.		10 birds	HBOC Camp	HBOC: <i>Ann. Bird Rept</i> No. 23
	Aug 20	Broughton Is.		24 birds	Chris Herbert & Liz Crawford	HBOC: <i>Ann. Bird Rept</i> No. 23
2016	Apr 18-20	Broughton Is.		25-30 birds incl. juvs	Alan Stuart <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 24
	Oct 10-12	Broughton Is.		15 birds	Alan Stuart <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 24
2017	Jun 22-24	Broughton Is.		20+ birds	Alan Stuart <i>et al.</i>	HBOC: <i>Ann. Bird Rept</i> No. 25

given the absence of regular organised surveys prior to 1999 (Stuart 1994-2017). Monthly surveys at Swan Bay, which commenced in 2002 (S. Hamonet pers. comm.) were augmented by regular summer and winter water-based surveys commencing a few years later (summer surveys from 2004, winter surveys from 2008). These surveys enabled better coverage of the entire estuary, and hence the counts for Sooty Oystercatcher became more representative of the local status. The data revealed Port Stephens had the second largest group of Sooty Oystercatcher in the Hunter, including many birds considered to be non-breeding (Stuart 2005; Stuart 1994-2017).

Hunter River estuary

Sooty Oystercatcher also occur in the Hunter River estuary (**Table 2**), where they roost mostly on the Kooragang Dykes and forage on oyster banks along the north arm of the Hunter River, west of the Stockton Bridge (Herbert 2007). While only six sightings of 1-3 birds were recorded in this area between 1970 and 1977 (Gosper 1981), data from regular surveys conducted between 2008 and 2017 indicated a monthly average of 15.5 birds.

The population demographic within the Hunter River estuary is uncertain. Movement of birds

between the Newcastle Rock Platforms and the estuary has often been observed, especially when the Rock Platforms have become inundated by high spring tides or heavy wave action during inclement weather (Herbert 2007; R. Nicholas pers. comm.). To date, numbers in the estuary have not exceeded 22 birds. However, between 2004 and 2017 the monthly, non-weather-related, high-count average was of 14 birds (**Table 2**). That suggests the presence of a discrete, resident, estuarine population, which may contain immature birds.

Mainland Coast

Small, mixed groups of 1-8 mature and immature birds also used rocky coastal areas from Newcastle north to the mouth of the Manning River, and from Newcastle southwards to around The Entrance (**Table 2**). There are only occasional reports of the southern birds. More frequent monitoring of the northern coastline in recent years has produced an increase in the number of sightings; however, the total number of birds remains much the same.

Offshore Islands

Sea conditions, difficulty of access, and logistical problems relating to the coordination of boats and

observers are factors which militate against the establishment of a regular regime of offshore island surveys. However, since 2012, Hunter Bird Observers Club in conjunction with NSW National Parks and Wildlife Service, has conducted systematic autumn and spring surveys of the terrestrial birds on Broughton Island, the largest island (132 ha) in an archipelago of smaller islets and rocky crags (Stuart *et al.* 2017). Between 2012 and 2017, Sooty Oystercatcher numbers seemed to be increasing (from 13 to 20+ birds) and they were the most common shorebird on the island (Stuart *et al.* 2017).

Breeding

The Sooty Oystercatcher typically breeds on offshore islands occurring in close proximity to the mainland (Marchant & Higgins 1993; Hansen *et al.* 2014). Sooty Oystercatcher counts in the Hunter Region have been found to peak in February. Their numbers gradually decreased through March, April and May, with winter counts falling to approximately 50% of the February count before rebuilding again through the summer months (**Figure 1**). It is assumed that the annual fluctuation in numbers reflects the movement of breeding birds to offshore island breeding territories, followed by their return in early summer, accompanied by newly fledged young (Herbert 2007; Roderick & Stuart 2010; R. Nicholas pers. comm.).

The indication of breeding success reflected by the mainland count data is not supported by the number of confirmed nesting attempts (**Table 3**). However, as previously stated, visits to offshore islands are infrequent; hence most nests would be unlikely to be discovered. Currently therefore, breeding success by Sooty Oystercatcher is best assessed by monitoring the steady increase in population size indicated by the overall count data, supplemented by regular observations of juvenile and immature birds throughout the known population. However, recruitment of immature birds from breeding territories beyond the Hunter Region may also occur (Stuart 2011).

