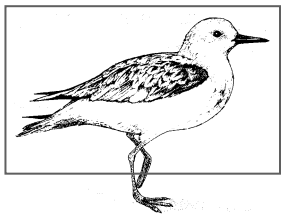

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Biodiversity Survey

Impact Assessment

Ecological Monitoring

Targeted Surveys

Project Management

Onsite Ecology

Kris Hincks
Environmental Manager
NH2U Pacific Highway Upgrade
Kris.HINCKS@rms.nsw.gov.au

04 October 2017

Dear Kris,

RE: NH2U Winter 2017 survey of microbat boxes and flyway monitoring.

Sandpiper Ecological Surveys was engaged by New South Wales Roads and Maritime Services (RMS) to conduct operational phase monitoring of fauna mitigation measures implemented as part of the Nambucca Heads to Urunga (NH2U) Pacific Highway Upgrade. One of the monitoring requirements was a winter inspection of microbat roost boxes installed as compensatory habitat for the removal of drainage structures featuring microbat roosts and inspection of microbat flyways associated with newly constructed culverts and bridges.

Background

Microbat monitoring was conducted in accordance with the *Brief for Environmental Services – Biodiversity & Water Monitoring – Nambucca Heads to Urunga* (the Brief). The Brief states that operational phase monitoring shall be undertaken in accordance with the *Warrell Creek to Urunga (WC2U) Microchiropteran Bat Management Strategy* (MMS) (Lewis 2013) and the *WC2U Pacific Highway Upgrade Ecological Monitoring Program (EMP) Stage 1: NH2U* (RMS & BEM 2013). The MMS provides details on the microbat roost box program which totals 39 boxes installed across 12 sites adjoining the NH2U alignment. Further, the MMS outlines a requirement to monitor microbat flyways by conducting inspections of riparian zones associated with newly constructed drainage structures. Initial flyway monitoring was completed in 2014 and follow-up monitoring of three sites post-construction was recommended (Sandpiper 2014). The three remaining sites were Boggy Creek and Jackson's Creek north and south.

Methods

Microbat roost boxes were inspected on 24 and 25 August 2017. A combination of spotlight and binoculars was used to inspect boxes. If there was concern about identification of microbats, a ladder was used to access the box and capture individual bats for processing and identification. The process of microbat identification involved use of a dichotomous key (Churchill 2008) which required weighing, measuring and photographing individuals. Processing of an individual microbat took approximately five minutes after which time the individual was returned to the roost box.

Microbat flyway inspections were performed by standing at the drainage structure inlet/outlet and viewing/taking a photograph of the area above the water level and along the drainage line in a direction away from the structure. Assessment of flyway condition was performed by comparing current photographs with those taken in 2014. Any noticeable impediments or cluttering of the flyway between the two periods was noted. Both eastern and western sides of the flyway were inspected with focus on flyways looking out from the clearing limit.

Photographs taken in 2014 differed slightly to those taken during the current period because many of the established flyway photo points were either cleared or dismantled during construction. Despite this, meaningful comparisons were still possible.

Results

i) Roost boxes

The winter 2017 inspection of 39 roost boxes on the NH2U alignment revealed a total of 27 bats of three species (Table 1). Twenty-five (probable) eastern long-eared bats (*Nyctophilus bifax*) were recorded roosting in one timber box near Waterfall Way (Plate 1) and a single (probable) large-footed myotis (*Myotis macropus*) was recorded in a timber box under Albatross bridge over Boggy Creek. Both species are listed as vulnerable by the *NSW Threatened Species Conservation (TSC) Act* 1995. Other records included a single Gould's wattled bat (*Chalinolobus gouldii*) roosting in a timber box near Waterfall Way (Plate 1). No evidence of breeding was recorded.

Evidence of other fauna included feathertail glider (*Acrobates pygmaeus*) leaf nests in two boxes. Boxes were in good condition except one that had rotted at the securing point.

Table 1: Results of winter 2017 microbat box inspections. M = masonry; T = timber; FtG = feathertail glider; pr = probable.

Site	Boxes	Location description	Easting	Northing	Date	Winter 2017 Survey	Box Condition
1	3T,1M	Cedar Creek off Railway Rd	497652	6611107	24/8/17	Nil bats, fresh FtG nest in M box	Good
2	4T	Powerline easement off Railway Rd	497655	6611449	24/8/17	Nil	Good
3	2T	Albatross Bridge, Boggy Ck	497782	6612159	24/8/17	*Myotis macropus* (pr) x 1 in HLH box	Good
4	4T	Cow Ck downstream	497942	6612871	24/8/17	Nil	Good
5	3T	Wetland, Cnr of property; solar panels.	498201	6613509	24/8/17	Nil	Good
6	3T	Deep Ck_South side	498179	6614116	24/8/17	Nil	Good
7	3T	Deep Ck_North side	498539	6613900	24/8/17	Nil	Good
8	2T,1M	Backyard, behind art studio, South Valla	499741	6615592	24/8/17	Nil	1x T-box rotted
9	1T,2M	Opp Jacksons Rd, South cluster	500597	6618502	24/8/17	Nil, one box full of old leaf	Good
10	2T,2M	Opp Jacksons Rd, North cluster	500623	6618751	24/8/17	Nil	Good
11	3T	Raleigh south cluster	500329	6628942	25/8/17	*Nyctophilus bifax* (pr) x 25 in 1 box	Good
12	3T	Raleigh north cluster	500373	6629261	25/8/17	*Chalinolobus gouldii* x 1	Good

Plate 1: Probable eastern long-eared bats (left) and a Gould's wattled bat (right) were observed in timber boxes at Raleigh.

ii) Flyways

Microbat flyways at Jackson's Creek north and south were not obstructed or constricted by clearing or construction activities (Plate 2-5; Table 2). The eastern flyway at Boggy Creek was partially obstructed by a tree that had fallen due to bank slumping (Plate 6). There were no impacts to the western flyway at Boggy Creek (Plate 7).

