Breeding of the Wedge-tailed Eagle *Aquila audax* during 2012 at Lorna Glen Conservation Reserve, Western Australia.

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EXECUTIVE SUMMARY

This report details the findings of a second field survey conducted by Insight Ornithology at Lorna Glen Proposed Conservation Reserve during early August 2012. Preliminary research carried out in October 2011 was cut short by bad weather, so this survey aimed to gather more information on wedge-tailed eagle ecology by searching for new breeding territories, examining nests for activity and collecting prey remains from active nests to determine eagle diet.

Thirty-five new wedge-tailed eagle nests were located and the presence of seventeen breeding territories was confirmed. This brings the total to 38 nests known from Lorna Glen. Thirty-six nests were built in *Acacia pruinocarpa* trees, usually on ridges or at the top of breakaways. Twelve territories were currently occupied, each having nests which were active: five recently lined with fresh leaves, six contained incubating eggs, and one with chicks. Clutch size was typical of 1 (n=2) or 2 (n=4) eggs. The two chicks were less than 1 week old and were found on Nest 2, one of the three nests located during October 2011. At that time the nest had been lined and the territory was deemed active but this had not been confirmed.

Eagle dietary data (prey remains and pellets) were collected from some nests although many (especially those that were old and inactive) failed to yield any material. This was not surprising, though, considering eagles had only just commenced breeding at the time of the survey. Data that were collected are yet to be quantified – this is pending completion of prey remains collection at the end of the breeding season, which will give a more representative summary of 2012 diet. However, early indications show that wedge-tails prey mostly on large macropods, rabbits and goannas over much of the landscape.

Further fieldwork is planned for late November/early December 2012. This will include revisiting active nests to collect more eagle diet data, and capture and telemetry of several adult wedge-tailed eagles to determine accurate home range and habitat use of the species at Lorna Glen.

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1 INTRODUCTION

In 2011, Insight Ornithology was commissioned by the Department of Environment and Conservation (DEC) to conduct an investigation into the ecology of the wedge-tailed eagle at Lorna Glen Conservation Reserve, situated across the border of the Murchison and Gascoyne regions in Western Australia. This (planned long-term) study has the following aims:

- To determine and monitor the status (whether breeding resident, visitor, vagrant, etc) of the wedge-tailed eagle at Lorna Glen;
- To quantify the diet of the wedge-tailed eagle at Lorna Glen;
- To relate eagle diet to the reintroduction of Threatened mammal species present at Lorna Glen, both in the 1100ha fenced enclosure, and across the broader landscape;
- To gather detailed information on eagle home range and habitat use via satellite telemetry, and relate this to Threatened mammals.

Findings of this research can then be used to assist with future management decisions regarding Threatened mammal translocations (for more information see Cherriman 2012).

A preliminary field survey was carried out in October 2011, but was cut short due to bad weather conditions, so a return trip was conducted. The aims of the second field survey were:

- To revisit Wedge-tailed Eagle nests located during October 2011 and check their status;
- To locate as many new eagle nests as possible and determine their status;
- To determine the number of breeding pairs of eagles present at Lorna Glen;
- To collect preliminary information on eagle diet at Lorna Glen during 2011.

This report details the findings of the second field survey conducted in August 2012.

2 METHODS

2.1 Study Area

Lorna Glen Proposed Conservation Reserve is located approximately 150 km east north-east of Wiluna in Western Australia.

2.2 Personnel

The following personnel were involved in the preparation of this report:

- Mr Simon Cherriman *BSc. Hons (Env. Biol.), MSciComm. (Nat. Hist. Film.)*
- Mr Jeff Turpin *BSc.*

The field survey was undertaken by Simon Cherriman and Jeff Turpin and the report was prepared by Simon Cherriman.

2.3 Field Survey

The field survey was conducted on 7th – 18th August 2012. Weather conditions were usually fine or partly cloudy with daily maxima around 24˚C. Activities undertaken during the field survey included the following:

2.3.1 Nest Searching

Surveys were conducted by systematically driving internal roads and access tracks, and walking and/or driving ridge-lines on a quad-bike, to search all visible vegetation for wedge-tailed eagle nests. These are large structures of sticks which are usually conspicuous in open landscapes such as that at Lorna Glen (Ridpath and Brooker 1987).

