

Eyre Peninsula Southern Emu-wren **Distribution Assessment 2023**

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This project was carried out in accordance with the necessary permits: DEW Permit to Undertake Scientific Research number E27327-1 and Wildlife Ethics Committee Approval number 05/2023.

We acknowledge and respect the ongoing cultural and spiritual connection that First Nations people have with their country, and their commitment to its stewardship for future generations.

Summary

The Eyre Peninsula Southern Emu-wren (*Stipiturus malachurus parimeda*, EPSEW) is a tiny bird taxon restricted to the southern tip of Eyre Peninsula, in South Australia. Here, it inhabits floristically diverse but structurally consistent habitat, marked by an incredibly dense understorey. Within its range, it has suffered significant contractions in Area of Occupancy due to a combination of land clearing, draining, grazing, and deliberate burning undertaken primarily in the years following the end of World War II. Habitat modification has reduced the area of habitat available to the subspecies, while also severely fragmenting its population; only 11 subpopulations existed in 2006. The subspecies' very poor capacity for flight ensures it struggles to move across open ground between patches of its preferred dense vegetation, while also leaving it poorly equipped to deal with the threat of wildfires.

In July 2023, the subspecies was uplisted from Vulnerable to Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*. This revision was based upon the taxon's low estimated total population (fewer than 750 adults), small distribution, high degree of fragmentation, and observed and inferred declines in population, including within Lincoln National Park (NP). However, the revision was based largely upon data collected between 2002 and 2009. In light of this and following a fire within the South Block subpopulation in 2021, the Nature Conservation Society of South Australia (NCS) sought and secured funding from the Wettenhall Environment Trust to conduct a survey throughout the subspecies' range, with a focus on revisiting high-priority, previously known sites.

In the intervening period between NCS securing funding for the survey and conducting the survey, a PhD project examining Southern Emu-wren ecology was commenced at Flinders University. As part of this project, the student conducted surveys in 2022 at a number of the sites on Eyre Peninsula that had been surveyed in the 2000s. In order to best target our survey effort, a data sharing agreement was entered into, and using the most up-to-date information the subspecies' distribution on Eyre Peninsula, subpopulations in highest need of re-surveying were identified.

We were thus able to, over six days in August 2023, conduct surveys across four subpopulations that had not been surveyed since 2009, as well as seek out unsurveyed sites and new sites within, or close to, other previously known subpopulation areas. A total of 59 sites were surveyed, 44 of which were existing survey sites. EPSEW were recorded at 36 sites, including 26 existing sites. In total, since 2021, 81 sites from the 2002-2009 surveys have been resurveyed, and EPSEW have been detected at 51 of these sites. In comparison, 60 of these same sites supported EPSEW during at least some part of the 2000s, although it should be noted that average repetitions during the 2000s were higher than over the past three years.

EPSEW are still present at 10 of the 11 subpopulations identified in 2006. The population at Yangie Bay, within Coffin Bay NP, appears to no longer be extant. Using data gathered for this survey, together with the other recent survey, new sites (or sites that had previously failed to record EPSEW) were located in the Glengyle Creek – Salt Creek drainage basin, around Sleaford Mere, within Lincoln NP at Wanna, east of Point Avoid in Coffin Bay NP, and at North Block. Conversely, declines in distribution appear ongoing in Lincoln NP around McLaren Point, and the subspecies has failed to recolonise the Koppio Hills since it was driven locally

extinct in the 2005 Wangary fire. A new alignment of subpopulations is proposed that identifies nine discrete units within the Lower Eyre Peninsula area.

The subspecies' Area of Occupancy (AOO) was calculated at 264 km² for the purposes of the 2023 conservation listing assessment. Our new data suggests a more accurate AOO for the subspecies is 212 km². This represents a 20% decrease in AOO for the subspecies since accurate distribution data were last collected in 2009 and demonstrates the need for up-to-date information to accurately inform any conservation listing assessment. Population density surveys are urgently needed to test if this measured decline in distribution is matched by a decline in population size. Further surveys are also required to test areas of connectivity within the subpopulations.

1. Introduction

1.1 Biology

The Eyre Peninsula Southern Emu-wren (*Stipiturus malachurus parimeda*, EPSEW) is a tiny bird, weighing only 5–9 g (Higgins *et al.* 2001). While it measures 17–19 cm, the majority of this is comprised of the distinctive, long (11–13 cm) tail of six feathers that resemble the emu feathers that lend this genus of birds its name (Higgins *et al.* 2001). Notably pale compared to other subspecies of Southern Emu-wren, the bird exhibits pale olive-grey or brown-grey upperparts with streaks of dark brown on the head, neck, and back, along with dull white streaks on the ear-coverts (DCCEEW 2023, Pickett 2002). The underparts are a pallid light-yellowish brown or tawny colour, except for the white belly. The wings are short and rounded, the bill is black, the iris dark brown, and the legs and feet brownish (Higgins *et al.* 2001).

Like other *Stipiturus* species, EPSEW demonstrate sexual dimorphism. On the forehead and forecrown, males display uniformly rufous feathering, while females have olive-grey or brown-grey plumage (Figure 1.1). Males have a distinctive large patch of light grey-blue or pale sky-blue on the chin, throat, and upper breast, with a sky-blue stripe above the eye, while females display yellow-brown or tawny feathering in these areas (Higgins *et al.* 2001). Details about the plumages of juvenile birds remain undocumented but are presumed to be similar to other subspecies of Southern Emu-wren, in which they resemble the plumage of the adult female (Higgins *et al.* 2001).



Figure 1.1 – A female Eyre Peninsula Southern Emu-wren. Females lack the blue plumage on the face and the breast of mature males in all species of Emu-wren, but still possess the long tail (held downward here).

Southern Emu-wrens are cryptic in habit, opting to stay predominantly within thick vegetation. They are poor fliers and tend to remain in the lower strata. Their call is a series of very high-pitched, scratchy, rolling trills, which can be inaudible to people with high-frequency hearing loss (Higgins *et al.* 2001).

The species primarily consume small invertebrates, primarily insects including beetles (Coleoptera), katydids (Orthoptera), psyllids (Hemiptera: Psyllidae), and other Hemiptera. They typically forage systematically through a single shrub, from low down to the shrubtop, before progressing to the next one. They occasionally capture flying insects, and have been recorded eating katydid eggs and wasp cocoons (DCCEEW 2023, Higgins *et al.* 2001).

Southern Emu-wrens are monogamous pair-breeders (Higgins *et al.* 2001). Birds establish and defend breeding territories, with each pair typically occupying approximately one hectare of high-quality habitat, minimising overlap with neighbouring pairs (DCCEEW 2023, Pickett 2006). Nests are a dome-shaped construction woven from fine-leaved grasses and sedges in dense vegetation near the ground or water (Higgins *et al.* 2001). Both parents contribute to feeding the young, but only the female incubates eggs and broods nestlings. Pairs produce one or two broods (clutch size up to three) from August to March, with a peak in hatching from September to December (DCCEEW 2023, Higgins *et al.* 2001). Young achieve independence by approximately three months of age (Pickett 2006). Cooperative breeding and extra-pair paternity, observed in other Southern Emu-wren subspecies, may also occur in the EPSEW (DCCEEW 2023).

1.2 Habitat

Habitat suitability for the EPSEW is determined primarily by vegetation structure, more so than by floristic components (Pickett 2002, Pickett 2006). EPSEW inhabit environments characterised by one or two layers of dense to very dense vegetation, rarely exceeding 2 m in total height. A full breakdown of the vegetation communities that EPSEW occur in can be sought in other reports, including Pickett (2006). Broadly, however, the subspecies occupies three habitat types: shrubland, mallee, and sedgeland.



Figure 1.2 – Low closed heathy shrubland habitat on the upper slopes of Marble Range.

Shrubland areas encompass both wet and dry heathlands, as well as low or tall shrublands, usually closed, but can be open when taller (Figure 1.2, Pickett 2006). Typically, these habitats are dominated by one or two primary plant species, with *Melaleuca*, including *M. brevifolia*, and occasionally *M. decussata* and *M. lanceolata*, being the most prevalent. Samphire shrublands dominated by *Tecticornia arbuscula* are also occupied by the subspecies (DCCEEW 2023).

Mallee habitats are marked by the presence of Eucalypt species, most often *Eucalyptus incrassata*, but are nonetheless structurally dominated by other low dense species consistent with the aforementioned shrubland habitats (Figure 1.3). In coastal areas, mallee trees rarely exceed 2 m height in suitable habitat, although they may reach 5 m at more inland sites (Pickett 2006). In these areas, the eucalypts tend to be clumped or widely spaced, with a resultantly open canopy, and dense heathy understorey.

Sedgeland are dominated by *Gahnia* species, and should be very dense (cover >90%) in order to properly support EPSEW (Figure 1.4, Pickett 2006). At some sites, the presence of *Melaleuca* species can make the distinction between a sedgeland and a shrubland unclear, further highlighting the structural components rather than vegetation community as the primary driver of habitat suitability.



Figure 1.3 – Low coastal mallee habitat north of D’Anville Bay.

1.3 Conservation status and threats

The EPSEW is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) effective from 5 July 2023 (DCCEEW 2023). The subspecies is eligible for listing in the Endangered category due to its restricted distribution, small and severely fragmented population, and observed and inferred continuing population decline. In South Australia, the subspecies is listed as Endangered under the *National Parks and Wildlife Act 1972*.

The primary threats to the EPSEW are wildfire, and habitat loss, degradation, and fragmentation (DCCEEW 2023, Pickett 2002, Van Weenen & Garnett 2021). Wildfires are high mortality events for EPSEW due to their weak powers of flight, and have the potential to completely eliminate subpopulations if the fire comprehensively burns all available habitat

(Pickett 2006). Habitat loss and damage are primarily driven by vegetation clearance, livestock grazing, water extraction, and swamp drainage (DCCEEW 2023). The subspecies is particularly vulnerable to habitat fragmentation, again owing to their poor flight ability. Seemingly insignificant breaks in dense vegetation can prove too great of a challenge for the subspecies to overcome. As such, habitat degradation that thins the understorey can effectively fragment the landscape even when vegetation appears continuous. Fragmented habitats put isolated populations at risk of genetic diversity loss, inbreeding depression, and demographic stochasticity.

Several further threats exist to the subspecies on Eyre Peninsula. Weed invasion and *Phytophthora*-induced dieback can contribute to thinning of the understorey. Climate change, with longer droughts and more frequent heatwaves, heightens the threat of extreme fire weather in the future, and may change the hydrology of the region, exacerbating the effects of water extraction. Introduced predators (feral cats and foxes) are not considered a threat in intact dense habitat, but may pose more of a threat in degraded habitat (DCCEEW 2023, Van Weenen & Garnett 2021).



Figure 1.4 – Dense *Gahnia* sedgeland. Such habitat is vulnerable to water extraction and grazing by stock.

1.4 Distribution and survey history

The EPSEW is confined to the southern tip of the Eyre Peninsula in South Australia (Pickett 2002, Pickett 2009). At the time of European settlement, the subspecies is thought to have occurred widely and more or less contiguously throughout the region it currently occupies in a fragmented fashion (Pickett 2002). In particular, it seems likely that the dominant habitat west and south of Wanilla was mixed *Melaleuca/Gahnia* swamps and shrublands, that have since been reduced to a mere fraction of their former extent through a combination of land clearing, draining, grazing, and deliberate burning. Much of this habitat alteration occurred rapidly in the years following the end of World War II, and while some areas have since recovered, the ongoing apparent absence of EPSEW suggests that corridors by which recolonisation could occur do not exist (Pickett 2002).

Prior to 2002, the distribution of the subspecies and its preferred habitats were poorly understood (Pickett 2002). Between 2002 and 2009, surveys were conducted annually throughout the region, the results of which informed, among others, a Habitat Management Plan, and the 2013 and 2023 federal Conservation Advice documents (DCCEEW 2023, Pickett 2006, Pickett 2009).

The most recent distribution assessment of the subspecies in 2006 identified 11 subpopulations spread around the southern end of Eyre Peninsula, south of a line connecting Warrow with Edillilie and Port Lincoln (Figure 1.5, Pickett 2006). Each of the 11 subpopulations is considered to be isolated from one another, such that a single stochastic event that eliminated the entire subpopulation would not see subsequent reoccupation of that area (DCCEEW 2023). The subpopulations and their tenures were broadly identified as:

1. South Block (private land);
2. Marble Range (heritage agreement, private land);
3. Edillilie – Salt Creek – Duck Lake (road reserve);
4. Kellidie Bay – Wanilla (Kellidie Bay Conservation Park (CP), Murrunatta CP, road reserve, private land);
5. Yangie Bay (Coffin Bay National Park (NP));
6. Point Avoid (Coffin Bay NP);
7. Shoal Point – D’Anville Bay – Whalers Way – Fishery Bay (SA Water reserve, heritage agreement area, private land);
8. Sleaford Bay West – Tulka (Lincoln NP, Sleaford CP, road reserve, private land);
9. Wanna – Cape Tournefort (Lincoln NP);
10. West Point – Jussieu Bay (Memory Cove Wilderness Protection Area (WPA)).
11. Carcass Point – McLaren Point – Point Haselgrove – Taylors Landing (Lincoln NP);

Until 2005, an additional subpopulation was known from the Koppio Hills, in the Charlton Gully and White Flat area (Pickett 2002). However, the devastating Wangary wildfire of 2005 burned through the entirety of that area, and EPSEW were not found in subsequent surveys between 2006 and 2009, leading to conclusions that the subspecies had been extirpated throughout the Koppio Hills (Pickett 2009). These fires also burnt vast tracts of land east of Wangary, and north as far as Edillilie, through much of the Edillilie – Salt Creek – Duck Lake subpopulation, and into the north-eastern (Wanilla, Murrunatta CP) reaches of the Kellidie Bay – Wanilla subpopulation. By 2008, EPSEW from the latter population had been recorded recolonising areas within the fire scar, while birds from the northern population persisted beyond the edge of the fire scar, but had not been detected recolonising regenerating habitat (Pickett 2009).

