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Report on the 2024 Biennial Hooded Plover Population Count

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Summary

The Hooded Plover (*Thinornis cucullatus cucullatus*) Biennial Count, occurring since 1980, rallies hundreds of skilled participants across eastern mainland Australia to survey suitable ocean beach habitat for Hooded Plovers (eastern subspecies) over several weeks in November. During this count, all other species of resident beach-nesting birds, including several tern species, are also recorded, enabling an assessment of the use of ocean beach habitats by these species. Fixed survey routes, first established in 2010, are surveyed during the biennial count so that direct comparisons of species abundance can be made across years. During the 2024 count:

- 2,770 kilometres of suitable coastline (i.e., Hooded Plover habitat) was identified in New South Wales, Victoria, and South Australia, of which 2,441 km (88%) was surveyed.
- A total of 1,642 Hooded Plovers (1,607 adults and 35 juveniles) were counted, comprising approximately 55% of the estimated world population of 3,000 birds (eastern subspecies) and 91% of the estimated mainland breeding population of 1,800 birds.
- Regionally, Hooded Plover numbers were distributed as follows:
    - In Victoria (85% of habitat surveyed): 682 Hooded Plovers (679 adults and 3 juveniles).
    - In South Australia (89% of habitat surveyed): 892 Hooded Plovers (860 adults and 32 juveniles).
    - In New South Wales (99% of habitat surveyed): 68 Hooded Plovers (68 adults and 0 juveniles).

For the first time in the biennial count's history, three regions of south-west Western Australia were also included in the 2024 count. Over 117 kilometres of suitable Hooded Plover habitat was surveyed in Mandurah to Busselton, Margaret River, and Denmark and West regions. A total of 67 Hooded Plovers (62 adults and 5 juveniles) were counted which constituted 3% of the estimated world population of 2,250 birds of the western subspecies of Hooded Plover (*Thinornis cucullatus tregellasi*).

A comparison of numbers in the south-eastern states with the 2022 count (1,664 Hooded Plovers; 2,589 km surveyed) revealed there were 22 fewer Hooded Plovers counted during the 2024 count (2,441 km surveyed). Within regions, there appeared to be a significantly higher number of Hooded Plovers in the regions of Eyre Peninsula (+71 birds), Yorke Peninsula (+24 birds), Coorong (+19 birds), and Warrnambool to Yambuk (+11 birds). Six other regions experienced an increase of between 1 to 9 birds. Fourteen regions experienced decreases in recorded Hooded Plover numbers of between 1 to 23 birds, however nine of these were associated with a decrease in survey coverage compared with the 2022 count.

The highest densities of Hooded Plovers were recorded in the regions of Warrnambool to Yambuk (2.07 birds/km) in far west Victoria, followed by San Remo to Inverloch (2.02 birds/km) on the Bass Coast, Mornington Peninsula (1.72 birds/km), Wilsons Prom to Waratah Bay (1.65 birds/km) in South Gippsland, and Kangaroo Island (1.51 birds/km) in South Australia. All these regions have been flagged as having the highest densities in the four previous counts, as well.

Introduction

The biennial Hooded Plover (*Thinornis cucullatus cucullatus*) counts began in 1980 after initiation by the Australasian Wader Studies Group and from the 1990s, they were coordinated by Birds Australia, and then BirdLife Australia. The biennial count is a census-style count aimed at occurring over a single weekend in mid-November aimed at providing an accurate estimate of population size and distribution of the mainland Hooded Plover (eastern subspecies) population. The timing of the count coincides with when most Hooded Plovers are firmly established on their breeding territories, minimising the possibility of inaccurate counting due to bird movements. The count has always included Victorian and South Australian coastlines and has expanded in recent years to include most of the southern New South Wales coastline extending as far north as Jervis Bay. The count does not typically include the Western Australian coastline which is inhabited by the western subspecies of the Hooded Plover (*Thinornis cucullatus tregellasi*). However, for the first time in the biennial count's history, three regions in south-west Western Australia – Mandurah to Busselton, Margaret River, and Denmark and West - were included in the 2024 count.

This report details the results of the 2024 Hooded Plover biennial count, held on 16–17th November 2024. The count was successful with many regions experiencing good weather conditions. However, some regions experienced extreme heat resulting in high fire danger conditions. This restricted not only the ability of count participants to conduct surveys due to health and safety concerns but also access to the coastline especially where beaches were located within national parks (closed due to high fire danger), resulting in decreased survey coverage. A total of 372 participants undertook 624 surveys, totalling approximately 931 hours of surveying (not including travel to and from their designated survey routes) in South Australia, Victoria and New South Wales. In Western Australia, 37 participants undertook 64 surveys, totalling approximately 70 hours of surveying. The number of surveys exceeds the number of established survey routes due to some routes being split and synchronously shared amongst participants for logistical reasons as well as the inclusion of a few ad-hoc routes where Hooded Plovers were recorded. A total of 2,441 kilometres (88%) of suitable coastline habitat was surveyed in the three south-eastern states, extending from 250 kilometres west of Ceduna in South Australia to just south of Jervis Bay in New South Wales. In south-west Western Australia, a total of 117 kilometres (27%) of suitable coastline habitat was surveyed, extending from the Yalgorup National Park south of Mandurah to Ocean Beach in Denmark.

Currently, the population of the eastern subspecies of the Hooded Plover which occurs in South Australia, Victoria, Tasmania, and New South Wales, is estimated at 3,000 birds, and listed as Vulnerable [Category C1 + 2a (ii)] in The Action Plan for Australian Birds 2010 (Garnett *et al.* 2011). In late 2014, the eastern subspecies was listed as Vulnerable on the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), recognising substantial population declines, and the need for more extensive management measures to improve its conservation status.

Prior to the establishment of fixed survey routes in 2010 as part of standardising biennial count surveys, the Hooded Plover population in Victoria was estimated to be between 450 and 550 birds, based on counts between 2006 and 2010. In New South Wales, the population was estimated to be 50 birds, based on regular surveys during the breeding season (New South Wales National Parks and Wildlife Service), and in South Australia, estimates of between 600 and 800 birds in the population were made based on data collected from biennial counts and extrapolations made for areas that had not been surveyed.

Methods

Coordination

A part-time (1 day per fortnight) count coordinator based at BirdLife Australia coordinated the biennial count and was primarily responsible for liaising with regional count coordinators, participants, and land managers to ensure that the count occurred within the specified timeframe across all three south-eastern states. For the three regions in Western Australia, regional count coordination assistance was provided by the Beach-nesting Birds Program Project Officer who was based in Denmark. As part of the count coordinator's role, a meeting was held with the regional count coordinators well in advance of the count weekend to plan the count and discuss any potential issues that could impact the delivery of the count. A major task of the count coordinator's role is to ensure that all the data is collected using standardised data sheets, following survey instructions and strict survey routes determined in previous counts. Furthermore, the count coordinator ensures that all collected count data is collated, entered, vetted, analysed, and mapped. The count coordinator then uses this information in compiling the final report. Kasun Ekanayake was the count coordinator in 2024.

Survey design

No changes were made to the well-established survey methods that were followed in 2022. The timing of the count and the time span within which surveys are conducted, are two critical aspects of the biennial count. Bird movements are likely to be minimal since the count is timed to coincide with the peak of the breeding season when territory occupancy is highest (mid to late November), and most pairs are at least on their first nesting attempt for the breeding season. However, if the survey window was to be particularly wide, there is an increased risk of double counting due to possible bird movements (e.g., because of birds not yet settled on a territory or experiencing failed breeding). Therefore, it is important that the bulk of the census is undertaken in as short a time span as possible.

In summary, participants were instructed to survey a predefined section of coastline in mid-November 2024 in suitable weather and tide conditions, recording all observations of beach-nesting birds, including terns. To avoid double-counting, participants were instructed to count birds on survey routes in one

direction only. Information on evidence of nesting and the presence of threats and invasive weeds was also collected for each observation where possible.

Smart phone app for recording data

In 2019, the online portal for entering biennial count data was made available in BirdLife Australia's Birdata smart phone app on iPhones and Android smart phones, ready for the 2020 count. After the successful uptake of the phone app in 2020 and 2022, survey participants were encouraged to input their data directly into the app using the Beach-nesting Birds Program survey form in the field for the 2024 count as well. Where this was not possible, participants were supplied with data sheets which were the same as those used in previous counts and then encouraged to enter their data through the smart phone app or website at home. The ability for participants to directly enter their own data into the portal enables a greater efficiency in data collection as well as reduces the likelihood of data entry errors and minimises the time lag between data collection. It also enabled the count coordinator to quickly identify data that had not yet been submitted, so that missing data could be tracked closer to survey participation dates before it was potentially lost or misplaced. Participants were provided with detailed instructions on how to obtain a login to Birdata (note: this is a different system and data collection methodology to the MyBeachBirds data portal) and ongoing support on how to enter their biennial count data.

Development of the Beach-nesting Birds Program survey form within the Birdata app was supported by BirdLife Australia through funding from the Australian Government's National Landcare program and by the generosity of BirdLife Australia supporters.

Use of defined survey routes

Although Hooded Plover biennial counts have been undertaken since 1980, the capacity to compare each count over time has been limited (Glover 2008), particularly because in earlier years there was no determination of the lengths and proportions of suitable habitat surveyed on each count. The 2010 biennial count was the first to report the length of suitable coastline surveyed and to relate this to the density of birds observed. From continuing these methods, it is now possible to make further meaningful interpretations of what bird numbers might mean between years. As described in Ewers *et al.* (2011), it is essential to be able to quantify the length of the coastline surveyed in order to assist with interpretation of bird numbers.

For the purposes of organising such an extensive census, the entire coastline of the south-eastern mainland of Australia was divided into 24 regions across three states, and into three regions in south-west Western Australia. These regions are based on historical count regions and often land management or Natural Resources Management (NRM) regional boundaries. They are not equal in size or availability of suitable habitat.

Each region was assigned one or multiple regional count coordinators (local land managers or volunteers) who organised count participants to survey the routes in their designated region. In many cases, regional count coordinators had fulfilled the same role for several biennial counts, providing much needed local

knowledge and consistency across years. Regional count coordinators were instructed to assign people to survey as many of the survey routes in their designated region as possible, and to inform the count coordinator if any routes were not going to be covered prior to the count weekend so alternative arrangements could be investigated.

Using the 2022 set of survey route start and finish points, each regional coordinator was provided with survey maps for the routes in their region in August 2024 for further review to ensure all suitable Hooded Plover habitat was still encapsulated. Each map covered what appeared to be suitable Hooded Plover habitat based on historical range, expert knowledge, and assessment of habitat features (typically high energy/surf beaches backed by dunes). For the 2024 count, adjustments were made to six routes, and 131 new routes were added which included 119 routes encompassing suitable habitat in the three regions of south-west Western Australia.

This was the eighth count where fixed routes have been used with success. In some areas there is probably a case to be made for removing certain beaches from the standard list or to reduce survey effort in areas with low habitat quality, and/or very low bird densities (see Discussion).

Threat assessments

Of as much value as understanding the abundance and distribution of Hooded Plovers and other beach-nesting bird species on ocean beaches, is understanding the threat levels to which each site is exposed where these birds occur (observation location). Effective conservation management is built around mitigating threats at breeding sites, so it is critical to know what these threats are and how threatened these sites are relative to one another.

While a proportion of the mainland Hooded Plover population is monitored intensively during the breeding season and threats are recorded during each visit using the MyBeachBirds data portal, for other sites that are rarely visited, the biennial count provides an opportunity to assess the range and relative severity of threats that the birds may be encountering there

Whenever a beach-nesting bird was observed during the count, participants were instructed to note all the key threats present on the beach within a 100 m radius of the observation. This data is used to devise a crude scoring system for threats at sites and to devise heat maps to signal how threatened the birds are at each site.

The threat score was calculated based on the presence and type of threat:

5=	Vehicles/ Horses/Stock	**4=**	Dogs off leash/ Dune use	**3 =**	Dogs on leash/ Evidence of people/Dog prints/Cats/Foxes/Deer

Threat types are scored individually and summed to provide an overall score for a particular observation. For vehicles, for which three subtypes exist (4WD, trail bike, quad bike/ATV), the presence of each of these is scored separately. Similarly, 'evidence of people' consists of two subtypes: presence of human prints above the high tide line and presence of people on the beach.

Threats given a score of higher than 3 are rated as having a greater impact because they:

a. have multiple impacts on the birds, their eggs and chicks as well as their physical habitat,
b. are generally present across a greater cross-section of the birds' habitat (i.e., water's edge, beach and dunes),
c. are more difficult to mitigate (e.g., roaming stock, unregulated horse, or vehicle access) and,
d. are known to inhibit successful breeding.

Five score categories were used, in line with the previous three biennial counts (Driessen and Maguire 2015), ranging from very low threat levels (green) to extreme threat levels (purple, generally only encountered in a suburban beach context or at a recreational hotspot):

- Green, score of 0-3,
- Yellow, score of 4-8,
- Orange, score of 9-13,
- Red, score of 14-23; and,
- Purple, score of 24 or more.

Through grouping the threat scores into fixed categories for each biennial count, approximate trends in threat levels across regions and years emerge. This is useful both as a high-level indicator – i.e., trends in threat levels across different states – as well as a local conservation management aid.