2.3.2 Breeding Territory Mapping

The locations of all wedge-tailed eagle nests identified during the field survey were mapped using Google Earth software. Spatial information together with eagle nest activity data was used to estimate the approximate territory boundaries of breeding eagles.

2.3.3 Opportunistic Observations

Observations of wedge-tailed eagles were made at all times. Notes were made on the location, number and behaviour of birds sighted. Where possible, wedge-tailed eagles were aged using plumage colour (see Ridpath and Brooker 1986). Observations of adult eagles, especially those seen in pairs during the breeding season, can often indicate the location of a breeding territory containing nests. Thus, thorough searches for eagle nests were initiated in areas where sightings of such adult pairs were made.

3 RESULTS

3.1.1 Nests and Territories

Thirty-five new wedge-tailed eagle nests were located at Lorna Glen, and the presence of at least seventeen breeding territories was confirmed. Together with information from the October 2011 field survey, this brings the total to 38 nests known from the study area. Characteristics of all known nests, including the status of those previously located, are shown in Table 1 and maps of nests and breeding territories are shown in Figures 1 and 2.

Table 1. Characteristics, location and status of wedge-tailed eagle nests located during the field survey carried out at Lorna Glen in August 2012.

Nest No.	Easting	Northing	Tree Species	Ht. (m)	2012 Status	Content	Notes
1	342747	7089819	*Grevillea berryana*	6	**ACTIVE**	Fresh leaves	Fresh sticks and a few sprigs added since 2011 visit but not bred in.
2	327309	7102443	*Acacia pruinocarpa*	6	**ACTIVE**	2 chicks	Lined in 2011 but no breeding.
3	333956	7105899	*A. pruinocarpa*	7	**ACTIVE**	2 eggs	Used to successfully rear one chick in 2011.
4	357722	7115942	*A. pruinocarpa*	5	inactive		Very old and partially disintegrated.
5	358496	7115582	*A. pruinocarpa*	8	inactive		Old but recently refurbished in last 6 months.
6	358936	7115311	*A. pruinocarpa*	5	inactive		Flat, bleached platform; last used to fledge young some years ago.
7	357785	7116438	*A. pruinocarpa*	10	**ACTIVE**	1 egg	Incubating bird reluctant to leave on first visit.
8	356569	7123479	*A. pruinocarpa*	3	**ACTIVE**	Fresh leaves	Very old, new leaves added in last 6 months, recently used as feeding platform.
9	357186	7124291	*Callitris columellaris*	4	inactive		Very old, faded stick platform, not used for many years.
10	357355	7122897	*A. pruinocarpa*	6	inactive		Scats below, some sticks added to edges but no fresh lining.
11	357502	7122998	*A. pruinocarpa*	4	inactive		Very old, partially collapsed, recent use as feeding platform, no lining.
12	357149	7123218	*A. pruinocarpa*	4	inactive		Very old, collapsed, not used for many years.
13	353083	7119003	*A. pruinocarpa*	8	inactive		Old nest, one fresh sprig in cup placed in last few months, few scats below.
14	335775	7121531	*A. pruinocarpa*	3	inactive		Very old, small nest, used many years ago.
15	335974	7121713	*A. pruinocarpa*	3	inactive		Old and collapsed.
16	335929	7121398	*A. pruinocarpa*	-	inactive		Old and collapsed.
17	351234	7088143	*A. pruinocarpa*	6	inactive		Appeared refurbished for use but not lined or bred in.
18	351488	7088146	*A. pruinocarpa*	6	inactive		Very old, a few fresh sprigs indicating recent visitation.
19	351469	7088105	*A. pruinocarpa*	-	inactive		Totally collapsed and fallen to ground.
20	326786	7132078	*A. pruinocarpa*	6	**ACTIVE**	2 eggs	Many scats below nest.
21	334919	7133799	*A. pruinocarpa*	10	**ACTIVE**	2 eggs	Very close to road; incubating bird flushed from road.
22	354483	7128110	*A. pruinocarpa*	2	**ACTIVE**	Fresh leaves	Very fresh eucalypt sprigs, laying may still occur.
23	348112	7100290	*A. pruinocarpa*	6	inactive		Old and partially collapsed, last used to fledge young some years ago.
24	347732	7103123	*A. pruinocarpa*	9	inactive		No fresh material in nest, last used 2+ years ago, some scats below.
25	346947	7103550	*A. pruinocarpa*	8	**ACTIVE**	Fresh leaves	Very fresh mulga/eucalypt lining placed in last few weeks but no eggs.
26	346333	7102540	*A. pruinocarpa*	9	inactive		Very old and collapsed, not bred in for years, recent use as feeding platform.
27	345853	7102531	*A. pruinocarpa*	6	inactive		Several fresh sprigs placed in last month but not bred in.
28	345558	7103104	*A. pruinocarpa*	7	inactive		Two fresh sprigs placed but no other signs of use.
29	344818	7102621	*A. pruinocarpa*	5	inactive		Very old nest, no fresh lining or signs of recent use.
30	241749	7109332	*A. pruinocarpa*	7	inactive		Not lined or visited recently but still in good condition.
31	340130	7111025	*A. pruinocarpa*	4	inactive		Very old and collapsed, not used for many years.
32	339605	7110987	*A. pruinocarpa*	8	inactive		Probably used in last 2-3 years, still in good condition.
33	339154	7110237	*A. pruinocarpa*	6	**ACTIVE**	1 egg	Many scats below nest.
34	337437	7113940	*A. pruinocarpa*	5	**ACTIVE**	Fresh leaves	Very fresh mulga/eucalypt lining placed in last few weeks but no eggs.
35	347830	7113622	*A. pruinocarpa*	7	inactive		Old, collapsed and not used for many years.
36	348668	7113606	*A. pruinocarpa*	6	**ACTIVE**	2 eggs	Incubating bird flushed on arrival.
37	336909	7081533	*A. pruinocarpa*	4	inactive		Partly collapsed, not bred in for several years, recent use as feeding platform.
38	327823	7095393	*A. pruinocarpa*	7	inactive		Probably used in last 2-3 years, still in good condition but no recent lining.

