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Threatened species monitoring: Ampurta, Dusky Hopping-mouse and Plains Mouse in the Strzelecki region of north-eastern South Australia

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Summary

A survey to verify the presence of Ampurta or Crest-tailed Mulgara in the Strzelecki region in June 2015 revealed sign at 22 of the 77 plots sampled and the capture of seven animals at one of the three sites trapped. Sign of Ampurta was initially recorded opportunistically during a survey of banded stilts in January 2015. Presence of the species was detected 55 km north of Montecollina Bore along the gas pipeline track, 43 km to the east along the boundary between Lindon and Quinyambie and 24 km to the south on the edge of Lake Callabonna. The survey work extended the distribution of the Ampurta some 180 km to the southeast of nearest known sign on the edge of Lake Eyre (North). This information will be used to reassess status of the Ampurta and may result in the species being down listed from the threatened status. The survey detected the Dusky hopping-mouse sign at 23 plots and trapped individuals at two sites. No sign of the Plains Rat was detected.

Introduction

The Ampurta, Dusky Hopping-mouse and Plains Rat are small mammal species currently listed as Vulnerable under the EPBC Act 1999 and also Vulnerable in Schedule 9 of the SA National Parks and Wildlife Act 1972. This study reports on a survey to detect and validate the species presence in part of the Strzelecki Desert, northeastern South Australia during June 2015.

Ampurta or Crest-tailed Mulgara (*Dasycercus cristicauda*) weigh around 140 g with a head-body length 150 mm and tail length of 100 mm. The head and body dorsal fur has a ginger tinge and the ventral surface is creamy-white. The tail has black crest hairs of similar length contrasting sharply with the tan hairs of the rest of the tail. They have an opportunistic or non-specialist carnivore diet eating a range of invertebrates, lizards and small mammals foraging along the dune crests and flanks with forays down onto the swales. Clear track imprints are characteristic of dasyurids with five toes on the front foot and four on the hind foot. Individuals produce an over-step bounding gait typical of many species including rats and rabbits. Their burrows are circular or oval and are often found at the base of shrubs. Scats can often be found near the burrow entrance. Clear tracks or the presence of burrows and scats can be used to validate the presence of the genera *Dasycercus*, but not to species level.

The Ampurta had a broad distribution prior to European settlement extending from the Simpson Desert in Queensland to the Canning Stock Route in Western Australia and to the Nullarbor Plain to the south (Adams *et al*. 2000; Woolley 2005). By the 1990s it was known to occur only in parts of southern Northern Territory and Queensland and northern South Australia from the Simpson Desert, Tirari Desert and western margin of the Strzelecki Desert. An expansion into parts of their former range has been recorded in recent decades. Sign has been recorded from the eastern and western side of Lake Eyre North and as far south Lake Eyre South (Moseby 2013; Southgate 2006).

Known habitat is primarily dunes with a low cover of sandhill canegrass *(Zygochloa paradoxa*), or areas around salt lakes with nitre bush (*Nitraria billardierei*). They may also inhabit sand mound areas often with nitre bush and plains or sandy watercourses sand plain with a mix of saltbush species.

Evidence of Ampurta activity in the southern Strzelecki region was found by Reece Pedler and co-workers in January and March 2015 while surveying banded stilts. Verification of this finding would extend the known current distribution considerably to the south east of the nearest known sign on the edge of Lake Eyre.

The Plains Rat *Pseudomys australis* has a head and body length of 140 mm and tail length of 120 mm. Field weights range from 35-65 g (Brandle and Pavey 2008). The species feeds on seeds and herbage. They are currently found on the cracking clay gibber plain habitats of the Lake Eyre Basin where the vegetation is predominantly chenopod shrub, grasses and forbs. These habitats can become highly productive after rain. The species generally dig discrete burrow systems with surface runways that connect adjoining burrows (Brandle.

pers. com.).

The species was once widely distributed across inland Australia but underwent a very substantial range contraction in the early 1900s. Despite extensive survey the species could be reliably found only in core areas of cracking clay plains habitat during the early 1990s. The most southern records were from Arcoona tablelands south of Woomera, 90 km north-west of Roxby Downs and an isolated population south-west of Lake Torrens.

Since the late 1990s, the distribution has expanded and the species has been encountered in abundance in some areas including the townships of Roxby Downs, Coober Pedy and William Creek. The species has also been recorded from intervening clay plain habitats of the Simpson-Strzelecki Dunefields, and confirmed from trapping (Letnic, unpublished and Barratt, unpublished) and dentition in a dingo scat collected in central Quinyambie Station, near the NSW/SA Border in 2009 (Allen *et al*. 2011).

The Dusky Hopping-mouse *Notomys fuscus* has a head-body length of 120 mm with a tail length of 150 mm, tufted at the end. Adults can reach a weight of 45 g. Their diet consists of seeds, plant and invertebrate material. They burrow and form colonies. At locations where animals are abundant, pop-holes that vertically enter burrow systems, and runways are often evident. The tracks and gait of hopping mice are distinctive but cannot be used to distinguish among species of hopping mouse.

This species was once broadly distributed with historical records as far south as Ooldea. Like the other species, it underwent a very substantial range contraction and up until the late 1990s was only reliably recorded in the Strzelecki Desert Dunefields, particularly in the Cobbler Sandhills at the Montecollina Bore and an area near Betoota in SW Qld long term DEWNR study sites.

New distributional records began to emerge from the late 1990s onwards including the Stony Plains Bioregion west of Lake Frome, the Tirari Desert (northern Simpson-Strzelecki Dunefields) and from far western New South Wales and south of the Dog Fence in the Flinders-Lofty Block Bioregion, Broken Hill Complex and Stony Plains Bioregions. Records were recorded from the Beverley Mine and the Gammon Ranges National Park, where the species had not previously been recorded despite extensive trap effort prior to 1997.