Data entry and analysis

BirdLife Australia's Birdata web portal was used to record and manage the biennial count data using the custom-built Beach-nesting Birds Program survey form. Count data were entered directly into Birdata by either the count participant or regional count coordinator. The data were then exported into Microsoft Excel for analysis and to produce maps.

Data vetting

There was still a strong need for data vetting in data entered both online and from paper data sheets. Ten percent of surveys were entered through the website on behalf of the person/people conducting the survey. A common problem when entering data from data sheets is in relation to the recorded Global Positioning System (GPS) coordinates. There are different formats of coordinates that describe a position on a map, and they are available as options on hand-held GPS units. The biennial count instructions and data sheets contained examples of the format of coordinates that should be used for the count. The format "decimal degrees" was preferred (DDD.DDDDD°; e.g., 38.540903°S 145.438145°E) as much of our data is collected using this format to allow for consistency across years. A proportion of the data still came

back in the formats of degrees minutes seconds (DDD° MM' SS.SS”; e.g., 38° 32' 27.25"S 145° 26' 17.32"E), degrees and decimal minutes (DDD° MM.MMM'; e.g., 38° 32.454'S 145° 26.289'E) and Universal Transverse Mercator (UTM; e.g., 55 H 363882.80m E 5733011.78m S). All these different formats represent the same spot on a map, but when multiple formats are used, conversion calculators are required to convert locations into decimal degrees where an element of accuracy is lost during conversion as well as significantly slowing down data processing.

Another error that was detected during vetting was survey data belonging to multiple survey routes being combined and entered as one ad-hoc route instead of several entries in Birdata with each entry relating to a unique survey route. This creation of ad-hoc routes leads to the initial assumption that survey routes have not been surveyed and eventually resulting in the count coordinator having to manually separate the observations out into their respective survey routes. Another common error when entering data online was creating a separate survey for each individual observation instead of recording each observation within the one survey. Where this occurred, observations had to be consolidated into the one survey. Alternatively, in some instances where no birds were sighted during a survey, the survey was not entered into Birdata. However, it is still important to record that the survey occurred despite no birds being observed.

Birdata uses predefined polygons to encompass each survey route into which participants plot their observations. In the 2024 count, survey participants were able to enter bird observations even if they fell outside of these boundaries (if a sighting fell outside of the boundaries, Birdata would show a warning enabling users to double check their coordinates before submitting their data). These sightings were then manually checked, with the majority falling on extensive sand flats, spits or dunes that are not always captured in the route boundaries due to their dynamic nature over time and variations in satellite imagery. Observations of birds other than of Hooded Plovers that occurred well outside of the route boundaries were excluded from further analyses.

Mapping

All existing survey routes were digitised in a Geographic Information System (GIS) environment, using ArcGIS Pro software. Existing spatial coastline data was used to provide an accurate basis for the complexity of the coastline along each survey route – i.e., each route was digitised in accordance with the layout of the landscape, not ‘as the crow flies’. Subsequently all surveyed and non-surveyed routes (or sections thereof) were similarly digitised in ArcGIS Pro, providing an overview of regional coverage. Count data (observations) were imported into ArcGIS Pro to allow for the creation of maps as well as spatial querying of the dataset.

Results

Results of only the three south-eastern states - South Australia, Victoria, and New South Wales – are presented in the main body of the report for ease of comparison with previous count reports whereas results of the three south-west Western Australian regions are presented separately.

Survey timing and effort

The majority of surveys for the 2024 biennial count were undertaken in the third week of November, coinciding with the target count weekend and two days either side of the count weekend (Figure 1). Out of all count data, 33% was collected during the official count weekend. Within four days of the count weekend (the day before to the day after the count weekend), 53% of all data was collected, while 86% of data was collected within 10 days of the count weekend. This outstanding effort from participants across the three states resulted in 98% of all data being collected during November. Less than 1% of all count data was collected outside of November and December due to access limitations related to remoteness of some survey routes (e.g., islands).

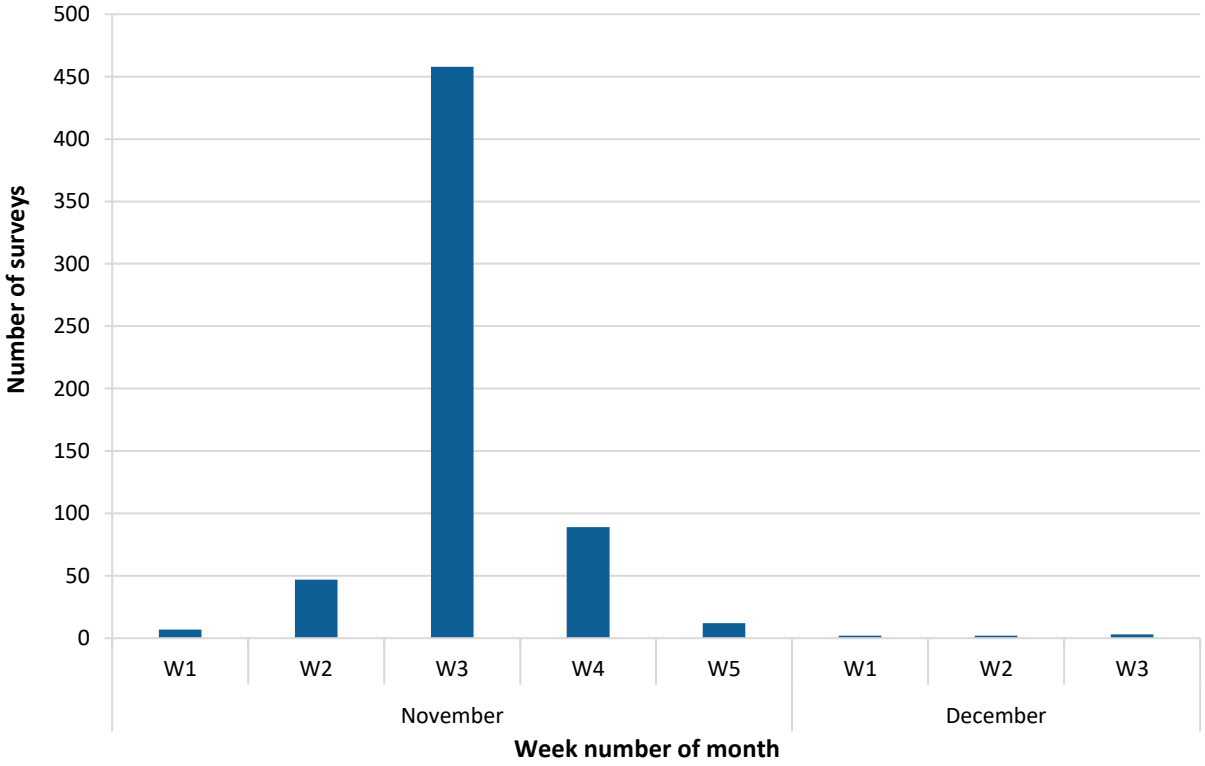


Figure 1. Distribution of the 2024 biennial count surveys in time.

Overall beach-nesting shorebird numbers

In the 2024 biennial count, a total of 1,642 Hooded Plovers (1,607 adults and 35 juveniles) were counted across 88% of suitable coastline of south-eastern mainland Australia (Table 1; Appendices 1-3). That constituted 91% of the estimated number of birds in the mainland population and 55% of the world population (eastern subspecies). In a global context, counts for Hooded Plover, Red-capped Plover (*Charadrius ruficapillus*), Pied Oystercatcher (*Haematopus longirostris*), and Sooty Oystercatcher (*Haematopus fuliginosus*) represent internationally important numbers i.e. greater than 1% of the global population (Table 1). While the count is not intended to census the populations of the latter three species, it does reveal that ocean beach habitats on the eastern mainland provide important habitat for them. For Pied Oystercatchers in particular, the count surveys a high proportion of their preferred habitat.

Table 1. Overview of the 2024 biennial count results (adults and juveniles) in an international context.

	Hooded Plover	Red-capped Plover	Pied Oystercatcher	Sooty Oystercatcher
Victoria	682	216	793	257
South Australia	892	1,895	987	505
New South Wales	68	99	136	50
Total	**1,642**	**2,210**	**1,916**	**812**
Global population*	3,000	95,000	11,000	11,500
Importance	**55%**	**2%**	**17%**	**7%**
* estimates from The Action Plan for Australian Birds 2020 and Wetlands International 2024.				

A regional and state breakdown of total counts reveals that for Hooded Plovers, similar to previous counts, the regions of Yorke Peninsula, Eyre Peninsula, and Kangaroo Island (all in South Australia), and Warrnambool to Yambuk (in Victoria) all support significant numbers of the species (Table 2, Figure 2a). It is important to note that the size of these regions relative to their Hooded Plover populations varies significantly, thus Figure 2b of the density of birds relative to area provides a meaningful depiction of high value sections of coastline. In comparison with the 2022 count, the overall Hooded Plover numbers decreased in Victoria by 10% whereas a 6% increase was detected in South Australia. A 5% increase in overall numbers was also detected in New South Wales with an 8% increase in adult birds. The variations in survey coverage between the 2022 and 2024 biennial counts must be considered in examining these changes in overall Hooded Plover numbers in each state.

Juvenile Hooded Plovers made up approximately 2.1% of the total species count. Given the timing of the count within the breeding season, only August to mid-September nesters would have flying juveniles by mid-November. These would be the earliest nesting attempts and so this proportion of juveniles is not unexpected. Interestingly, Eyre Peninsula had a higher proportion of juveniles (6.6% of species count made up of juveniles) than other regions. It is one of the regions in south-eastern Australia where Hooded

Plover pairs begin to nest the earliest in the breeding season and the higher proportion of juveniles suggest that it has experienced high rates of chick survival in the early part of the season.

The overall number of Red-capped Plovers on ocean beaches suffered a significant decrease in the 2022 count (41% decrease) compared with the 2020 count. However, the trend was reversed in the 2024 count where a significant increase (29%) was detected in comparison to the 2022 count. As with previous counts, the number of Red-capped Plovers in South Australia is considerably higher compared with Victorian and southern New South Wales beaches (Table 2, Figures 3a and b). In South Australia, Red-capped Plovers were recorded in large numbers in Eyre Peninsula, Yorke Peninsula, Ceduna and West, and Coorong regions. Of the total number of Red-capped Plovers recorded for the state, 6.3% were juveniles. In Victoria, the highest number of Red-capped Plovers were recorded in the Seaspray to Corner Inlet region closely followed by Warrnambool to Yambuk. Only four juveniles were recorded in the entire state. Lower numbers of the species were scattered throughout the other Victorian regions surveyed. This species occupies a broad range of habitats that were not surveyed, including low-energy beaches and wetlands. These habitats may instead be the preferred habitat for this species in Victoria. In New South Wales, the beaches in New South Wales South region had 119% more Red-capped Plovers than the beaches in the North region, which included five juveniles.

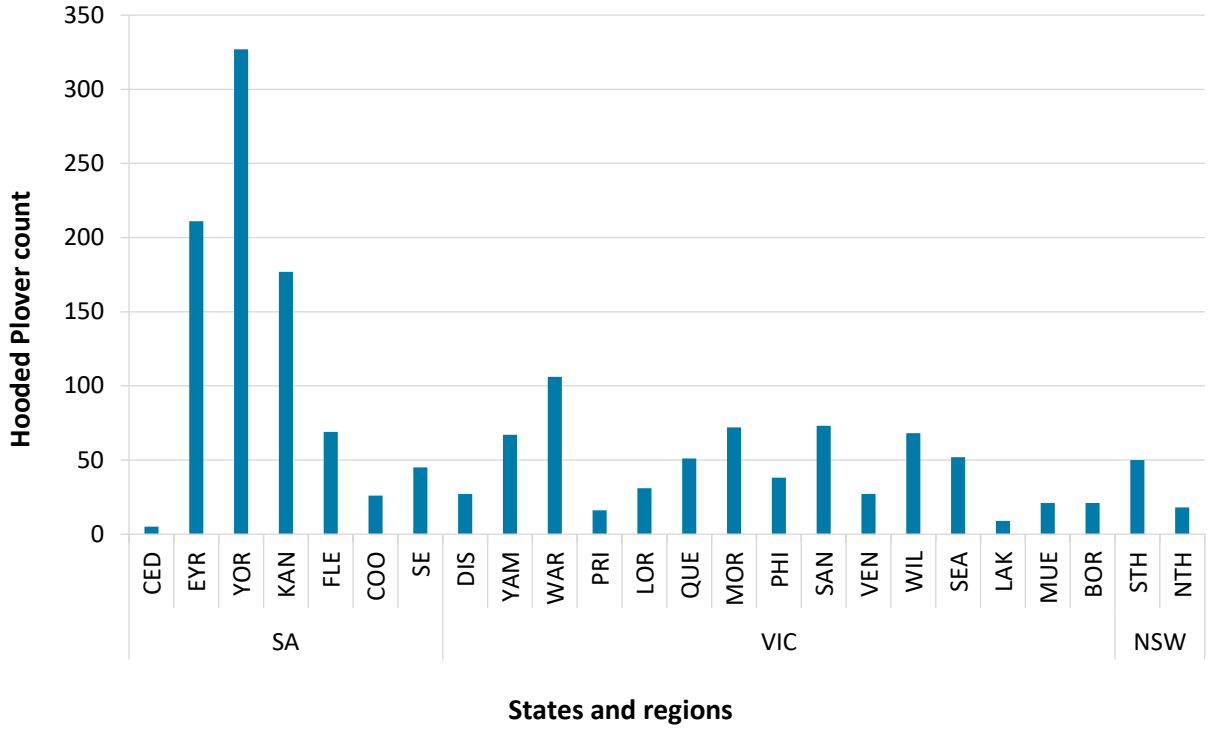
As with previous counts, relatively large numbers of Pied Oystercatchers were recorded in South Australia, far-western Victoria and Corner Inlet (Table 2, Figures 4a and b). Corner Inlet, Yambuk to Swan Lake, Coorong, Kangaroo Island, Yorke Peninsula, Eyre Peninsula, and Ceduna and West regions each support internationally important numbers of Pied Oystercatchers (exceeding 1% of the global population). A 30% increase in the total number of Pied Oystercatchers was detected in Victoria where significant increases were detected in Seaspray to Corner Inlet and Lake Tyers to Seaspray regions. The highest number of juveniles were also recorded in Victoria and interestingly, all 33 juveniles recorded were sighted in the Yambuk to Swan Lake region. In South Australia, the total number of Pied Oystercatchers decreased by 15% with significant declines evident in Ceduna and West and Kangaroo Island regions. In New South Wales, the total number of Pied Oystercatchers increased by 66% compared with the 2022 count. Both New South Wales South and North regions experienced increases with the North region experiencing the most significant increase. Both regions collectively harboured just over 1% of the global population. Given its Endangered conservation status in New South Wales (fewer than 200 breeding pairs in the state; Office of Environment and Heritage, NSW 2025) and the fact that some of the remote beaches in the south provide important habitat for the species, it may be prudent to closely monitor their numbers.

