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Subject: 2015 Winter Nest Box Monitoring – Newcastle Gas Storage Facility

This report outlines the 2015 findings of the annual nest box monitoring programme on the Newcastle Gas Storage Facility (NGSF) site at Tomago, NSW.

Background

In August 2012, 100 nest boxes (boxes) were installed on AGL owned land adjacent to the Newcastle Gas Storage Facility as a requirement under Section 75J of the *Environmental Planning & Assessment Act 1979,* Application No. MP 10_0133. Due to the low number of large trees in regenerating native forest at the site [Minister for Planning and Infrastructure required 80 boxes to be mounted on treated timber posts which were cemented into the ground. The remaining boxes were placed on trees in mature forest. Four different box types were installed to suit a variety of arboreal mammals including:

- Sugar/Squirrel Glider (40 boxes)
- Brushtail/Ringtail Possum (15 boxes)
- Pygmy Possum (15 boxes)
- Microchiropteran bat (30 boxes)

The Fauna Hollow Management Plan (AGL, 2012) specified annual inspections of boxes for five years to evaluate native fauna usage, and to ensure they remain operational and available for use.

Following the 2014 monitoring surveys, nine nest boxes were found to be destroyed by fire. All nine boxes were replaced in September 2014.

Monitoring methods

Two Kleinfelder staff with experience and accreditation in handling animals and working at heights attended the site on the 12 and 13 August 2015.

For the 2015 monitoring period we trialed the use of a wireless HD camera to monitor box usage. The design involved a GoPro™ camera attached to an extension pole capable of reaching heights of 6 m. A live video feed is transferred wirelessly from the camera to an iPhone device capable of capturing still images or video. Images were captured in the field and processed in the office.

A handheld GPS, pre-loaded with co-ordinates, was used to locate the boxes. Once a box was located, the pole camera was used to open the lid and to observe the contents. To confirm the capability and accuracy of the camera, the boxes were also manually checked via a tethered ladder.

Status of the boxes were recorded as either:

- A – Animal present
- E1 – Fresh evidence of use (i.e. fresh nest or scats)
- E2 – Moderately fresh evidence of use (i.e. green leaves but beginning to age)
- E3 – Old signs of use (i.e. old leaf nest, old scats)
- N – No evidence of use
- NA – Not available for use
- X - missing

If a box was found to be occupied, an attempt was made to capture the animal for positive identification and to evaluate the health of the animal.

Signs of use include the presence of hair, scats or nesting material. Samples of hair and scats were collected for microscopic analysis to identify the species. Hair analysis was undertaken by Luke Foster following Brunner and Coman (1974).

Boxes which contained wasp nests or other pest species, had lids which were open or missing, or were missing/destroyed were deemed to be not available for use by target animals.

Results

In 2015, the total number of boxes exhibiting any signs of use was 62 (62%) compared to 41 boxes (41%) in 2014 (**Figure 1**). A total of 97 boxes out of 100 were available for use in 2015 compared to 81 boxes in 2014. The percentages shown in **Figure 1** have been calculated out of 100 total boxes regardless of box availability.