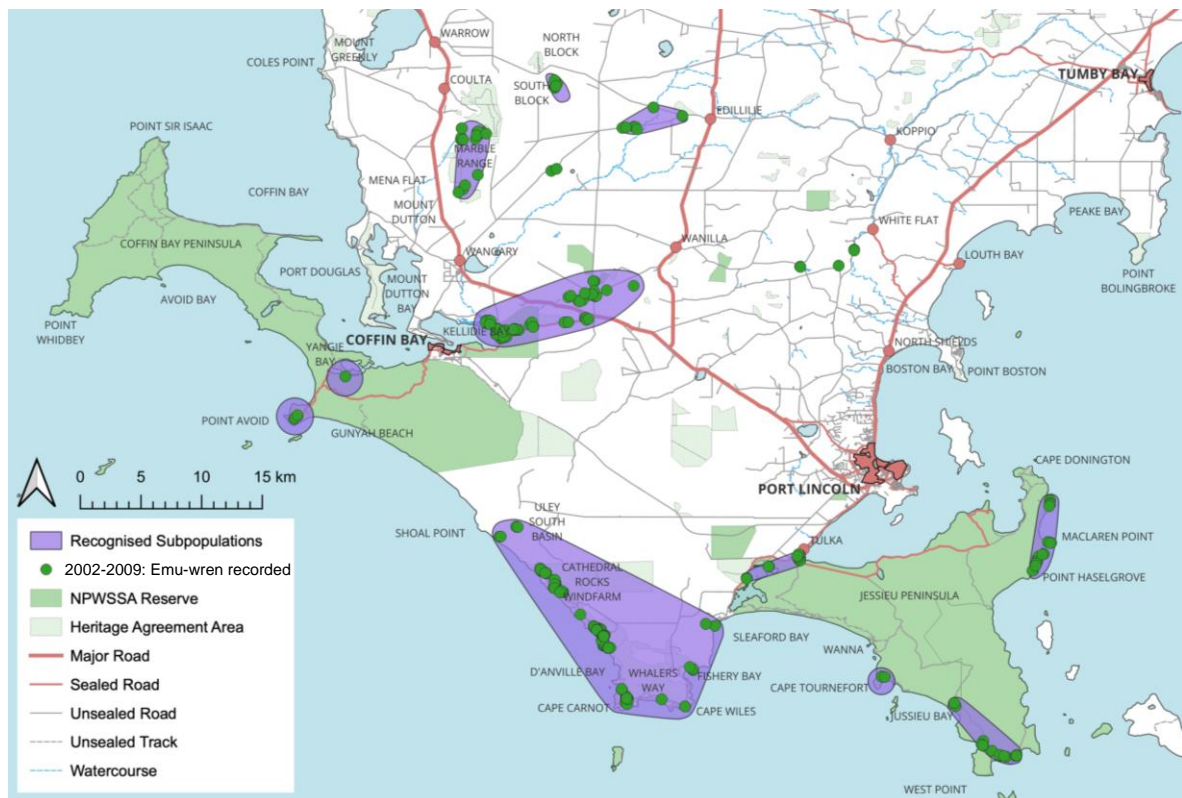


Figure 1.5 – The 11 subpopulations of EPSEW identified in 2006 by Pickett and subsequently used in the Conservation Advice (2023) which uplisted the taxon to Endangered. The records in the Koppio Hills and north-east of Wangary were a part of populations that were eliminated by the 2005 Wangary fire (green dots not circled in blue).

Between 2009 and 2020, no formal surveys of the subspecies were undertaken. Sporadic reports through the Biological Databases of SA and citizen science platforms such as eBird and the Atlas of Living Australia indicated ongoing presence around Kellidie Bay, at Point AVOID, near Tulka and Sleaford Bay West, on Marble Range, and at Fishery Bay (ALA 2023, DEW 2023). In 2021, surveys were conducted as part of the environmental assessment process for the proposed Whalers Way Orbital Launch Complex development (DCCEEW 2023). These indicated that the Whalers Way and Cape Carnot area supported significant numbers of EPSEW, and also that the subspecies persisted in Lincoln NP and at West Point in Memory Cove WPA (DCCEEW 2023).

In December 2021, a lightning strike on South Block, in the north-west of the subspecies' distribution, ignited a wildfire that, due to active re-lighting, subsequently burnt through the entirety of the inselberg. With no follow up surveys, it has been unclear whether any EPSEW had survived, or whether any suitable habitat remained (DCCEEW 2023).

It was in the context of uncertainty regarding the persistence of the population at South Block, together with the significant passage of time since systematic survey across the subspecies' range had taken place, that the NCS sought funding for survey of the EPSEW, with the aim of producing an updated distribution map of the subspecies while also seeking to confirm the ongoing presence of the subspecies within its 11 described subpopulations and confirm the local extinction of the population in the Koppio Hills. This report summarises the results of this survey and presents our best estimate of the current distribution of the subspecies on Eyre Peninsula.

2. Methodology

2.1 Site selection

Between 2002 and 2009, 168 sites were surveyed for EPSEW, either as part of DEW-funded Southern Emu-wren monitoring, or for environmental assessment work associated with the Cathedral Rocks Wind Farm. A major aim of this project was to revisit these established survey sites to confirm ongoing presence, or apparent absence and decline. Logistic and funding limitations restricted our survey window to approximately five days in August 2023, meaning that revisits to all 168 sites were not feasible. It thus became necessary to identify priority subpopulations and sites.

In the intervening period between NCS securing funding for the surveys and conducting those surveys, a PhD project examining Southern Emu-wren ecology was commenced at Flinders University. As part of this project, the student conducted surveys in 2022 at a number of the sites on Eyre Peninsula that had been surveyed in the 2000s. Given this, we decided to approach Flinders University regarding sharing information, and under the terms of the Data Sharing Agreement subsequently entered into, the results of our surveys would be shared with them in exchange for the results of their surveys and their audio recordings of the subspecies.

From the environmental assessment process for the proposed Whalers Way Orbital Launch Complex and the PhD project surveys emerged a map of the subspecies' recent distribution on Eyre Peninsula (Figure 2.1). This allowed for easy identification of subpopulations that urgently needed survey data. We identified the following priority survey areas:

1. South Block
2. Marble Range
3. Edillilie – Salt Creek – Glengyle Creek
4. Yangie Bay
5. Shoal Point – D'Anville Bay
6. Koppio Hills

Priority was given to sites that had previously supported EPSEW. Additionally, scope existed for either resurveying of previously negative sites if habitat looked suitable, or for the investigation of additional sites. These sites were selected opportunistically by the surveyor, based on the quality and extent of habitat, and its apparent suitability for EPSEW.

Many of the sites lay on privately-owned land. Access to such sites was arranged with respective landholders. In several instances, surveys were conducted on road reserves adjacent to historic sites; such occasions were necessary when landholder contact information was not obtained, and only occurred when the road reserve lay within a few hundred metres of the original survey site and was connected by continuously suitable habitat.

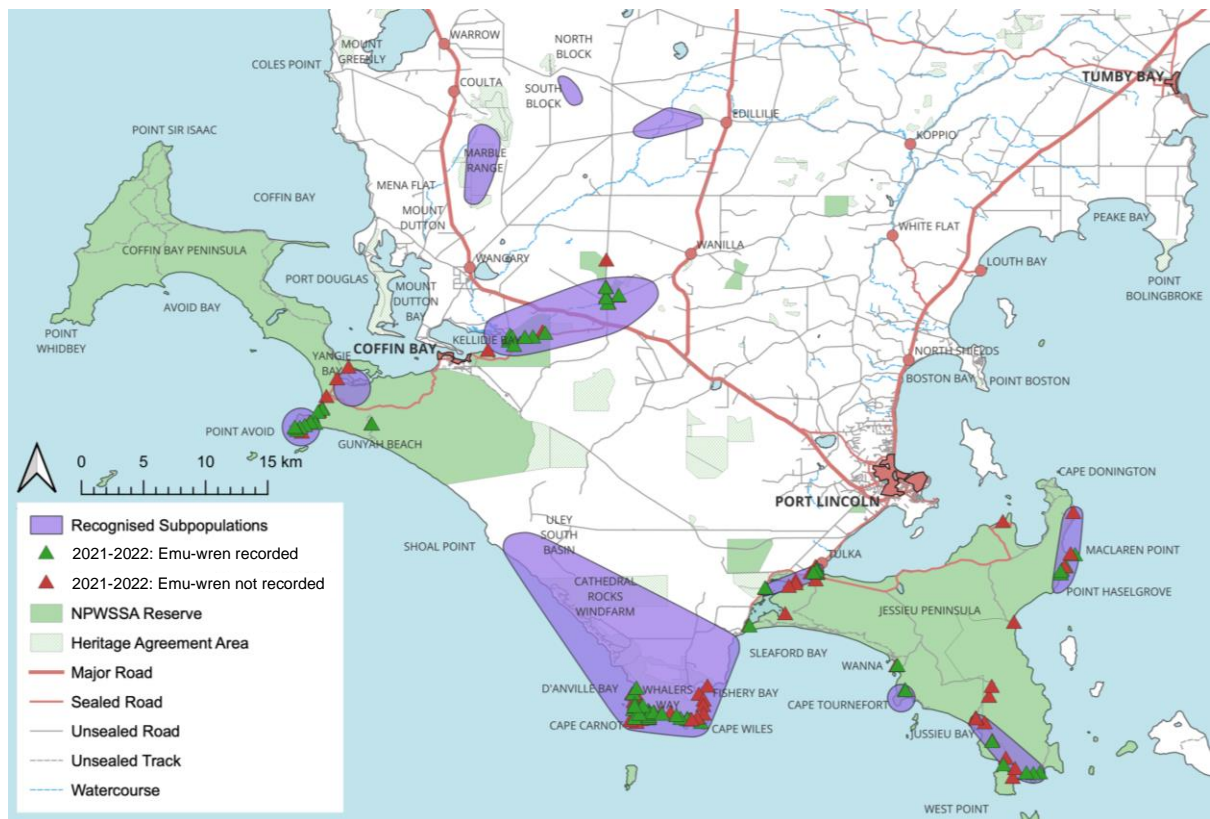


Figure 2.1 – Recent survey effort for EPSEW. Priority survey areas were identified by overlaying recent survey sites on the 11 recognised subpopulations.

2.2 Survey method

Sites were surveyed in a manner consistent with the method used between 2002 and 2009 by Pickett (2002). Surveys centred on the use of playback; that is playing pre-recorded calls of EPSEW (provided by Flinders University) from a mobile phone on maximum volume. Emu-wrens are typically responsive to the calls of conspecifics, and playback was used to elicit a response from birds, which took the form of song, contact calls, close investigative approach, or some combination of all three behaviours (Figure 2.2). The survey period of August 14-19 2023 was selected to coincide with the early stages of the EPSEW breeding season. At that time of year, most EPSEW have formed breeding pairs and have established territories that they defend more intently and conspicuously than at other times of the year (Pickett 2002). Additionally, daytime temperatures in mid-August tend to remain suitable for surveying and heightened detectability throughout the day. As such, the time of year maximised the accuracy and efficiency of the surveys.

At each site, an area search, transect survey, or point survey was conducted, with the preferred method determined by the extent and layout of accessible and suitable habitat. Transects were of various lengths and area searches were mostly of at least 2 ha. Point counts were undertaken most often when habitat patches were of such small scale that a single playback point was sufficient to elicit a response from birds within the entire patch. Surveying typically involved movement through the site on foot, stopping not more than every 100 m to play calls of EPSEW, before waiting stationary, looking and listening for responding birds. Surveying at a site continued until EPSEW were detected and presence was confirmed, or

until the surveyor was satisfied that they had covered the accessible suitable habitat to such an extent that birds, if present, would almost certainly have been detected.

Surveys were typically undertaken in fine conditions. Wind strength is a major confounding factor in emu-wren surveys, owing to the faint and high-pitched nature of the species' calls, which can be hard to detect when wind speeds exceed 20km/h. At higher wind levels, playback also carries less effectively, and so intervals between playback points were shortened. At each site, weather conditions, including bracketed wind speed, temperature, cloud cover, and precipitation, were recorded. In instances where the integrity of the survey was compromised by poor weather, those survey results were discarded, and the sites revisited in more optimal conditions.

A number of vegetation and other site-specific variables were also recorded for each site. Dominant vegetation community, vegetation height and cover were all estimated, while nearest human disturbance and distance to disturbance were calculated afterward from a desktop analysis. If EPSEW were detected, an estimate of abundance was made. However, the objective of this project was to confirm presence rather than produce a density estimate, and so follow up playback or observation efforts beyond confirming binary presence/absence were minimal. In particular, efforts were made to reduce disturbance to detected birds, given the proximity to the breeding season, and thus it is likely that the recorded number of individuals at each site consistently underestimated the number of birds present.



Figure 2.2 – A male Eyre Peninsula Southern Emu-wren that approached closely to investigate the source of emu-wren calls.

3. Results

A total of 44 historic survey sites were revisited and resurveyed. EPSEW were located at 26 of these sites. An additional 15 new locations in suitable habitat were surveyed for the first time, with each site assigned a new site identification code and name. EPSEW were confirmed to be present at 10 of these new sites. In total, there were 57 detections of EPSEW, totalling at least 96 individual birds.

3.1 South Block

The 2021 fire on South Block has burnt through almost the entirety of the vegetation. There are two established survey sites on the inselberg. One of these (17/2004) lies on the lower slopes of the hill, and has not previously recorded EPSEW. Given this, and the total lack of vegetation cover, this site was not formally surveyed. The other site (18/2004) lies atop the hill, in an area that was clearly low closed heathy shrubland habitat prior to the fire. This site supported EPSEW in the 2000s. In 2023, the area immediately surrounding the site coordinates has been burnt, however, a small area remained unburnt very close by on the slope of a gully. This patch contains approximately 5 ha of suitable EPSEW habitat, and EPSEW were encountered four times here (Figure 3.1).

