Using observers on horseback to monitor bilby (*Macrotis lagotis*) and other animal activity at Lorna Glen

Results of a trial carried out 29-31 March 2011

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Releasing bilbies at Lorna Glen (Photo: Judy Dunlop)

Background

Rangelands Restoration is a long term program to restore biodiversity and ecosystem health and function to former pastoral leases in the northern Goldfields. The program is currently focused on the ex-pastoral lease Lorna Glen, which is jointly managed by DEC and the Wiluna Aboriginal Community. The re-introduction of bilbies to Lorna Glen is part of a long term program to re-establish 11 locally extinct native mammals. Over the period 2007-2009, some 128 captive-bred bilbies were re-introduced to various locations on Lorna Glen (see Pertuisel 2010). According to the Translocation Proposal (TP), criteria for successful reintroduction of bilbies are as follows:

- Better than 60% survival by 30 November 2007.
- Body weight of survivors has been maintained or increased by 30 November 2007.
- The appearance of pouch young known to have been conceived at Lorna Glen by March 2008.
- The appearance of new, unmarked Bilbies in the population.
- The successful expansion of Bilbies into large areas of suitable habitat after 18 months.
- An estimated population > 200 by August 2010.

In order to determine whether these criteria are satisfied, it has been, and continues to be, necessary to carry out systematic surveys. Initially, monitoring by radio-tagging and some associated trapping provided some information against some of the success criteria. However, animals are no longer being radio-tagged and they are very difficult to trap.

In order to comply with the TP and to know whether or not success criteria are met, it is essential that bilbies continue to be monitored. Basically, it is necessary to know whether their numbers are trending up, down, or are stable, and where they are. Because of their mostly solitary nature, low density and high mobility (so-called ‘nomadic’ habit), monitoring their numbers and distribution is problematic. Trapping will be time consuming and ineffective unless we know exactly where the animals are and which burrow they are in, so monitoring will depend on indirect measures, such as recording tracks, burrows, scats and digs.

Currently, ‘monitoring’ is limited to opportunistic sightings and recording footprints encountered during the predator (cat) surveys carried out quarterly. The predator survey alone is an inadequate technique because it relies on seeing footprints only on the vehicle tracks; it is highly unlikely that digs, scats and burrows will be observed during these surveys. For example, no bilby footprints were observed on the tracks during the most recent survey, which covered a total of 500 km of roads and tracks over 5 nights.

There have been occasional searches using quad-bikes, but these machines are limited in terms of bush access and they damage vegetation and cryptogamic soil crusts.

An alternative, repeatable, viable and cost-effective method is needed to better monitor bilby (and other animals) activity as a surrogate for density and distribution.

Horses as a means of transport to survey for bilbies offer many advantages over other techniques. These include:

- Horses are much gentler and quieter on country than quads or 4WDs – machines, to varying degrees, damage / crush the vegetation and the soil, damaging the important cryptogamic crusts. On fragile arid zone soils, just one pass by a machine leaves tracks / impressions that are visible for decades. Horse tracks virtually obliterate after a good downpour of rain. Repeated surveys along the same transects by quads will result in significant environmental damage as well as visual scarring.
- Horses can go where quads can't – for example, through thick scrub, water, mud, steep creek crossings, steep and scrubby sand dunes and across recently burnt (within 10 years) spinifex. It is perilous (and damaging) taking quads (and other vehicles) across recently burnt spinifex for fear of puncturing tyres.
- Horses are faster and more durable than people on foot – if urged, they can walk almost twice the speed of a person and can walk considerably longer distances and for a longer time.
- Horses provide an excellent observation platform; the horseback observer is considerably higher than one on foot or on a quad bike. For example, the eye-level of a person on a reasonable sized horse (15hh) is ~2.4m above ground, compared with ~1.2m for a person on a quad bike or ~1.6 for a person on foot. Also, the horseback observer can pay much greater attention to observing, rather than driving the machine. The horse will navigate its way through the terrain.

A proposal to use horses was put before the Rangelands Restoration Steering group at its September 2010 meeting. The Steering Group agreed to trial the technique and make future decisions based on the trial outcomes.

