Recent innovations in microbat mitigation on road projects in NSW

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Overview

• Affected microbat species and their roost types
• Impacts on threatened microbat populations
• Historic approaches to mitigate impacts
• Experimental supplementary habitat
• Evolution of habitat within permanent structures
• Population monitoring results

• **AN AUSTRALIAN FIRST!!**
• Lessons learned and emerging issues
Bent-wing bats (*Miniopterus* spp.)

Small clusters and individuals roost during the colder months in:
- Rock crevices and overhangs
- Concrete box cell culverts, concrete Bebo arches,
- Concrete bridges

They migrate to a limited number of large maternity roost sites in Spring (Sept-Oct) where a single young is born between Oct and Jan. Fly hundreds of km’s to maternity roosts.

No breeding in road structures as they are obligate cave breeders.
Eastern bent-wing bats are usually only found in small clusters in the colder months, prior to migrating to maternity colonies (caves).
Large-footed Myotis (*Myotis macropus*)

- Australia’s ONLY ‘fishing’ bat
- Oversized feet used to catch prey
- Rakes water with feet for small fish and insects
- Breeding commences in September
- Synchronised births starting October/November
- Second birthing event in January
- Roosts AND breeds in concrete box cell and pipe culverts, concrete and wooden bridges
- Promiscuous male ‘bachelors’ usually roost alone but close to the females
Bat roost habitat types

- Small, dry crevices in structures over water or within 100-200m of flowing water.
- Fairy martin nests, paper wasp nests
- Culvert lift/grab points and drainage scuppers
- Expansion gaps between bridge deck planks
- Roughened and exposed concrete
- Timber bridges
Culvert lift points and drainage scuppers
Expansion gaps (concrete plank bridges)
Roughened and exposed concrete
Timber Bridges
Impacts of road projects and maintenance on threatened microbat populations

- Local extinctions of species with specific habitat requirements.
- Mortality during bridge cleaning
- Culvert maintenance
- Bridge removal = complete removal of habitat
- Cumulative impacts
Historic approaches to microbat mitigation
New ‘CYPLAS’ recycled and plastic roost boxes
Experimental trial of replacement habitat in 2013 – did it work??

‘The Floating Bat Hotel’

December 2014 7 LFM + 1 pup

December 2016 2 LFM and one Carpet Python!!
The ‘Bat Caves’ – did they work?

NO…..

5 concrete pipes placed into open farm paddocks (with no running water) to mimic concrete culverts.

No uptake by target threatened species (Myotis)

Uptake by some hollow tree dwelling (common) species
The evolution of habitat within permanent structures

1. Incidental
Parapet ledges on Super T or Concrete plank bridges
2. Purpose-built recessed chambers in culvert
3. Replicate microbat roost features into culvert relining

Large-footed Myotis – 122 (breeding and roosting habitat)
Eastern Bent-winged bat- 100 (non-breeding roosting habitat)
Little Bent-winged bat- 19 (non-breeding roosting habitat)
2. First design of permanent cave-dwelling roost habitat within a new culvert

- Install reinforcement
- Install habitat blockouts
- Install confined reinforcement
- Pump reinforcement full of concrete
- Remove reinforcement and blockouts
- Let the concrete cool
- *Look at the happy microbats*
Monitor – did it work?

![Graph showing the total number of Myotis macropus before, during, and after construction.]

**Pre-construction**
- 01/04/2015: 140
- 01/05/2015: 120
- 01/06/2015: 120
- 01/07/2015: 110
- 01/09/2015: 100
- 01/10/2015: 100
- 01/11/2015: 80
- 01/12/2015: 80
- 01/01/2016: 90
- 01/02/2016: 90

**Construction**
- 01/09/2015: 100

**Post-construction**
- 01/04/2015: 140
- 01/05/2015: 120
- 01/06/2015: 120
- 01/07/2015: 110
- 01/09/2015: 100
- 01/10/2015: 100
- 01/11/2015: 80
- 01/12/2015: 80
- 01/01/2016: 90
- 01/02/2016: 90
Heritage bridge replacement

Artist impression of new bridge
Myotis habitat on the old bridge

Plate 4.1  View north showing underside of Sportsmans Creek Bridge

Plate 4.2  Two piece (split) stringer

Plate 4.3  Large-footed Myotis in bridge decking

Plate 4.4  Cavity at the end of a rotted girder
4. Pioneering long term habitat
Super T Bridge deck
- row of 12 x 65mm diameter holes which extend through the Super T.
- There are two Super T’s with these built in.
- Internally roughened.
Super T joins to remain unsealed and roughened

Breeding roost habitat replicated across shared pathway

View from underside of concrete girders
Lessons learned and emerging issues

- Installing microbat habitat into the bridge deck
- ‘Scabbling’ of the parapet
- Super T lift-holes could be left unsealed
- Never trust a bat!
- Timber Truss Bridge Strategy
Installing microbat habitat into the bridge deck
What’s a parapet again??
Scabbling of the parapets
Use Rugasol to roughen surface to in casting yard
NEVER TRUST A BAT!
8 Large-footed Myotis in permanent breeding habitat under the Super T deck but not the shared pathway. WHY?

90mm vs 50mm entry diameter?
Not roughened at entry?
Too exposed?
Too soon to tell?
Emerging issue: Timber Truss Bridge Strategy
Removal of **virtually all** microbat habitat on bridge
Split stringer breeding habitat: 35mm gap x 20-25cm long
Replicate breeding habitat into secondary cross girders
Drill cylindrical ‘bat caves’ and horizontal chambers
Same dimensions as bat breeding habitat on old bridge
Any questions- come see me at the RMS Trade Booth