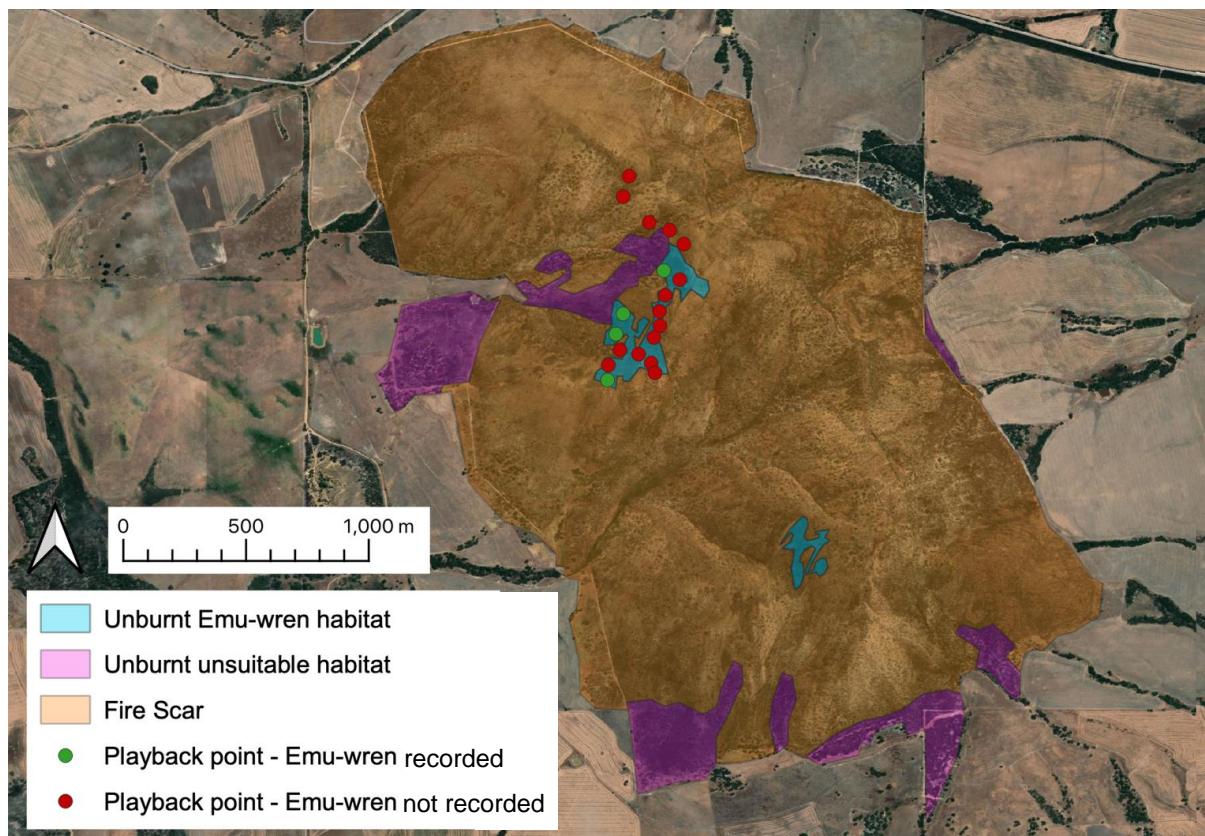


Figure 3.1 – The extent of the 2021 South Block fire scar. Surveys were conducted at existing site 18/2004, where a small patch of low closed heathy shrubland remained unburnt.

3.2 Marble Range

Three distinct survey areas exist on Marble Range. Two of these, on the upper slopes of the main range, lie in low closed heathy habitat, while the third, on the lowest slope of the western side of the main range, is dominated by *Melaleuca uncinata* mixed shrubland. Six existing sites were distributed between the three survey areas; EPSEW were detected at four of these. An additional six survey sites were established in patches of suitable habitat that were traversed while navigating between existing survey sites. EPSEW were detected at all six of these new sites. EPSEW were encountered 21 times on Marble Range, totalling at least 28 birds.

3.3 Edillilie – Salt Creek – Glengyle Creek

In 2023, eight existing sites were resurveyed, and two new sites were established in patches of suitable roadside habitat. Four of eight existing sites were found to support EPSEW, while the subspecies is apparently absent at four others (Table 3.1). EPSEW were also confirmed at both new sites. There was little correlation between the presence of EPSEW at sites prior to the 2005 fire and ongoing detectable presence in 2023. Similarly, there was no apparent correlation between presence this year and presence in habitat that was burnt and recolonised by EPSEW in the years following the fire.

Table 3.1 – Survey results from the Edillilie – Salt Creek – Glengyle Creek subpopulation. Surveys were conducted in road reserves, where vegetation gives every indication of having fully recovered since the 2005 fires.

Site	EPSEW Presence		
	Pre-fire 2002-2005	Post-fire 2006-2009	2023
15/2002	Y	N	N
63/2002	Y	N	Y
64/2002	Y	–	N
65/2002	Y	Y	N
66/2002	Y	Y	N
71/2002	N	N	Y
5/2006	–	N	Y
15/2009	–	N	Y
7/2023	–	–	Y
8/2023	–	–	Y

3.4 Yangie Bay

The Yangie Bay subpopulation is known from a single survey site that was surveyed only once, in 2002. This site lies in dense samphire shrubland, dominated by Shrubby Glasswort (*Tecticornia arbuscula*). Despite extensive surveying through this habitat at this site and along an adjacent transect, EPSEW could not be located.

3.5 Shoal Point – D’Anville Bay

A total of 22 established survey sites lie between Shoal Point and the north-western end of Whalers Way. Two of these sites are on SA Water land, in the Uley South Basin borefield. EPSEW were found at one site here (39/2002), in open low mallee on the windswept coastal slope. The other site (40/2002) lies in the centre of a *Gahnia* swamp. EPSEW were not found here.

A further 20 sites owe their existence to the environmental impact assessment process associated with the Cathedral Rocks Wind Farm that occupies the land between the southern boundary of the SA Water land and the northern boundary of Whalers Way. During that survey process in the 2000s, EPSEW were detected at 16 sites (over multiple years of surveying). All 16 of these positive sites were resurveyed in August 2023, with EPSEW located at 12 of these (Figure 3.2). Additionally, one of the formerly negative sites was surveyed, and EPSEW were confirmed.

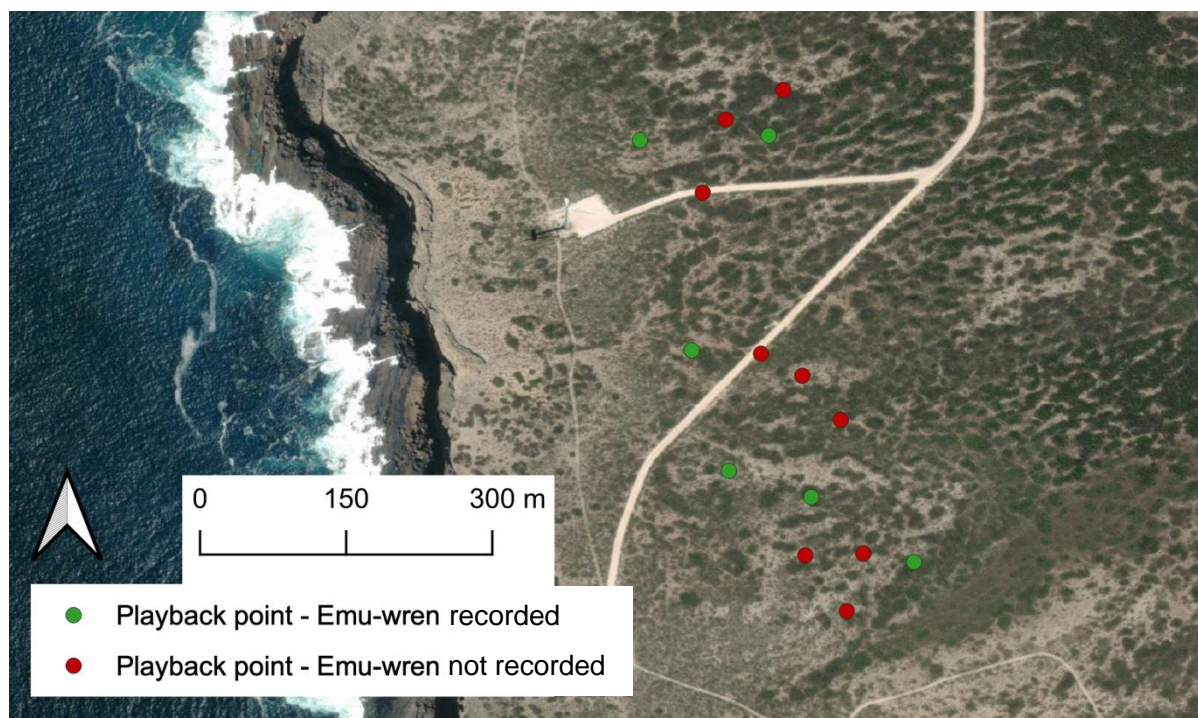


Figure 3.2 – Survey effort and results from area searches of three existing sites on Cathedral Rocks Wind Farm.

3.6 Koppio Hills

The Wangary fire of 2005 burnt through much of the Koppio Hills, and destroyed all vegetation at the sites that had been known to support EPSEW up to that event. Subsequent site revisits between 2006 and 2009 failed to detect EPSEW anywhere in the area, and the subspecies had been declared likely locally extinct. While not all existing sites were resurveyed in August 2023 (access constraints), five sites were resurveyed, and a further four new roadside sites were surveyed. EPSEW were not detected at any sites, despite the presence of apparently suitable habitat.

3.7 Other sites

Several other sites were surveyed over the course of the available survey period. Some of these were existing sites that fell within subpopulations and were therefore not high priority, but nonetheless had not been surveyed since 2009. Others were new sites in suitable habitat.

Two sites on Coffin Bay Rd, west of Kellidie Bay CP, had not been surveyed since 2008 and 2006 respectively, but both were found to support EPSEW in 2023.

At Cape Tournefort, in Lincoln NP, two sites that were established in 2004 were resurveyed. One of these (23/2004) had not recorded EPSEW during its initial (and only) former survey, and this absence was observed again this year. At the other site (24/2004), where EPSEW had been recorded in 2004 but not in follow up surveys in 2006, their occupancy was confirmed. An additional site, established in suitable habitat during this survey, was also found to hold EPSEW.

While surveying South Block, the adjacent, far smaller North Block hills attracted attention. The block is long unburnt and is dominated by the same closed low heathy shrubland that typifies the upper slopes of Marble Range and, prior to the 2021 fire, South Block. Access was granted at short notice by the landholder, and a morning's surveys on North Block revealed a new population of EPSEW in good health. EPSEW were encountered at six of ten playback points, and incidentally encountered on one further occasion.

At the invitation of a private landholder, habitat on the southern edge of Lake Greenly was also investigated. Extensive suitable habitat exists here, however weather conditions were inappropriate for an effective survey during this survey session, with wind speeds in excess of 40 km/h.

4. Discussion

The August 2023 surveys have successfully allowed for a reassessment of the distribution of the EPSEW (Figure 4.1). The survey window maximised the detectability of EPSEW and allowed for relatively robust conclusions on presence and absence to be drawn. It is important nonetheless to identify the risks of false negative results – that is, the chance that birds were present at a site or within a subpopulation but not detected. It is for this reason that the term ‘apparent absence’ is preferred over ‘absence’ when discussing survey results. There are a number of possible sources of false negative data.

One such source is unsuitable survey weather. As discussed above, high winds can reduce detectability, by reducing the distance that emu-wren calls are audible over, by reducing the distance that playback calls carry, and by reducing the ability of the observer to visually detect the birds, due to wind-driven movement of foliage. In this survey session, however, good fortune led to almost calm weather for two days of the survey. Day-to-day site selection was carefully managed to ensure sites on leeward sides of hills were surveyed on windier days, and in total three were resurveyed in calmer conditions on subsequent days when the initial survey was conducted in fresh to moderately windy conditions. Only the suitable habitat at Lake Greenly was assessed in excessively windy conditions, and as a result no conclusions regarding EPSEW presence are made for this area.

It should also be noted that the EPSEW on Marble Range were generally far less conspicuously responsive to playback than in all other areas searched during this survey period. This is suggestive of another source of false negative data. EPSEW are less responsive and more difficult to find once nesting has commenced and following fledging of nestlings. It is possible that breeding on Marble Range had commenced earlier this year than in other subpopulations, leading to lower rates of detection. This possibility applies across the Eyre Peninsula to any patch of suitable habitat that did not have EPSEW detected within it. Breeding is typically not perfectly synchronised within a population or a site, so the general expectation is that by conducting surveys in August, at least some pairs at any given site will be at a more territorial stage of breeding, and that detectability at a site will be sufficient to confidently determine absence. Nonetheless, if there are consistent breeding timing trends within populations (e.g. on Marble Range), then there is the possibility that entire subpopulations of EPSEW may go undetected during a single-week survey session.

From the confirmed presence data that was gathered, EPSEW definitively continue to persist in 10 of the 11 subpopulations that were recognised in 2006. This is an encouraging result, as the most recent assessment of the subspecies’ status in the State of Australia’s Birds report concluded, based on rates of inferred and observed decline, that the subspecies had likely vanished from three subpopulations. An uplisting to Endangered is nonetheless still justified. A full review of all recognised, historic, or potential subpopulations is conducted forthwith.

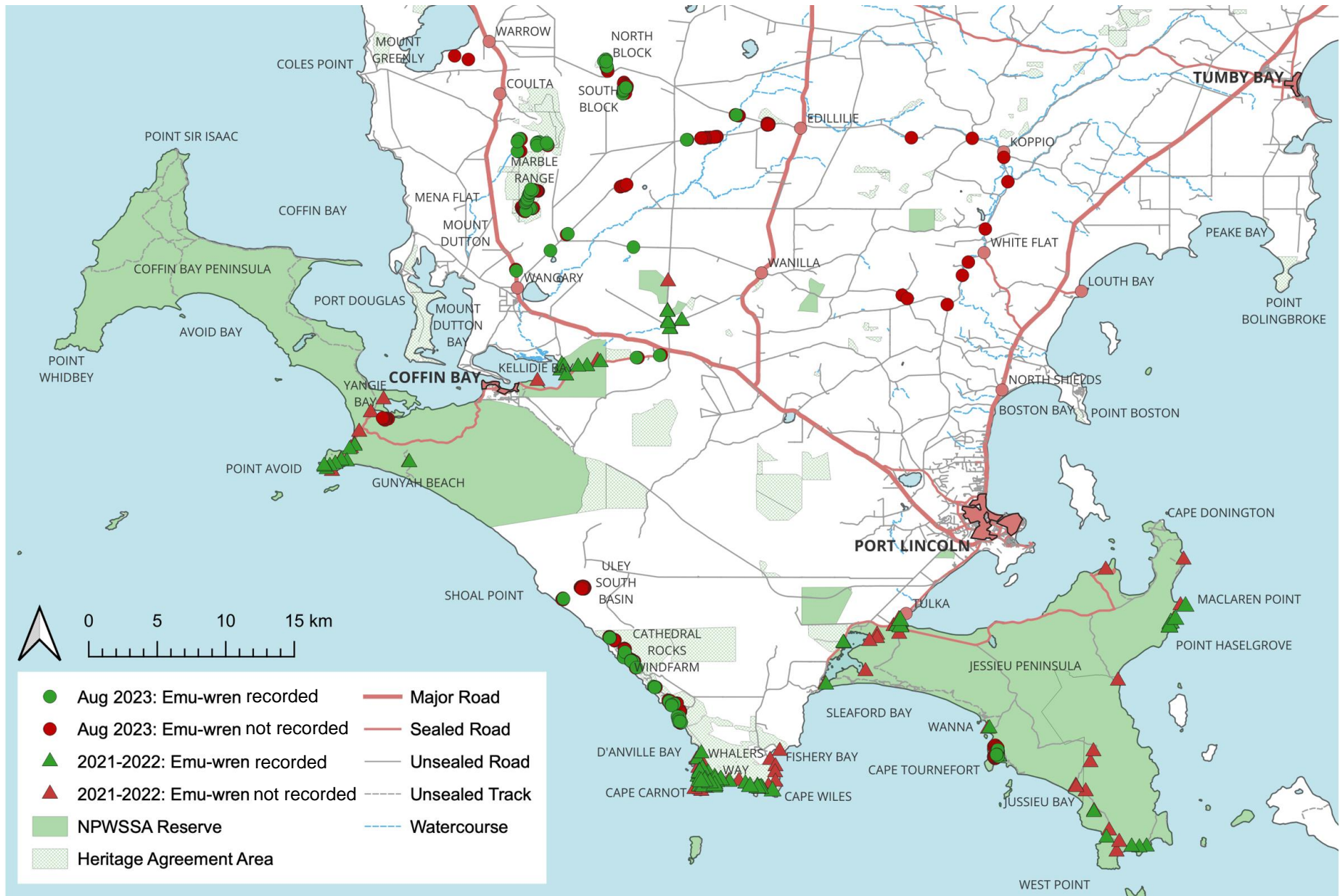


Figure 4.1 – All survey effort and records of EPSEW from the 2021-2023 period.