Plate 1: DEC volunteer horseman Shane Burrows at Lorna Glen (photo: Judy Dunlop)

Method

Accompanied by me and a volunteer (Shane Burrows, owner of the horses), two stock horses were floated from Mt Magnet to Lorna Glen via Leinster. Aside from some tyre trouble with the float, the trip was uneventful. The horses were stabled in the old cattle yards near the airstrip. With help from the caretaker (Tony) we spent about 1.5 hrs making the yards secure and safe. To reduce the possibility of horses introducing more weeds, they were fed a diet of horse muesli and steam-cut chaff (grainless) for 3 days prior to arriving at Lorna Glen. Whilst at Lorna Glen, they were fed the same diet, but also grazed on abundant grass growing in the yards.

Myself, volunteer Shane Burrows and DEC Scientist Judy Dunlop, also an accomplished rider, participated in the horseback survey trial.

The plan was to ride straight line transects, focusing on signs of bilbies, but recording some other animal activity including feral cat, dog and echidna. The transects were placed in the vicinity of Possum Lake (see attached map), one of the bilby release sites. The transects were oriented N-S to avoid looking into the sun, and commenced from the main road opposite the predator-proof compound. While the aim was to trial the horseback technique, the transect pattern was also designed to pick up the range extent of any live / active bilbies originating from the Possum Lake release site.

Originally, the transects were intended to be 6.35 km long x 1.65 km apart, starting from the compound and heading due south to just north of Christmas Creek. On the morning of Day 1 (Tuesday 29th March), we rode 6.35 km south from the main road to intersect with Possum Lake Road. The intention was to then turn west for 1.65 km, then turn north for 6.35 km, back to the main road, then east for 1.65 km, closing out the circuit and ending back at the vehicle. This would give a total distance of 15.9 km.

From horseback, clear and comfortable observation distances through most of the vegetation types encountered (mostly spinifex or mulga country) was about 15-20 m for burrows and about 5m for tracks. Noting that riders were on average ~15 m apart (this was variable), this gave an average visual sample swathe of ~45,000 m^2 and 15,000 m^2 for burrows and tracks respectively for each 1 km of transect. Navigation was by way of a hand-held GPS. A satellite phone was carried for communication with the homestead should that be necessary.

For safety reasons, riders rode within visual contact – usually not more than 30-40 m apart. All tracks and other signs of activity of interest were logged on a GPS and notes made. We only recorded signs if we were quite confident about what animal had made them. For example, on several occasions, it was difficult to determine the animal responsible for old, weathered diggings – which could have been varanids, bilbies or even rabbits – so these were not recorded. Only fresh cat and dog tracks were recorded. The following signs of activity were recorded:

- Bilby Burrow Fresh (BWF)
- Bilby Burrow Old (BWO)
- Bilby Digs Fresh (BDF)
- Bilby Digs Old (BDO)
- Bilby Track Fresh (BTF)

- Cat Tracks Fresh (CAT)
- Dog Tracks Fresh (DOG)
- Echidna Tracks Fresh (ECH)

Because of the bush fly plague, on the following days (30th, 31st March), we halved the transect distances. The flies were awful, as bad as I have ever experienced – annoying both horse and riders. The horses were annoyed by the flies, which bit their eyes, ears, muzzle and nose. Subsequent transects were shortened to 3 km x 1.6 km x 3 km (see attached map).

Plate 2: DEC volunteer Shane Burrows (on Zena) and DEC scientist Judy Dunlop (on Abbie) set out in search of bilbies at Lorna Glen. It took about 30 minutes for the flies to find us.

Results & Discussion

The primary aim was to trial the effectiveness of observers on horseback for surveying bilby (and other animals) activity. Because of the fly plague, the transects, (hence the trial) was shortened, but it was more than adequate to test the methodology and to obtain valuable information about bilbies in the vicinity of Possum Lake.

The total length of transects surveyed was 27 km (see Table 1) and based on clear visibility distances for a) burrows and b) tracks (see above), the total area visually observed was 121.5 ha (i.e., 27 km x 45m visibility swathe = 121.5 ha). The area encompassed by the transects was ~2,849ha.