The current study provided an opportunity to determine the distribution and status of the three species within the southern Strzelecki region and the prevalence of species known to present a threat. Specifically, the aims of this study were to:

- Undertake track plot surveys sandy areas in the vicinity of Lake Blanche, Lake Frome and north to the Strzelecki Crossing to determine presence and activity levels of Ampurta, plus other small mammals, predators and herbivores (eg. rabbits, kangaroos, livestock, ferals).
- Conduct trapping to validate the species detected using the sign surveys and provide all data and specimens for submission to the DEWNR Biological Survey Databases and SA Museum.
- Investigate the potential factors associated with the increased detectability of the species and whether or not other species are responding similarly

- Contribute to increasing landholder understanding of this species and its habitat.

Methods

Elliott trapping

The survey used a combination of track-based monitoring and trapping to identify and verify the occurrence of *Dasycercus cristicauda, Notomys fuscus* and *Pseudomys australis* in the survey area. The survey was conducted 3 June – 10 June and included Merty Merty, Lindon, Bollard Lagoon and Murnipeowie Stations. Monitoring plots were surveyed about 5 km or more apart, along existing roads and station tracks. A GPS was used to record the position of each plot in UTMs (datum: WGS84) (**Appendix 1**). Land holders were contacted a week prior to commencing the survey and before conducting sampling on a property. A report was provided two weeks after completion summarizing findings from the survey (**Appendix 2**).

Trapping of animals was conducted at three locations near Montecollina Bore, on Lindon Station and along the Moomba-Adelaide gas pipe line access track (Appendix 2). Evidence of *D. cristicauda* was evident at these locations. The traps were placed 40 m apart with two lines each containing 20 traps. Each Elliott trap was baited with a mixture of peanut butter and rolled oats. The trap line near Montecollina Bore was set for two consecutive nights and the other location for a single night.

The track-based monitoring protocol was applied to document the distribution of *Dasycercus* and a range of other native and introduced species (Moseby *et al*. 2009). With this protocol a visual search of a 100m x 200m plot was conducted for a period of 25-30 minutes to determine the occurrence of species including feral cats, foxes, dingoes, cattle, camels, rabbits, kangaroos, emu, bustard, small dasyurids and mice and sleepy lizards. Species were identified primarily on the basis of track imprint characteristics and gait pattern. The presence of a species was recorded if at least three consecutive clear tracks and gait imprints were found, or if sufficient burrow and scat sign clearly characteristic of a particular species was found. The age (days) of the most recent track imprint or activity for each species was estimated based on track clarity and antecedent wind conditions and categorised as aged two days or less and three to seven days. The amount of activity for a particular species encountered on a plot was assessed and categorised at high (3), medium (2) and low (1).

The conditions that affected animal imprint detection at each plot were recorded. This included the intensity of light, sun angle, area of plot with a sandy trackable surface and continuity or size of the sand lenses. Each attribute was scored between 1 and 3, with 1 indicating good response and 3 a poor response. An ordinal detection score (ODS) was derived for each plot by adding the score for the five attributes. This produced a minimum score of 4 (very good tracking conditions) and 13 (very poor). On each the plot, the composition of dominant ground and shrub vegetation was also recorded and the vegetation cover of each layer was estimated visually. The habitat type was categorised as creek line, sand plain, sand rise and sand dune and the geological characteristics were derived from 1:250 k geological map sheets.

Chi squared analysis was used to compare the frequency of plots with and without Ampurta sign with the expected frequency occurrence of invasive species and other habitat features such as vegetation type and ODS.

Results

Trapping

Trapping was conducted at three sites, SZM02, SZP23 and SZR26 where sign of Ampurta was evident (**Table 1**). Seven Ampurta were captured from site SZM02 dominated by nitre bush, located 6.5 km north of Montecollina Bore. A male and female were taken for museum specimens and ear tissue was taken from the remaining individuals before release (**Appendix 3**). Both females had 8 teats. The tail crest, which ran along the top distal section of the tail, was also consistent with that found on Ampurta. No Ampurta were captured at the other sites although an Ampurta scat was left at the entrance of an Elliott trap at site SZP23. Ampurta scats were collected from 12 sites.

Eleven *Notomys fuscus* were captured at site SZP23 and two at site SZM02 on the second night of trapping. No *Pseudomys australis* were captured. At site SZP23, two house mice (*Mus domesticus*) were captured and at site SZR26, one *Pseudomys hemannsburgensis* was captured.

Track-based monitoring

Habitat and tracking conditions

Seventy-seven 2 ha plots were sampled within the study area. The vegetation at the plots sampled included dune fields, sand mound areas and lake edges.

Canegrass *(Zygochloa paradoxa*) was present on 37 plots, 5 plots had both nitre bush (*Nitraria billardierei*) and canegrass and 4 plots were dominated by nitre bush. Ground cover at the remaining 31 plots was dominated by a variety of grasses, forbs or chenopods. The overstorey was absent or <1% at 36% of plots. Where present it consisted of shrub species and commonly *Acacia ligulata*.

There was widespread rain in the region that ended three days prior to the start of sampling. Water was still present in low lying parts of the study area, the soil was moist and the tracking surface was crusty or stippled with the pattern rain spatter making detection of tracks difficult on a number of plots. It was considered that small animal could be seen on less than 50% of a plot (trackability >2) at 60% of plots surveyed. Another factor that reduced track detectability was the large amount of litter and “green pick” ground vegetation cover. This resulted in poor (score=2) or very poor (score=3) continuity of the tracking surface at 48% and 21% of plots, respectively. The light conditions and the sun angle were good during the survey and had little negative impact on the detection of tracks.