Access to suitable breeding territory may be restricted by offshore island topography and the fact that resident breeding pairs can occupy the same breeding territory for up to 20 years (Lane 1987). A lack of available nest sites may have led some first-time breeders to attempt nesting on the mainland (Harrison 2009; Ens & Underhill 2014). In the past decade at least three mainland nests have been reported on the far south coast of NSW,

and a possible fourth nest was destroyed before it could be confirmed (Dunn & Harris 2009; Jarman 2010). In 2011, a nest, possibly built by an inexperienced pair that was unable to find an offshore site, was found on One Tree Island, in the Port Stephens estuary (Stuart 2011). Technically this nest qualifies as an island nest, but the island is located *c.* 13 km inland from the coast (Google Earth, accessed 30 April 2019). It is unclear whether mainland nests are an anomaly or a response by first-time breeders to a scarcity of traditional breeding territory.

Habitat preference

Sooty Oystercatcher is a marine coastal species typically found in small groups along rocky sections of the shoreline. It is more numerous where offshore islands lie in close proximity to the mainland (Lane 1987; Marchant & Higgins 1993). The rocky topography along the Hunter Region coastline matches this description, particularly in the vicinity of Port Stephens and Newcastle, where the largest congregations of birds occur (**Table 2**). Sessile prey (algae and invertebrates) a major component of the Sooty Oystercatcher diet, tends to attach to rock surfaces; also, many of the coastal rocks, which are dark in colour due to their volcanic origin, provide background camouflage for roosting and foraging birds (Creese *et al.* 2009; Gilmore 2014).

Sooty Oystercatchers are also found in estuaries, inlets, mud flats, sandy shores and reefs (Lane 1987; Marchant & Higgins 1993). There are three main estuaries within the study area. While surveys in the Manning Estuary have been semi-regular, survey efforts in the Hunter and Port Stephens estuaries have been consistent over the past decade, during which time increasing numbers of Sooty Oystercatcher have been recorded.

The largest estuary, located within the Port Stephens-Great Lakes Marine Park, has extensive (~1000 ha) seagrass beds, and much of the relatively undeveloped shoreline has tracts of mangrove-lined, muddy substrate. These are factors which are prerequisites for the reliable production of the marine biota needed to underpin the shorebird prey-base (Creese *et al.* 2009; Port Stephens Council 2016). Benthic sampling carried out during 2012-2014 indicated that the biodiversity of organisms in the substrate was relatively unaffected by shoreline development, marine enterprise or recreational activity (Stuart & Wooding unpublished).

In 2007, the demolition of an oyster processing facility at Swan Bay, in the western basin, exposed a ~110 m² cement slab (B. Clulow pers. comm.) which has since become an important roost for a variety of shorebirds, waterbirds, gulls, terns and oystercatchers (Wooding 2016). Prior to the demolition, 1-2 Sooty Oystercatcher routinely roosted on the breakwater at the rear of the site. Since the demolition, the numbers of roosting Sooty Oystercatcher at this site have increased, to 30-40 birds now (**Table 2**). The incoming and outgoing flight direction of the Sooty Oystercatcher using the roost usually has been to the north or south, which suggests that these birds forage around the estuary's western mud flats. The birds at this location were mostly immature (LW pers. obs.). It is thought that estuarine habitat may be of particular importance for the survival of maturing birds (Stuart 2005).

The rugged nature of the Hunter's offshore islands has been a natural deterrent to human visitation, and, as protected Nature Reserves, most islands have remained relatively pristine (NSW National Parks and Wildlife Service 2002; Stuart *et al.* 2017). The Hunter Region offshore islands are not dissimilar to islands where successful breeding activity was recorded in regional studies to both the north and south of the Hunter (Dunn & Harris 2009; Harrison 2009; Jarman 2010). Sooty Oystercatchers have been sighted on eight of the eleven offshore islands of the Hunter Region, and nests have been found on six of them (**Table 3**). There are no records for Little Island, Looking Glass Island or Inner Rock, but it should be noted that only brief visits (1 to 2 h) have been made to these islands to check for seabirds; therefore, the presence of Sooty Oystercatcher may have been overlooked (Lane 1976; Carlile *et al.* 2013a, 2013b).