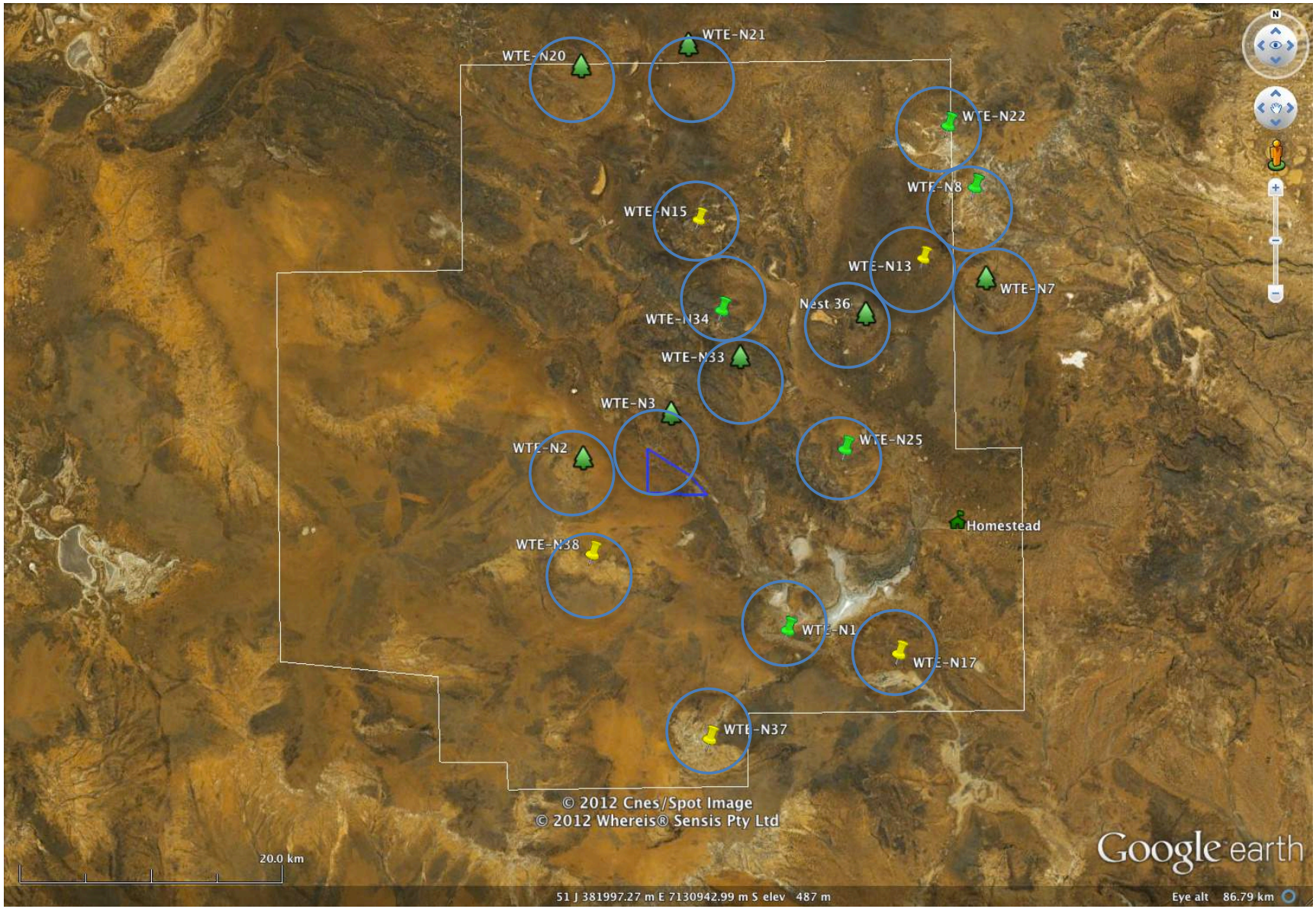

Figure 1. Map of Lorna Glen Proposed Conservation Reserve showing locations of 17 wedge-tailed eagle breeding territories (blue circles) and respective nests. Tree symbol = active nests containing eggs/chicks; green pin = active nests lined but not bred in; yellow pin = inactive nest; blue triangle = fenced enclosure. Note that eagle territories are unlikely uniform in shape – circles used for demonstrative purposes only.