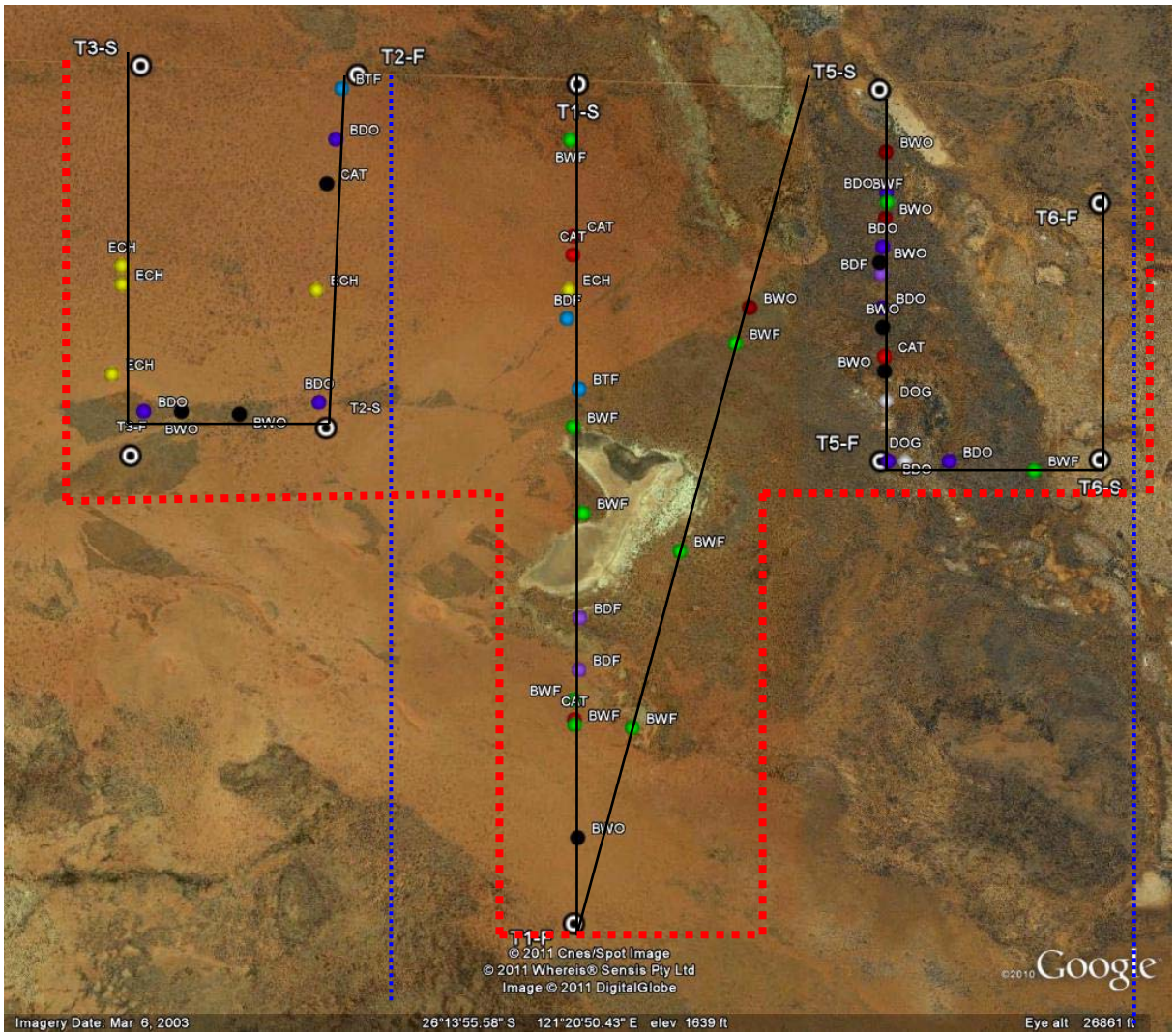

Figure 1: Horseback transects (black lines) and location of target animal activity intercepted along the transects. The red lines mark the encompassed survey area and the blue lines mark the likely E-W extent of fresh bilby activity. The southern and northern extent was not determined in this trial. Legend: BWF=bilby burrow fresh; BWO=bilby burrow old; BDF=bilby dig fresh; BDO=bilby dig old; BTF=bilby track fresh; ECH=echidna track fresh CAT=cat track fresh; DOG=dog track fresh.

The horses

The trial was a resounding success. We were easily able to observe digs, tracks and burrows of bilbies and other animals (see Figure 1) and, being stock horses familiar with the bush, the horses easily negotiated the terrain, moving across country at an average speed of 4.4 km/hr. On 'easy going', they walked at 6.8-7.4 km/hr, but slowed to 3.3-3.7 km/hr when the going was rougher (such as over stony, broken calcrete country, through thick scrub). Actual riding time to cover the total 27 km of transect was ~6.1hrs, with the total time, including loading time from the yards, float time and time to walk back to the vehicle being ~11hrs. All of the benefits of using horses outlined above, came to the fore in this trail:

- go virtually anywhere including across spinifex plains, burnt country, through thick scrub, mulga groves, across wet lakes, across and along sand dunes.