Sooty Oystercatchers were found in relatively large numbers in Ceduna and West, Eyre Peninsula, and Yorke Peninsula regions (all in South Australia) however, densities were quite low (Table 2, Figures 5a and b). This high abundance relative to other parts of the coast may be attributed to the rocky coastline and the presence of offshore islands in these regions, as this is the preferred habitat of the species. The highest number in Victoria was recorded in Wilsons Prom to Waratah Bay region while New South Wales North region had the highest recorded numbers in New South Wales (Table 2). In comparison with 2022, the overall numbers remained relatively unchanged in both Victoria and New South Wales whereas there was a 29% decrease in South Australia. A reliable estimate of the population of Sooty Oystercatchers in the

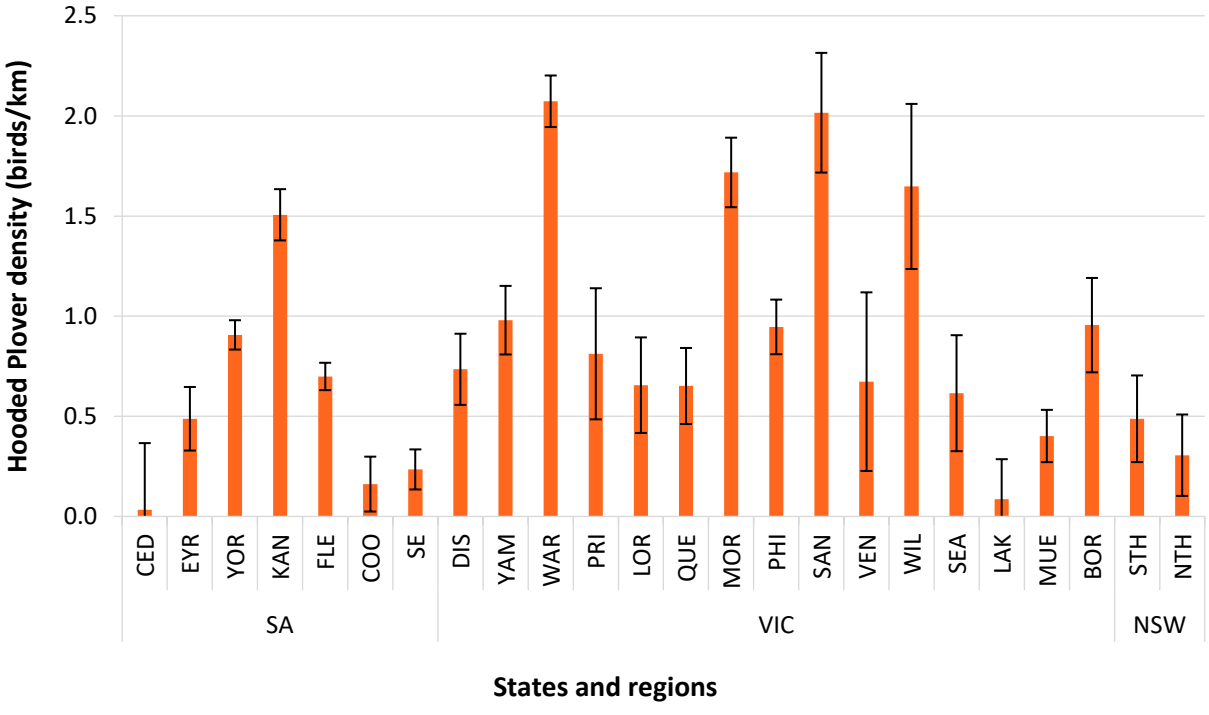
southern mainland of Australia is difficult to be determined through the Hooded Plover biennial count as it does not target their prime habitat.

Table 2. Results of the 2024 Hooded Plover biennial count (by state and region).

REGION	Hooded Plover			Red-capped Plover			Pied Oystercatcher			Sooty Oystercatcher		
	Adult	Juv.	Total	Adult	Juv.	Total	Adult	Juv.	Total	Adult	Juv.	Total
Victoria												
1. NSW Border to Point Hicks	21	1	**22**	3	0	**3**	20	0	**20**	8	0	**8**
2. Mueller River to Lake Tyers	21	0	**21**	0	0	**0**	38	0	**38**	0	0	**0**
3. Lake Tyers to Seaspray	9	0	**9**	5	0	**5**	90	1	**91**	3	0	**3**
4. Seaspray to Corner Inlet	52	1	**53**	49	3	**52**	328	3	**331**	38	0	**38**
5. Wilsons Prom to Waratah Bay	68	0	**68**	3	0	**3**	6	0	**6**	28	0	**28**
6. Venus Bay	27	0	**27**	0	0	**0**	2	0	**2**	2	0	**2**
7. San Remo to Inverloch	73	0	**73**	0	0	**0**	5	1	**6**	36	0	**36**
8. Phillip Island	38	0	**38**	16	0	**16**	18	0	**18**	41	0	**41**
9. Mornington Peninsula	72	0	**72**	7	0	**7**	0	0	**0**	40	0	**40**
10. Queenscliff to Lorne	51	1	**52**	32	0	**32**	9	0	**9**	3	0	**3**
11. Lorne to Princetown	31	0	**31**	0	0	**0**	8	0	**8**	11	0	**11**
12. Princetown to Warrnambool	16	0	**16**	0	0	**0**	1	0	**1**	4	0	**4**
13. Warrnambool to Yambuk	106	0	**106**	50	0	**50**	52	2	**54**	35	2	**37**
14. Yambuk to Swan Lake	67	0	**67**	27	1	**28**	116	1	**117**	5	1	**6**
15. Discovery Bay	27	0	**27**	20	0	**20**	92	0	**92**	0	0	**0**
VIC Total	**679**	**3**	**682**	**212**	**4**	**216**	**785**	**8**	**793**	**254**	**3**	**257**
South Australia												
16. Southeast South Australia	45	0	**45**	41	3	**44**	41	0	**41**	37	1	**38**
17. Coorong	26	4	**30**	233	60	**293**	166	0	**166**	10	0	**10**
18. Fleurieu Peninsula	69	0	**69**	25	0	**25**	52	0	**52**	10	1	**11**
19. Kangaroo Island	177	6	**183**	50	0	**50**	157	1	**158**	32	0	**32**
20. Yorke Peninsula	327	7	**334**	517	34	**551**	137	2	**139**	139	1	**140**
21. Eyre Peninsula	211	15	**226**	593	11	**604**	305	7	**312**	204	3	**207**
22. Ceduna and West	5	0	**5**	317	11	**328**	115	4	**119**	67	0	**67**
SA Total	**860**	**32**	**892**	**1776**	**119**	**1895**	**973**	**14**	**987**	**499**	**6**	**505**
New South Wales												
23. New South Wales South	50	0	**50**	63	5	**68**	85	0	**85**	20	0	**20**
24. New South Wales North	18	0	**18**	30	1	**31**	50	1	**51**	30	0	**30**
NSW Total	**68**	**0**	**68**	**93**	**6**	**99**	**135**	**1**	**136**	**50**	**0**	**50**
Grand Total	**1607**	**35**	**1642**	**2081**	**129**	**2210**	**1893**	**23**	**1916**	**803**	**9**	**812**

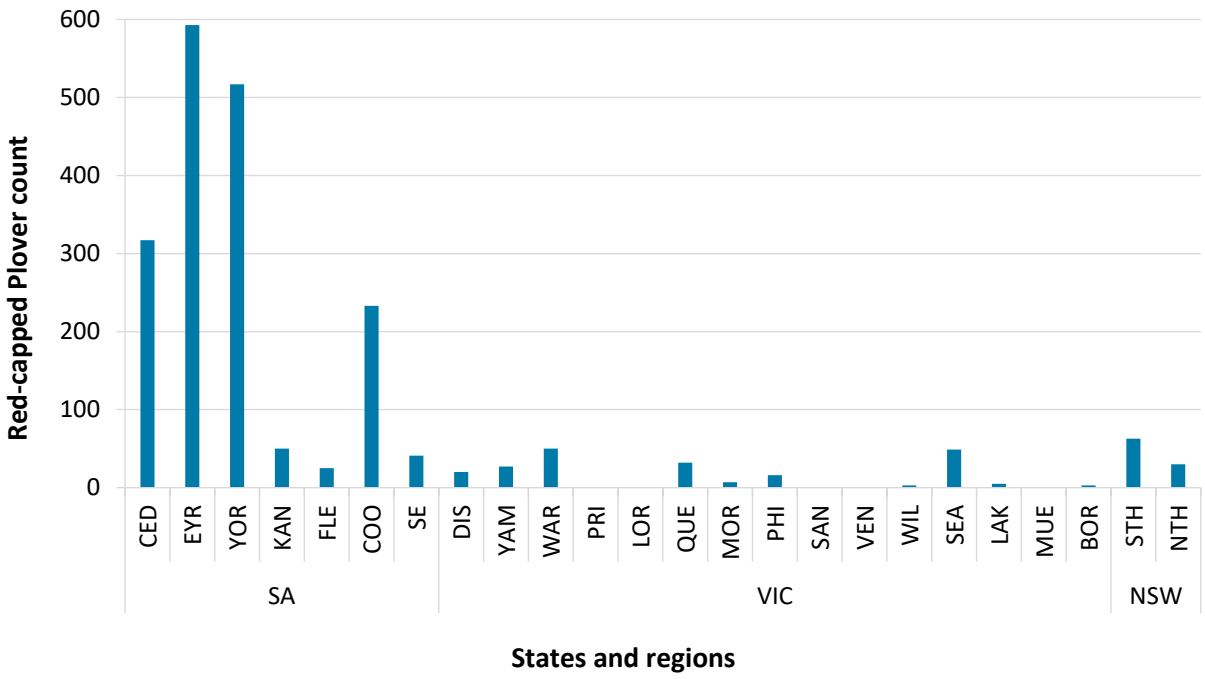


(a)

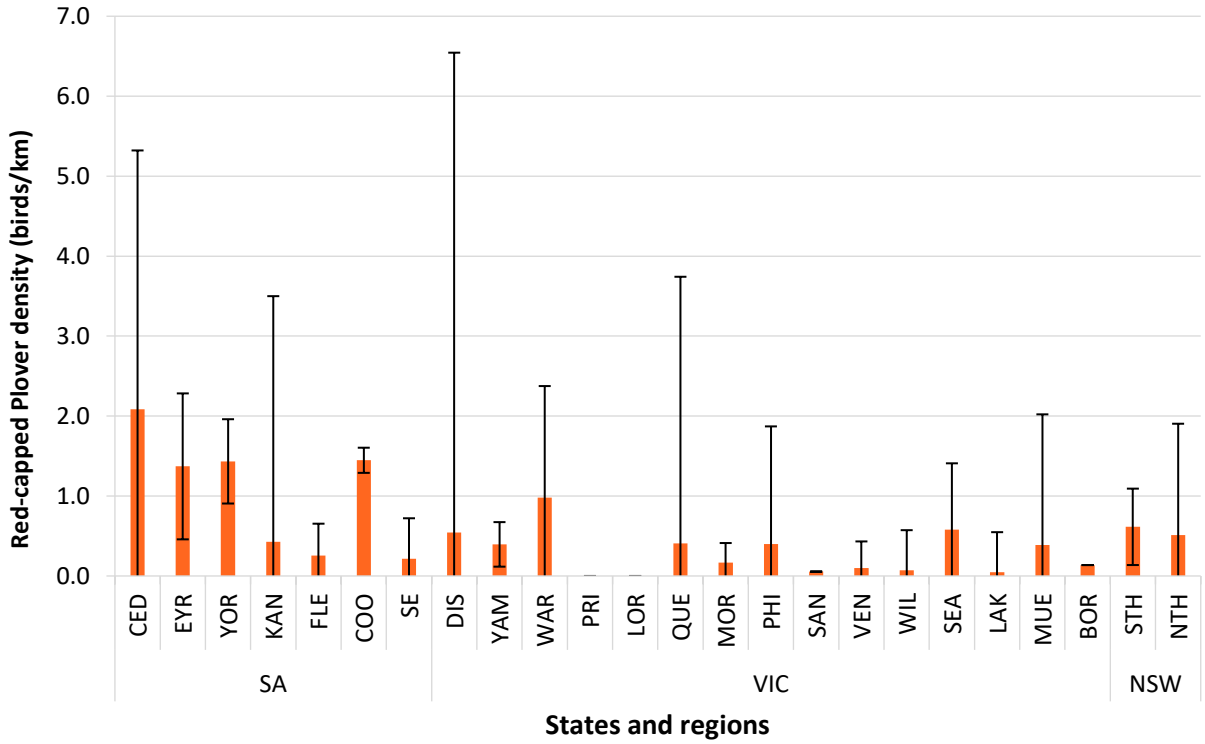


(b)

Figure 2. Adult Hooded Plover counts (a) and densities (b) by region from the 2024 biennial count. Densities are presented with ± standard errors and regions are arranged from west to east for ease of interpretation.