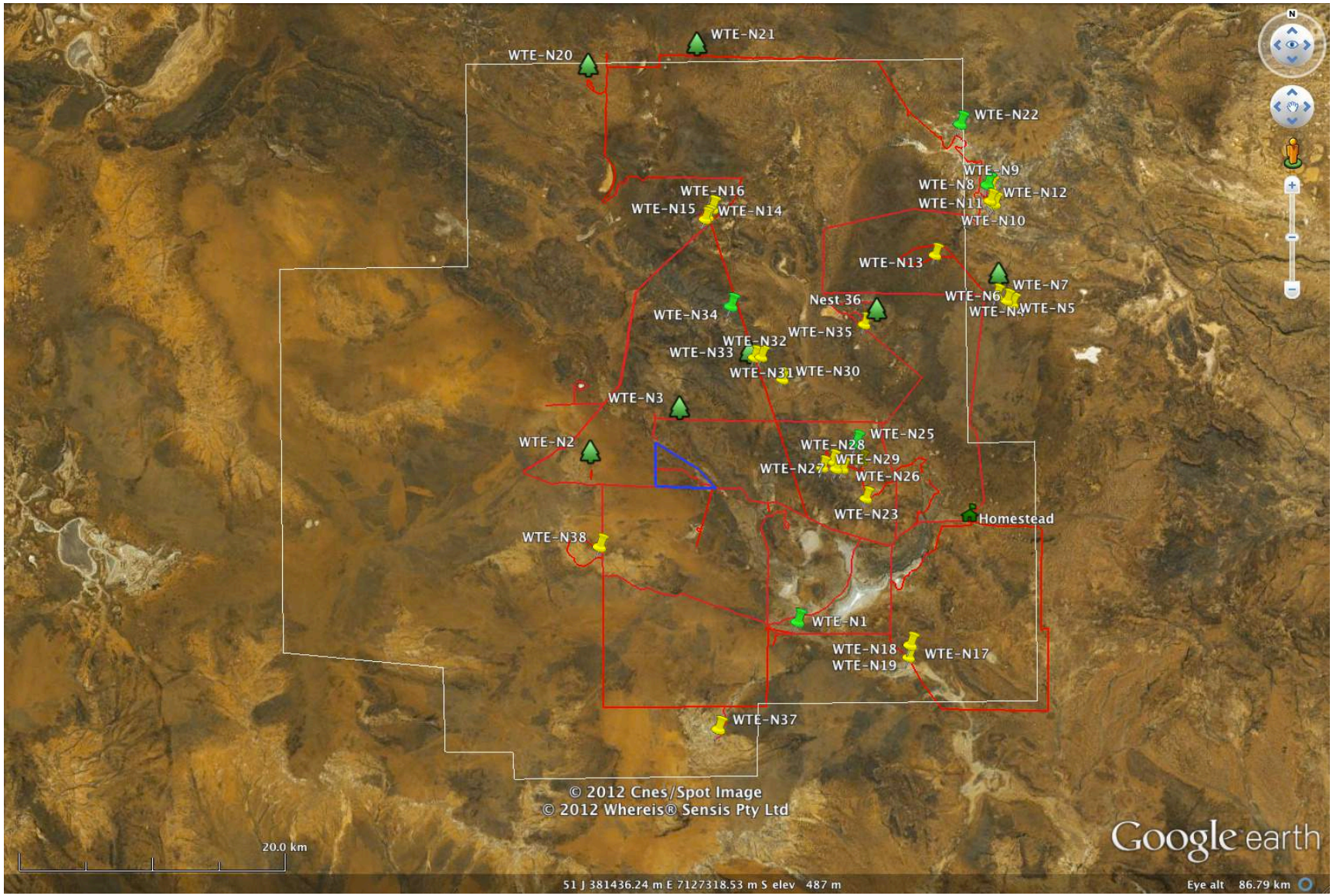

Figure 2. Map of Lorna Glen Proposed Conservation Reserve showing locations of all 38 wedge-tailed eagle nests located during August 2012. Areas traversed during the field survey are indicated by red lines. Tree symbol = active nests containing eggs/chicks; green pin = active nests lined but not bred in; yellow pin = inactive nest; blue triangle = fenced enclosure.

All but two of the nests located at Lorna Glen were built in Gidgee (*Acacia pruinocarpa*) trees, usually on ridges, with a commanding view over the surrounding landscape. The other two nests were in similar large tree species: Nest 1 in *Grevillea berryana* and Nest 9 in *Callitris columellaris*. Nests were on average 6 m above the ground. Figure 3 shows a typical eagle nest at Lorna Glen.

Figure 3. Site photo of wedge-tailed eagle Nest 6, a typical example of a nest at Lorna Glen, located during field survey in August 2012.

Twelve territories were occupied during the field survey, each having nests which were active: five recently lined with fresh leaves, six contained incubating eggs, and one with chicks. Of the nests containing eggs, four contained a clutch of 2 and two contained a clutch of 1. Examples of active wedge-tailed eagle nests are shown in Figures 4 - 7.

3.1.2 Diet