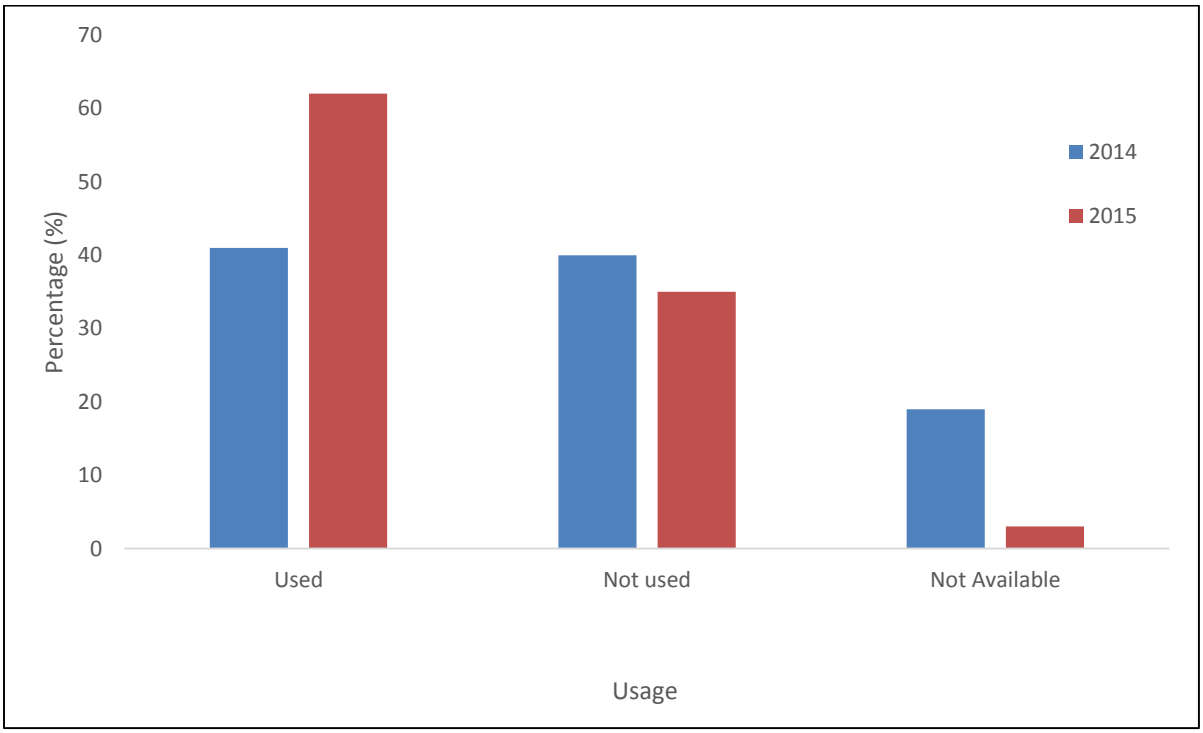

Figure 1: **General usage rates of nest boxes (n=100)**

The number of animals present (A) rose from seven boxes in 2014 to nine boxes in 2015 and the occurrence of recent evidence of use (E1 & E2) rose from seven boxes in 2014 to 41 boxes in 2015. This significant increase in rate of recent usage correlates to the fall in the recording rate of old signs of use (E3) between 2014 and 2015; being 27 boxes and 12 boxes respectively (**Figure 2**).

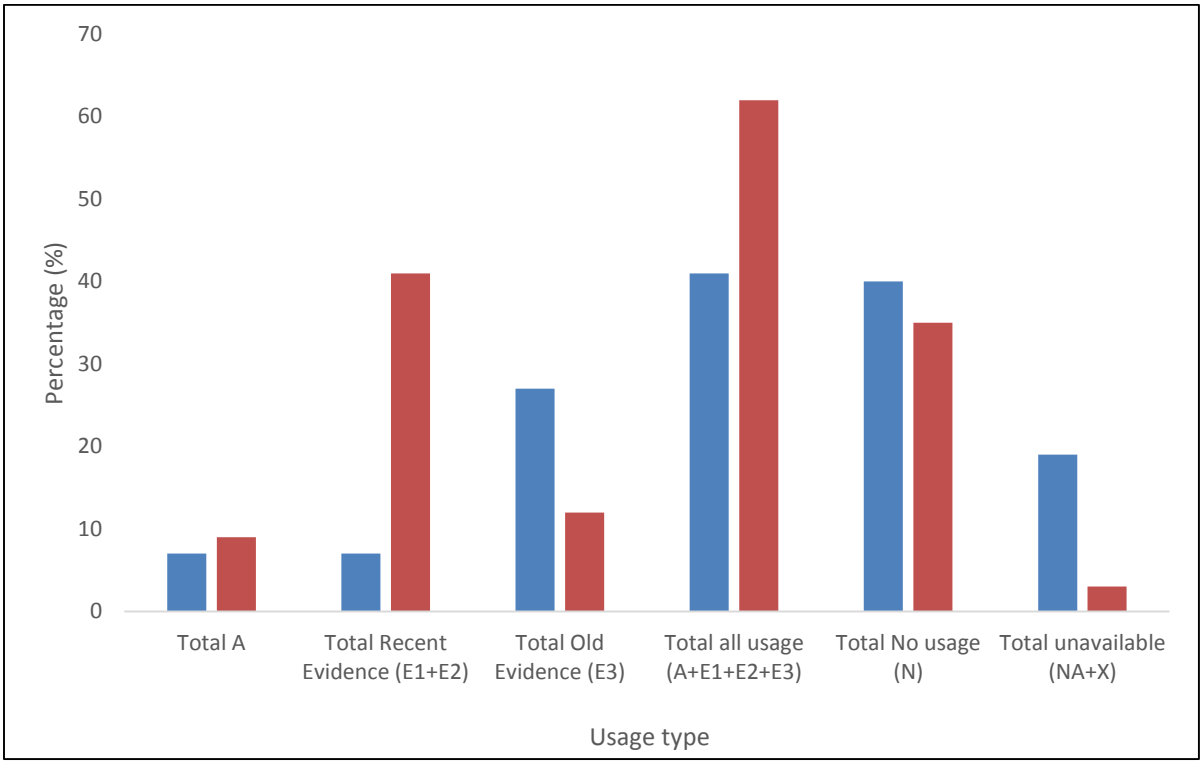

Figure 2: **Detailed usage of nest boxes (n=100)**

Usage per box type showed an overall increase between survey years (**Figure 3**) for all nest box types. Possum boxes saw a 40% increase in usage, Pygmy Possum boxes 22%, Glider boxes 27% and bat boxes 3%.