- excellent observation platform. Easily see burrows out to 15-20m and tracks and digs out to 5-10 m depending on the nature of the vegetation and substrate.
- covered the ground at a good speed for observing.
- gentle on the country – no damage to vegetation, minimal soil surface area affected by hoof prints.
- observer did not have to 'steer' the horses around obstacles etc. so could concentrate on observing. The benefit of using stock horses is that they 'pick' their own way through the bush and don't have to be 'steered' as such.

The main problem with the horses during this trial was that they became distracted and annoyed by flies (as did the riders!). Otherwise, they performed superbly and had no problems with the terrain.

Animal activity – bilbies

A total of 10 fresh and 9 old bilby burrows were found along the transects (see Table 1 and Figure 1). Assuming the transects were representative of the country traversed, this equates to 1 fresh bilby burrow per 12.15 ha, and either a fresh or an old burrow every 6.39 ha.

Based on an encompassed transect area of 2,849 ha, the calculated number of fresh bilby burrows in the survey area is 234 (2,849/12.15). Assuming five fresh burrows per bilby, then it is estimated that there are some 47 bilbies active in the area, a most encouraging figure.

From Figure 1, it can be seen that the distribution of bilby burrows is not uniform across the survey area. No fresh Burrows were detected on the shortened 3 km transects several km west of Possum Lake and no fresh activity was recorded more than several km east of Possum Lake (see Figure 1). It seems that the bilbies may have also travelled further south, but this can only be confirmed by further surveys.

Table 1: Summary of animal activity along each of the horseback transects. It is estimated that there are some 47 bilbies active in the survey area (see above).

Transect	Distance (km)	BWF	BWO	BDF	BDO	BTF	ECH	CAT	DOG
T1-S T1-F T5-S	12.7	7	2	3	0	4	1	2 (same cat)	0
T2-S T3-S	7.6	0	2	0	3	0	4	1 (new cat)	0
T5-F T6-S T6-F	6.7	3	5		5	1	0	1 (new cat)	1
Total	**27**	**10**	**9**	**3**	**8**	**5**	**5**	**4 (3 cats)**	**1**

Plate 3: A bilby being released at Lorna Glen (photo: Judy Dunlop)

Other animal activity

Fresh echidna tracks and associated digging activity was observed on five occasions, although it may have well been only 1-2 animals. We recorded a total of 4 sets of cat tracks, but based on size and distance apart of the foot prints, we estimate these were made by 2 or possibly 3 individual cats. Translating this to the standard Track Density Index, this equates to a TDI of 7.4-11.1. This is similar to the last quad-bike based predator survey undertaken, and although the horseback transects are not directly comparable, it is an indication perhaps that activity of feral cats on the tracks is similar to activity off the tracks. This is unlike dogs – only one set of dog foot prints were recorded in the bush along the horseback transects, but we observed significant dog activity (foot prints) on roads and tracks around the compound and in the Possum Lake area in general.

Recommendations

- The use of observers on horseback to survey for bilbies and other animals that are difficult to trap has proved to be highly effective and should be adopted by DEC. However, if the technique is to be routine, then there are some statistical, logistical and risk management issues to be addressed.

- A statistically rigorous (precise, repeatable, meaningful) methodology needs to be developed. This to be done in consultation with Keith Morris, Karl Brennan and Mathew Williams. The methodology needs to give repeatable and reliable measures of the bilby population (such as number of active burrows).

- Horseback surveys should be conducted when a) it is cool and b) flies are not abundant. I suggest an annual survey be carried out over a one week period sometime in May-August.

- Old cattle yards near the airstrip need some maintenance to ensure that they are safe and secure for holding horses. This will not take much – perhaps half a day's work.

- Two teams of two horses and riders (4 people, 4 horses) could comfortably survey 40 km of transect per day (20 km per team per day) or 200 km of transect in five days. Because of the distance away from Perth and the south-west, I suggest that, in the first instance, we seek to engage local volunteer horse people (within a 600 km or comfortable one day drive / float) of Lorna Glen. Transporting horses beyond a day's drive presents significant logistical and animal welfare issues.

- Volunteers would make their own transport arrangements. DEC should offer to pay for fuel, horse feed and the usual arrangements for looking after registered volunteers.