Overall, the tracking conditions at 43% (33) of plots was considered good to very good with a composite ordinal detection score (ODS) <6 indicating that small animal sign, if present at

these plots, would be relatively easy to detect. Tracking conditions were reasonable at 29% (22) of plots with ODS from 6-7 with the remaining 28% having an ordinal detection score >7 indicating that tracking conditions were poor.

Ampurta

The 77 2ha plots surveyed in June 2015 included 4 of the 6 plots sampled in February and March 2015 (**Appendix 2**). Ampurta sign was detected at 22 (30%) plots if track, scat and burrow sign was included. Ampurta tracks (< 7 days old) were detected at only 9 (12%) plots. Burrows consistent with those produced by Ampurta were recorded at 27 (35%) plots sampled but not all showed clear sign of activity in the previous seven days. With the use of track, burrow and scat sign, more Ampurta sign was detected than expected on plots with poor tracking conditions i.e. ODS score >6 (Chi sq= 6.39, 1df, $p<0.05$). The amount of Ampurta activity was considered to be high at two plots and medium level at eight plots. Plots with higher activity were mostly within 20 km of Montecollina Bore.

No fresh or medium-age Ampurta sign was evident north of 28°53' S or 55 km north of Montecollina Bore on the Moomba-Adelaide gas pipeline access track and no sign was recorded on plots sampled along the Strzelecki track north of the crossing or along the road via Merty Merty to Camerons Corner. Sign was detected 43 km east of Montecollina Bore along a station track on the boundary of Lindon and Quinyambie Stations and 20 km south of Montecollina Bore along the gas pipeline. Reece Pedler and colleagues recorded Ampurta activity slightly further south (24 km or 29°36' S) of Montecollina Bore on the edge of Lake Callabonna. These sites were not visited during our survey. The other four sites identified by Pedler with Ampurta sign were revisited and of these, Ampurta sign was recorded as absent at two including the Montecollina site.

Sign of tracks consistent with Ampurta was found as far south as Mulligan Springs but more evidence is required at this location to verify the record. Here a series of tracks registered in the puffy loamy soil and consistent with the gait pattern and size of Ampurta tracks were detected (**Fig. 1**) but no burrows or scats were found.

Other native species

Fresh *Notomys* track sign was recorded at 23 (30%) plots and popholes were recorded at 28 (36%) plots but some of the popholes were old and degraded. Sign was located just north of the Strzelecki Crossing and along the road to Cameron Corner at a similar latitude. No sign was evident at sites examined opportunistically along the Dog Fence but sign was recorded a few kilometres to the west along the Lindon/Quinyambie boundary fence and also at most of the plots surveyed along this fence line. No sign was recorded at plots sampled south of Montecollina Bore but sign was recorded at Mulligan Springs. Detection of *Notomys* based on tracks was not significantly associated with the ODS score (Chi sq= 2.76, 1df, $p>0.05$).

No sign of the Plains Rat (*P. australis*) was detected. Rodent runways with abundant sign were recorded at two plots but the track clarity was poor and the species responsible could not be confidently identified. Both locations were located on low dunes and it is unlikely

that Plains Rats were responsible and more likely *Notomys* and other rodents created the runways. Overall, small rodent or dasyurid sign was recorded at 24 (31%) plots.

Fresh-medium aged bustard and emu sign was recorded on 12 (13%) and 8 (8%) plots, respectively and red kangaroo sign was recorded on 4 plots. Grey kangaroo sign was recorded but not on plots.

Introduced predators

Dingo/dog was the most common predator species detected with sign (<2 nights) encountered on 44 (57%) plots. Feral cats were the next most common species detected with sign on 16 (21%) plots and foxes were the least common with sign on 4 (5%) plots. Each of the predator species was broadly distributed in the study area (**Fig. 2**). No sign of introduced predators were detected on 28 (36%) plots and 15 (19%) plots had sign of two predators present.

Introduced herbivores

Rabbit tracks (<2 nights) were detected on 37 (48%) plots but if the detection of both fresh digging and scat sign was included, fresh rabbit activity was recorded on 40 (52%) plots. Fresh cattle tracks were detected on 18 (23%) plots. Rabbit activity was broadly distributed in the study area but cattle sign was most evident at plots on Lindon/Quinyambie border (**Fig. 3**). Camel sign was not common and fresh sign was recoded on 5 (6%) plots. Pig tracks were recorded at one plot 20 km north of Montecollina Bore along the gas pipeline track.

Association of Ampurta and hopping-mice with habitat variables and invasive species

Sixty-eight percent of the Ampurta sign detected occurred on plots with canegrass and/or nitre bush and the remainder on plots with a ground cover of grasses and forbs. There was no significant association of plots with Ampurta sign, with cane grass and/or nitre bush (Chi sq = 0.16, 1 df, ns). The hopping-mouse sign occurred on plots with grasses and forbs, canegrass and/or nitre bush (54%) but there was no significant association with a particular vegetation class (Chi sq = 0.16, 1 df, ns).

Ampurta occurrence was not significantly associated with dingo/dog, fox, cat and rabbit occurrence when applying < 7 day old sign for all species (Chi sq = 0.01, 0.22, 3.1 and 0.45, respectively, 1 df, $p>0.05$) however, Ampurta sign was negatively associated with cattle occurrence (Chi sq = 6.1, 1 df, $p<0.05$). The occurrence of hopping-mouse sign was not significantly associated with the invasive herbivore and predator species. Hopping mouse sign showed a slight positive associated with cattle sign but the effect was not significant.