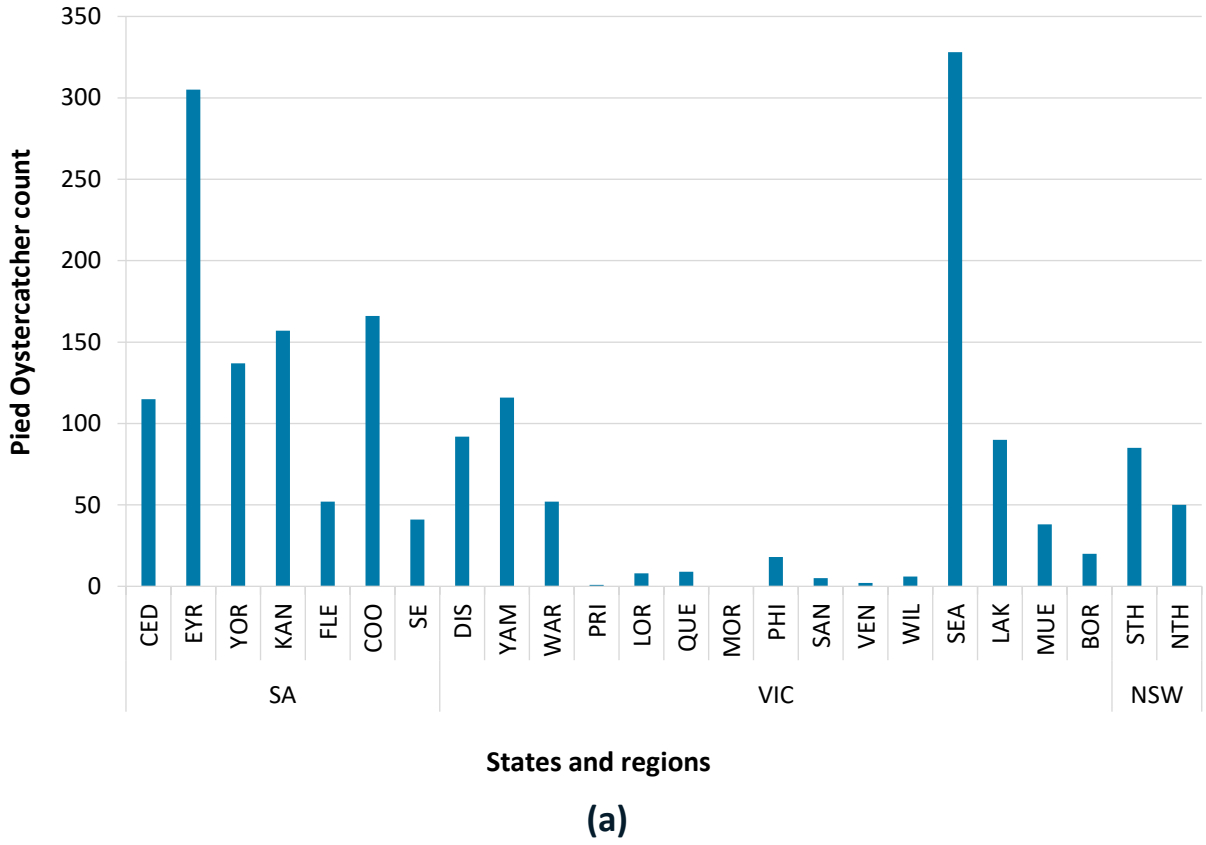


(a)

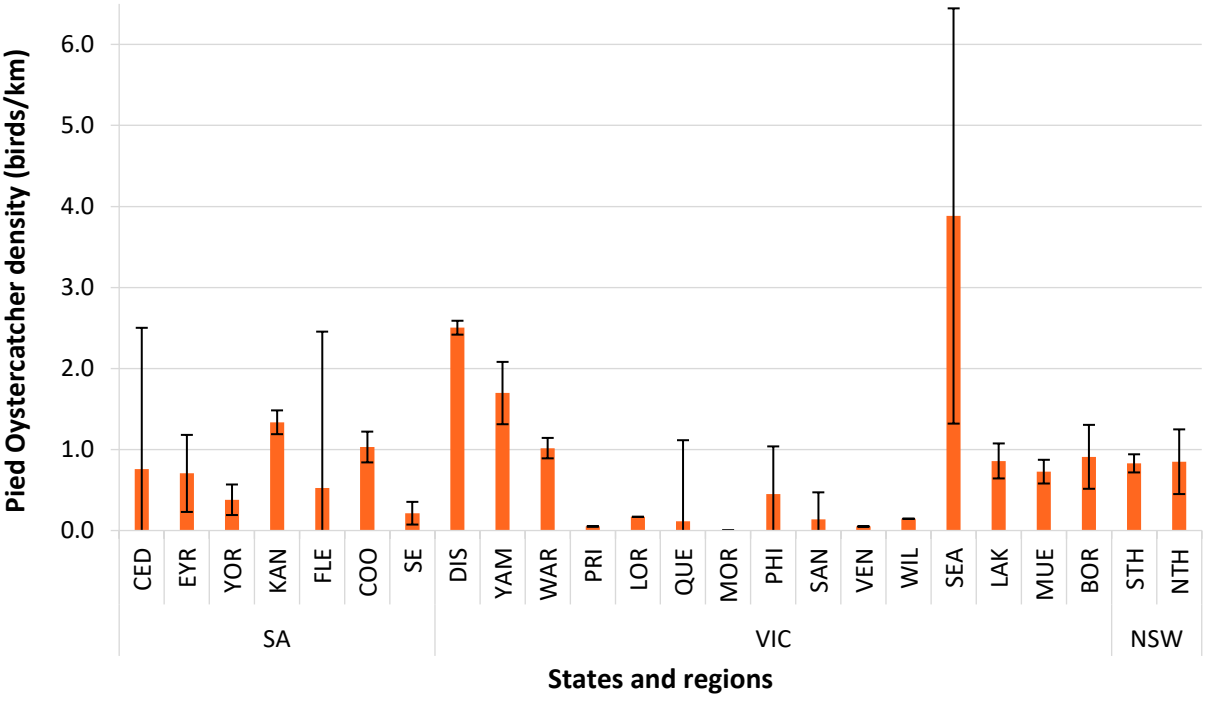


(b)

Figure 3. Adult Red-capped Plover counts (a) and densities (b) by region from the 2024 biennial count. Densities are presented with ± standard errors and regions are arranged from west to east for ease of interpretation.

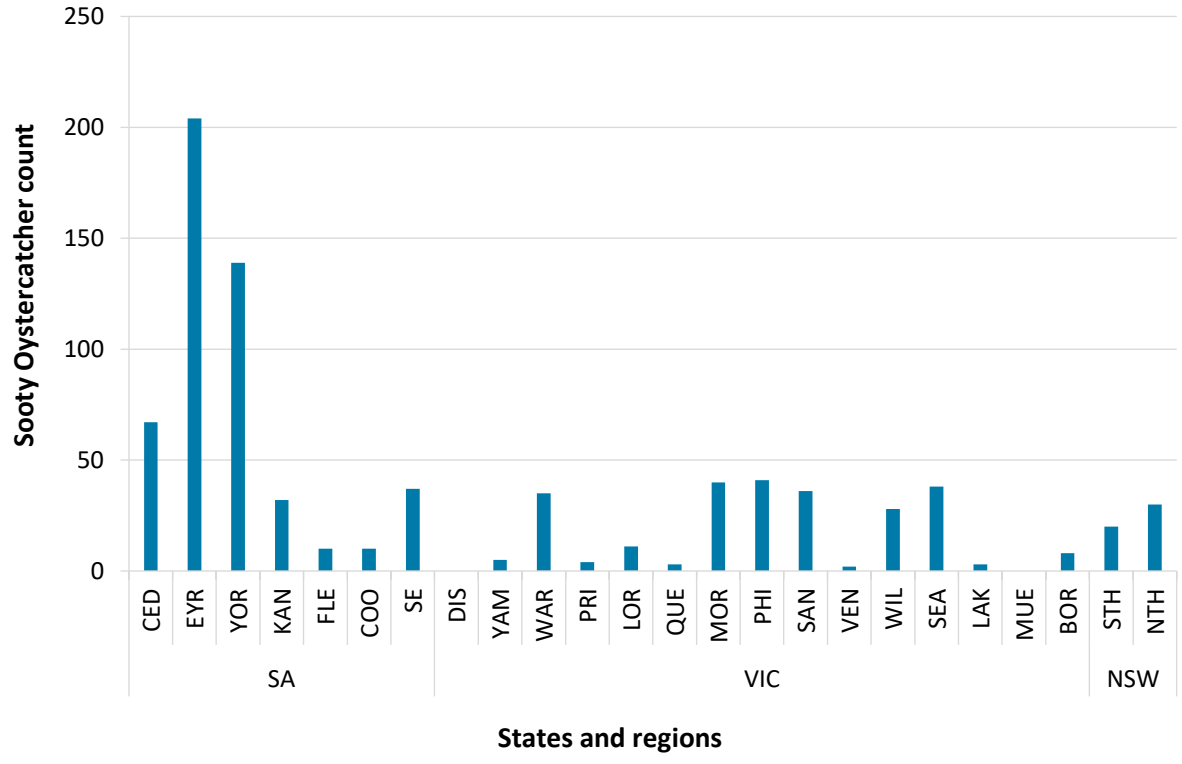


(a)

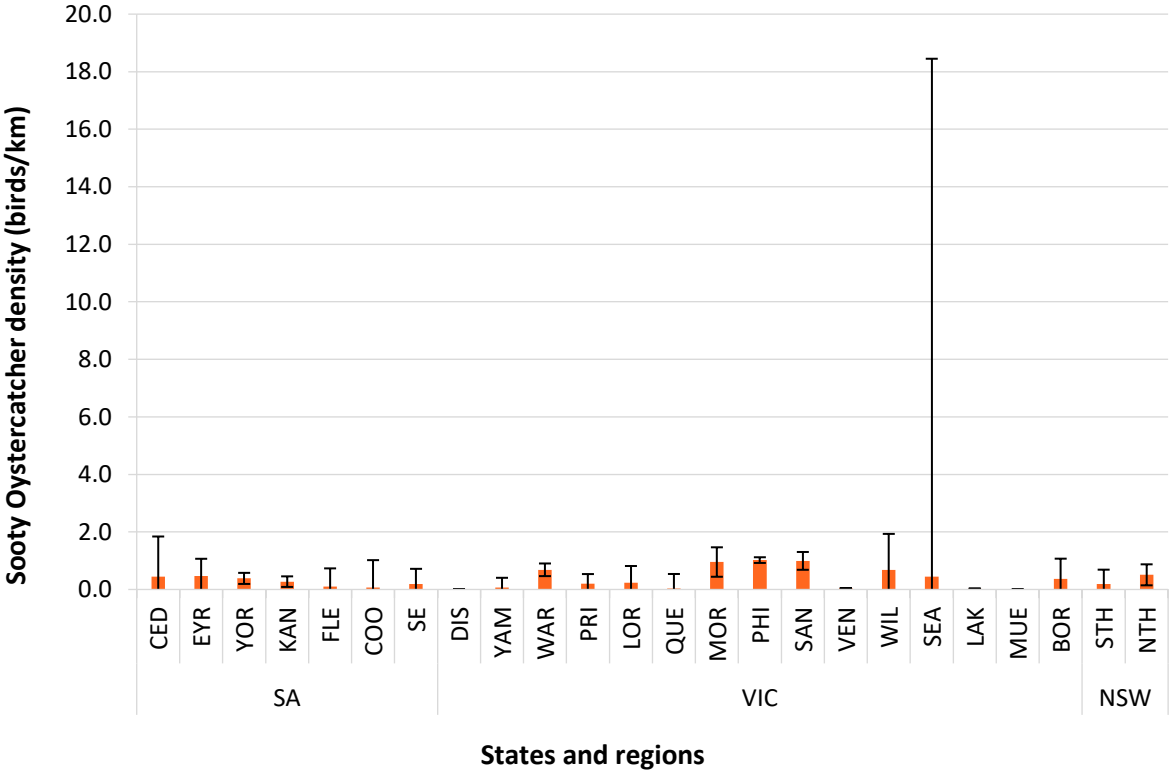


(b)

Figure 4. Adult Pied Oystercatcher counts (a) and densities (b) by region from the 2024 biennial count. Densities are presented with ± standard errors and regions are arranged from west to east for ease of interpretation.