4.1 Recognised Subpopulations

4.1.1 South Block

A significant degree of relief is associated with the confirmation that EPSEW persist on South Block in spite of the 2021 fire event, albeit within just a handful of hectares of suitable habitat that remain. An analysis of satellite imagery suggests the area where EPSEW were found may be the only unburnt shrubland on the entire inselberg, and thus the only area that remains on South Block that can support EPSEW. A very small patch on the southern hill may also contain unburnt low shrubland, but appears too small to sustain more than a single pair of EPSEW.

It was, however, encouraging to see that the intensity of fire across much of the inselberg was low, and that vegetation recovery is already well underway (Figure 4.2). It is possible that the shrubland habitat on South Block may recover in density and height to a level that can support EPSEW by mid to late 2025. It is important, however, to understand that fire response is complicated by many factors. The speed of vegetation growth and thickening is heavily influenced by the climate in the years following the fire, including rainfall and occurrence of heatwaves. Grazing pressure, whether from native or introduced species, can greatly impede vegetation from reaching the density required to support EPSEW. More generally, the linkages between a fire scar and nearby populations will have a significant impact on the speed at which habitat is recolonised once it becomes suitable. The specific type of habitat that was burnt, and the intensity of the fire, can also play an overwhelmingly significant role. Wet habitats such as sedgeland are far more tolerant of fire and tend to rebound well and swiftly following fire (Pickett 2006). Low heathy habitat, particularly mallee varieties, may require and tolerate fire at far lower intervals, and the recovery of vegetation may be difficult to predict.



Figure 4.2 – Vegetation recovery within the 2021 fire scar on South Block.

The primary impact of the 2021 fire on the EPSEW appears to have been to reduce the local population to a handful of individuals. This may present subsequent genetic bottleneck issues as the habitat recovers and the population grows and recolonises the block. North Block, which was found for the first time to support a healthy population of EPSEW, is close by, but appears not to be sufficiently connected by dense native vegetation to allow free movement of EPSEW between the two inselbergs. There is notionally a corridor, in places only one tree wide, that connects the two hills. Colour-banding birds to track their local movements, and monitoring of genetics as the South Block population recovers could be of significant value.

4.1.2 Marble Range

Marble Range generally appears to support significant areas of suitable habitat and high densities of EPSEW. This population is clearly one of great significance for the subspecies. This is consistent with the assessment in the Conservation Advice report, which identifies the range as critical to the long term survival and recovery of the subspecies (DCCEEW 2023). While the report describe the range as containing sparse numbers, the results of this survey suggest otherwise.

Of the two sites that EPSEW were apparently absent from, one (32/2004) appeared to have undergone successional vegetation change since vegetation characteristics were recorded during its first survey in 2004, with vegetation now much taller than would typically support EPSEW. The other (38/2004), on the southern flank of the range, supported extensive suitable habitat, and the apparent absence of EPSEW is difficult to explain, especially in light of the high densities of EPSEW in adjacent areas. It should be noted however that year-to-year variation in occupied territories is common among animals that are not at their maximum population density, and thus individual territories where playback was used may have been unoccupied.

The range is extremely vulnerable to the threat of wildfire. Marble Range has not burnt for many decades, since 1968, and the density of vegetation, terrain, and lack of human assets are such that a fire could easily consume much of the suitable EPSEW habitat very quickly.

4.1.3 Edillilie – Salt Creek – Duck Lake

Prior to the 2005 Wangary fire, records of EPSEW from this subpopulation spanned an area from close to Edillilie in the north-east to Duck Lake Rd south of South Block, some 15 km to the south-west (Pickett 2006). Following the fire, the population appeared to have contracted exclusively to unburnt roadside habitat on Duck Lake Rd around 8 km west of Edillilie (Pickett 2006).

These results suggest that the subspecies has successfully recolonised suitable habitat throughout the portion of the fire scar that lies within the Salt Creek – Glengyle Creek drainage basin, which is unsurprising after 18 years. The connectedness of this subpopulation is perhaps the hardest to gauge of the remaining subpopulations, given that free movement of the subspecies may depend on the specific density of the vegetation. Much of the Glengyle Creek and Salt Creek system lie on private agricultural land, and ungrazed roadside reserves may not represent the condition of the habitat on the other side of the fence (Figure 4.3). The drainage system undoubtedly has the potential, both currently, and in future, to be highly

fragmented. Vegetation on private land may be subject to overgrazing, and is very vulnerable to changing land use and land management practices. Equally, great potential exists to improve outcomes for the subspecies by protecting suitable habitat from grazing and cropping.

Nonetheless, it is likely that connectivity exists throughout both creeklines, from near Edillilie down to Lake Wangary. If this is the case, then this population is both hugely significant in its own right, and also an important source population for the surrounding areas. Potential paths of connectivity with Marble Range and South Block, as well as between Wangary and the coast around Kellidie Bay, if restored, strengthened and protected, would allow for genetic exchange throughout the western half of the subspecies' range, and faster recolonisation following adverse but potentially unavoidable events such as fire.



Figure 4.3 – Healthy dense swampy *Melaleuca* shrubland habitat that currently supports EPSEW. Road reserves such as this one are protected from grazing by stock.

4.1.4 Kellidie Bay – Vanilla

With the exception of two positive sites on Coffin Bay Rd, the subpopulation around Kellidie Bay and to the north-east was already known to be in good health. Kellidie Bay CP is a popular local destination for birdwatchers and bird photographers, and records of the subspecies are uploaded to citizen science databases quite regularly. Additionally, surveys by Flinders University in 2022 indicate ongoing presence around the Settlers Rd/Gerschwitz Rd intersection south of Murrunatta CP, suggesting the extent of the subpopulation is much the same as it was before the Wangary fire.

There must be some question, however, regarding the connectivity between the habitat on either side of the Flinders Highway. While major roads such as that are not generally considered to be barriers to movement for EPSEW, there exists a break in the continuity of habitat along Merintha Creek, between the eastern boundary of Kellidie Bay CP and the sedgeland habitat on the northern side of the highway. The current density and width of the vegetation corridor along Merintha Creek is probably sufficient to allow for some dispersal

between areas by EPSEW, and it is not therefore recommended to treat this subpopulation as two separate entities. Nonetheless, widening the vegetation corridor along Merintha Creek would shore up the connectivity between the two halves of this subpopulation.

4.1.5 Yangie Bay

The extent and size of the Yangie Bay population in Coffin Bay NP has never been well understood. The samphire flats here are in excellent condition, however the extent of appropriate habitat is low, particularly if the adjacent samphire-dominated island is too widely separate from the mainland (Figure 4.4). Additionally, the connectivity between this population of known populations to the south (at Point Avoid) and east (Kellidie Bay) is not known. Until this area can be more extensively and intensively surveyed, this subpopulation should be tentatively considered to be extinct.

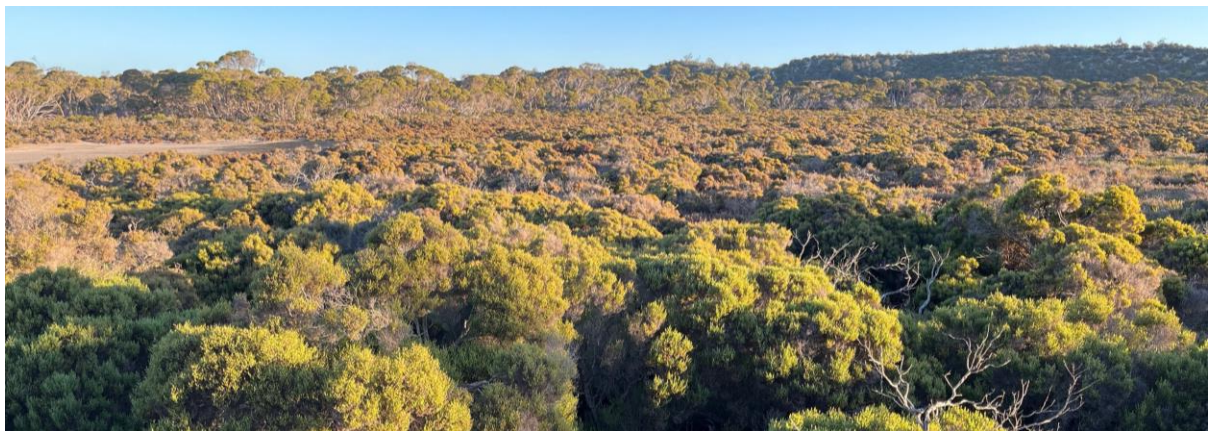


Figure 4.4 – *Tecticornia arbuscula* shrubland at Yangie Bay. Such habitat at Kellidie Bay supports an important population of EPSEW, but the subspecies appears to have gone extinct at Yangie Bay since 2002.

4.1.6 Point Avoid

The Point Avoid subpopulation, within Coffin Bay NP, lies within another publicly-accessible area that is visited by birdwatchers. Records here from birdwatchers suggest that the habitat between the point and the Almonta Beach carpark holds good numbers of birds, and this is supported by surveys from 2022 by Flinders University. This distribution is consistent with pre-2009 records. Of particular note, however, is a record from 2013 on the Gunyah Beach track, almost 5 km further east. This sighting was corroborated by Flinders University in 2022, and suggests a persistent population here. Satellite imagery suggests there may be habitat connectivity between there and Point Avoid, which could imply a significant expansion in the understood occupied area of this subpopulation.

4.1.7 Shoal Point – D’Anville Bay – Whalers Way – Fishery Bay

The 2023 surveys are the first time since 2008 that the coastline between D’Anville Bay and Shoal Point has been surveyed for EPSEW. The low coastal mallee and shrubland habitats appear in excellent condition, and this area is clearly a critical one for the subspecies (Figure 4.5). It was pleasing to see EPSEW living in close proximity to the turbine towers, despite the associated noise pollution that the turbine blades generate.

The full distribution of this subpopulation was described in 2006 broadly as a triangle with apexes of Shoal Point in the north-west, Cape Carnot/Whalers Way/Cape Wiles in the south-east, and Sleaford Bay in the north-east (Pickett 2006). Surveys in the past three years, both by Flinders University and for the environmental assessment process for the proposed Whalers Way Orbital Launch Complex have demonstrated a high density of EPSEW territories in the vicinity of Cape Carnot, but a sharp drop off in presence among sites heading east to Cape Wiles, and no recent available records exist north of Cape Wiles into Fishery Bay. The two historic sites in Sleaford Bay have not been resurveyed since 2009.



Figure 4.5 – low mallee habitat within the Cathedral Rocks Wind Farm. This land is subject to a Vegetation Heritage Agreement, and is in excellent condition.

There is no firm evidence that EPSEW occupies habitat away from the coast in the area between Sleaford Bay and Shoal Point. The 2002 record of EPSEW from an ephemeral sedgeland swamp in Uley South Basin indicates that the subspecies will occupy suitable habitat in this area if it exists, however surveys have not been conducted to assess for habitat suitability, and little is evident from satellite imagery. Patches of suitable habitat in this area would need active surveying to confirm the presence of EPSEW. Site 40/2002, the aforementioned sedgeland swamp, appears to no longer be ideal for the subspecies – the fractional vegetation cover provided by the native sedges is comparatively low (below 50%, c.f. optimal cover >90%) and the area is suffering from invasion by weed species, notably Horehound (*Marrubium vulgare*). The condition of this site was specifically commented on in 2002 as one that was highly dependent on maintenance of good hydrology, and that excessive water extraction and overgrazing (by native herbivores) could pose threats to the site (Pickett 2002). Changing rainfall patterns associated with climate change may also have played a role in what appears to be insufficient above and below ground water supply. Such threats likely apply to other patches of potential habitat in this area.

The absence of recent records in Fishery Bay, and north of Cape Wiles is of concern. Further, the very narrow band of suitable coastal shrubland and mallee, which is as little as 100 m wide in some areas, presents as a major vulnerability for the integrity of the population. Any commercial development that might clear or build upon this strip would fragment the population, and potentially prevent free movement of birds along the coastline.

4.1.8 Sleaford Bay West – Tulka

Publicly-accessible habitat immediately north and south of Tulka is recognised by birdwatchers to be the best location close to Port Lincoln to see EPSEW. The complete distribution of this subpopulation and the extent of fragmentation in this area is, however, very poorly understood. Recent survey records exist from an isolated location on the west side of Sleaford Mere, and a new site on the southern edge of Sleaford Mere is very notable (Figure 4.6). Despite recent survey effort, however, no records from the east side of Sleaford Mere, and extensive habitat modification close to the western shoreline point towards extensive fragmentation of this subpopulation. As mentioned above, historic records from Sleaford Bay have been formerly attributed to the Shoal Point – Fishery Bay coastal subpopulation; the recent EPSEW record from the southern end of Sleaford Mere is closer geographically, and satellite imagery suggests a greater potential for connectivity between these territories (Figure 4.6). It is therefore recommended that the Sleaford Bay records be incorporated into the Tulka subpopulation.