Table 1 Trapping site details, effort and captures during the survey

Site	Date	Elliott trap nights	Ampurta captures (trap success)	Hopping Mouse captures (trap success)	Sandy inland Mouse captures (trap success)	Sandy inland Mouse captures (trap success)
SZP23	8June15	40	0	11	0	2
SZR26	9June15	40	0	0	0	1
SZM02	10June15	40	7	0	0	0
SZM02	11June15	40	1 (recapture)	2	0	0

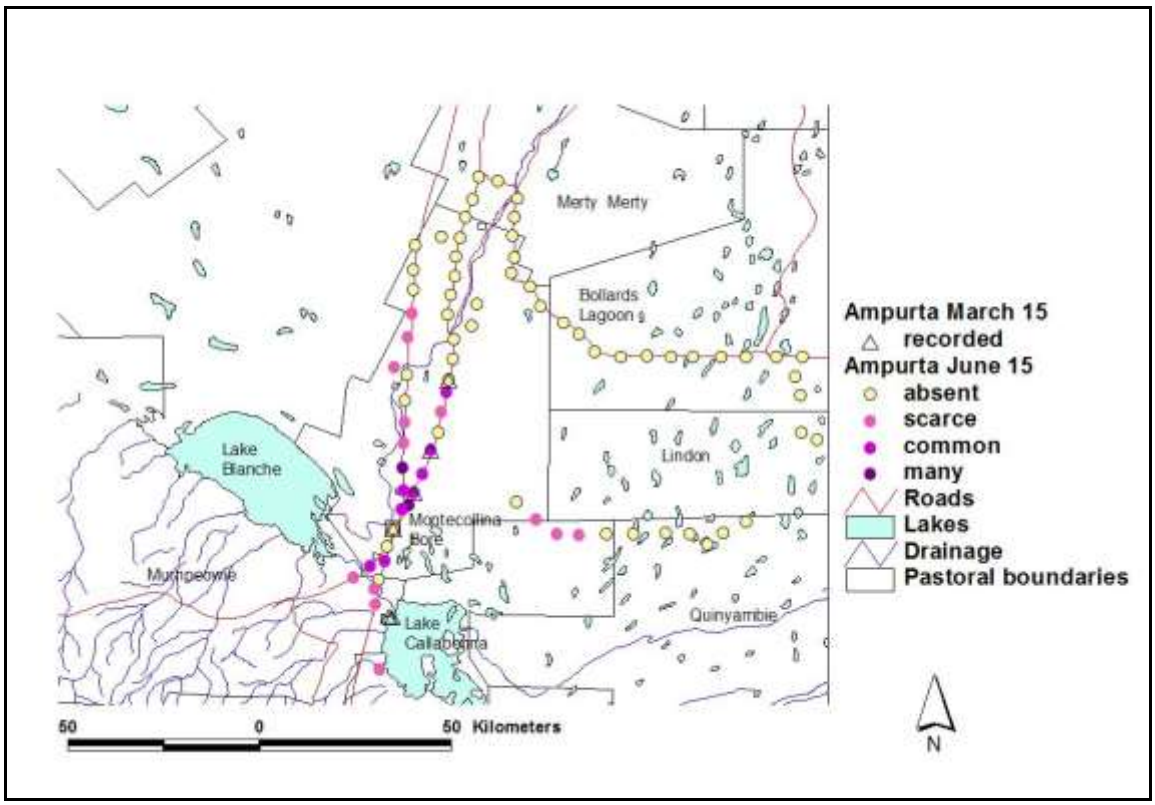

Fig. 1 Sites sampled during the survey showing Ampurta occurrence.

