Albury-Wodonga Bypass Threatened Bat Surveys

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INTRODUCTION

Wildlife Unlimited was commissioned by Connell Wagner to undertake a survey in spring 1999 for microbats and microbat habitats along the inner route of the proposed Albury freeway bypass between Mullengrandra and the Murray River on the Victorian border, a distance of approximately 40 kilometres. The proposed roadworks will involve a dual carriageway and the removal of trees in some areas. This survey was focussed on detecting threatened species of microbats along this route with range distributions that included the Albury region of south-eastern Australia (Churchill 1998, Strahan 1995). Only two species classified as threatened in New South Wales are likely to occur along the proposed freeway route, The Large-footed Myotis, *Myotis macropus* (formerly *adversus*) and Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris*. The former species is a specialist forager flying over waterbodies in search of aquatic vertebrates and invertebrates known to inhabit inland waterways such as the Goulburn and Murray rivers. The latter species is regarded as a rare seasonal visitor from the north and little is known of its habitat preferences. Both species are likely to utilise tree hollows in the Albury region. Other threatened species recorded from the general region include the Eastern Pipistrelle *Falsistrellus tasmaniensis*, Large Bent-wing Bat *Miniopterus schreibersii* and Greater Long-eared Bat *Nyctophilus timoriensis* (Churchill 1998, Strahan 1995) (Schedule 2, NSW Threatened Species Conservation Act 1995).

The survey was conducted over 6 nights, from the 28\10\99 to 2\11\99 using a variety of survey techniques that included spotlighting, harptrapping, mistnetting, ultrasound recordings and dusk observations of tree hollows.

BACKGROUND

In approving the Albury Bypass, the Department of Urban Affairs and Planning (DUAP) issued 87 Conditions of Approval. Condition 50 details the requirement for additional surveys for threatened bat species which were considered undersampled by National Parks and Wildlife Service during the initial surveys.

In the Representations Report, Section 6.14, sub-section 6.14.2 Terrestrial Fauna it stated:

> *Twenty-four submissions related to general fauna issues were received. The National parks and Wildlife Service (NPWS) (704) considered that an adequate range of fauna survey methods was employed in the EIS\EES, however , for some species the sampling period was inadequately brief. Microchiropteran bats in particular, were believed to have been undersampled.*

The response included:

> This appendix (Appendix 1, Gunninah Consultants in Working Paper No. 5 (Vol. 3A)) states that harp trapping occurred along each route for 10 trap-nights in one habitat type, whilst only one hour ultrasonic bat surveys occurred due to poor weather conditions. Both the harp trapping and the ultrasonic bat detection occurred in the same habitat type and site.
>
> Considering this, there are several other species of microchiropterans potentially occurring along the proposed routes. Further surveys will be conducted in warmer weather, when movement is likely to be occurring.
>
> The EIS\EES states that no microchiropterans are "likely to be restricted to habitat features along the road routes for the Hume Highway". The Large-footed Myotis (*Myotis adversus*) is the only threatened microchiroptera to be discussed in detail in the EIS\EES.

The Aims of this Survey

The overall aims of the Albury threatened bat surveys were to,

- Review the findings of bat surveys conducted during the preparation of the Environmental Impact Statement.
- Liaise with New South Wales National Parks and Wildlife Service and the RTA in preparing a survey design and sampling strategy.

- Conduct field surveys in Spring 1999 of likely habitats within the Bypass Corridor.
- Document the findings with supporting mapping illustrating the areas surveyed and the locations of any threatened bat species recorded.
- Develop recommendations for the management of any of the threatened bat species, if required.

The objectives of the survey were to:

1. Identify the presence/absence of the species listed above along the freeway route.
2. Identify critical habitats of the above species and other microbats along the freeway route.
3. Recommend appropriate actions to ameliorate the impacts on microbats along the proposed freeway route.

SURVEY METHODOLOGY

Identification of Priority Sites for Survey

A number of priority sites were selected for follow-up on-ground survey during a pre-project briefing and inspection of the route. Aerial photographs of the route were analysed and potentially suitable vegetated areas were identified. A field investigation of the entire route including the selected areas confirmed the priority of sites for surveying. The selection was based on; sampling different woodland and riparian communities, the availability of mature hollow-bearing trees within the communities and the presence of waterbodies potentially suitable for the targeted threatened species. Dams in open paddocks immediately adjacent to the study sites and pools on watercourses were inspected for bat activity.

The priority sites were;

1. Sages Reserve (Travelling Stock Reserve)

   An open woodland with mature Yellow Box *Eucalyptus melliodora*, Long Leaf Box *Eucalyptus goniocalyx* and Blakelys Red Gum *Eucalyptus blakelyi* with a mainly weed infested ground cover dominated by Paterson Curse *Echium plantagineum*, thistles and introduced pasture grasses (Rick Webster and Evelyn Buckley pers comm.). Shrubs were non-existent on the reserve. A shallow vegetated depression in the north-east corner of the reserve gradually narrowed and deepened into a watercourse as it meandered to the western perimeter and joined a larger drainage system. Intermittent pools of water were found along the length of this waterway. A number of standing dead trees were scattered throughout the reserve. Over 50% of the live and dead trees had hollow limbs that were potentially suitable for bats.