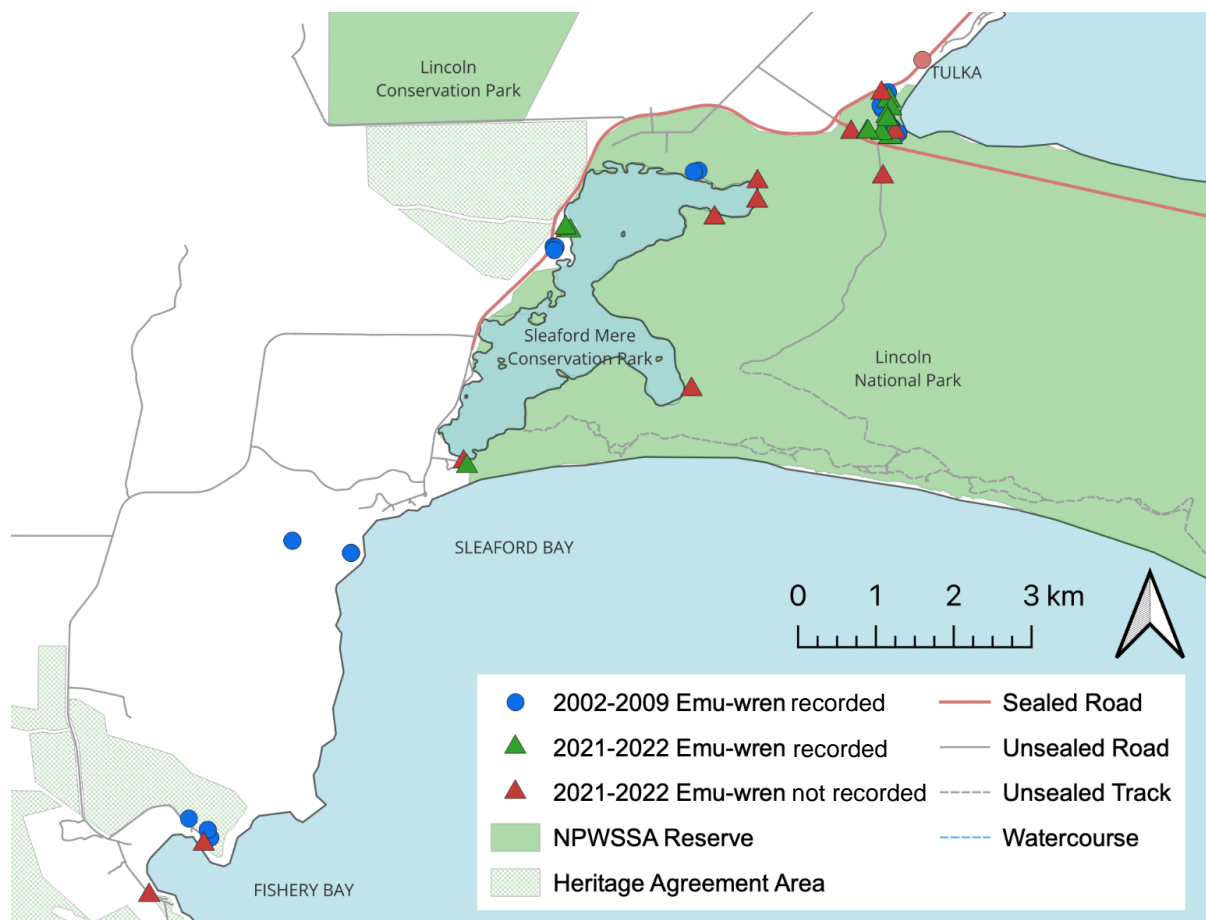


Figure 4.6 – Recent and historic survey results from Tulka, Sleaford Mere, and northern Fishery Bay. Habitat connectivity between the historic western Sleaford Bay sites and Sleaford Mere is better than to the south.

4.1.9 Wanna – Cape Tournefort

Cape Tournefort supports extensive low coastal mallee habitat and a healthy population of EPSEW (Figure 4.7). Recent survey work identified a new territory of EPSEW to the immediate north, near Wanna, and this suggests the possibility that birds may be distributed continuously throughout this stretch of coast. At a minimum, the continuity of native vegetation provides cover for birds as they disperse, allowing them to seek patches of suitable habitat. This recent expansion in our understanding of the distribution of the subspecies on this section of coastline suggests there is value in further surveys both north-west and south-east of Cape Tournefort.

4.1.10 West Point – Jussieu Bay

Recent targeted EPSEW surveys in Memory Cove Wilderness Protection Area confirmed the persistence of EPSEW in the vicinity of West Point. Surveys of several sites that have historically supported EPSEW, particularly to the north, inland from Jussieu Bay, failed to record birds in recent surveys, suggesting a decline in the subpopulation distribution here. Similar such declines were observed in this area in the 2000s; overgrazing by kangaroos and particularly emus may be a factor, as well as natural senescence driven by an absence of fire, although year-to-year variation in territory occupation cannot be dismissed (Pickett 2009).

Further surveys between Jussieu Bay and Cape Tournefort may provide evidence of near continuous distribution of EPSEW along this stretch of coastline. Given the continuity of coastal vegetation, it is reasonable to think that birds may move freely through between these subpopulations, particularly as satellite imagery suggests suitable habitat exists through this region. The continuity of vegetation here, even if unsuitable for EPSEW, increases the likelihood that a wildfire would threaten both subpopulations simultaneously. The combination of these factors suggests that the Cape Tournefort and West Point subpopulations should be treated as a single population.

4.1.11 Carcass Point – McLaren Point – Point Haselgrove – Taylors Landing

The subpopulation on the east coast of Lincoln NP has been recognised as critical to the survival of the EPSEW. This population was not subject to surveying for this project due to recent survey efforts by Flinders University. These surveys confirmed the ongoing presence of the subspecies between Point Haselgrove and McLaren Point along a narrow coastal strip. Birds appeared absent from all sites north of McLaren Point, and no records exist in that area since prior to 2008. Similarly, it is more than 20 years since the subspecies was recorded at Taylors Landing, suggesting this subpopulation may be suffering a continued decline and contraction in range (DCCEEW 2023, Pickett 2009, Van Weenen & Garnett 2021). Underlying causes of this decline deserve further study, but are likely to be similar to those mentioned above in section 4.1.10.

4.2 Other Subpopulations

4.2.1 Koppio Hills

Within the Koppio Hills, many pockets of suitable habitat exist, particularly in the Charlton Gully area and along the Tod River. It is clear the vegetation has recovered well in the 18 years

since the Wangary fire. The isolation of this subpopulation from other subpopulations, and other areas of suitable habitat was identified in 2002, well before the fire (Pickett 2002). The ongoing apparent absence of EPSEW therefore can only be concluded as being due to the 2005 fires eliminating the entire population, and non-existent habitat corridors between other remnant subpopulations and the Koppio Hills.

4.2.2 North Block

The identification of North Block as a new population of EPSEW is of great significance. As discussed in Section 4.1.1, it is unclear whether this hill should be treated as a wholly new subpopulation, or as an extension of the South Block subpopulation, due to the presence of extremely poor vegetation corridors linking the two inselbergs. Nonetheless, it should be highlighted that North Block suffers from similar concerns as South Block, in being isolated from other, larger subpopulations, and vulnerable to being entirely burnt in a short space of time by a wildfire.



Figure 4.7 – A typical view of a male EPSEW in mallee.

4.2.3 Lake Greenly area

While there are no formal records from this area, the landholder that invited inspection of his property was confident that previous survey efforts by local birdwatchers in the early 2000s had yielded sightings of EPSEW. There are significant stands of suitable sedgeland habitat, and potentially suitable shrubland habitat here, therefore the area may have been occupied by EPSEW in the past. There is clearly an extensive history of active burning, slashing, and grazing, and whether EPSEW persist to this day deserves future attention.

More widely within this area, suitable habitat was apparent on the upper slopes of Mount Greenly, which remains long unburnt. It seems likely that if EPSEW were ever present on this

inselberg that they would persist to this day; if so, this would be comfortably the most isolated of all EPSEW subpopulations.

Extensive habitat rehabilitation has occurred on the western coastline of Eyre Peninsula in the vicinity of Coles Point, and it appears feasible that the area could support EPSEW now or in the future, although the lack of habitat linkages between there, Mount Greenly, Lake Greenly, and any currently recognised subpopulations makes it doubtful that the subspecies actually occupies that area in 2023.

4.3 Current Distribution

In 2006, 11 extant populations were defined for the EPSEW. These populations were used as the starting point for an assessment of the subspecies' status in the State of Australia's Birds in 2021, and subsequently for the uplisting of the taxon to Endangered in July 2023. Following recent surveys throughout the known range of the subspecies over the past three years, the following nine revised and current subpopulations are proposed (Figure 4.8):

1. South Block – North Block (private land);
2. Marble Range (heritage agreement, private land);
3. Glengyle Creek – Salt Creek (private land, road reserve);
4. Kellidie Bay – Wanilla (Kellidie Bay Conservation Park, Murrunatta Conservation Park, road reserve, private land);
5. Point Avoid – Gunyah Beach (Coffin Bay National Park);
6. Shoal Point – D'Anville Bay – Whalers Way – Cape Wiles (SA Water reserve, renewable energy tenement, heritage agreement area, private land);
7. Tulka – Sleaford Mere (Lincoln National Park, Sleaford Conservation Park, road reserve, private land);
8. Wanna – Cape Tournefort – West Point (Lincoln National Park, Memory Cove Wilderness Protection Area);
9. McLaren Point – Point Haselgrove (Lincoln National Park).

Further surveys are urgently needed to identify the boundaries of several of these populations and potential fragmentation within proposed populations, which may thus require further separation. These proposed subpopulations are defined on the basis that each appears isolated from the others, both by movement of birds, and from the threat of a single catastrophic event that might eliminate multiple populations at once. Nonetheless, these populations appear likely to be suffering from varying degrees of internal fragmentation that may inhibit dispersal and recolonisation by birds from within a population to other zones within the same population's range.

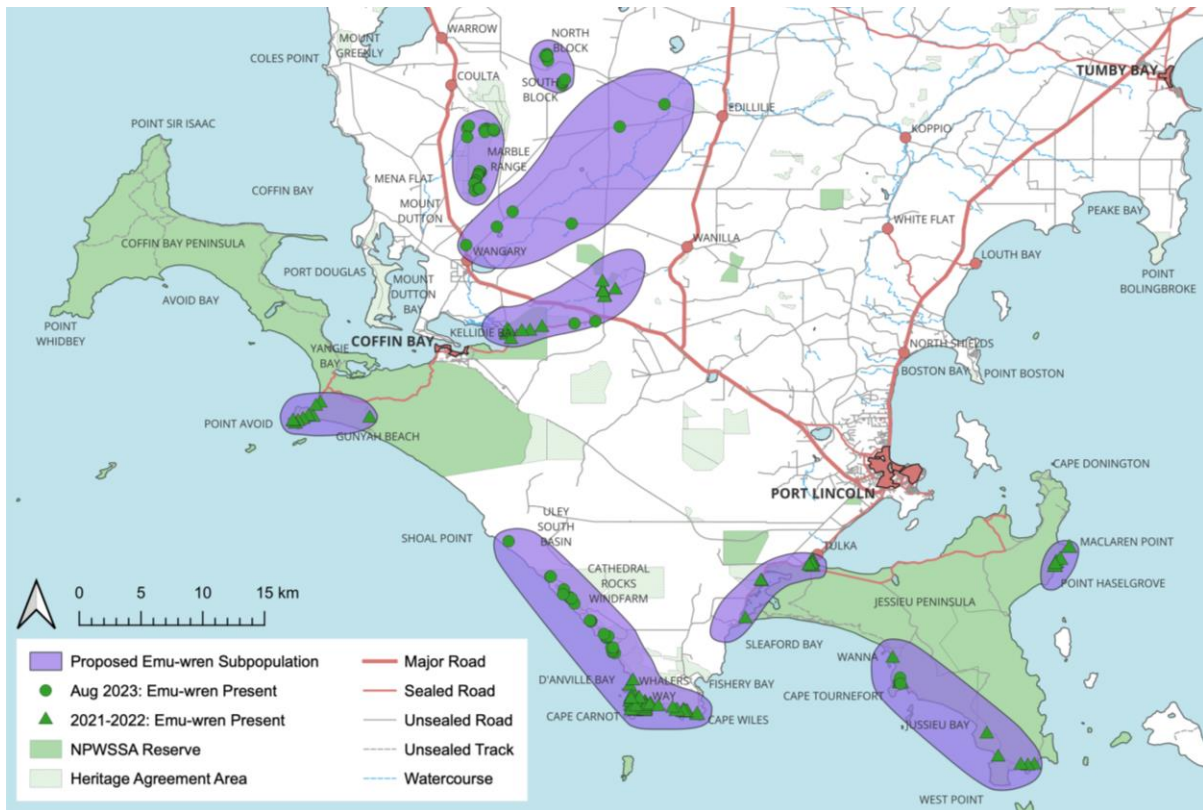


Figure 4.8 – Recent records of Eyre Peninsula Southern Emu-wren and a proposed revised breakdown of the subspecies into nine subpopulations. Each subpopulation is considered likely to have internal connectivity, but no or extremely minimal connectivity with adjacent subpopulations.

The following subpopulations are considered the largest and most critical to the survival of the EPSEW:

1. Marble Range (heritage agreement, private land);
2. Glengyle Creek – Salt Creek (private land, road reserve);
3. Kellidie Bay – Wanilla (Kellidie Bay Conservation Park, Murrunatta Conservation Park, road reserve, private land);
4. Shoal Point – D’Anville Bay – Whalers Way – Cape Wiles (SA Water reserve, renewable energy tenement, heritage agreement area, private land);
5. Wanna – Cape Tournefort – West Point (Lincoln National Park, Memory Cove Wilderness Protection Area).

It is important to acknowledge that population estimates were not made from the data gathered by this and other recent surveys, and thus that the identification of these populations as the most important is based on a subjective qualitative assessment of the number of birds observed, and the extent, quality, and connectivity of the habitat within each subpopulation.

The 2023 Conservation Advice published by the federal environment department calculated a probable Extent of Occurrence (EOO) of 2,686 km² (DCCEEW 2023). This measure reflects “area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence” (IUCN 2022), and

in the 2023 report included all historic records of the subspecies (including records from the Koppio Hills) (DCCEEW 2023). This area is not likely to have contracted substantially since European settlement. On the other hand, the Area of Occupancy (AOO) was estimated at only 264 km² (DCCEEW 2023). AOO is a calculation of the area within the EOO that is currently occupied by the subspecies, and is typically calculated by overlaying a 2 x 2 km grid upon the EOO and counting up cells that are occupied by the subspecies (IUCN 2022). The 2023 estimate presents a picture of a thinly distributed subspecies, and is undoubtedly many times smaller than its Area of Occupancy 250 years ago.