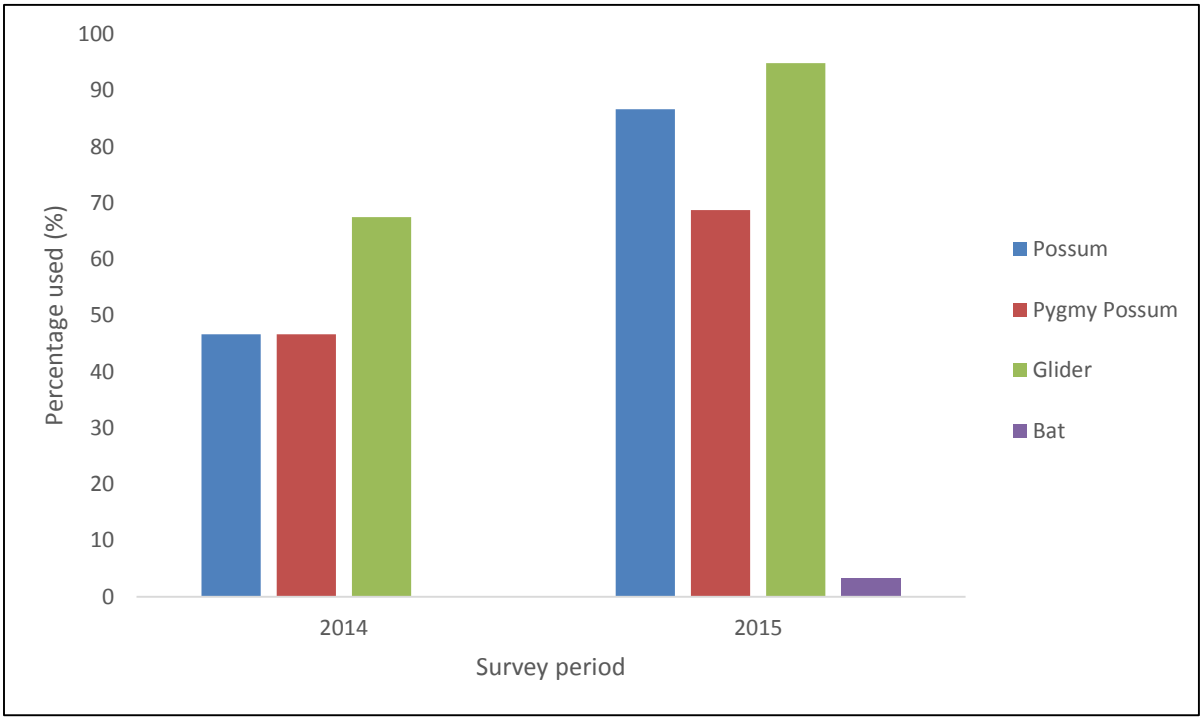

Figure 3: Usage per nest box type

Six fauna species were detected using boxes in 2015. This included animals present and evidence of use. The species detected were Brown Antechinus (*Antechinus stuartii*), Common Brushtail Possum (*Trichosurus vulpecula*), Common Ringtail Possum (*Pseudocheirus peregrinus*), Lace Monitor (*Varanus varius*), Sugar Glider (*Petaurus breviceps*) and Squirrel Glider (*Petaurus norfolcensis*).

The Squirrel Glider is listed as Vulnerable under the *Threatened Species Conservation Act 1995* (NSW).

Nineteen live animals in nine nest boxes were physically present during the 2015 monitoring event (**Table 1**). Three mammal species, Squirrel Glider (*Petaurus norfolcensis*), Sugar Glider

(*Petaurus breviceps*) and Brown Antechinus (*Antechinus stuartii*) were observed within nest boxes. One juvenile Lace Monitor (*Varanus varius*) was observed utilising a bat box.