(a)



(b)

Figure 5. Adult Sooty Oystercatcher counts (a) and densities (b) by region from the 2024 biennial count. Densities are presented with ± standard errors and regions are arranged from west to east for ease of interpretation.

Banded and flagged birds

Banding and flagging of beach-nesting bird species occurs throughout south-eastern Australia and is undertaken by several different study groups including BirdLife Australia's Beach-nesting Birds team, New South Wales National Parks and Wildlife Service (NSW NPWS) staff, Phillip Island Nature Parks (PINP) staff and Friends of Shorebirds SE / Victorian Wader Study Group volunteers. Participants of the biennial count are encouraged to read engraved flags and record the different coloured flag combinations on birds.

During the 2024 count, 345 observations of banded or flagged beach-nesting birds were reported. Of these observations, 272 were of Hooded Plovers, 71 of Pied Oystercatchers, and 2 of Sooty Oystercatchers. In comparison with the 2022 count, 16% more flagged birds were reported for which Hooded Plovers contributed significantly (37% increase). This increase may be due to a combination of the presence of more flagged Hooded Plovers (flagged in the period between the two counts) and a genuine increase in detection of flags. Interestingly, no flags were recorded of Red-capped Plovers in 2024 compared with six during the 2022 count. This could be due to low detectability (small flags) and mortality of flagged birds in the period between the two counts. Reading flag codes, especially on engraved flags, can be difficult for many reasons (e.g., bird is too distant, the bird flies off or is moving about, insufficient power of binoculars, etc.). Over 82% of total observations of flagged birds comprised fully read flag codes or combinations. This information is invaluable to conservation programs, helping to gain a better understanding of bird survival and movements.

Hooded Plover coverage and densities

As evident in Figures 2-5, when comparing regions, bird numbers are less informative than the density values that can be derived from the bird numbers and the proportion of suitable habitat surveyed. It is also essential that only the adult bird numbers are used in calculating densities as juveniles may disperse from their natal territories hence inflating density values if included in the calculation. Table 3 represents the length of habitat surveyed and the density of Hooded Plovers in each region. Approximately 88% of suitable Hooded Plover habitat was surveyed which is slightly lesser than the 94% coverage achieved in the 2022 count. The decrease in coverage was significant in NSW Border to Point Hicks, Wilsons Prom to Waratah Bay, and Ceduna and West regions. Most of the routes that were not surveyed in these regions were in remote and relatively inaccessible areas and on islands.

The Hooded Plover hotspots on the south-eastern mainland that have had densities exceeding 1 bird per kilometre and 2 birds per kilometre in some cases, in previous biennial counts produced similar results in the 2024 count. The coastline between Warrnambool to Yambuk had the highest density (2.03 birds/km), followed by San Remo to Inverloch (1.75 birds/km) on the Bass Coast, Mornington Peninsula (1.66 birds/km), Wilsons Prom to Waratah Bay (1.60 birds/km), and Kangaroo Island in South Australia (1.51 birds/km). However, the Yambuk to Swan Lake region experienced a genuine decrease in density from 1.35 birds/km in 2022 to 0.98 birds/km in 2024 with the same survey coverage. The San Remo to Inverloch region on the other hand, experienced a genuine increase in density from 1.75 birds/km in 2022 to 2.02 birds/km in 2024, again with the same coverage in both counts. Significant variation in densities across the coast indicates that habitat for Hooded Plovers is not uniform in quality, and that regions with high

densities are likely to reflect high quality habitat. Research into habitat quality and preference reveal that Hooded Plovers are selective of particular habitat features, both terrestrial (amount of dune and foredune habitat) and offshore (amount of intertidal and submerged rocks), as well as food availability which is undoubtedly linked to these features (Cuttriss *et al.* 2015; Ehmke *et al.* 2016).

Table 3. Regional habitat coverage and adult Hooded Plover densities for the 2024 biennial count.

Region	Habitat length (km)	Habitat surveyed (km)	Habitat surveyed (%)	Density (birds/km)
1. NSW Border to Point Hicks	54.0	22.0	40.7	0.96
2. Mueller River to Lake Tyers	121.2	52.3	43.1	0.40
3. Lake Tyers to Seaspray	104.8	104.8	100.0	0.09
4. Seaspray to Corner Inlet	85.3	84.5	99.0	0.62
5. Wilsons Prom to Waratah Bay	62.2	41.3	66.3	1.65
6. Venus Bay	40.1	40.1	100.0	0.67
7. San Remo to Inverloch	36.2	36.2	100.0	2.02
8. Phillip Island	40.2	40.2	100.0	0.95
9. Mornington Peninsula	41.9	41.9	100.0	1.72
10. Queenscliff to Lorne	89.2	78.3	87.8	0.65
11. Lorne to Princetown	47.3	47.3	100.0	0.66
12. Princetown to Warrnambool	20.5	19.7	96.1	0.81
13. Warrnambool to Yambuk	51.1	51.1	100.0	2.07
14. Yambuk to Swan Lake	68.4	68.4	100.0	0.98
15. Discovery Bay	36.8	36.8	100.0	0.73
16. Southeast South Australia	211.1	191.7	90.8	0.23
17. Coorong	173.1	161.0	93.0	0.16
18. Fleurieu Peninsula	98.7	98.7	100.0	0.70
19. Kangaroo Island	135.9	117.5	86.5	1.51
20. Yorke Peninsula	383.9	360.7	94.0	0.91
21. Eyre Peninsula	506.2	432.6	85.5	0.49
22. Ceduna and West	198.5	152.1	76.6	0.03
23. New South Wales South	104.8	102.5	97.8	0.49
24. New South Wales North	58.9	58.9	100.0	0.31
Victoria	**899.1**	**764.8**	**85.1**	**0.89**
South Australia	**1707.4**	**1514.5**	**88.7**	**0.57**
New South Wales	**163.7**	**161.4**	**98.6**	**0.42**
TOTAL	**2770.2**	**2440.6**	**88.1**	**0.66**

Comparison with previous years

From 2010 onwards, we have adjusted survey routes to more accurately reflect potential habitat, and so there have been some changes in densities recorded over the years. In 2016, an additional 116 km (a 5% increase) of habitat were added to the fixed route length of the 2014 count which largely related to new routes identified in remoter regions such as Eyre Peninsula, but there was a 2% decrease in survey coverage compared with the 2014 count (Table 4). Remarkably, 178 more Hooded Plovers were recorded causing the overall density to increase significantly. This reflects a genuine increase in population numbers related to a boom breeding season in 2015/16. A further 99 km were added to the fixed routes in the 2018 count which saw a 2% increase in coverage compared with the 2016 count, however the number of Hooded Plovers recorded decreased by 31, with the overall density also decreasing (Table 4). An additional 38 km were incorporated to the fixed routes during the 2020 count, with coverage increasing by 3% compared with the 2018 count. This resulted in 37 more adult Hooded Plovers being recorded however the density decreased (Table 4). In the 2022 count an additional 176 km of habitat were surveyed compared with the 2020 count, resulting in an additional 96 Hooded Plovers. This, however, did not result in an increase in density. In 2024, a further 16 km were added to the fixed routes, but survey coverage decreased by 6% compared with 2022. The total Hooded Plover number slightly decreased, but there was an increase in the overall density (Table 4).

Table 4. Comparison of adult Hooded Plover count totals and densities between 2014 and 2024.

	Total HP	Fixed route length (km)	Actual habitat surveyed (km)	Density (birds/km)
2014	1,342	2,494	2,340 (94%)	0.57
2016	1,520	2,610	2,291 (88%)	0.66
2018	1,489	2,709	2,333 (86%)	0.64
2020	1,526	2,747	2,413 (88%)	0.63
2022	1,622	2,754	2,589 (94%)	0.63
2024	1,607	2,770	2,441 (88%)	0.66
Difference 2014-2016 count	**178**	**116**	**-49 (-2%)**	**0.09**
Difference 2016-2018 count	**-31**	**99**	**+42 (+2%)**	**-0.02**
Difference 2018-2020 count	**37**	**38**	**+80 (+3%)**	**-0.01**
Difference 2020-2022 count	**96**	**7**	**+176 (+7%)**	**0.00**
Difference 2022-2024 count	**-15**	**16**	**-148 (-6%)**	**0.03**

Examining the number of adult birds and densities across years reveals some interesting patterns in each state (Table 5). In Victoria, adult bird numbers have fluctuated significantly over the years with varying survey coverage. Although the highest number of adult birds was recorded in 2022, the highest density was recorded in 2018 with the least amount of habitat surveyed. In 2024, the adult bird numbers decreased by 10% compared with 2022 which corresponded with only a 1% decrease in survey coverage. In contrast, the adult bird numbers in South Australia, have increased gradually over the years (except for the drop in 2018) even with fluctuations in survey coverage. The highest number of adult birds and density were recorded in 2024 even with 9% less survey coverage compared with 2022. Similarly, in New South Wales, adult numbers have increased gradually (except for the abnormal increase in 2016) with increasing survey coverage mainly since 2018. A small but genuine increase in the population is evident from 2020 onwards where there was an increase in adult numbers with roughly the same survey coverage across years.

Table 5. Comparison of adult Hooded Plover count totals and densities in each state between 2014 and 2024.

State	Year	Number of adult birds	Habitat surveyed (km)	Density (birds/km)
Victoria	2014	569	748.9 (86%)	0.76
	2016	697	777.2 (88%)	0.90
	2018	737	691.1 (76%)	1.07
	2020	694	715.7 (79%)	0.97
	2022	756	781.9 (86%)	0.97
	2024	679	764.8 (85%)	0.89
South Australia	2014	722	1430.2 (98%)	0.50
	2016	763	1373.6 (88%)	0.56
	2018	695	1500.9 (91%)	0.46
	2020	773	1536.0 (92%)	0.50
	2022	803	1646.1 (98%)	0.49
	2024	860	1514.5 (89%)	0.57
New South Wales	2014	51	160.5 (98%)	0.32
	2016	60	140.4 (86%)	0.43
	2018	57	140.9 (86%)	0.40
	2020	59	161.2 (98%)	0.37
	2022	63	161.2 (98%)	0.39
	2024	68	161.4 (99%)	0.42

Breaking down the above total density values further to the regional level reveals some major differences between the average densities (2014-2022) compared with the 2024 densities (Table 6). However, since density is a combination of number of birds sighted and length of coastline surveyed, a significant

difference in density may be a consequence of change in either of these values, or both. Therefore, separating the density values into their components, and then comparing those directly provides a better insight into why some densities appear to have changed dramatically within ten years (between five counts) while others have remained stable (Table 7). Theoretically, for each count, if all habitat surveyed was equally suitable, the difference in proportions between the coverage and the number of Hooded Plovers should be negligible; in other words, surveying an extra 20% of 'suitable' coastline should yield approximately 20% extra Hooded Plovers counted, leading to a minor discrepancy.

Table 6. Adult Hooded Plover densities from 2014 to 2024, arranged in order of decreasing percentage of difference between the average densities (2014 - 2022) and 2024 densities.

