Sutherland Shire COUNCIL

Kirrawee Brick Pit – Microbat & Flying-fox Monitoring Report

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Photograph recorded by infrared, motion detection, remote camera situated on the eastern side of the pond.

Prepared by Beth Noel – Ecologist for Sutherland Shire Council's Environmental Science and Policy Unit.

Tel: 02 9710 0686

1. Executive Summary

Monitoring of the Kirrawee Brickpit for microbats and flying-foxes was undertaken 14-22 June 2017 by Council's Environmental Science staff. Remote, infrared, motion sensor cameras were used as well as field observations conducted. In addition a Songmeter, which records microbat echolocation calls, was installed to capture any microbat activity. The cameras and field observations did not detect any microbat or flying-fox activity at the temporary pond. However, the Songmeter did detect microbat activity at the site adjacent the pond. As the timing was not suitable for microbat or flying-fox monitoring a further monitoring event is recommended in spring and when the closest flying-fox camp returns to confirm if the pond at the site is being relied upon by microbats and flying-foxes. Further monitoring will help to establish if bats are using this temporary sedimentation pond and therefore are likely to use a pond post development.

Caveat:

Please note that the field work was conducted at an unfortunate time to assess the use of this temporary water body by microbats & flying-foxes. The nearest flying-fox camp at Kareela was abandoned at the time of the survey; Flying-foxes roosting at Kareela are the most likely to use the Brickpit site as Kareela is 1.5km away and other camps within the Sutherland Shire are between 3.5 and 8km away from the Brickpit and have freshwater bodies closer to them. In addition, during the period of monitoring, the temperature dropped well below minimum temperatures for microbats to be expected to be active. The presence of cranes and construction activities may also make the site less suitable for bats and flying-foxes to forage or use the temporary pond for drinking.

2. Scope of Works

Sutherland Shire Council's Environmental Science unit was engaged to monitor the activity of bats and flying-foxes at Kirrawee Brick Pit located at 566-594 Princes Highway Kirrawee NSW. The site, with a focus on the sedimentation pond, was monitored for flying-fox and bat activity in relation to the temporary sedimentation pond installed at the site. See Figure 1 Aerial photograph below for approximate size and location of the current temporary sediment detention pond shown in blue.

Figure 1 – Aerial Photograph (2015) of the site with approximate size and location of the current sedimentation pond shown in blue on the western edge of the site. Note the site does not currently look like this as the aerial photo is out of date.

3. Background

Previously a Flora and Fauna Assessment prepared by Cumberland Ecology (2010) identified the presence of the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and Grey-headed flying-fox (*Pteropus poliocephalus*) at the Kirrawee Brickpit site. Cumberland Ecology indicated that these species would be likely to forage at the site and use the existing water body as a source of drinking water. Both of these species are listed as Vulnerable under the Threatened Species Conservation Act 1995. This prompted conditions of consent applied, by the Office of Heritage, to the concept approval for the site to retain a water body for use by microbats and flying-foxes. In order to monitor if the temporary sedimentation pond was being relied upon as part of the local microbat and flying-fox life cycle, Environmental Science staff were asked to undertake monitoring of microbats & flying-foxes.

4. Methodology

Environmental Science staff attended the Brickpit site on 14 June 2017 to install three infrared, motion sensor, remote cameras facing the length of the temporary sedimentation pond. A Songmeter to record microbat echolation

calls was also installed at the site adjacent the pond on 14 June 2017. Three staff were stationed to observe the pond for flying-fox and microbat activity on 14 June 2017 from 4:30pm until approximately 6pm (sunset time was 4:52pm). Observations were conducted from the car park area looking north over the pond.

The cameras and Songmeter were left onsite from 14 – 22 June to monitor flying-fox and microbat activity on the surface of pond and record echolocation calls from microbats in the locality. It should be noted that the nearest flying-fox camp at Kareela was empty at the time of the survey as it had abandoned late May 2017. Other occupied flying-fox camps are situated within 8km of the Brickpit site, however these have drinking water sources nearby making it unlikely for them to rely on the Brickpit site as a source of drinking water.

During the survey period the temperature ranged from 4ºC to 23ºC, based on measurements from the remote cameras. At air temperatures below 10 ºC bats often remain in torpor (decreased physiological activity similar to hibernation) for more than a day (Geiser & Brigham 2000). Temperatures below 10ºC require a great deal of energy for microbats to function and less insects are available in these cold months to meet a microbat's energy needs (Spence 1992). Many species of microbat go in and out of torpor during the day with possible activity observed early evening where they may wake to hunt for food and rehydrate but once temperatures drop over night they will often return to torpor (Stawski et al).