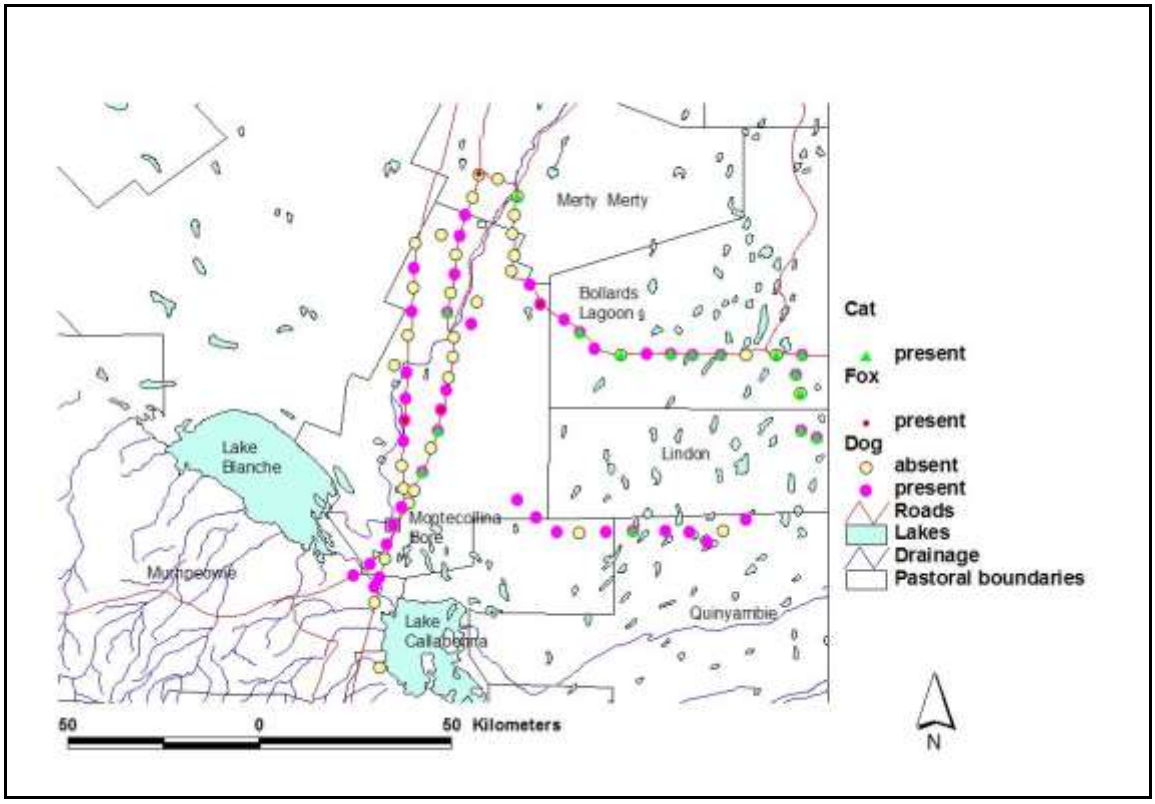

Fig. 2 Sites sampled during the survey showing introduced predator occurrence

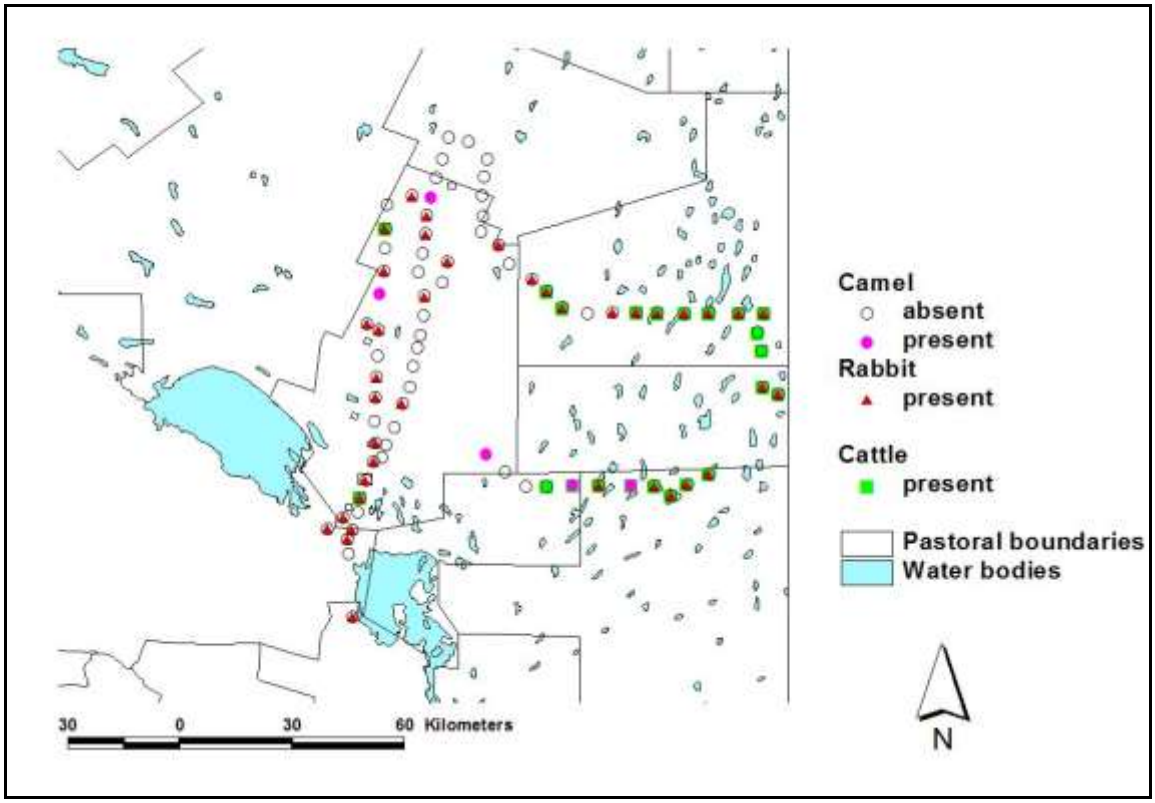

Fig. 3 Sites sampled during the survey showing introduced herbivore occurrence.

Discussion and Conclusion

The study demonstrated that Ampurta *Dasycercus cristicauda* were present and likely to be reasonably widely spread within the Strzelecki survey area based on the capture of several individuals and detection of sign. Similarly, the dusky hopping-mouse *Notomys fuscus* was also present and likely to be widespread. No sign of the plains mouse *Pseudomys australis* was detected. It was highly likely the sign of *Dasycercus* and *Notomys* detected during track-based monitoring was that of *D. cristicauda* and *N. fuscus* and not of other species within each respective genus. The records for Ampurta represent a range extension of 180 km to the southeast of Lake Eyre (North) where sign had previously been recorded in the recent past (Southgate 2006, Moseby 2013). The Montecollina Bore area has historically been a strong hold for *N. fuscus*. However, it is of interest that the species remains widespread following the exceptional rainfall during 2010-11 and sign continued to extend towards the SA/NSW border.

Detection of Ampurta sign was actually significantly greater on plots with poorer tracking conditions. This probably resulted because burrow and scat was primarily used to detect this species and this sign was not affected by a degraded tracking surface. It may also reflect that Ampurta favoured some habitat where tracking surfaces were innately poor such as mound areas with nitre bush. Tracks of both *Dasycercus* and *Notomys* were identified in the moist substrate at some plots and this is possibly why the tracking surface did not significantly affect detection of *Notomys* during the study.

The abundance and extent of dingo/dog sign was notable in the study area as was the low occurrence of feral cat and fox sign. Rabbit sign was also reasonably patchy. Sign of cattle was similarly patchy distributed within and among pastoral stations. Less sign was encountered on Merty Merty and the northern boundary of Quinyambie than on Lindon and Bollards Lagoon. The western edge of Lindon had less cattle sign than the eastern and central parts. There was an indication that cattle numbers increased closer to Montecollina Bore to take advantage of the availability of feed in the region following recent rain. Dams and bores were being refurbished. Further investigation on the effect of grazing pressure from cattle (and rabbits) would be warranted as cattle occurrence was the only factor that was found to associate negatively with *Dasycercus* occurrence during the study.