Zone	Region	Density (birds/km)						Percentage difference (2024 to avg.)
		2014	2016	2018	2020	2022	2024	
1	NSW Border to Point Hicks	0.54	0.42	0.55	0.46	0.86	0.96	69
15	Discovery Bay	0.24	0.15	0.49	0.81	0.81	0.73	47
23	New South Wales South	0.23	0.32	0.34	0.37	0.44	0.49	43
21	Eyre Peninsula	0.42	0.40	0.34	0.31	0.30	0.49	38
17	Coorong	0.12	0.14	0.16	0.14	0.06	0.16	30
5	Wilsons Prom to Waratah Bay	0.91	1.00	1.42	1.43	1.60	1.65	29
10	Queenscliff to Lorne	0.51	0.52	0.62	0.49	0.52	0.65	22
20	Yorke Peninsula	0.75	0.92	0.80	0.80	0.81	0.91	11
7	San Remo to Inverloch	1.63	2.19	2.00	1.64	1.75	2.02	9
19	Kangaroo Island	1.40	1.64	1.28	1.32	1.51	1.51	5
18	Fleurieu Peninsula	0.57	0.68	0.71	0.67	0.71	0.70	5
14	Yambuk to Swan Lake	0.67	0.72	1.21	1.02	1.35	0.98	-1
9	Mornington Peninsula	2.08	2.09	1.88	1.55	1.66	1.72	-7
2	Mueller River to Lake Tyers	0.33	0.47	0.43	0.39	0.57	0.40	-8
4	Seaspray to Corner Inlet	0.25	0.51	1.17	0.78	0.69	0.62	-9
8	Phillip Island	1.19	1.21	1.12	0.89	0.82	0.95	-9
16	Southeast South Australia	0.21	0.27	0.24	0.33	0.29	0.23	-13
13	Warrnambool to Yambuk	2.44	2.82	2.49	2.32	2.03	2.07	-14
6	Venus Bay	1.04	0.82	0.76	0.72	0.86	0.67	-20
11	Lorne to Princetown	0.54	1.08	1.06	1.02	0.91	0.66	-29
24	New South Wales North	0.46	0.62	0.53	0.35	0.30	0.31	-32
12	Princetown to Warrnambool	1.14	2.17	1.24	1.01	0.99	0.81	-38
22	Ceduna and West	0.26	0.12	0.05	0.20	0.14	0.03	-79
3	Lake Tyers to Seaspray	0.13	0.22	0.78	1.01	0.21	0.09	-82

Table 7. Comparison between coverage and the numbers of Hooded Plovers (adults and juveniles) in 2022 and 2024, by region. The 'Difference in coverage' column shows how much more or less coastline was surveyed in 2024 than in 2022, e.g., a negative value indicates less coverage in 2024. Similarly, the 'Difference in HP total' column compares the 2024 and 2022 totals of Hooded Plovers, e.g., a negative value indicates fewer birds in 2024. The 'Discrepancy' column shows the difference between these two values which should, theoretically, be very small if the routes surveyed in that region are similar in quality. The regions are arranged in order of decreasing 'Discrepancy'.

Zone	Region	State	Difference in coverage (%)	Difference in HP total (%)	Discrepancy (%)
17	Coorong	SA	-7	173	180
21	Eyre Peninsula	SA	-11	46	57
10	Queenscliff to Lorne	VIC	-8	18	26
8	Phillip Island	VIC	-1	15	16
7	San Remo to Inverloch	VIC	-1	14	15
23	New South Wales South	NSW	-2	9	10
1	NSW Border to Point Hicks	VIC	-50	-42	8
20	Yorke Peninsula	SA	0	8	8
13	Warrnambool to Yambuk	VIC	9	12	2
9	Mornington Peninsula	VIC	-1	1	2
19	Kangaroo Island	SA	-12	-10	2
5	Wilsons Prom to Waratah Bay	VIC	-25	-24	1
18	Fleurieu Peninsula	SA	9	3	-6
24	New South Wales North	NSW	3	-5	-8
15	Discovery Bay	VIC	-1	-10	-9
4	Seaspray to Corner Inlet	VIC	-2	-12	-10
16	Southeast South Australia	SA	-10	-29	-19
12	Princetown to Warrnambool	VIC	9	-11	-20
6	Venus Bay	VIC	-1	-23	-22
14	Yambuk to Swan Lake	VIC	0	-27	-27
11	Lorne to Princetown	VIC	-4	-33	-28
2	Mueller River to Lake Tyers	VIC	11	-22	-33
22	Ceduna and West	SA	-19	-82	-63
3	Lake Tyers to Seaspray	VIC	23	-50	-73
		AVERAGE	**-4**	**-3**	**0**

Three of the 24 regions had greater than a 20% difference in coverage between the 2022 and 2024 counts – a decrease compared with the 2022 biennial count when five regions fell into this category. One of these three regions had 23% more coverage than in 2022. For example, in 2024, within the Lake Tyers to Seaspray region, some of the long stretch of beach between Lakes Entrance and Seaspray which was not surveyed in 2022 due to access issues, was surveyed with the help of all-terrain vehicles. The other two regions had significantly less coverage (25-50% less) compared with 2022. This included some remote beaches of the NSW Border to Point Hicks region in East Gippsland which were impacted by access limitations and of the Wilsons Prom to Waratah Bay region for which count participants who were willing to undertake overnight hikes could not be engaged. Eleven of the 24 regions had greater than a 20% different in Hooded Plover numbers between the 2022 and 2024 counts which was greater than the eight regions in 2022. Only two of these regions recorded increases while the remaining nine recorded decreases in observed numbers. The decrease in numbers in six out of those nine regions corresponded with decreases in survey coverage.

Once the difference in coverage and bird numbers has been considered, large discrepancies (Table 7) can be interpreted as either a real change in the local numbers of Hooded Plovers or unsuitable habitat being surveyed in regions where habitat coverage increased. Large negative discrepancies trigger potential concern and a need to explore our local knowledge and data from these areas. Fewer birds, despite increased coverage were noted in New South Wales North (3% more habitat surveyed but 5% fewer Hooded Plovers), Princetown to Warrnambool (9% more habitat surveyed but 11% fewer Hooded Plovers), Mueller River to Lake Tyers (11% more habitat surveyed but 22% fewer Hooded Plovers), and Lake Tyers to Seaspray (23% more habitat surveyed but 50% fewer Hooded Plovers) regions. In the Yambuk to Swan Lake region a 27% decrease in Hooded Plover numbers was detected with no difference in survey coverage. The decrease in numbers of regions such as New South Wales North (2 birds fewer), Princetown to Warrnambool (2 birds fewer), and Mueller River to Lake Tyers (6 birds) is negligible. However, the decrease in Hooded Plover numbers in the Yambuk to Swan Lake region (25 birds fewer) is of concern, especially as conditions or the extent of habitat availability has not changed significantly during the period between the two counts.

Overall, the average change in numbers corresponds with the change in survey coverage producing a null discrepancy, indicating that the overall population trend is stable (Table 7). It should be noted that not all habitat is the same in quality and that 10 km of coastline will not have the equivalent occupancy across regions. We thus interpret discrepancies cautiously, utilising local knowledge of breeding pairs from other projects. Interestingly, in the Coorong region, there was 7% less survey coverage, but a 173% increase in Hooded Plover numbers. This was mainly due to having additional observers in the vehicle during surveys which enhanced detectability over 160 km of suitable habitat. Small increases in bird numbers that corresponded with no or smaller increases in coverage, were evident in Yorke Peninsula (no increase in coverage, 8% more Hooded Plovers), Warrnambool to Yambuk (9% more coverage, 12% more Hooded Plovers), and Fleurieu Peninsula (9% coverage, 3% more Hooded Plovers).

Evidence of breeding

Count participants were requested to record evidence of breeding when it was observed. Evidence of breeding was recorded in 33% of the Hooded Plover observations made during the count (a considerable increase from 27% in 2022). As well as direct evidence of breeding, several people noted adult behaviour that suggested breeding (e.g., leading and distraction displays). More chicks (82% more) were observed in 2024 than during the 2022 count which indicates greater hatching success in the early part of the 2024/25 breeding season (Table 8).

Count data are seldom useful for accurately assessing breeding activity, as Hooded Plovers are adept at hiding their nests and chicks, and because count participants must cover a lot of ground during the survey, there is little spare time for participants to spend watching the birds' behaviour and search for nests. Nest monitoring is not an essential task of the biennial count and is typically carried out by trained nest monitors within various organisations (e.g., BirdLife Australia, volunteers of Friends of the Hooded Plover, Phillip Island Nature Parks, and New South Wales National Parks and Wildlife Service) who embark on regular monitoring of breeding pairs in Victoria, South Australia and New South Wales. As part of the established monitoring program, Hooded Plover pairs are visited regularly and over time, trained citizen scientists become proficient at recognising breeding behaviour of Hooded Plovers. The data collected through this method of monitoring enables us to quantify breeding success, to devise more accurate threat profiles based upon multiple visits to breeding sites, and for us to make comparisons of breeding output between regions, guiding us in our conservation efforts for the species.

Table 8. Evidence of Hooded Plover breeding recorded in each region during the 2024 biennial count. Values represent the number of observations recorded within each nesting stage. *Scrape:* a small depression in the sand which does not contain eggs; *Suspect nest:* based on adult behaviours (leading, false brooding), a nest with eggs is suspected but never sighted; *Nest with eggs:* scrape containing eggs; *Suspect chicks:* based on adult behaviours (distraction displays, aggression), presence of chicks is suspected but never sighted; *Chicks:* chicks between 1-35 days old sighted.

Region	Scrapes	Suspect nests	Nests with eggs	Suspect chicks	Chicks
Victoria					
1. NSW Border to Point Hicks	1	2	-	-	-
2. Mueller River to Lake Tyers	3	-	2	-	-
3. Lake Tyers to Seaspray	-	1	-	-	-
4. Seaspray to Corner Inlet	3	-	1	-	-
5. Wilsons Prom to Waratah Bay	3	1	5	-	-
6. Venus Bay	-	1	-	-	-
7. San Remo to Inverloch	3	-	7	-	-
8. Phillip Island	-	-	3	-	-
9. Mornington Peninsula	2	-	16	1	1
10. Queenscliff to Lorne	6	1	4	-	-

Region	Scrapes	Suspect nests	Nests with eggs	Suspect chicks	Chicks
11. Lorne to Princetown	5	-	-	-	-
12. Princetown to Warrnambool	-	-	-	-	1
13. Warrnambool to Yambuk	3	10	4	-	1
14. Yambuk to Swan Lake	5	1	5	-	1
15. Discovery Bay	2	-	-	-	-
Total	**36**	**17**	**47**	**1**	**4**
South Australia					
16. Southeast South Australia	2	-	-	-	-
17. Coorong	-	2	1	-	4
18. Fleurieu Peninsula	3	1	10	-	6
19. Kangaroo Island	2	5	5	2	5
20. Yorke Peninsula	6	27	8	7	7
21. Eyre Peninsula	3	10	9	2	5
22. Ceduna and West	-	-	-	-	1
Total	**16**	**45**	**33**	**11**	**28**
New South Wales					
23. New South Wales South	2	1	3	-	6
24. New South Wales North	4	-	2	-	2
Total	**6**	**1**	**5**	**0**	**8**
Grand Total	**58**	**63**	**85**	**12**	**40**

Threat assessments

Of all observations of beach-nesting birds (including terns), 76% of sightings included threat assessments which was a reduction from 83% in the 2022 count. Out of the 1,776 observations of beach-nesting birds where threat data was collected, no threat of any kind was observed at 35% of sites (625 observations). Fifty-five percent of sightings with no threats detected were recorded in remote areas in South Australia (Kangaroo Island, Yorke Peninsula, Eyre Peninsula, Ceduna and West, and Southeast South Australia), compared with 70% in the 2022 count. A further 43% were recorded in relatively inaccessible areas in Victoria (parts of Wilsons Promontory National Park and the Corner Inlet sand islands), compared with 29% in the 2022 count. A summary of the percentage of sites in the three states falling within the different threat score categories reveals that in all states except New South Wales, there were more sites with green threat scores than any other threat score category. In New South Wales, there were more sites with both yellow and orange threat scores (similar percentages) than sites with green threat scores (Table 9).

Table 9. The percentage of sites (observations) with beach-nesting birds falling within each threat score category in 2024, by state.

	Green (0-3)	Yellow (4-8)	Orange (9-13)	Red (14-23)	Purple (24+)
VIC	63.0	14.6	15.4	6.6	0.3
SA	49.4	28.5	15.3	6.3	0.6
NSW	27.0	31.1	31.1	10.8	0.0
ALL SITES	53.5	23.4	16.0	6.6	0.5

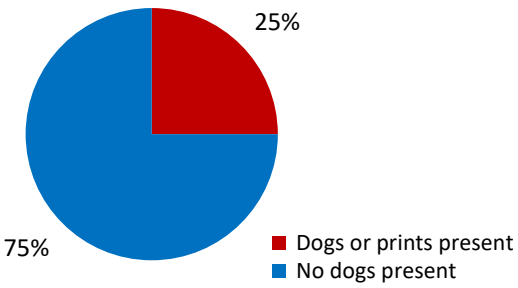
Maps depicting threat score categories have been made for each of the 24 surveyed regions (see Appendices 1-3). Since the 2010 count, these maps have revealed a similar pattern of distribution of threat score categories where sites with orange, red, and purple (moderate, high, and very high levels) threat scores have been generally located near population centres or areas of high recreational use, while sites with green and yellow (very low and low level) threat scores have been typically located away from these busy areas.

A comparison of the spread of sites with different threat score categories between the 2022 and 2024 counts, indicates a decrease in the number of sites with very low level (green) threat scores, and an increase in sites with low and moderate level (yellow and orange) threat scores (Table 10). In Victoria, there has been a decrease in both very low and low level (green and yellow) threat scores with a corresponding increase in orange and red (moderate and high) threat scores. Similarly in South Australia and New South Wales, the decrease in green threat scores has corresponded with an increase in yellow and orange threat scores. The number of sites with red threat scores in those two states have decreased as well with New South Wales experiencing the largest difference. The number of sites with the highest threat level (purple) appears to have decreased slightly but is largely stable in all three states. The reduction in sites with green threat scores and the increase in yellow and orange threat scores flags concern and warrants investigation especially after years of significant investment in site protection in Victoria and South Australia theoretically should lead to an increase in the number of sites with green threat scores. However, it may not be an accurate representation of threat reduction resulting from investment in site protection as count participants only focus on assessing threats in the vicinity of where birds are sighted and not at specific breeding sites.