Eagle dietary data (prey remains and pellets) were collected from some nests although many (especially those that were old and inactive) failed to yield any material. Data that were collected are yet to be quantified – this is pending completion of prey remains collection at the end of the 2012 breeding season, which will give a more representative summary of 2012 diet. Early indications from dietary material show that wedge-tails prey mostly on large macropods, rabbits and goannas over much of the landscape. Fresh prey remains collected from Nest 3, which is situated <1 km from the fenced enclosure, included an Eastern Barn Owl (*Tyto javanica*) and an Australian Bustard (*Ardeotis australis*).

Figure 4. Wedge-tailed eagle Nest 2 which contained 2 chicks during field survey in August 2012.

Figure 5. Wedge-tailed eagle Nest 20, a typical example of an active nest containing incubating eggs, located during field survey in August 2012..

Figure 6. Wedge-tailed eagle Nest 25, a typical example of an active nest lined with fresh material but not laid in, located during field survey in August 2012

Figure 7. Wedge-tailed eagle Nest 30, a typical example of an inactive nest, located during field survey in August 2012

3.1.3 Opportunistic Observations

Eleven opportunistic records were made of wedge-tailed eagles during the field survey at Lorna Glen; these are presented in Table 2 and Figure 8. All except one were adult eagles, seen either singly or in pairs.

Table 2. Opportunistic records of wedge-tailed eagles made during field survey at Lorna Glen, August 2012.