Table 1: Actual animals present in 2015

Species recorded occupying box	No. Individuals	Box Type	Mount Type	Box no.
Brown Antechinus (*Antechinus stuartii*)	1	Pygmy Possum	Tree	97
Brown Antechinus (*Antechinus stuartii*)	5	Sugar/Squirrel Glider	Pole	58
Brown Antechinus (*Antechinus stuartii*)	2	Pygmy Possum	Pole	36
Lace Monitor (*Varanus varius*)	1	Bat	Pole	40
Sugar Glider (*Petaurus breviceps*)	1	Sugar/Squirrel Glider	Pole	6
Sugar Glider (*Petaurus breviceps*)	3	Sugar/Squirrel Glider	Tree	93
Squirrel Glider (*Petaurus norfolcensis*)	1	Sugar/Squirrel Glider	Pole	20
Squirrel Glider (*Petaurus norfolcensis*)	2	Sugar/Squirrel Glider	Pole	50
Squirrel Glider (*Petaurus norfolcensis*)	3	Sugar/Squirrel Glider	Pole	49
Total	**19**			

Discussion

The 2015 monitoring surveys identified a combined usage rate (incorporating animals present, recent and old evidence of use) as 62% (62 boxes out of 100), a 21% increase from 2014. Even with this high rate of use, it is likely to be underestimated due to the difficulty of gauging use in current microbat nest box designs. Bat boxes contain an opening on the underside of the box and so scats and hair left by visiting microbats or other fauna are not retained within the box.

The high rate of nest box usage in young forest is consistent with other studies such as that conducted by Lindenmayer, and colleagues (2009) who found 58% of boxes in 20 year old regrowth were occupied. Boxes placed in mature forest are not thought to be as well used by fauna due to the availability of natural hollows.

As **Figure 2** highlights, the 2015 surveys identified not only a much higher rate of overall evidence of use, but also a much higher rate of recent evidence compared to 2014. This is consistent with other nest box programmes where the rate of box usage increases dramatically in the first couple of years as hollow dependent fauna discover the new resource. As monitoring continues it is expected that the rate of usage will plateau to suit the carrying capacity of the local environment.

The high rate of recent evidence of usage could also be attributed to the growth of the local population of hollow dependent species and thus using more boxes as part of their family

territories. Squirrel Gliders recorded in 2015 were observed to have had a successful breeding event and the offspring had dispersed to boxes adjacent to that of the parents' box. As the juveniles mature, it is expected that they will disperse to form their own territories which may incorporate other nest boxes in the vicinity.

The species recorded in boxes in this study is consistent with arboreal species detected during baseline fauna surveys for the gas storage facility in 2009 and 2010 (ecobiological 2010). Although the threatened Squirrel Glider was detected from only one capture during baseline surveys, it was recorded three times using both glider (n=2) and pygmy-possum (n=1) boxes at the site in 2014 surveys, and again in 2015 using solely glider boxes (n=6).

It is to be noted that Squirrel Gliders were detected in nest box 50 in both 2014 and 2015. In the 2015 survey, box 49 which is approximately 20 m north of box 50, contained three juvenile Squirrel Gliders indicating that successful breeding is occurring (**Appendix 1**). A preferred feed tree species (*Eucalyptus gummifera*) found throughout the immediate area of boxes 49 and 50, also showed signs of heavy feeding activity again indicating a healthy population (**Appendix 1**).

Fifteen pygmy possum boxes were installed at the site as the area was thought to be suitable habitat for this species. Eastern Pygmy Possum are difficult to survey for using conventional trapping and spotlighting techniques and it has been suggested that nest boxes may provide greater opportunities to detect this species through indirect evidence such as characteristic nests or hairs (Beyer and Goldingay 2006). No Eastern Pygmy Possum or their signs were detected during either the 2014 or 2015 surveys.

Nest boxes at the site were installed consistently on warmer north-easterly aspects and so it is assumed that this would make them more likely to be occupied in winter. Other factors such as the presence of canopy shade may also influence the microclimate within the boxes.

Storm damage, assumed to be from the June storms, has resulted in the uprooting of many trees. Only one box (No. 77, **Appendix 1**) was noted to have been damaged.

Summary

The 2015 nest box monitoring programme has shown that the 100 nest boxes installed on the NGSF property continue to provide hollow dependent fauna with a den resource. The observation of the threatened Squirrel Glider and a successful breeding event is a positive sign for this species in the area.

Ongoing monitoring and maintenance of nest boxes is essential for determining the ongoing success of the offset programme.

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Legend

- Occupied
- Signs of use
- No signs of use
- Unavailable

Metres

0 25 50 100 150

N

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DATA SOURCE:
nearmap - 2015

Nest Box Monitoring

AGL Energy Ltd
Nest Box Monitoring - Winter 2015
Newcastle Gas Storage Facility
Old Punt Road Tomago

FIGURE:

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APPENDIX 1 – FIELD PHOTOS

Adult Squirrel Glider caught in Box 50.

Squirrel Gliders using Box 49

Squirrel Gliders using Box 50

Example of a Possum box showing signs of use by a Common Brush-tail Possum.

Antechinus stuartii caught in Box 58

Feeding signs (Gliders) on a *Eucalyptus gummifera*

Box and pole (No. 77) fallen over due to storm damage