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Appendix 1 Plot locations and summary data for species occurrence for Ampurta, dingo/dog, red fox, feral cat, rabbit and cattle (<7 days age) and dusky hopping-mouse (<2 days)

plot id	lat	long	zone	east	north	Ampurta	Hopping mouse	dog	fox	cat	rabbit	cow
szm01	29.402	139.986	54J	401575	6747027	0	0	1	0	0	1	0
szm02	29.347	140.023	54J	405181	6753142	1	1	0	0	0	0	0
szp01	29.273	140.053	54J	408044	6761361	1	1	1	0	1	0	0
szp02	29.176	140.091	54J	411599	6772226	0	1	1	0	1	0	0
szp03	29.081	140.109	54J	413318	6782755	1	1	1	0	0	0	0
szp04	29.004	140.126	54J	414829	6791300	0	0	1	0	1	0	0
szp05	28.852	140.121	54J	414270	6808074	0	0	1	0	0	0	0
szp06	28.762	140.133	54J	415323	6818128	0	0	0	0	0	1	0
szp07	28.669	140.155	54J	417389	6828356	0	0	1	0	1	0	0
szp08	28.572	140.185	54J	420302	6839190	0	0	0	1	0	0	0
szp09	28.624	140.277	54J	429338	6833484	0	0	0	0	1	0	0
szp10	28.713	140.264	54J	428106	6823590	0	0	0	0	0	0	0
szp11	28.800	140.263	54J	428040	6813991	0	0	0	0	0	0	0
szp12	28.878	140.330	54J	434633	6805373	0	0	1	1	0	0	0
szp13	28.944	140.422	54J	443641	6798077	0	0	1	0	1	1	0
szp14	28.998	140.883	54J	488575	6792189	0	0	0	0	1	1	1
szp15	28.997	140.752	54J	475861	6792269	0	0	1	0	1	1	1
szp16	28.997	140.636	54J	464547	6792329	0	0	1	0	1	1	1
szp17	29.045	140.927	54J	492896	6787059	0	0	1	0	1	0	1
szp18	29.194	140.977	54J	497780	6770565	0	0	1	0	1	1	1
szp19	29.386	140.811	54J	481673	6749236	0	1	1	0	0	1	1
szp20	29.439	140.720	54J	472825	6743298	0	1	1	0	0	1	1
szp21	29.413	140.624	54J	463528	6746148	0	1	1	0	0	1	1
szp22	29.416	140.484	54J	449937	6745865	0	1	1	0	0	0	1
szp23	29.416	140.370	54J	438901	6745728	1	1	1	0	0	0	0
szp24	29.340	140.275	54J	429654	6754178	0	1	1	0	0	0	0
szp25	28.896	140.030	54J	405431	6803150	1	1	1	0	0	1	0
szp26	28.793	140.033	54J	405661	6814576	0	0	1	1	0	1	1
szp27	28.924	140.169	54J	418978	6800109	0	0	1	0	1	0	0
szp28	29.491	139.932	54J	396474	6737095	1	0	1	0	0	1	0
szp29	29.523	139.953	54J	398530	6733564	0	0	1	0	0	1	0
szp30	29.358	140.005	54J	403467	6751961	1	0	1	0	0	1	0
szp31	29.258	140.006	54J	403465	6762983	1	1	0	0	0	0	0
szr01	29.127	140.099	54J	412304	6777610	1	0	1	1	0	0	0
szr02	28.957	140.128	54J	415012	6796469	0	0	0	0	0	1	0
szr03	28.899	140.113	54J	413546	6802923	0	0	1	0	1	0	0
szr04	28.807	140.129	54J	415044	6813132	0	0	1	0	0	1	0
szr05	28.716	140.142	54J	416166	6823147	0	0	1	0	0	0	0
szr06	28.625	140.171	54J	418959	6833228	0	0	0	0	0	0	0
szr07	28.583	140.231	54J	424839	6837921	0	0	0	0	0	0	0
szr08	28.669	140.269	54J	428561	6828502	0	0	0	0	0	0	0
szr09	28.762	140.268	54J	428584	6818140	0	0	1	0	0	0	0
szr10	28.832	140.306	54J	432299	6810412	0	0	1	0	0	1	0
szr11	28.916	140.385	54J	440050	6801129	0	0	1	0	0	1	0
szr12	28.984	140.458	54J	447176	6793622	0	1	1	1	1	1	1
szr13	28.999	140.942	54J	494390	6792157	0	0	1	0	1	1	1
szr14	28.997	140.810	54J	481527	6792357	0	1	0	0	0	1	1