- Both horses and riders need to be experienced in bush riding. Stock horses are ideal for this job, but not essential. Horses (and riders) without bush experience will probably have trouble adjusting to the spinifex and other 'obstacles' in the bush.

- Safety: Riders to wear a minimum PPE of riding boots, helmet, long pants and long sleeve shirt. Each team to carry basic first aid kit (for cuts and abrasions), water, sat phone, maps, GPS. One rider in each team to be Senior First Aid certified.

- DEC exposure: While DEC will take all reasonable measures to ensure the safety of people and horses, the participants will be required to sign a release and waiver of liability form, similar to that used by horse and pony clubs. Further advice to be sought from DEC's Risk Management Branch.

Appendix 1: GPS data

Transect 1:
Date: 29/03/11
Start time: 0810
Finish time: 1040
Distance: 6.35km
PoI18: 26 13.064E 121 21.569S Old bilby Burrow (OBW)
PoI17: 26 13.212S 121 21.503E: Fresh bilby Burrow (FBW)
PoI16: 26 14.059S 121 21.257E: FBW
PoI15: 21 14.776S 121 21.038E: FBW
PoI8: 26 13.905S 121 20.813E: FBW
PoI6: 26 13.397S 121 20.793E: Fresh Bilby tracks (FBT) (not associated with a Burrow or a dig)
PoI9: 26 14.331S 121 20.798E: Fresh Bilby digs (FBD)
PoI7: 26 13.552S 121 20.767E: FBW
PoI10: 26 14.543S 121 20.794S: FBD
PoII2: 26 12.774S 121 20.769E: Fresh cat track (FCT)
PoI3: 26 12.850S 121 20.763E: Fresh cat track (same as above)
PoI4: 26 12.992S 121 20.747E: Fresh Echidna tracks and digs
PoI5: 26 13.110S 121 20.739E: FBT & FBD
PoI12: 26 14.744S: 121 20.773E: FCT
PoI13: 26 14.764S: 121 20.774E: FBW
PoI11: 26 14.666S 121 20.759E: FBW
PoI1: 26 12.381S 121 20.754E: FBW
PoI14: 26 15.228S 121 20.788E: OBW
PoI15: 26 13.452S 121 19.610E: BDO
PoI16: 26 12.386S 121 19.690E: BDO
PoI17: 26 13.485S 121 18.813E: BDO

Transect 2: 30/03/11
Start time: 0800
Finish time: 1030
PoI19: 26 12.172S 121 19.710E: FBT
PoI20: 26 12.559S 121 19.647E: Fresh Cat track (FCT)
PoI21: 26 12.994S 121 19.540E: Echidna
PoI22: 26 13.501S 121 19.248E: BWO (Bilby Burrow old)
PoI23: 26 13.490S 121 18.982E: BWO
PoI24: 26 13.384S 121 18.670E: End of transect
PoI25: 26 13.338S 121 18.667S: Echidna
PoI26: 26 12.972S 121 18.724E: Echidna
PoI27: 26 12.895S 121 18.707E: Echidna
PoI28: 26 12.085S 121 18.706E: End of transect

Transect 3: 31/3/11
Start time: 0830
Finish time: 1030
PoI29: 26 12.430S 121 22.192E: BWO
PoI30: 26 12.596S 121 22.195E: Old Bilby Feeding digs
PoI31: 26 12.634S 121 22.198E: BWF
PoI32: 26 12.705S 121 22.188E: BWO
PoI33:26 12.817S 121 22.177E: Old bilby feeding digs
PoI34: 26 12.881S 121 22.163E: 2 x BWO
PoI35: 26 12.926S 121 22.168E: Fresh bilby dig

PoI36: 26 13.066S 121 22.174E: old bilby digs
PoI37: 26 13.145S 121 22.176E: BWO
PoI38: 26 13.324S 121 22.185E: BWO
PoI39: 26 13.265S 121 22.185E: Fresh Cat track
PoI40: 26 13.445S 121 22.192E: Fresh dog track
PoI41: 26 13.682S 121 22.175E: end of transect
PoI42: 26 13.693S 121 22.203E: old bilby dig
PoI43: 26 13.691S 121 22.280E: Dog track
PoI44: 26 13.691S 121 22.479E: Old bilby feeding digs
PoI45: 26 13.734S 121 22.864E: BWF
PoI46: 26 13.555S 121 23.123E: Water