It should also be noted that this estimate included records from the Koppio Hills and other areas that EPSEW have not been recorded since the Wangary fire in 2005, and uses a cell size that likely far exceeds the actual area occupied by the subspecies. As mentioned above, a pair of EPSEW will hold a territory of around one hectare in high quality habitat, and habitat on Eyre Peninsula is highly fragmented in places, restricted at times to road reserves and strips of samphire in the intertidal zone. Given these factors, a 2 x 2 km cell may represent an area tens or even hundreds of times the area actually occupied by the subspecies at a given spot.

Using the Geocat tool provided by the IUCN Redlist, a new AOO estimate can be calculated (Bachman *et al.* 2011). Between 2021 and August 2023, there were 172 confirmed records EPSEW derived from targeted surveying. These records produce an AOO of 212 km² (and an EOO of 2532 km²). This represents a 20% decline in the area inhabited by EPSEW since 2006, a significant and concerning decrease.

Based on the recent survey results for EPSEW, and desktop analysis of satellite imagery, an up-to-date distribution map can be approximated. This map applies knowledge gained through this project regarding the appearance of appropriate habitat from the ground and relating it to aerial imagery to identify probable appropriate habitat that is contiguous with recent positive survey sites. The map should not be considered comprehensive and should be revised as new data come to light.

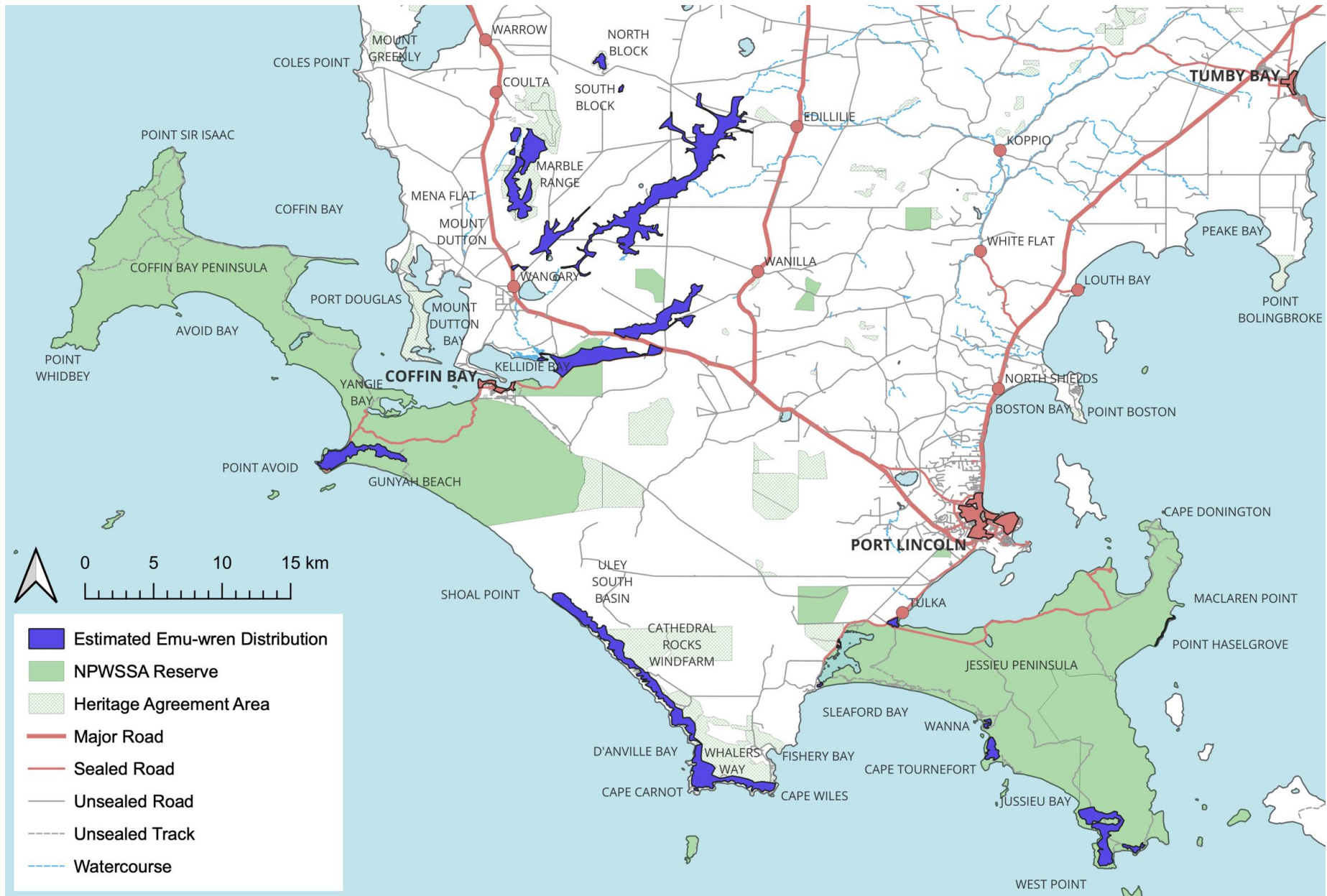


Figure 4.9 – The current best estimate of the distribution of the Eyre Peninsula Southern Emu-wren.

5. Recommendations

With regard to future distribution surveys, the following recommendations are made:

- Ongoing monitoring of known populations should be conducted;
 - In particular, monitoring of the recovery of vegetation and the EPSEW population on South Block;
 - Surveys should focus on establishing population density estimates.
- Surveys of known subpopulations for which there are doubts regarding the population distribution, connectivity, or status, should be prioritise. In particular:
 - The Yangie Bay subpopulation;
 - Habitat on private land on within the Glengyle Creek and Salt Creek basin;
 - Habitat between Point Avoid and Gunyah Beach;
 - The historic sites in Sleaford Bay, and all possible habitat in the vicinity of Sleaford Mere;
 - The coastline between Cape Tournefort and West Point.
- Surveys in patches of suitable habitat for which there have not been surveys conducted previously, or where birds were not formerly detected. For example:
 - Around Lake Greenly, Mount Greenly, and Coles Point;
 - Mount Dutton;
 - Horse Peninsula;
 - Coffin Bay Peninsula.

Importantly, monitoring of EPSEW populations should be a single part of a wider recovery strategy for the subspecies. It is beyond the scope of this report to make recommendations on actions that relate to the conservation of the EPSEW. Other documents exist that make wide ranging and comprehensive conservation recommendations, most significantly the 2023 Conservation Advice (DCCEEW 2023, Van Weenen & Garnett 2021).



Figure 5.1 – Male Eyre Peninsula Southern Emu-wren.

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7. Appendices

7A 2023 Survey Sites – Tenure

Site ID	Site Name	Site Location	Tenure	Site Use
39/2002	Shoal Point - 2	19 km SSE of Coffin Bay	Water Dept Reserve	Water Catchment (Designated)
40/2002	Paradise - Charlotte Waterholes	18 km SSE of Coffin Bay	Water Dept Reserve	Water Catchment (Designated)
24/2004	Wanna - Cape Tournefort - 2	21 km S of Port Lincoln	National Park	Nature Conservation
1/2023	Wanna - Cape Tournefort - 3	20 km S of Port Lincoln	National Park	Nature Conservation
23/2004	Wanna - Cape Tournefort - 1	20 km S of Port Lincoln	National Park	Nature Conservation
A4	Cathedral Rocks - 4	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A20	Cathedral Rocks - 20	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A5	Cathedral Rocks - 5	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A6	Cathedral Rocks - 6	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A7	Cathedral Rocks - 7	28 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A8	Cathedral Rocks - 8	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A9	Cathedral Rocks - 9	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A19	Cathedral Rocks - 19	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A10	Cathedral Rocks - 10	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A11	Cathedral Rocks - 11	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A12	Cathedral Rocks - 12	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A18	Cathedral Rocks - 18	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A15	Cathedral Rocks - 15	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A16	Cathedral Rocks - 16	30 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A17	Cathedral Rocks - 17	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A13	Cathedral Rocks - 13	29 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
A14	Cathedral Rocks - 14	30 km SW of Port Lincoln	Heritage Agreement area	Wind Farm
36/2002	Yangie Bay	9 km WSW of Coffin Bay	National Park	Nature Conservation
32/2004	Marble Range - 4	9 km SSE of Coultas	Heritage Agreement area	Nature Conservation
2/2023	Marble Range - 7	9 km SSE of Coultas	Heritage Agreement area	Nature Conservation
3/2023	Marble Range - 8	9 km SSE of Coultas	Heritage Agreement area	Nature Conservation
4/2023	Marble Range - 9	9 km SSE of Coultas	Heritage Agreement area	Nature Conservation
5/2023	Marble Range - 10	10 km SSE of Coultas	Heritage Agreement area	Nature Conservation
38/2004	Marble Range - 5	8 km N of Wangary	Heritage Agreement area	Nature Conservation
6/2023	Marble Range - 11	8 km N of Wangary	Heritage Agreement area	Nature Conservation
14/2009	Marble Range - 6	10 km SSE of Coultas	Heritage Agreement area	Nature Conservation
20/2004	Marble Range - 2	4.5 km SSE of Coultas	Private	Remnant Native Vegetation - Agricultural

Site ID	Site Name	Site Location	Tenure	Site Use
19/2004	Marble Range - 1	5 km SSE of Coultas	Private	Remnant Native Vegetation - Agricultural
7/2023	Flinders Highway	2.5 km N of Wangary	Road Reserve	Transport - Road/Roadside
15/2009	Duck Lake Road - 5	4.5 km NE of Wangary	Private/Road Reserve	Remnant Native Vegetation - Agricultural
71/2002	Duck Lake Road - 2	6 km NE of Wangary	Road Reserve	Transport - Road/Roadside
15/2002	Duck Lake Road - 1	14.5 km WSW of Edillilie	Road Reserve	Transport - Road/Roadside
5/2006	Salt Swamp	10 km NE of Wangary	Private/Road Reserve	Remnant Native Vegetation - Agricultural
69/2002	Coffin Bay Junction	11.5 km ENE of Coffin Bay	Private/Road Reserve	Remnant Native Vegetation - Agricultural
6/2006	Coffin Bay Road - 1	9.5 km ENE of Coffin Bay	Private/Road Reserve	Grazing
18/2004	South Block - 2	14 km WNW of Edillilie	Private	Remnant Native Vegetation - Agricultural
9/2023	Marble Range - 12	5.5 km SE of Coultas	Private	Remnant Native Vegetation - Agricultural
31/2004	Marble Range - 3	5 km SE of Coultas	Private	Remnant Native Vegetation - Agricultural
10/2023	Poona Lane - 1	4 km NW of Coultas	Private	Remnant Native Vegetation - Agricultural
63/2002	Edillilie - 2	5 km W of Edillilie	Road Reserve	Transport - Road/Roadside
11/2023	North Block	8 km ENE of Coultas	Private	Remnant Native Vegetation - Agricultural
8/2023	Edillilie - 6	8.5 km W of Edillilie	Road Reserve	Transport - Road/Roadside
66/2002	Edillilie - 5	7.5 km W of Edillilie	Road Reserve	Transport - Road/Roadside
65/2002	Edillilie - 4	6.5 km W of Edillilie	Road Reserve	Transport - Road/Roadside
64/2002	Edillilie - 3	2.5 km W of Edillilie	Road Reserve	Transport - Road/Roadside
76/2002	Tod River - 2	12.5 km E of Edillilie	Private/Road Reserve	Grazing
12/2023	Tod River - 7	15 km E of Edillilie	Private/Road Reserve	Remnant Native Vegetation - Agricultural
13/2023	Tod River - 8	16 km ESE of Edillilie	Private/Road Reserve	Remnant Native Vegetation - Agricultural
14/2023	Tod River - 9	16 km ESE of Edillilie	Private/Road Reserve	Remnant Native Vegetation - Agricultural
27/2004	Tod River - 3 (White Flat - 1)	23 km N of Port Lincoln	Private/Road Reserve	Grazing
29/2004	Tod River - 5 (Gawler Pond - 1)	22 km N of Port Lincoln	Private/Road Reserve	Remnant Native Vegetation - Agricultural
15/2023	Charlton Gully East - 1	14 km E of Wanilla	Private/Road Reserve	Remnant Native Vegetation - Agricultural
57/2002	Charlton Gully - 1	10.5 km E of Wanilla	Private/Road Reserve	Remnant Native Vegetation - Agricultural
3/2002	Charlton Gully - 2	10.5 km E of Wanilla	Private/Road Reserve	Grazing