Table 2: Results of winter 2017 microbat flyway inspections.

Flyway	Side of alignment	Chainage	Date	Condition	Photo
Boggy Creek	Both	62750	24/08/2017	East side minor constriction by slumped tree	Yes, both sides
Jacksons Creek South	Both	70180	24/08/2017	Good, no restrictions	Yes, both sides
Jacksons Creek North	Both	70350	24/08/2017	Good, no restrictions	Yes, both sides

Plate 2: Jackson's Creek south east before (L) and after (R) construction.

Plate 3: Jackson's Creek south west before (L) and after (R) construction.

Plate 4: Jackson's Creek north east before (L) and after (R) construction.

Plate 5: Jackson's Creek north west before (L) and after (R) construction.

Plate 6: Boggy Creek East flyway before (L) and after (R) construction.

Plate 7: Boggy Creek West before (L) and after (R) construction.

Discussion:

i) Roost boxes

The single operation phase microbat roost box inspection yielded some notable records. An individual large-footed myotis was recorded in a timber box beneath Albatross bridge over Boggy Creek. This is an important record because this species is one of the target species of mitigation measures. Four large-footed myotis were also recorded roosting in the same box in winter 2014 (Sandpiper 2014). Large-footed myotis, along with little bent-wing (*Miniopterus australis*) and eastern bent-wing (*Mi. schreibersii oceanensis*) are cave-dwelling species that seek out large cavernous structures in which to roost (Churchill 2008). An aim of the microbat roost box program was to provide supplementary roosting habitat for these species when culverts and bridges on the old highway were excluded and demolished. The presence of large-footed myotis in one of the compensatory boxes suggests some level of success of the roost box program. There may be several reasons for this. The boxes at Boggy Creek are located under Albatross bridge, which probably features structural and microclimate attributes favourable to cave-dwelling bats. Further, large-footed myotis roosts are always associated with water (Van Dyck *et al* 2013). Albotross bridge provides large-footed myotis with proximal water access and a clear flyway. Neither of the other two target species were recorded in roost boxes and, to our knowledge, have never been recorded utilising tree-mounted roost boxes.

The record of twenty-five eastern long-eared bats in one box at the north of the project is notable as the species is listed as vulnerable by the NSW *Threatened Species Conservation Act 1995*. The species is associated with paperbark swamps, riparian woodlands and rainforests (Churchill 2008). Eastern long-eared bats are known to roost under large leaves, peeling bark, amongst epiphytes and in tree hollows. They often utilise multiple roosts within a small area (Lunney *et al* 1995). Eastern long-eared bats have not been recorded in previous roost box surveys on the project and there are few records of this species south of the Clarence River. Hence, the Raleigh/Urunga area record is at the southern extent of its range (OEH 2017).

The other microbat record was a single Gould's wattled bat in a timber box at the north of the project. This species is very common throughout Australia and is associated with multiple habitat types. They are generalist in roost habits and utilise numerous resources such as tree hollows, birds' nests, bat boxes and even rolled up blinds (Van Dyck 2013). Previous roost box inspections recorded Gould's wattled bat (Sandpiper 2014).

ii) Flyways

Post construction flyway inspections at Boggy Creek and Jackson's Creek north and south were conducted utilising set photo points established in 2014. These points were largely removed during clearing and construction activities but flyway condition could still be adequately assessed and compared with pictures taken in 2014. Flyways at Jackson's Creek north and south were un-restricted. Vegetation in front of the old culvert structures at these sites was removed on the western side, effectively opening the flyway and enabling access to both the old and new culverts (Plates 2-5). Extensive areas of vegetation were removed on the western side of the new culvert at Jackson's Creek north (Plate 5 (R)), effectively opening the flyway and enabling greater access to the new culvert structure. There were no significant differences in flyway structure on the western side of Boggy Creek. Vegetation between the flyway at the clearing limit and the new bridge structure over the creek has been removed. This may enable bats to access the bridge as a roosting structure without impediment. A single tree located just outside of the clearing limits has slumped across the water at Boggy Creek east creating a minor flyway obstruction (plate 6 (R)). Despite this, there may be limited value in removing the tree because of the minor nature of the obstruction

and because the area has been opened up after clearing allowing alternative pathways up and down the creek line for foraging bats. On the west side, the flyway between the new bridge and the old pipe structure at Boggy Creek has been cleared and there are no impediments between the two structures.

Conclusion

The NH2U microbat roost box program has provided compensatory habitat for at least one target species and a threatened forest bat species. The two other target species are not known to utilize nest boxes. However, reports from inspections conducted on new bridge structures along the NH2U alignment during the late stages of construction (Sandpiper 2016) suggest that the new structures provide considerable roosting habitat that would more than compensate for drainage structure roost habitat decommissioned during construction. As such, replacement of the single rotted roost box is not warranted.

Please contact me if you require further information.

Yours sincerely,

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