Microbat echolocation calls (recorded using a Songmeter, Echometer or Anabat) are analysed using species-specific parameters of the call profile such as call shape, characteristic frequency, initial slope and time between calls (Reinhold et al. 2001 and Pennay et al. 2004). To ensure reliable and accurate results the following protocols (adapted from Lloyd et. al. 2006) are followed when analysing calls:

- recordings containing less than three pulses were not analysed (Law et al. 1999)
- only search phase calls were analysed (McKenzie et al. 2002)
- four categories of confidence in species identification were used (Mills et al. 1996):
    - definite – identity not in doubt
    - probable – low probability of confusion with species of similar calls
    - possible – medium to high probability of confusion with species with similar calls
    - unidentifiable – calls made by bats which cannot be identified to even a species group
- Nyctophilus species are difficult to identify confidently from their calls and no attempt is made to identify this genus to species level (Pennay et al. 2004)
- sequences not attributed to microbat echolocation calls were labelled as junk or non-bat calls and don't represent microbat activity at the site

- sequences labelled as low were of poor quality and therefore not able to be identified to any microbat species, they can however be used as an indicator of microbat activity at the site.

5. Results

Sunset Observations:

Observations prior to and after sunset on 14 June 2017 resulted in no observations of microbats or flying-foxes using the temporary sedimentation pond. Observations were conducted from 4:30pm to 6pm by three staff looking north across the temporary sedimentation pond (currently north of the car park).

Infrared, Motion Sensor, Remote Cameras:

Three infrared, motion sensor, remote cameras were deployed, two cameras taking photos and one camera taking video from the southern end of the sedimentation pond from 14 – 22 June 2017. No observations of microbats or flying-foxes using the temporary sedimentation pond were recorded by the cameras. Feral cats were observed at the site on one of the cameras and by staff whilst onsite.

Songmeter:

The song meter recorded echolocation calls from 14-17 June 2017. The majority of calls were of poor quality. A total of 365 files were recorded by the Songmeter using the echolocation microphone during the monitoring period. Of these 365 files approximately 36 were definitively microbat calls, however none of them were of good quality and therefore a species identification was not able to be confirmed as "definite" using Mills et al. (1996) for these recorded calls.

The frequencies these calls were recorded at narrow down the list of species likely to be present at the site. The recording of these poor quality calls does confirm that microbat activity is occurring at the site. Table 1 below shows a list of the recorded calls and their frequency range with an indication of the species that occur in that frequency in the Sydney area.

Table 1 – Summary of species occurring in the frequency range of the calls recorded at the site. This is indicative only as the calls were not clear enough to be definitively identified.

Call Frequency Range	No. of calls	Dates	List of Species Occurring in this Frequency Range	
			Common Name	Scientific Name
10-15khz	8	14/6/17 - 16/6/17	Austronomus australis	White Striped Free-tail Bat
16-20khz	14	14/6/17 - 16/6/17	Saccolaimus faliviventris	Yellow-bellied Sheathtail-bat
21-25khz	7	14/6/17 - 17/6/17	Chalinolobus dwyeri, Saccolaimus flaviventris	Large-eared Pied Bat, Yellow-bellied Sheathtail-Bat
26-30khz	5	14/6/17 - 16/6/17	Chalinolobus gouldii & Mormopterus species	Gould's Wattled Bat & a range of Freetail bats
43-45khz	2	15/6/17 - 16/6/17	Vespedelus species & Miniopterus schreibersii oceanensis	A range of Forest Bats & Eastern Bentwing-bat

6. Conclusion

Based on previous information and current microbat activity it is likely that the Grey-headed Flying-fox, Eastern Bentwing-Bat and other microbats have used an open water body at this Kirrawee Brickpit site. No microbats or flying-foxes were observed using the current temporary water body during the 14 - 22 June 2017 monitoring period. However recordings of echolocation calls do indicate there is microbat activity at the site with no species definitively identified due to the poor quality calls, possibly due to the season and microbats moving in and out of torpor and therefore not exhibiting normal behaviour patterns. Although no activity was observed either visually or using the cameras the conditions were not ideal to definitively prove that the pond is not relied upon as part of local microbat or flying-fox life cycles.

7. Recommendations

Further surveys of the Kirrawee Brickpit site are recommended to be undertaken in spring for microbats and following the return of the Kareela flying-fox camp for flying-foxes. A further survey will help to establish if bats are using this temporary sedimentation pond and therefore are likely to use a pond post development.

8. References

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