Diet

Sooty Oystercatcher prey base is largely sessile and only available during low tide. However, Chafer (1994) is of the opinion that optimal dietary choice in predators with foraging time constraints is more catholic than might be expected. The Sooty Oystercatcher is known to use prey-specific foraging techniques to select prey from eleven morphologically different intertidal taxa, and while molluscs may be preferred, their consumption of crustaceans, echinoderms, polychaetes, ascidians and insects is well documented (Chafer 1994; Harrison 2009; Ens & Underhill 2014; Hansen *et al.* 2014). No dietary studies have been undertaken in the Hunter Region, but population stability

suggests an adequate prey base. Benthic collections conducted throughout 2012-2014 at eight sites within the Port Stephens estuary found that the distribution of benthic species was both varied and abundant (Stuart & Wooding unpublished).

Behaviour

Sooty Oystercatcher tend to be rock specialists, but they are known to co-exist with sand-foraging Australian Pied Oystercatcher *H. longirostris* in areas where their individually preferred habitats overlap (Schultz 1995; Harrison 2009). Reports of interbreeding are rare (Collins *et al.* 1999). In the Hunter Region it is not uncommon for both species to be found foraging and roosting together on rocky outcrops, at coastal sites where a sand/rock interface occurs, and on tidal mudflats and high-tide roosts within estuaries.

Implications for the future

The combined impact of human pressure from Australia's coastal culture and the predicted rise in sea level and sea temperature is expected to have an increasing effect on coastlines in coming decades (Hansen *et al.* 2014). It seems inevitable that all marine coastal species will encounter habitat contraction, prey-base decline, increased pollution and greater human disturbance (Harrison 2009; Ens & Underhill 2014). A preference for remote breeding locations may offer some protection for Sooty Oystercatcher; however, shrinkage of inter-tidal foraging zones may place them at great risk, especially in estuarine areas that support immature birds. In long-lived species it may take years before it becomes evident that events affecting one phase of the life-cycle of a species have resulted in population decline (Harrison 2009).

CONCLUSIONS

Conditions within the study area would appear to be favourable for Sooty Oystercatcher, and the steadily increasing population seems to be consistent with similar population increases reported in studies conducted on coastlines to the north and south of the Hunter Region (Dunn & Harris 2009; Harrison 2009; Jarman 2010). An indication of the change is that the status of the species in the Hunter Region has changed from Uncommon Resident (1995) to Resident (2008) (Stuart 1994-2017; Roderick & Stuart 2010). Although this is a positive sign, sadly rare among

shorebirds today, the Hunter population when viewed from a state and national perspective, remains small (Watkins 1993; Delany & Scott 2006; NSW Scientific Committee 2008; Wetlands International 2018). The recovery potential of a small population existing within a limited and ecologically specialised habitat could become compromised by human and environmental pressures, therefore, the continued conservation ranking of Vulnerable seems warranted (NSW Scientific Committee 2008; Harrison 2009).

The extent of Sooty Oystercatcher breeding activity on the Hunter coast is unresolved. The fact that immature birds have been recorded at most mainland locations suggests that successful local nesting has boosted population numbers. However, few nests have been reported, and there have been no follow-up visits to report on the success or failure of known nesting attempts. The possibility that immature birds from outside the region are attracted to the Hunter's estuaries cannot be proven or eliminated. While the common problems of logistics and difficulty of access has protected island environments, it has also impeded ornithological investigation. It is possible that future Broughton Island surveys, should any occur during the nesting season, could provide further insight to breeding on that island. An organised investigation of the other offshore islands seems unlikely at this time.

A contraction of foraging, roosting and nesting habitat has a tendency to bring nature and humans into ever closer contact; historically that association has been disastrous for nature (Harrison 2009). In the case of the Sooty Oystercatcher, further study is clearly needed if the species is to be better understood, protected and sustained in the face of future ecological stress. Continued surveys would seem to be essential to that process.

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