szr15	28.997	140.687	54J	469553	6792302	0	0	1	0	1	1	1
szr16	28.996	140.580	54J	459056	6792427	0	0	1	0	0	1	0
szr17	28.997	140.519	54J	453121	6792199	0	1	0	0	1	0	0
szr18	29.089	140.938	54J	493919	6782173	0	0	0	0	1	0	1
szr19	29.176	140.940	54J	494169	6772529	0	0	1	0	1	1	1
szr20	29.412	140.759	54J	476595	6746310	0	1	1	0	0	1	1
szr21	29.416	140.680	54J	468918	6745888	0	1	1	0	0	1	1
szr22	29.414	140.547	54J	456037	6746013	0	1	1	0	1	1	1
szr23	29.417	140.421	54J	443843	6745670	1	1	1	0	0	0	1
szr24	29.382	140.321	54J	434111	6749536	1	1	1	0	0	0	0
szr25	29.039	140.017	54J	404282	6787274	0	0	1	0	0	1	0
szr26	29.100	140.014	54J	404064	6780489	1	0	1	1	0	1	0
szr27	29.153	140.013	54J	404004	6774710	0	0	1	2	0	0	0
szr28	28.951	140.021	54J	404561	6796993	1	0	0	0	0	0	0
szr29	28.840	140.032	54J	405538	6809367	0	0	0	0	0	0	0
szr30	28.735	140.037	54J	405932	6820967	0	0	1	0	0	0	0
szr31	28.714	140.098	54J	411857	6823407	0	0	1	0	1	1	0
szr32	28.873	140.182	54J	420206	6805862	0	0	0	1	0	1	0
szr33	29.445	139.972	54J	400296	6742232	0	0	1	0	0	1	1
szr34	29.519	139.893	54J	392754	6733968	1	0	1	0	1	1	0
szr35	29.544	139.942	54J	397516	6731264	1	0	1	0	0	1	0
szr36	29.581	139.943	54J	397639	6727164	1	0	0	0	0	0	0
szr37	29.479	139.967	54J	399806	6738477	1	0	0	0	0	0	0
szr38	29.312	140.010	54J	403878	6757049	1	1	1	1	0	1	0
szr39	29.201	140.010	54J	403736	6769319	1	1	1	1	0	1	0
szr40	29.022	139.989	54J	401535	6789104	1	0	1	0	0	1	0
szr41	29.734	139.955	54J	398952	6710195	0	1	1	0	0	1	0
szs01	29.318	140.034	54J	406198	6756392	1	0	1	0	0	0	0
szs02	29.217	140.073	54J	409931	6767562	1	0	0	0	1	1	0
szs03	29.052	140.117	54J	413996	6785982	0	0	0	0	0	0	0

Appendix 2 Report provided to land holders

Australian Government | National Landcare Programme

Government of South Australia
South Australian Arid Lands Natural Resources Management Board

2015 Ampurta monitoring - landholder update

June 2015
Rick Southgate – Consultant ecologist

Photo: Pat Hodgens

Summary
A survey to verify the presence of ampurta or crest-tailed mulgara in the Strzelecki region in June 2015 revealed sign at 23 of the 77 plots sampled and the capture of seven animals at one of the three sites trapped. Presence of the species was detected 55 km north of Montecollina Bore along the gas pipeline track, 43 km to the east along the boundary between Lindon and Quinyambie and 24 km to the south on the edge of Lake Callabonna. The survey work extended the distribution of the ampurta some 180 km to the southeast of nearest known sign on the edge of Lake Eyre (North). This information will be used to reassess status of the ampurta and may result in the species being down listed from the threatened status.

Background and methods

Ampurta or crest-tailed mulgara are listed as *Vulnerable* under state and national legislation and are known to have once occupied a much larger area prior to European settlement. The species was recorded historically as being very widespread extending from the Simpson Desert in Qld to the Canning Stock Route in WA to Ooldea in the south.

In the mid-1990s it had become restricted to desert regions where the Northern Territory, South Australian and Queensland borders intersect and no evidence of the species was found in the region around Montecollina Bore despite substantial survey work. In 2006, the species was found to have expanded its range southward and it was confirmed around the east and west side of Lake Eyre (north) to the northern edge of Lake Eyre (south). An indication that ampurta were present in the Strzelecki region was made by Reece Pedler and co-workers in March 2015 while surveying banded stilts.

A survey was conducted between 4 June to the 12 June 2015 to verify the presence and survey the extent of the ampurta in the Strzelecki region. Information collected on the current survey will be used to reassess status of the ampurta.

Survey area and methods

The survey area extended from Lake Callabonna in the south to the Strzelecki crossing in the north. Searches were made for ampurta sign including tracks, scats and burrows at 77 plots, each about 2 ha in size. Each plot was searched for about 25 minutes. Sign of other species including predators and herbivores was also recorded. Trapping was conducted at three sites using 40 aluminium box (Elliott) traps spaced 40 m apart in two lines and baited with peanut butter and oats plus mixed with anchovy oil and kangaroo mince.

The burrows, scats and tracks of the ampurta are distinctive and may be used to verify presence if sufficient good quality sign is found.

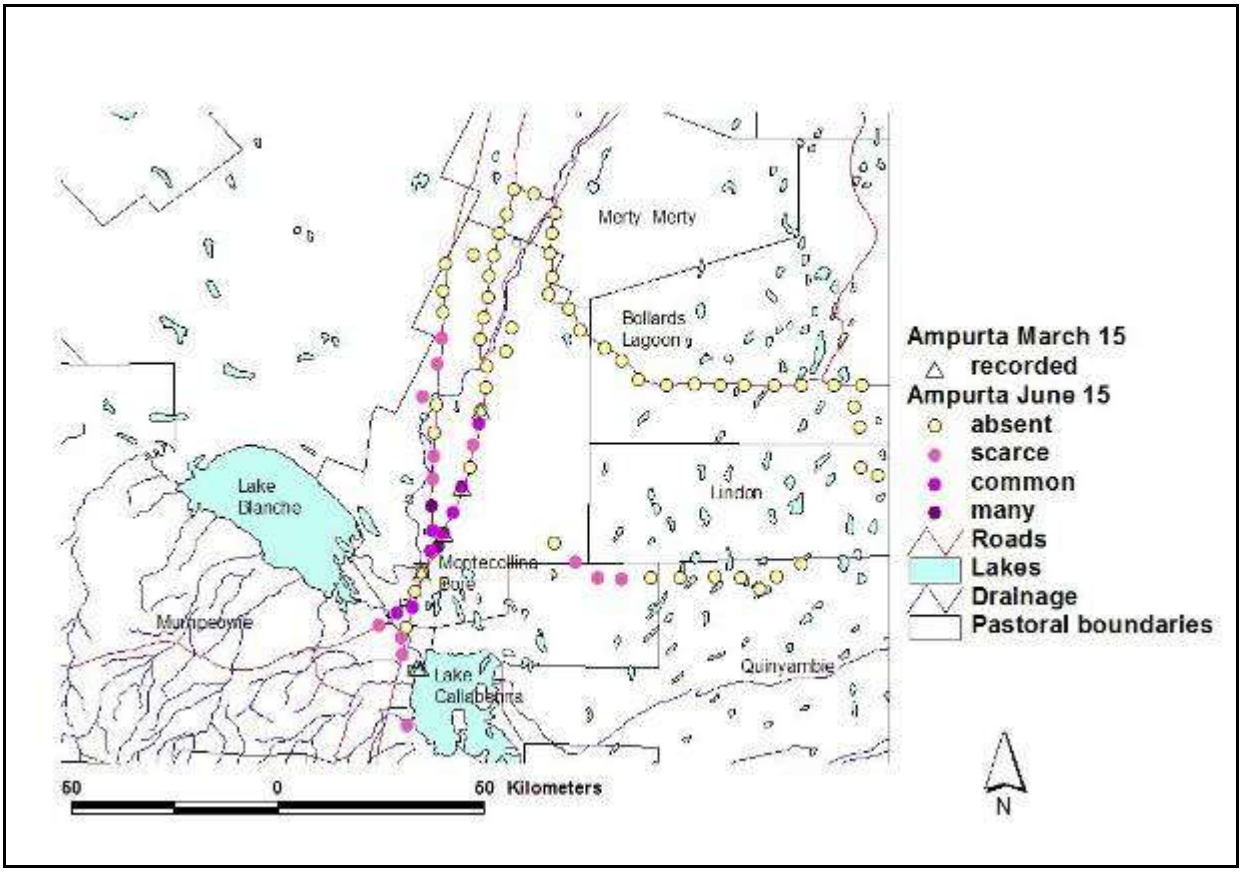
Burrow and scat near entrance (top right) and track size and pattern (bottom right) (Photo: Rick Southgate)