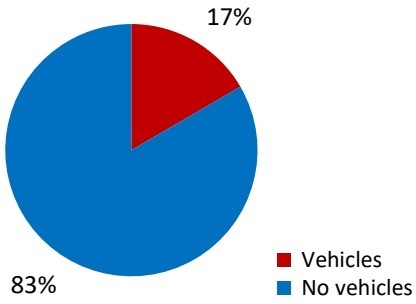
Table 10. The percentage difference between spread of threats of sites between 2022 and 2024, by state.

	Green (0-3)	Yellow (4-8)	Orange (9-13)	Red (14-23)	Purple (24+)
VIC	-1.2	-4.5	4.3	1.7	-0.3
SA	-4.9	1.6	4.1	-0.7	-0.1
NSW	-4.8	6.8	2.3	-4.3	0.0
ALL SITES	-3.3	-0.9	4.3	0.1	-0.2

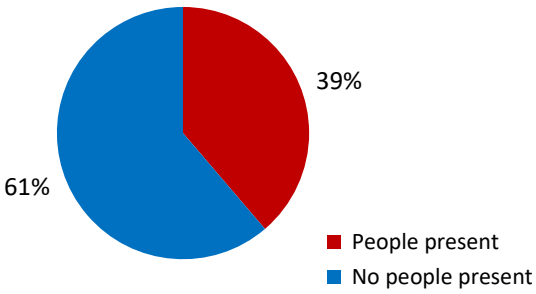
Based on the 2024 count data, around a quarter of all beach-nesting bird species observations (including terns) recorded the threats of dogs and introduced mammalian predators during the breeding season (Figures 6a and d). The threat of vehicles was recorded in 17% of observations and 39% had evidence of people presence (Figures 6b and c). When examining data of just Hooded Plover observations, it is clear that there is substantial pressure from threats on the species. Considering the size of the mainland population (eastern subspecies) – around 1,600 adult birds as detected in this survey – it is particularly concerning that 75% (an increase from 63% in 2022) of all Hooded Plover observations recorded during the 2024 biennial count showed evidence of people and/or dogs within a 100 metres radius, which is within the buffer of disturbance (Figures 6e and g). This is particularly meaningful given this is a snapshot of threats the birds face, and it is likely to underestimate threat occurrence as it represents only a single measure in time. Summer threat levels are likely to be higher and there can be an increase in the number of sites experiencing threats. Furthermore, 9% of observations had evidence of vehicles being present on the beach and 30% had evidence of introduced mammalian predators (Figures 6f and h).



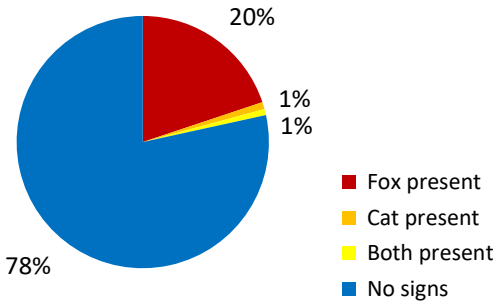
(a) % dog occurrence, all species



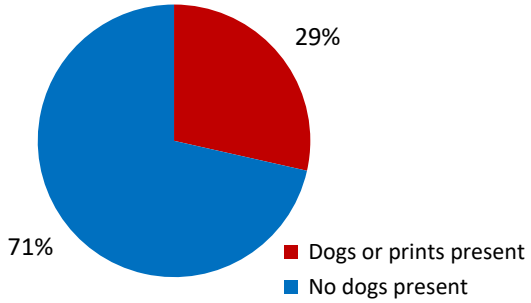
(b) % vehicle occurrence, all species



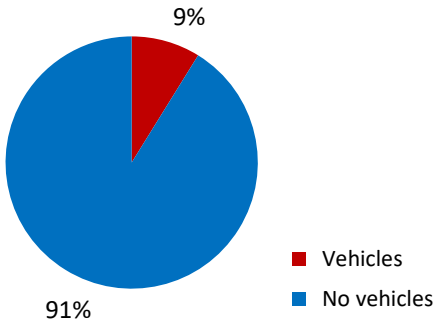
(c) % people occurrence, all species



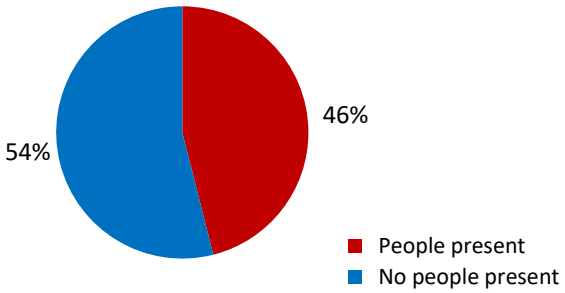
(d) % mammalian predator occurrence, all species



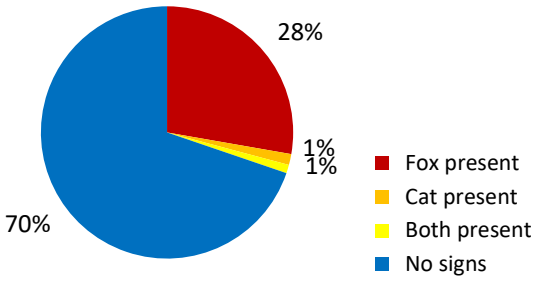
(e) % dog occurrence, Hooded Plover



(f) % vehicle occurrence, Hooded Plover



(g) % people occurrence, Hooded Plover



(h) % mammalian predator occurrence, Hooded Plover

Figure 6. Percentage of key threats recorded within 100 m of beach-nesting species' observations in 2024 (a-d, all species including terns, and e-h, Hooded Plover only).

Invasive weeds

Weeds, such as Marram Grass (*Ammophila arenaria*; deliberately introduced from Europe for dune stabilisation purposes), Sea Spurge (*Euphorbia paralias*; originating from Europe and presumably introduced in shipping ballast water), and Sea Wheat-grass (*Thinopyrum junceiforme*; native to Europe and deliberately introduced for dune stabilisation purposes), have been identified as key species that change the structure of beach and foredune habitats in Australia (Cousens *et al.* 2013). These structural changes alter the resources available (foraging, nesting, etc.) to Hooded Plovers, leading to either direct impacts (increased predation, mortality, or abandonment of beaches) or to more indirect impacts, such as reduced breeding success due to sub-optimal habitat, on the birds.

The density of vegetation estimated during the 2024 biennial count revealed that the majority of Hooded Plovers were observed within habitats with sparse vegetation or no vegetation (62%, n=645 observations where vegetation density was assessed), which is their preferred nesting habitat. The remainder of Hooded Plover observations were present in moderately (26%) or heavily (12%) vegetated areas. Regions which had Hooded Plover observations in more than 10 moderately or heavily vegetated sites included:

Yorke Peninsula (44), Eyre Peninsula (29), Warrnambool to Yambuk (22), Yambuk to Swan Lake (21), Fleurieu Peninsula and Wilsons Prom to Waratah Bay (17), Mornington Peninsula (12), and Coorong, Kangaroo Island, Phillip Island, and Queenscliff to Lorne (11). Weeds were recorded within 87% of these sites (this decreased to 86% when focusing on the five target weed species specified during data collection: Marram Grass, Sea Spurge, Sea Wheat-grass, Beach Daisy, and Pyp Grass). Some of the highest weed infestations were recorded in western Victoria and south-eastern South Australia which are in line with the findings of Cousens *et al.* (2013), who indicated that the most extensive Marram Grass infestations occur here, making vast sections of dunes largely unavailable as nesting habitat.

Overall, three major invasive weeds (Marram Grass, Sea Spurge, Sea Wheat-grass) occurred in nearly 59% of Hooded Plover observations where vegetation was assessed. Marram Grass is rated as being of greater threat to the Hooded Plover than other weeds due to Hooded Plovers showing strong avoidance of Marram vegetated dunes, whilst at low to moderate densities of Sea Spurge and Sea Wheat-grass infestations, they still place their nests amongst these weeds in the foredune and dune. However, Sea Spurge and Sea Wheat-grass are still weeds of serious concern, as once established at high densities, these too prohibit successful use of the foredunes and dunes by breeding Hooded Plovers. Also, of concern, is the spread of Cape Beach Daisy across the border from South Australia into Western Victoria, where this weed appears to be rapidly increasing its distribution. Maps of the occurrence of the five main weed species of concern for beach-nesting bird species are provided in Appendices 1-3.

Count participants

The 2024 biennial count attracted 372 participants, 58 fewer participants than in 2022. Table 11 presents the number of participants in each region for 2022 and 2024 and the differences between years. While most participants only surveyed routes in one region, some participants surveyed routes in multiple regions. All three states experienced declines in participation (Table 11). There was a significant drop in participation in South Australia where four out of the seven regions experienced declines.

Table 11. The number of participants of the 2022 and 2024 biennial counts.

Region	2022 participants	2024 participants	Difference
Victoria			
1. NSW Border to Point Hicks	15	8	-7
2. Mueller River to Lake Tyers	3	4	1
3. Lake Tyers to Seaspray	10	6	-4
4. Seaspray to Corner Inlet	9	11	2
5. Wilsons Prom to Waratah Bay	15	6	-9
6. Venus Bay	6	7	1
7. San Remo to Inverloch	16	16	0
8. Phillip Island	17	20	3
9. Mornington Peninsula	11	13	2

Region	2022 participants	2024 participants	Difference
10. Queenscliff to Lorne	24	25	1
11. Lorne to Princetown	5	5	0
12. Princetown to Warrnambool	6	7	1
13. Warrnambool to Yambuk	14	10	-4
14. Yambuk to Swan Lake	4	4	0
15. Discovery Bay	3	3	0
Total	**158**	**145**	**-13**
South Australia			
16. Southeast South Australia	11	14	3
17. Coorong	6	9	3
18. Fleurieu Peninsula	51	34	-17
19. Kangaroo Island	63	41	-22
20. Yorke Peninsula	37	44	7
21. Eyre Peninsula	55	53	-2
22. Ceduna and West	15	7	-8
Total	**238**	**202**	**-36**
New South Wales			
23. New South Wales South	25	20	-5
24. New South Wales North	20	17	-3
Total	**45**	**37**	**-8**

Results of the three regions in Western Australia

After the successful establishment of BirdLife Australia's Beach-nesting Birds Program in Western Australia in 2023, three regions in the south-west - Mandurah to Busselton, Margaret River, and Denmark and West - were included in the 2024 biennial count (see maps in Appendix 4), for the first time in the biennial count's history. A total of 67 Hooded Plovers were counted (62 adults and 5 juveniles) across 27% of suitable Hooded Plover habitat in the three regions of which Margaret River had the highest survey coverage of 70% (Table 12). This constituted 3% of the estimated number of birds of the world population of the western subspecies of the Hooded Plover (*Thinornis cucullatus tregellasi*). Overall, 37 count participants surveyed over 117 km of suitable habitat where approximately 81% of surveys were conducted within ten days of the count weekend.

Table 12. Summary statistics of the three Western Australian regions that were included in the 2024 biennial count.

Parameter	Denmark and West	Mandurah to Busselton	Margaret River	Total
Number of survey routes	27	39	53	**119**
Number of count participants	6	10	21	**37**
Percentage of surveys conducted within 10 days of the count weekend	100.0	58.3	83.3	**81.3**
Number of adult (and juvenile) Hooded Plovers	11 (0)	17 (3)	34 (2)	**62 (5)**
Number of adult (and juvenile) Red-capped Plovers	68 (2)	192 (25)	15 (1)	**275 (28)**
Number of adult (and juvenile) Pied Oystercatchers	11 (0)	4 (0)	28 (1)	**43 (1)**
Number of adult (and juvenile) Sooty Oystercatchers	11 (0)	0 (0)	20 (1)	**31 (1)**
Habitat length (km)	112.1	239.2	80.8	**432.1**
Habitat surveyed (km)	21.6	38.8	56.9	**117.3**
Habitat surveyed (%)	19.3	16.2	70.4	**27.1**
Adult Hooded Plover density (birds/km)	0.51	0.44	0.60	**0.53**
Hooded Plover breeding evidence (% of observations)	28.6	25.0	31.8	**30.3**
Number of flagged Hooded Plovers	0	0	19	**19**

Of all observations of beach-nesting birds (including terns), 92% of sightings included threat assessments. Out of the 122 observations of beach-nesting birds where threat data was collected, no threat of any kind was observed at 8% of sites (10 observations). All these observations were made in remote areas of the three regions. A summary of the percentage of sites in the three regions falling within the different threat score categories reveals different patterns in each of the regions. In Denmark and West, there were significantly more sites with very low level (green) threat scores and high level (red) threat scores. In Mandurah to Busselton, the increase in the percentage of sites corresponded with the increase in threat scores (green - red). In Margaret River, sites with both very low and low level (green and yellow) threat scores had similar percentages which were slightly lower than the sites with both moderate and high (orange and red) threat scores that were comparatively higher (Table 13). Interestingly, none of the regions had any sites with very high level (purple) threat scores.