Sighting	Date	Time	Easting	Northing	Notes
1	8/08/12	8:29	352479	7097660	Adult pair perched in live tree along drainage line.
2	9/08/12	9:23	358496	7115582	Single adult soaring high above Nest 4.
3	9/08/12	12:30	356237	7122756	Adult pair soaring high above breakaway ~1km east.
4	10/08/12	10:03	354165	7119079	Single adult flying low over road.
5	11/08/12	14:00	351066	7092376	Single adult soaring high north of New Bore.
6	12/08/12	8:00	343650	7098693	Single sub-adult circling low over road.
7	13/08/12	9:36	353425	7100860	Adult pair circling low over claypan.
8	13/08/12	11:00	323445	7084287	Adult pair feeding on dead camel near road.
9	14/08/12	9:30	351645	7098158	Adult pair soaring high ~500m to north.
10	14/08/12	10:32	348039	7104215	Single adult soaring above ridge ~1.5km south of road.
11	14/08/12	16:14	339603	7109574	Single adult soaring above road.
12	17/08/12	9:23	350951	7094015	Adult pair circling low over claypan.

Figure 8. Locations map of opportunistic wedge-tailed eagle records made during field survey at Lorna Glen, August 2012. Red pin = adult pair; blue pin = single adult; orange pin = single sub-adult.

4 DISCUSSION

4.1.1 Nests and Territories

The site, situation and characteristics of wedge-tailed eagle nests reported at Lorna Glen were similar to those reported by Ridpath and Brooker (1987), who found them to be typically 2-6m above the ground in the arid zone. Breeding density was much higher than estimated when Lorna Glen was first visited in October 2011. At least 12 pairs of eagles currently present, and there is the potential for at least five further (currently inactive) territories to be occupied. Although a much greater portion of the reserve has now been surveyed, most of the western and far northern sections remain to be comprehensively nest-searched, so the number of territories can still be predicted to be higher than 17. However, the total number of nests (n=38) now recorded provides valuable baseline information which can be used to predict suitable nesting habitat for future targeted surveys.

Early indications show most eagle territories seem to be confined to the rockier, undulating Mulga shrubland habitats present across the north-eastern half of Lorna Glen. The few sites located among the sandplain/spinifex habitat to the south-west which were visited contained no eagle nests (see Figure 2), despite the presence of many suitable tall nest trees (mostly *Eucalyptus gongylocarpa*). (Note that Nests 2, 37 and 38 all occur on rocky rises adjoining Mulga shrubland). While this may be owing to lack of survey effort, it remains to be seen if the densities of suitable prey animals in sandier soils is too low to support breeding eagles.

Wedge-tailed eagle clutch sizes of 1 (n=2) or 2 (n=4) eggs were also typical for the species (Olsen 2005). The two eaglets (Figure 4) were less than a week old and were found on Nest 2, one of the three nests located during October 2011. At that time the nest had been lined but not bred in, so it was predicted that an eagle pair occupied this territory, though this had not been confirmed. It was therefore encouraging to return to this territory and find this prediction was accurate. Similarly, other nests which had been freshly lined in 2012 indicate that adult birds are present in the territory and have not bred this year, but may do in the future.

4.1.2 Eagle diet

All active nests are planned to be revisited later this year to collect more dietary material required for a comprehensive 2012 breeding diet analysis. It will be interesting to determine whether the eagles breeding in Nest 2 prey on reintroduced mammals such as boodies and mala present within the fenced enclosure, which is <5 km to the east of this nest. If so, this will be the second pair known to utilise this food source.

4.1.3 Opportunistic Observations

Most adult wedge-tailed eagles observed by themselves were usually recorded close to active nests, where another bird (i.e. breeding partner) was incubating/brooding. The single sub-adult seen east of the fenced enclosure may be a vagrant. Several sightings were made of an adult pair (thought to be the same birds) in the vicinity of the Homestead which did not seem to be associated with an active breeding territory (See Figure 8). This pair may belong to Nests 1 or 17 and may travel over a large area because they are not breeding this year. Telemetry of such birds is required to gain detailed information on movements.

5 CONCLUSIONS AND RECOMMENDATIONS

The field study conducted in August 2012 gave a useful insight into wedge-tailed eagle ecology at Lorna Glen. Locations and site characteristics of known nests provide important baseline information for future work.

In light of the above information, the following recommendations are noteworthy:

- Revisit active nests to collect further prey remains and pellets representing 2012 breeding diet.
- Compile a comprehensive summary of the numbers of prey species eaten by wedge-tailed eagles at Lorna Glen.
- Conduct further field surveys in the western and far northern sections of the reserve to locate more eagle nests and gain further insight into eagle nesting characteristics and diet.
- Trap and monitor (through satellite-telemetry) the movements of adult eagles to gain information on habitat use, including visitations to the fenced enclosure.

6 REFERENCES

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