7B 2023 Survey Sites – Natural Features

Site ID	Site Name	Land Pattern	Habitat Type	Vegetation Community	Vegetation Height (m)	Vegetation Cover (%)	Closest Disturbance	Distance to Disturbance (km)
39/2002	Shoal Point - 2	Rises (9-30 m)	Mallee	Low Mallee Heath	0.8	75%	Vehicle Track	0.21
40/2002	Paradise - Charlotte Waterholes	Plain (< 9 m)	Sedgeland	Gahnia	1.3	40%	Vehicle Track	0.56
24/2004	Wanna - Cape Tournefort - 2	Low Hills (30-90 m)	Mallee	Low Mallee Heath	0.6	90%	Vehicle Track	0.32
1/2023	Wanna - Cape Tournefort - 3	Low Hills (30-90 m)	Mallee	Low Mallee Heath	0.7	60%	Vehicle Track	0.55
23/2004	Wanna - Cape Tournefort - 1	Low Hills (30-90 m)	Mallee	Low Mallee Heath	0.4	40%	Vehicle Track	0.62
A4	Cathedral Rocks - 4	Rises (9-30 m)	Mallee	Low Mallee Heath	0.6	60%	Vehicle Track	0.05
A20	Cathedral Rocks - 20	Rises (9-30 m)	Mallee	Low Mallee Heath	0.6	60%	Vehicle Track	0.25
A5	Cathedral Rocks - 5	Rises (9-30 m)	Mallee	Low Mallee Heath	0.7	60%	Vehicle Track	0.60
A6	Cathedral Rocks - 6	Rises (9-30 m)	Mallee	Low Mallee Heath	1.0	80%	Vehicle Track	0.70
A7	Cathedral Rocks - 7	Rises (9-30 m)	Mallee	Low Mallee Heath	2.0	80%	Wind Turbine	0.00
A8	Cathedral Rocks - 8	Rises (9-30 m)	Mallee	Low Mallee Heath	0.9	50%	Vehicle Track	0.40
A9	Cathedral Rocks - 9	Rises (9-30 m)	Mallee	Low Mallee Heath	0.8	75%	Vehicle Track	0.90
A19	Cathedral Rocks - 19	Rises (9-30 m)	Mallee	Low Mallee Heath			Wind Turbine	0.14
A10	Cathedral Rocks - 10	Rises (9-30 m)	Mallee	Low Mallee Heath	1.2	40%	Vehicle Track	0.01
A11	Cathedral Rocks - 11	Rises (9-30 m)	Mallee	Low Mallee Heath	0.8	75%	Vehicle Track	0.01
A12	Cathedral Rocks - 12	Rises (9-30 m)	Mallee	Low Mallee Heath	0.6	50%	Vehicle Track	0.03
A18	Cathedral Rocks - 18	Rises (9-30 m)	Mallee	Low Mallee Heath	2.0	40%	Vehicle Track	0.22
A15	Cathedral Rocks - 15	Rises (9-30 m)	Mallee	Low Mallee Heath	0.6	70%	Vehicle Track	0.02
A16	Cathedral Rocks - 16	Rises (9-30 m)	Mallee	Low Mallee Heath	0.6	70%	Vehicle Track	0.06
A17	Cathedral Rocks - 17	Rises (9-30 m)	Mallee	Low Mallee Heath	1.5	60%	Vehicle Track	0.03
A13	Cathedral Rocks - 13	Rises (9-30 m)	Mallee	Low Mallee Heath	0.7	80%	Vehicle Track	0.05
A14	Cathedral Rocks - 14	Rises (9-30 m)	Mallee	Low Mallee Heath	0.8	75%	Vehicle Track	0.06
36/2002	Yangie Bay	Tidal Flat	Shrubland	Samphire	0.9	80%	Campground	1.45
32/2004	Marble Range - 4	Hills (90-300 m)	Shrubland	Heath	2.4	90%	Pasture	0.13
2/2023	Marble Range - 7	Hills (90-300 m)	Shrubland	Heath	0.4	90%	Pasture	0.53
3/2023	Marble Range - 8	Hills (90-300 m)	Shrubland	Heath	0.5	80%	Pasture	0.72
4/2023	Marble Range - 9	Hills (90-300 m)	Shrubland	Heath	0.5	80%	Pasture	0.79
5/2023	Marble Range - 10	Hills (90-300 m)	Shrubland	Heath	0.9	80%	Pasture	0.72
38/2004	Marble Range - 5	Hills (90-300 m)	Shrubland	Heath	0.7	75%	Cropping	0.85
6/2023	Marble Range - 11	Hills (90-300 m)	Shrubland	Heath	0.8	75%	Cropping	0.73
14/2009	Marble Range - 6	Hills (90-300 m)	Shrubland	Heath	0.8	75%	Cropping	0.38
20/2004	Marble Range - 2	Low Hills (30-90 m)	Shrubland	Dry Melaleuca Shrubland	1.3	90%	Cropping	0.40
19/2004	Marble Range - 1	Hills (90-300 m)	Shrubland	Heath	1.0	75%	Cropping	0.10

Site ID	Site Name	Land Pattern	Habitat Type	Vegetation Community	Vegetation Height (m)	Vegetation Cover (%)	Closest Disturbance	Distance to Disturbance (km)
7/2023	Flinders Highway	Plain (< 9 m)	Sedgeland	Gahnia	1.8	100%	Road	0.10
15/2009	Duck Lake Road - 5	Plain (< 9 m)	Shrubland	Wet Melaleuca Shrubland	1.4	100%	Road	0.02
71/2002	Duck Lake Road - 2	Plain (< 9 m)	Shrubland	Wet Melaleuca Shrubland	1.4	100%	Road	0.02
15/2002	Duck Lake Road - 1	Rises (9-30 m)	Mallee	Dense Mallee	3.5	90%	Road	0.02
5/2006	Salt Swamp	Plain (< 9 m)	Shrubland	Wet Melaleuca Shrubland	0.9	90%	Road	0.02
69/2002	Coffin Bay Junction	Rises (9-30 m)	Shrubland	Wet Melaleuca Shrubland	2.5	70%	Road	0.02
6/2006	Coffin Bay Road - 1	Rises (9-30 m)	Shrubland	Wet Melaleuca Shrubland	2.0	50%	Road	0.03
18/2004	South Block - 2	Hills (90-300 m)	Shrubland	Heath	0.5	75%	Pasture	0.42
9/2023	Marble Range - 12	Rises (9-30 m)	Shrubland	Heath	0.6	90%	Cropping	1.09
31/2004	Marble Range - 3	Hills (90-300 m)	Shrubland	Heath	0.9	100%	Cropping	0.79
10/2023	Poona Lane - 1	Plain (< 9 m)	Sedgeland	Gahnia	1.3	60%	Cropping	0.30
63/2002	Edillilie - 2	Plain (< 9 m)	Shrubland	Dry Melaleuca Shrubland	3.0	40%	Road	0.02
11/2023	North Block	Hills (90-300 m)	Shrubland	Heath	0.8	80%	Pasture	0.30
8/2023	Edillilie - 6	Plain (< 9 m)	Sedgeland	Gahnia	1.3	90%	Road	0.02
66/2002	Edillilie - 5	Plain (< 9 m)	Sedgeland	Gahnia			Road	0.02
65/2002	Edillilie - 4	Plain (< 9 m)	Sedgeland	Gahnia			Road	0.02
64/2002	Edillilie - 3	Rises (9-30 m)	Mallee	Dense Mallee	4.0	50%	Road	0.02
76/2002	Tod River - 2	Low Hills (30-90 m)	Sedgeland	Gahnia	1.3	50%	Road	0.02
12/2023	Tod River - 7	Low Hills (30-90 m)	Shrubland	Wet Melaleuca Shrubland	1.5	30%	Grazing	0.01
13/2023	Tod River - 8	Low Hills (30-90 m)	Shrubland	Wet Melaleuca Shrubland	1.5	30%	Road	0.02
14/2023	Tod River - 9	Low Hills (30-90 m)	Sedgeland	Gahnia	1.2	80%	Grazing	0.02
27/2004	Tod River - 3 (White Flat - 1)	Low Hills (30-90 m)	Sedgeland	Gahnia	1.1	80%	Road	0.03
29/2004	Tod River - 5 (Gawler Pond - 1)	Low Hills (30-90 m)	Sedgeland	Gahnia	1.3	80%	Road	0.03
15/2023	Charlton Gully East - 1	Low Hills (30-90 m)	Shrubland	Wet Melaleuca Shrubland	2.0	90%	Grazing	0.02
57/2002	Charlton Gully - 1	Low Hills (30-90 m)	Sedgeland	Gahnia	1.0	60%	Road	0.02
3/2002	Charlton Gully - 2	Low Hills (30-90 m)	Sedgeland	Gahnia	1.2	80%	Road	0.02

7C 2023 Survey Results

Site ID	Site Name	Date	Time	Duration	Survey Method	Area (ha)	Transect length (km)	Wind	Temperature	Sky	Precipitation	EPSEW	Count
39/2002	Shoal Point - 2	14/8/23	11:36	0:40	Area search	3.5		Light (<20km/h)	Mild	Cloudy	None	Y	2
40/2002	Paradise - Charlotte Waterholes	14/8/23	12:37	0:56	Area search	8.5		Light (<20km/h)	Mild	Cloudy	None	N	
24/2004	Wanna - Cape Tournefort - 2	14/8/23	16:05	0:45	Transect		1.00	Light (<20km/h)	Mild	Cloudy	None	Y	3+
1/2023	Wanna - Cape Tournefort - 3	14/8/23	16:56	0:38	Transect		0.75	Light (<20km/h)	Cool	Clear	None	Y	1
23/2004	Wanna - Cape Tournefort - 1	14/8/23	17:08	0:14	Transect		0.48	Light (<20km/h)	Cool	Clear	None	N	
A4	Cathedral Rocks - 4	15/8/23	07:32	0:16	Transect		0.35	Light (<20km/h)	Cold	Clear	None	Y	1
A20	Cathedral Rocks - 20	15/8/23	07:45	0:22	Area search	4.6		Light (<20km/h)	Cold	Clear	None	Y	6+
A5	Cathedral Rocks - 5	15/8/23	08:13	0:19	Area search	4.2		Light (<20km/h)	Cold	Clear	None	Y	4
A6	Cathedral Rocks - 6	15/8/23	08:35	0:35	Area search	5.2		Light (<20km/h)	Cold	Clear	None	N	
A7	Cathedral Rocks - 7	15/8/23	09:12	0:12	Area search	1.5		Light (<20km/h)	Cool	Clear	None	N	
A8	Cathedral Rocks - 8	15/8/23	09:26	0:28	Transect		0.60	Light (<20km/h)	Cool	Clear	None	Y	2
A9	Cathedral Rocks - 9	15/8/23	09:36	0:09	Transect		0.16	Light (<20km/h)	Cool	Clear	None	Y	1+
A19	Cathedral Rocks - 19	15/8/23	10:08	0:16	Area search	3.2		Light (<20km/h)	Mild	Clear	None	Y	2
A10	Cathedral Rocks - 10	15/8/23	10:30	0:33	Area search	1.6		Light (<20km/h)	Mild	Clear	None	Y	8+
A11	Cathedral Rocks - 11	15/8/23	11:07	0:06	Point			Light (<20km/h)	Mild	Clear	None	Y	2
A12	Cathedral Rocks - 12	15/8/23	11:18	0:20	Area search	3.2		Light (<20km/h)	Mild	Clear	None	Y	2
A18	Cathedral Rocks - 18	15/8/23	11:34	0:11	Area search	2.5		Light (<20km/h)	Mild	Clear	None	Y	2
A15	Cathedral Rocks - 15	15/8/23	11:52	0:08	Area search	2.1		Light (<20km/h)	Mild	Clear	None	N	
A16	Cathedral Rocks - 16	15/8/23	12:02	0:10	Area search	2.0		Light (<20km/h)	Mild	Clear	None	Y	2
A17	Cathedral Rocks - 17	15/8/23	12:13	0:05	Area search	2.0		Light (<20km/h)	Mild	Clear	None	N	
A13	Cathedral Rocks - 13	15/8/23	12:20	0:13	Transect		0.27	Light (<20km/h)	Mild	Clear	None	Y	1
A14	Cathedral Rocks - 14	15/8/23	12:34	0:10	Area search	1.0		Light (<20km/h)	Mild	Clear	None	Y	1+
36/2002	Yangie Bay	15/8/23	17:02	0:35	Transect		0.61	Light (<20km/h)	Mild	Clear	None	N	
32/2004	Marble Range - 4	16/8/23	07:34	0:24	Transect		0.12	Light (<20km/h)	Cold	Clear	None	N	
2/2023	Marble Range - 7	16/8/23	08:05	0:54	Transect		0.24	Light (<20km/h)	Cold	Clear	None	Y	3+
3/2023	Marble Range - 8	16/8/23	09:02	0:29	Transect		0.42	Moderate (20-30 km/h)	Cold	Clear	None	Y	4+
4/2023	Marble Range - 9	16/8/23	09:31	0:14	Transect		0.40	Moderate (20-30 km/h)	Cool	Clear	None	Y	1
5/2023	Marble Range - 10	16/8/23	09:45	0:27	Transect		0.49	Moderate (20-30 km/h)	Cool	Clear	None	Y	6+
38/2004	Marble Range - 5	16/8/23	10:12	0:46	Transect		0.86	Moderate (20-30 km/h)	Mild	Clear	None	N	
6/2023	Marble Range - 11	16/8/23	10:58	0:28	Transect		0.32	Light (<20km/h)	Mild	Clear	None	Y	2
14/2009	Marble Range - 6	16/8/23	11:30	0:45	Transect		0.50	Light (<20km/h)	Mild	Clear	None	Y	3
20/2004	Marble Range - 2	16/8/23	13:41	0:31	Transect		0.67	Light (<20km/h)	Mild	Sunny	None	Y	3+
19/2004	Marble Range - 1	16/8/23	14:40	1:00	Transect		0.55	Light (<20km/h)	Mild	Sunny	None	Y	1+

Site ID	Site Name	Date	Time	Duration	Survey Method	Area (ha)	Transect length (km)	Wind	Temperature	Sky	Precipitation	EPSEW	Count
7/2023	Flinders Highway	16/8/23	16:13	0:17	Transect		0.13	Light (<20km/h)	Mild	Overcast	None	Y	2+
15/2009	Duck Lake Road - 5	16/8/23	16:34	0:03	Point			Light (<20km/h)	Mild	Overcast	None	Y	1+
71/2002	Duck Lake Road - 2	16/8/23	16:40	0:11	Transect		0.12	Light (<20km/h)	Cool	Cloudy	None	Y	1+
15/2002	Duck Lake Road - 1	16/8/23	16:56	0:13	Transect		0.51	Light (<20km/h)	Cool	Cloudy	None	N	
5/2006	Salt Swamp	16/8/23	17:24	0:03	Point			Light (<20km/h)	Cool	Cloudy	None	Y	1+
69/2002	Coffin Bay Junction	16/8/23	17:38	0:10	Transect		0.12	Light (<20km/h)	Cool	Cloudy	None	Y	2
6/2006	Coffin Bay Road - 1	16/8/23	17:52	0:07	Transect		0.11	Light (<20km/h)	Cool	Cloudy	None	Y	2
18/2004	South Block - 2	17/8/23	08:00	1:55	Transect		2.01	Fresh (30-40 km/h)	Cool	Cloudy	None	Y	5+
9/2023	Marble Range - 12	18/8/23	08:11	0:42	Transect		0.55	Light (<20km/h)	Cool	Cloudy	None	Y	2
31/2004	Marble Range - 3	18/8/23	09:00	0:48	Transect		0.73	Moderate (20-30 km/h)	Cool	Cloudy	Showers	Y	3+
10/2023	Poona Lane - 1	18/8/23	13:39	0:10	Transect		0.84	Fresh (30-40 km/h)	Cool	Cloudy	None	N	
63/2002	Edillilie - 2	19/8/23	07:26	0:20	Transect		0.29	Light (<20km/h)	Cool	Overcast	None	Y	2
11/2023	North Block	19/8/23	08:12	1:23	Area search	6.0		Moderate (20-30 km/h)	Cool	Fog	None	Y	10+
8/2023	Edillilie - 6	19/8/23	09:55	0:03	Point			Moderate (20-30 km/h)	Cold	Overcast	None	Y	2
66/2002	Edillilie - 5	19/8/23	09:59	0:18	Transect		0.46	Light (<20km/h)	Cool	Overcast	None	N	
65/2002	Edillilie - 4	19/8/23	10:24	0:19	Transect		0.24	Light (<20km/h)	Cool	Overcast	None	N	
64/2002	Edillilie - 3	19/8/23	10:56	0:20	Transect		0.35	Light (<20km/h)	Cool	Overcast	None	N	
76/2002	Tod River - 2	19/8/23	11:33	0:05	Point			Light (<20km/h)	Mild	Cloudy	None	N	
12/2023	Tod River - 7	19/8/23	11:43	0:05	Point			Light (<20km/h)	Mild	Cloudy	None	N	
13/2023	Tod River - 8	19/8/23	11:51	0:04	Point			Light (<20km/h)	Mild	Cloudy	None	N	
14/2023	Tod River - 9	19/8/23	12:00	0:03	Point			Light (<20km/h)	Mild	Cloudy	None	N	
27/2004	Tod River - 3 (White Flat - 1)	19/8/23	12:10	0:04	Point			Light (<20km/h)	Mild	Cloudy	None	N	
29/2004	Tod River - 5 (Gawler Pond - 1)	19/8/23	12:19	0:04	Point			Light (<20km/h)	Mild	Cloudy	None	N	
15/2023	Charlton Gully East - 1	19/8/23	12:26	0:15	Point			Light (<20km/h)	Mild	Cloudy	None	N	
57/2002	Charlton Gully - 1	19/8/23	12:55	0:03	Point			Light (<20km/h)	Mild	Cloudy	None	N	
3/2002	Charlton Gully - 2	19/8/23	12:59	0:03	Point			Light (<20km/h)	Mild	Cloudy	None	N	