Table 13. The percentage of sites (observations) in the three Western Australian regions with beach-nesting birds falling within each threat score category in 2024.

	Green (0-3)	Yellow (4-8)	Orange (9-13)	Red (14-23)
Denmark and West	33.3	12.5	20.8	33.3
Mandurah to Busselton	7.9	21.1	34.2	36.8
Margaret River	21.7	21.7	28.3	28.3
ALL SITES	19.7	19.7	28.7	32.0

Discussion and Recommendations

Data obtained from the biennial count help us enhance our understanding of the Hooded Plover distribution, population size, habitat suitability and changes in habitat occupancy over time. The nomination of the eastern subspecies of Hooded Plover for listing under the EPBC Act in 2014 was entirely based on the strong evidence of overall declines in the population numbers and loss of occupancy of Hooded Plovers on the eastern mainland. Thus, the biennial count provides us with the best assessment of the mainland trajectory for the species and help us identify trends of concern.

The monitoring of breeding birds carried out by trained citizen scientists complement the biennial count data. Targeted and regular monitoring of breeding pairs of Hooded Plovers reveals recruitment rates and severity of certain threats at breeding sites, facilitating adaptive management to mitigate threats and improve breeding success. Therefore, the biennial count and monitoring breeding birds are complementary as both approaches provide different data that assist us in assessing the health of the mainland Hooded Plover population. One approach allows us to investigate whether breeding success translates into actual trajectory change at a population scale whereas the other approach facilitates the evaluation of success of conservation actions and adaptive management at the scale of regional recruitment rates and threat trajectories at breeding sites.

The 2024 biennial count is the fourth count to have had investment, receiving funding from a few different sources. Having a funded count coordinator is beneficial as it allows the coordinator to allocate time towards liaising with regional count coordinators and land managers to increase survey coverage, vetting and analysing data, improving the quality of results and increasing efficiency of report compilation. The importance of maintaining the biennial count over time cannot be overstated, especially as it is critical to monitoring conservation recovery which aids us in understanding the effectiveness of on-ground and other threat management actions and tracking the population trajectory of this threatened species.

The importance of the Birdata phone app

The Birdata app continues to prove its worth as more and more count participants used it to collect and record survey data in the field during the 2024 biennial count. It significantly improved the quality of data collected as participants were able to enter their data in real-time into standardised data fields. This not only allows count participants to correct any errors especially in relation to locations of beach-nesting bird sightings, but also to check their observational data before submitting their surveys after completion. Although the functionality of editing surveys within the phone app is non-existent, users can edit surveys using the desktop version of the Birdata portal by logging in on their computers. This further enhanced the quality of data collected as participants could rectify any mistakes they made while entering data on the phone app. These improvements made data vetting quick and efficient, as the number of records requiring conversion of GPS coordinates of sighting locations was significantly reduced leading to fewer errors in actual locations of bird sightings.

The value of threat data

One of the many benefits of the biennial count is the opportunity it provides us to survey beach-nesting bird habitat in remote areas that are not typically surveyed otherwise. This enhances our understanding of threats at Hooded Plover sites in remote areas which supplements the threat data obtained by trained citizen scientists through breeding monitoring at sites in relatively accessible areas. Therefore, these biennial count surveys that cover thousands of kilometres in three south-eastern states and in some regions in Western Australia, provide crucial information on threats such as weeds especially in relation to assessing their distribution along the coast.

The 2024 biennial count data revealed a concerning trend for the Victorian population of Hooded Plovers where there was a reduction in the number of sites in lower threat categories and a corresponding increase in moderate and higher threat categories. This may be due to a genuine increase in threats fuelled by increased human visitation at beaches and enhanced accessibility to remote areas. Effectiveness of localised threat mitigation actions should be investigated to ensure that this trend is reversed. Both the South Australian and New South Wales populations (listed as Critically Endangered in NSW) of Hooded Plovers, experienced a decline in the number of sites with lower and higher threat categories which corresponded with an increase in the moderate threat category. The reduction in higher threat categories is welcomed, and in South Australia, this may be due to a slight decrease in the percentage of sites where evidence of vehicles was present. However, the increase in the number of sites with the moderate threat category flags concern, triggering an assessment of the effectiveness of localised threat mitigation measures. Site specific threat reduction occurs primarily at breeding sites and given assessing threats at breeding sites is not the primary focus of biennial count surveys, an accurate assessment of the effectiveness of threat mitigation measures may not be possible. The prevalence of specific threats has been mapped (see Appendices) and they can be used to determine hotspots that warrant management intervention.

Coverage of remote coastline

The relative decrease in survey coverage recorded in the 2024 biennial count was largely due to reduced coverage in remote areas in Victoria. Some of these areas are only accessible by hiking overnight or by boat. Some survey routes involve long walks which require a considerable level of physical fitness and in some cases, organising lifts between access points. The two regions between the NSW border and Lake Tyers were still experiencing access issues where some roads were still closed due to flood damage sustained a couple of years ago. Therefore, survey coverage in these two regions were less than 50% of actual surveyable habitat. The other remote area in Victoria that had less than 70% survey coverage was within the Wilsons Promontory National Park where many survey routes especially those located on the east coast of the national park require overnight hikes or boat transport. Ceduna and West, the most remote region in South Australia, had just over 75% survey coverage as most of the coastline here, relies on being surveyed by vehicle. All these remote areas warrant more support in terms of coordination to overcome challenges related to survey coverage. They typically only have a few count participants that cover vast stretches of coastline and therefore, investment on recruitment of count participants from within local communities is essential for future success of counts. Apart from these regions, above 85% survey coverage was achieved in all other regions thanks to the ongoing support from volunteers and land managers.

Changes in regional Hooded Plover populations

The 2024 biennial count highlighted a couple of regions where significant declines in Hooded Plover numbers were evident which did not correspond with decreases in survey coverage. In the Yambuk to Swan Lake region, there was no difference in survey coverage between 2022 and 2024 counts, however there was a 27% reduction in Hooded Plover numbers. Given the condition of the habitat surveyed in the region has not changed in the period between the two counts, this decrease in Hooded Plover numbers can be considered genuine. It is difficult to determine the cause of this genuine decrease but it may be due to birds abandoning territories and moving to other adjacent regions such as Warrnambool to Yambuk which experienced an increase in Hooded Plover numbers with a slight increase in survey coverage. Nevertheless, it is important to investigate breeding success of Hooded Plovers in this region to gain a better understanding of the breeding population.

The most remarkable decrease in Hooded Plover numbers occurred in the Lake Tyers to Seaspray region where a 50% decline was evident, despite 23% more habitat surveyed. The beaches that contributed to the increase in survey coverage (parts of the Ninety Mile Beach in East Gippsland) are known to have very low densities of Hooded Plovers and therefore, it should not have resulted in a significant increase in bird numbers. The reduction in Hooded Plover numbers in the remainder of surveyed habitat is of concern mainly because around 50% of habitat is located on islands within the Lakes National Park near Lakes Entrance. These islands are thought to be safe havens for Hooded Plovers and other beach-nesting birds and therefore it will be important to closely monitor these birds to ensure the declines are only temporary. The remaining stretch of ocean beach habitat that lies between the east side of the entrance at Lakes

Entrance and Lake Tyers is subject to high levels of human visitation and increased disturbance which may have led to abandonment of Hooded Plover territories.

The other two regions that experienced small declines in Hooded Plover numbers despite increased survey coverage were Mueller River to Lake Tyers and Princetown to Warrnambool. This is the second consecutive count where there was low survey coverage in the Mueller River to Lake Tyers region and therefore it is difficult to determine if this is a true indication of a localised decline in the Hooded Plover population. The beaches in the Princetown to Warrnambool region are part of the popular Great Ocean Road drive and are thus subject to high visitation rates and disturbance during the spring and summer months. Therefore, the decline in Hooded Plover numbers evident in this region may well be due to movement of birds into other regions with less disturbance and temporary abandonment of territories. It will be important to monitor the breeding populations closely in these regions over the next few years to ensure these declines are reversed.

There were six regions where Hooded Plover numbers increased slightly despite decreases in survey coverage. These regions may have experienced genuine increases in Hooded Plover populations thanks to improved breeding success owing to on-ground threat mitigation and management actions at breeding sites. The most significant increase in Hooded Plover numbers was evident in the Coorong region and this could possibly be attributed to a combination of improved breeding success and a higher rate of detection thanks to more experienced count participants. Nine regions experienced declines in Hooded Plover numbers that corresponded with declines in survey coverage. It is important to ensure that survey coverage is increased in these regions in future counts to examine if Hooded Plover numbers increase accordingly. The provision of additional support will need to be prioritised for future biennial counts.

Inclusion of Western Australian regions

BirdLife Australia's Beach-nesting Birds Program was established in south-west Western Australia only in 2023 and since then, a part-time Project Officer has been working tirelessly to recruit volunteers to undertake monitoring of breeding Hooded Plovers and to implement breeding site management. The Project Officer also undertook the challenging task of recruiting and coordinating volunteers for the three regions that were going to be included in the count. Therefore, an overall 27% survey coverage (although relatively low) for a program that is still in its infancy is an exceptional achievement. Regionally, Margaret River where the program has made great strides in recruiting volunteers and garnering land manager support had 70% survey coverage which was the highest out of the three regions. The rapid success of the program in this region can be attributed to the Hooded Plover conservation efforts that have occurred over a long period raising the profile of the species and its plight.

As this is the first biennial count to include Western Australian regions, comparison of beach-nesting bird numbers and densities between counts is not possible. This will, however, provide a baseline estimate of populations for regions such as Margaret River where somewhat better survey coverage was achieved. It should also be noted that only a subset of birds from the Hooded Plover population will be sampled as the western subspecies *tregellasi* is known to inhabit inland salt lakes as well. Nevertheless, continuation

of counts on beaches should provide us with an estimate of the population that utilise beaches and allow us to investigate trends in the future. Investment in recruitment of new volunteers and garnering support from land managers need to be prioritised to improve survey coverage in existing regions and to facilitate inclusion of more regions in future biennial counts.

Acknowledgements

We are extremely grateful to all the participants who contributed to the 2024 biennial count. It is an enormous achievement to survey so many thousands of kilometres of coast within such a short timeframe and obtaining this snapshot of Hooded Plover numbers is the best opportunity we have in understanding the status of the south-eastern mainland population of the eastern subspecies and south-west Western Australian population of the western subspecies. Few projects worldwide can claim that nearly half the world population of a threatened bird species is surveyed in a matter of weeks! The effort of our participants is something one cannot put a value on, and we cannot thank you enough for your outstanding efforts.

In particular, we would like to thank the regional count coordinators of all 27 regions. They organised participants to survey routes and helped fill gaps when they could not find participants. Without the help of the regional coordinators, none of this would have been possible. Thanks also to Parks Victoria, the Department of Energy, Environment and Climate Action (VIC), Phillip Island Nature Parks, Great Ocean Road Coast and Parks Authority, the Department for Environment and Water (SA), Alinytjara Wilurara Landscape Board, Eyre Peninsula Landscape Board, Northern and Yorke Landscape Board, Green Adelaide, Hills and Fleurieu Landscape Board, Kangaroo Island Landscape Board, Limestone Coast Landscape Board, National Parks and Wildlife Service South Australia, the Office of Environment and Heritage (NSW), National Parks and Wildlife Service New South Wales, and the Department of Biodiversity, Conservation and Attractions (WA) who provided assistance in the form of quad bikes, boats and staff time. For some regions, we would have been unable to access remote areas or survey challenging sites without the assistance of land managers.

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Appendices

Appendices 1 to 4 are provided separately due to file size and they can be found in the "Reports and Research" section of BirdLife Australia's Beach-nesting Bird Hub:
https://beachvol.birdlife.org.au/login/index.php?pathway=1

Appendix 1

South Australian maps of routes surveyed, beach-nesting bird sightings, threats assessed and weed occurrence.
https://beachvol.birdlife.org.au/public_files/92/2024%20Biennial%20Hooded%20Plover%20Population%20Count%20Report%20Appendix%201%20-%20South%20Australian%20Maps.pdf

Appendix 2

Victorian maps of routes surveyed, beach-nesting bird sightings, threats assessed and weed occurrence.
https://beachvol.birdlife.org.au/public_files/91/2024%20Biennial%20Hooded%20Plover%20Population%20Count%20Report%20Appendix%202%20-%20Victorian%20Maps.pdf

Appendix 3

New South Wales maps of routes surveyed, beach-nesting bird sightings, threats assessed and weed occurrence.
https://beachvol.birdlife.org.au/public_files/90/2024%20Biennial%20Hooded%20Plover%20Population%20Count%20Report%20Appendix%203%20-%20New%20South%20Wales%20Maps.pdf

Appendix 4

Western Australian maps of routes surveyed, beach-nesting bird sightings, threats assessed and weed occurrence.
https://beachvol.birdlife.org.au/public_files/89/2024%20Biennial%20Hooded%20Plover%20Population%20Count%20Report%20Appendix%204%20-%20Western%20Australian%20Maps.pdf

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Thank you

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