Results

Ampurta sign was recorded at 23 plots. Presence of the species was detected 55 km north of Montecollina Bore along the Moomba-Adelaide gas pipeline track, 43 km to the east along the boundary between Lindon and Quinyambie and 24 km to the south on the edge of Lake Callabonna. Sign of tracks consistent with ampurta was found as far south as Mulligan Springs on the western side of Lake Callabonna, but more evidence is required at this location to verify the record. Tracking surfaces were poor because widespread good rain had occurred in the study area several days prior to sampling. Presence of ampurta was based mainly on the detection of burrow and scat sign.

The ampurta sign was found on dunes with cane grass and sand mounded areas and watercourses with Nitrebush. The burrows were often found at the base of shrubs or cane grass some of which had scats located near the entrance.

The survey work extended the distribution of the ampurta some 180 km to the southeast of the nearest known sign near Lake Hope on Mulka Station.



Map showing plots visited during the survey with ampurta sign detected in June 2015 and earlier in March 2015

The survey recorded a range of other species on the 2 ha plots (Table 1). Dingoes/dogs were the most common predator sign encountered with fresh (1-2 day old) sign found on 57% of plots. Feral cat (21% plots) was the next most frequently detected predator and fox sign (8% plots) was comparatively scarce. Rabbit sign was recorded on 48% of plots and fresh cattle sign was recorded on 23% of plots. Hopping-mouse sign was recorded on 30% of plots. Pig prints were found on one plot 20 km north of Montecollina Bore along the pipeline track.

Dusky hopping-mouse, the sandy inland mouse and house mouse where the other animals captured during the Elliott trapping. Sign of dusky hopping-mouse was detected through most the survey area and was particularly common along the boundary between Lindon and Quinyambie.

Table 1 Percentage occurrence of 1-2 day old sign and 1-7 day old sign for key species recorded on survey plots. The 1-2 day old ampurta represents track observations only and the 1-7 day sign includes tracks, burrow and scat sign.

		dingo	fox	Cat	rabbit	cattle	camel	kangaroo	Emu	bustard	Hopping mouse	ampurta
1-2 days	% occurrence	57.1	7.8	20.8	48.1	23.4	6.5	1.3	7.8	5.2	29.9	13.0
1-7 days	% occurrence	75.3	14.3	20.8	51.9	27.3	7.8	3.9	18.2	13.0	29.9	29.9

In summary, the survey work has extended the distribution of the ampurta some 180 km to the south east of the nearest known sign. With the cumulating evidence that the species has expanded its range over a much larger area it is looking like the species may be more secure now than it was 25 years ago. There is good evidence to suggest that this expansion is in response to the reduction in rabbit numbers following the release of Rabbit Haemorrhagic Disease Virus resulting in less habitat damage caused by rabbits and lower predation pressure particularly from foxes and feral cats.

View from a plot located on the Lindon/Quinyambie boundary where hopping-mice were very abundant and close to where ampurta sign was detected. (Photo: Pat Hodgens)

Appendix 3 A list of vouchered specimens and tissue samples lodged at the S.A. Museum.

Type of Sample	Species	Collector	Organisation	Date	Site	AM G zone	Easting	Northin
Specimen	D. cristicauda	R Southgate	Envisage	June15	SZM02	54	0405184	5752864
Specimen	D. cristicauda	R Southgate	Envisage	June15	SZM02	54	0405184	5752864
Ear clip	D. cristicauda	R Southgate	Envisage	June15	SZM02	54	0405184	5752864
Ear clip	D. cristicauda	R Southgate	Envisage	June15	SZM02	54	0405184	5752864
Ear clip	D. cristicauda	R Southgate	Envisage	June15	SZM02	54	0405184	5752864
Ear clip	D. cristicauda	R Southgate	Envisage	June15	SZM02	54	0405184	5752864
Ear clip	D. cristicauda	R Southgate	Envisage	June15	SZM02	54	0405184	5752864
Ear clip	D. cristicauda	R Southgate	Envisage	June15	SZM02	54	0405184	5752864

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