7D Site Survey History

Site ID	Site Name	Survey Year *										Period Summary	
		2002	2004	2005	2006	2007	2008	2009	2021	2022	2023	2002 - 2009	2021 - 2023
1/2002	Tulka - 1	Y			N				Y	Y		Y	Y
2/2002	MacLaren Point	Y			Y	Y	N		Y			Y	Y
3/2002	Charlton Gully - 2	N						N			N	N	N
4/2002	MacLaren Point - Investigator Trail to South	Y			Y	Y	Y		Y	Y		Y	Y
5/2002	Carcase Rock - South	N			N							N	-
6/2002	Carcase Rock - Investigator Trail to North	N	Y		Y						N	Y	N
7/2002	Taylor's Landing - North	N										N	-
8/2002	Taylor's Landing	N									N	N	N
9/2002	West Point - 1	N									N	N	N
10/2002	Memory Cove Track - 1	Y			N	N	N	N			N	Y	N
11/2002	Memory Cove Track - 2	Y			N	N	N	N			Y	Y	Y
12/2002	Memory Cove Track - 3	Y			Y	Y	N	Y			Y	Y	Y
13/2002	Wanilla - 3	Y					Y	Y			Y	Y	Y
14/2002	Memory Cove Track - 4	Y										Y	-
15/2002	Duck Lake Road - 1	Y		N	N						N	Y	N
16/2002	Cape Donington	N										N	-
17/2002	Memory Cove Track - 5	N									N	N	N
18/2002	Memory Cove Track - 6	N									N	N	N
19/2002	Memory Cove Track - 7	N										N	-
20/2002	Memory Cove Track - 8	Y			Y	Y	N	N			Y	Y	Y
21/2002	Memory Cove Track - 9	Y				N	N	N			N	Y	N
22/2002	Memory Cove Track - 10	N									Y	N	Y
23/2002	Cape Wiles	Y				N	N		Y			Y	Y
24/2002	Memory Cove Track - 11	N									N	N	N
25/2002	Whalers Way Road - 1	Y			N	N	N				Y	Y	Y
26/2002	Whalers Way Road - 2	Y			N	Y	Y		Y	Y		Y	Y
27/2002	Whalers Way Road - 3	Y			Y	Y	Y		Y	Y		Y	Y
28/2002	Fishery Bay	Y			Y		N				N	Y	N
29/2002	Murrunatta Conservation Reserve - 1	Y			N		N	Y			Y	Y	Y
30/2002	Frenchman Bluff	N										N	-
31/2002	Point Avoid - 1	N									Y	N	Y
32/2002	Point Avoid - 2	N			Y		Y				Y	Y	Y
33/2002	Point Avoid - 3	Y			Y		N				Y	Y	Y
34/2002	Point Avoid - 4	N			N						Y	N	Y
35/2002	Coffin Bay NP - 1	N									Y	N	Y
36/2002	Yangie Bay	Y			N							Y	N
37/2002	Cooroona Waterhole	N										N	-
38/2002	Shoal Point - 1	N										N	-
39/2002	Shoal Point - 2	Y			Y		N				Y	Y	Y
40/2002	Paradise - Charlotte Waterholes	Y			Y		N				N	Y	N
41/2002	Kellidie Bay - 1	Y			Y	Y	Y				Y	Y	Y
42/2002	Kellidie Bay - 2	Y			Y						Y	Y	Y
43/2002	Kellidie Bay - 3	Y	Y		Y		Y				Y	Y	Y
44/2002	Point Whidbey - 1	N										N	-
45/2002	Point Whidbey - 2	N										N	-
46/2002	Point Whidbey - 3	N										N	-
47/2002	Point Whidbey - 4	N										N	-
48/2002	Point Whidbey - 5	N										N	-
49/2002	Coffin Bay Peninsula - 1	N										N	-
50/2002	Coffin Bay Peninsula - 2	N										N	-
51/2002	Kellidie Bay - 4	N									N	N	N
52/2002	Kellidie Bay - 5	Y										Y	-
53/2002	Sleaford Mere - 1	N										N	-
54/2002	Sleaford Mere - 2	N									N	N	N
55/2002	Sleaford Mere - 3	Y			Y						Y	Y	Y
56/2002	Sleaford Bay - 1	Y										Y	-
57/2002	Charlton Gully - 1	Y										N	Y
58/2002	Pope Road - 1	N										N	-
59/2002	Pope Road - 2	N										N	-
60/2002	Charlton Gully - 3	Y		N	N			N				Y	-
61/2002	Wanilla - 1	N										N	-
62/2002	Edillilie - 1	N										N	-
63/2002	Edillilie - 2	Y			N						Y	Y	Y
64/2002	Edillilie - 3	Y									N	Y	N
65/2002	Edillilie - 4	Y		Y	Y		N	Y			N	Y	N
66/2002	Edillilie - 5	Y			Y		N	N			N	Y	N
67/2002	Sleaford Bay - 2	Y										Y	-
68/2002	Mena Flat	N										N	-

Site ID	Site Name	Survey Year *										Period Summary	
		2002	2004	2005	2006	2007	2008	2009	2021	2022	2023	2002 – 2009	2021 – 2023
69/2002	Coffin Bay Junction	Y			Y		Y				Y	Y	Y
70/2002	Duck Lake Road - 3	N						N				N	-
71/2002	Duck Lake Road - 2	N						N			Y	N	Y
72/2002	Gerschwitz Road	N		Y		Y	Y					Y	-
73/2002	Wanilla - 2	N						N				N	-
74/2002	Coomunga	N										N	-
75/2002	Tod River - 1	N										N	-
76/2002	Tod River - 2	N									N	N	N
77/2002	Memory Cove Track - 12	Y			N	N	N	N		N		Y	N
1/2004	Wellington Point		N									N	-
2/2004	Sillifant Hill - 1		N									N	-
3/2004	Sillifant Hill - 2		N									N	-
4/2004	Weepra Spring		N									N	-
5/2004	Venus Bay CP - 1		N									N	-
6/2004	Venus Bay CP - 2		N									N	-
7/2004	Venus Bay CP - 3		N									N	-
8/2004	Talia Caves Rd		N									N	-
9/2004	Harbour Point		N									N	-
10/2004	South Lake		N									N	-
11/2004	Sheringa		N									N	-
12/2004	Mt Drummond Road		N									N	-
13/2004	Taunto		N									N	-
14/2004	Lake Greenly - 1		N									N	-
15/2004	Horse Peninsula		N									N	-
16/2004	Salt Creek (Farm Beach)		N									N	-
17/2004	South Block - 1		N									N	-
18/2004	South Block - 2		Y		Y						Y	Y	Y
19/2004	Marble Range - 1		Y		Y		N				Y	Y	Y
20/2004	Marble Range - 2		Y								Y	Y	Y
21/2004	Lincoln Conservation Reserve		N									N	-
22/2004	Mungerowie Scrub - 1		N									N	-
23/2004	Wanna - Cape Tournefort - 1		N								N	N	N
24/2004	Wanna - Cape Tournefort - 2		Y		N				Y		Y	Y	Y
25/2004	Mungerowie Scrub - 2		N									N	-
26/2004	Mungerowie Scrub - 3		N									N	-
27/2004	Tod River - 3 (White Flat - 1)		N								N	N	N
28/2004	Tod River - 4 (White Flat - 2)		N									N	-
29/2004	Tod River - 5 (Gawler Pond - 1)		Y					N			N	Y	N
30/2004	Tod River - 6 (Gawler Pond - 2)		N									N	-
31/2004	Marble Range - 3		Y		Y		N	Y			Y	Y	Y
32/2004	Marble Range - 4		Y								N	Y	N
33/2004	Tulka - 2		Y		Y		N	Y	Y	Y		Y	Y
35/2004	Shoal Point - Gunyah Beach		N									N	-
37/2004	Murrnatta CP		N									N	-
38/2004	Marble Range - 5		Y		Y						N	Y	N
39/2004	Lake Greenly - 2		N									N	-
A1	Cathedral Rocks - A01		N	N	N	N	N					N	-
A2	Cathedral Rocks - A02		N	N	N	N	N					N	-
A3	Cathedral Rocks - A03		N	N	N	N	N					N	-
A4	Cathedral Rocks - A04		N	Y	N	N	N				Y	Y	Y
A5	Cathedral Rocks - A05		Y	N	Y	N	Y				Y	Y	Y
A6	Cathedral Rocks - A06		Y	Y	Y	N	N				N	Y	N
A7	Cathedral Rocks - A07		Y	Y	N	N	N				N	Y	N
A8	Cathedral Rocks - A08		Y	Y	N	N	Y				Y	Y	Y
A9	Cathedral Rocks - A09		N	N	N	N	Y				Y	Y	Y
A10	Cathedral Rocks - A10		N	N	N	Y	N				Y	Y	Y
A11	Cathedral Rocks - A11		N	N	N	N	N				Y	N	Y
A12	Cathedral Rocks - A12		Y	Y	Y	Y	Y				Y	Y	Y
A13	Cathedral Rocks - A13		Y	Y	N	N	N				Y	Y	Y
A14	Cathedral Rocks - A14		Y	N	N	N	Y				Y	Y	Y
A15	Cathedral Rocks - A15		Y	N	N	Y	N				N	Y	N
A16	Cathedral Rocks - A16		Y	Y	Y	Y	N				Y	Y	Y
A17	Cathedral Rocks - A17		Y	N	N	N	N				N	Y	N
A18	Cathedral Rocks - A18		Y	N	N	N	N				Y	Y	Y
A19	Cathedral Rocks - A19		Y	Y	Y	N	N				Y	Y	Y
A20	Cathedral Rocks - A20		N	Y	Y	N	N				Y	Y	Y
1/2005	Settlers Road			N				N				N	-
2/2005	Charlton Gully West - 1			N								N	-
3/2005	Barrett Lake - Mallee			N								N	-
4/2005	Barrett Lake - Swamp			N								N	-
1/2006	Duck Lake Road - 4				N							N	-

Site ID	Site Name	Survey Year *											Period Summary	
		2002	2004	2005	2006	2007	2008	2009	2021	2022	2023	2002 – 2009	2021 – 2023	
2/2006	Charlton Gully West - 2				N								N	-
3/2006	Proude Gully				N								N	-
4/2006	Glengyle Creek				N								N	-
5/2006	Salt Swamp				N							Y	N	Y
6/2006	Coffin Bay Road - 1				Y							Y	Y	Y
7/2006	Glengyle West - 1				N								N	-
8/2006	Glengyle West - 2				N								N	-
9/2006	Merintha - 1				Y								Y	-
10/2006	Merintha - 2				Y								Y	-
1/2007	Kellidie Bay - North					Y							Y	-
2/2007	Little Douglas - 1					N							N	-
3/2007	Little Douglas - 2					N							N	-
1/2008	Little Douglas - 3						N						N	-
1/2009	Wanilla - 4							Y		Y			Y	Y
2/2009	Kellidie Bay - 6							Y		Y			Y	Y
3/2009	Murrunatta Conservation Reserve - 2							N					N	-
4/2009	Wanilla - 5							N					N	-
5/2009	Murrunatta Conservation Reserve - 3							N					N	-
6/2009	Murrunatta CP - 2							N					N	-
7/2009	Kellidie Bay - 7							Y		Y			Y	Y
8/2009	Kellidie Bay - 8							N					N	-
9/2009	Kellidie Bay - 9							N					N	-
10/2009	Wanilla - 6							N					N	-
11/2009	Wanilla - 7							Y					Y	-
12/2009	Wanilla - 8							N		Y			N	Y
13/2009	Charlton Gully - 4							N					N	-
14/2009	Marble Range - 6							N			Y		N	Y
15/2009	Duck Lake Road - 5							N			Y		N	Y
16/2009	Sleaford Mere - 4							Y					Y	-
1/2023	Wanna - Cape Tournefort - 3										Y		-	Y
2/2023	Marble Range - 7										Y		-	Y
3/2023	Marble Range - 8										Y		-	Y
4/2023	Marble Range - 9										Y		-	Y
5/2023	Marble Range - 10										Y		-	Y
6/2023	Marble Range - 11										Y		-	Y
7/2023	Flinders Highway										Y		-	Y
8/2023	Edillilie - 6										Y		-	Y
9/2023	Marble Range - 12										Y		-	Y
10/2023	Poona Lane - 1										N		-	N
11/2023	North Block										Y		-	Y
12/2023	Tod River - 7										N		-	N
13/2023	Tod River - 8										N		-	N
14/2023	Tod River - 9										N		-	N
15/2023	Charlton Gully East - 1										N		-	N

* Result from each survey year reflects targeted survey data and does not account for other potential data sources such as citizen science databases. 2002-2009 surveys conducted by Marcus Pickett, 2021 surveys conducted by EBS Consulting for Southern Launch, 2022 surveys conducted by Julian Behrens for Flinders University, 2023 surveys conducted by Ashwin Rudder for NCSSA and this report.