2. "Ilha-Langi" Property to Table Top Creek.
   (RTA Ref. 154.000)

   A 15-20 metre wide section of roadside reserve containing scattered and isolated mature White Box *Eucalyptus albens* and *E. melliodora* with reasonably dense stands of regenerating juvenile trees of both species. Larger, more mature trees were scattered in the paddocks adjacent to the route. Scattered individual *E. blakelyi* along Tabletop Creek formed the western boundary of this site. Tabletop Creek was a series of pools of steady water. A dam situated 100m from the roadside reserve and "Ilha Langi" property gateway was chosen as a trapping site. The dam was situated in an open paddock sown down to Oats.

3. Bells Road runoff Creek and woodlot

A woodland of mature E. blakelyi with fringing E. melliodora formed a 20-30 metre wide corridor along Bells Creek as it meandered through agricultural land immediately to the west of the railway line. Where Bells Creek intersected the railway line it was 10-15 metres wide in places and >1metre deep. Approximately 100 metres upstream the stream was only 2-3 metres wide and shallow. Several trees along the banks of the watercourse were dead and contained hollows. A number of live trees were also hollow bearing. The understorey was open and consisted of only introduced pasture grasses.

4. Eight Mile Creek
(RTA Ref. 164.800)

Eucalyptus blakelyi woodland following the Eight Mile Creek depression where it crosses the existing Hume highway. Upstream and west of the highway, between the highway and railway line a patch of *E. blakelyi* regrowth formed a potential corridor for bats. Deep billabongs in the depression contained pools of stationary water. Eight Mile creek itself was flowing but very narrow (2-3m) and heavily vegetated upstream of the highway with Bulrush *Cumbungi spp.* and deeply incised and overhung below and to the east of the highway. A large mature hollow-bearing *E. melliodora* was situated on the roadside verge on the eastern side of the highway.

5. Etranogah Road
(RTA Ref. 167.200 & 171.200)

A shallow sedge filled depression with an overstorey of E. blakelyi traverses this site. On both sides of the railway line are plantations of eucalypts of various species, including Red Ironbark Eucalyptus sideroxylin. The plantations provide a dense barrier that bats would be unlikely to penetrate. In the depression there is no shrub understorey and the ground is covered by introduced pasture grasses and *E. plantogineum*. There are a number of small dead eucalypts along the depression that would contain suitable hollows for bats.

6. Oddies Creek, Upstream and Downstream of Olive Street bridge.

This site is on the southern outskirts of Albury and forms the northern limit of the Murray River floodplain. Oddies Creek flows roughly east to west under the Olive Street bridge and railway line bridge to the west. The creek is severely infested with Weeping Willows *Salix babylonica* with mature trees growing in the waterway and along both banks for at least a kilometre on each side of the bridge. Large mature River Red Gum *Eucalyptus camaldulensis* are scattered along the creek. A deep billabong with isolated pools of stagnant water runs parallel and to the south of Oddies Creek upstream of the Olive Street bridge. This billabong is lined with mature *E. camaldulensis* and *E. melliodora*.

Field Trapping

Six nights (28/10/99-2/11/99) were spent in the field surveying microchiropteran populations and habitats along the proposed bypass. Flightpaths amongst the roadside vegetation, watercourses, dams and hollow trees were targeted for harp-trapping (Tidemann and Woodside 1978), mistnetting. Particular emphasis was placed on siting the traps and nets across water where *M. macropus* might be encountered.

A total of 20 harp-trap\nights was carried out across the priority sites including Sages Reserve (6 trap\nights), "Illu Langi" (2 trap\nights), Bells Road Intersection (4 trap\nights), Eight Mile Creek (4 trap\nights), Oddies Creek (4 trap\nights) (Table). Harp-traps were checked between 1-2 hours after dark and any lactating females were processed and released immediately. They were again checked and cleared first thing each morning.

Standard 30mm mesh mistnets were used on a dam at "Illu Langi", in *Eucalyptus blakelyi* woodland at Etranogah Road and across pools in billabongs at Oddies Creek. A total of 5.9hrs of mistnetting with 40 metres of mistnet over 3 nights was conducted.

Bats captured were identified to species level, aged, sexed and reproductive condition noted.

Ultrasonic Detection

An ultrasonic detector (Anabat II, Titley Electronics) was linked via a zero crossing interface module (ZCAIM) to a Toshiba Satellite 300CDS Pentium Laptop computer. On the first night (Sages Reserve) the detector was placed on the bonnet of a vehicle at approximately 45° and pointed in the direction of a possible flight path and left in automatic (monitor) recording mode. Only a limited number of calls were recorded using this technique and after observations of bat activity (see below) the bat detector was held in the hand and directed at identified flightpaths. Bat passes were recorded and identified using Anabat software version 5. A single pass was defined as a sequence of three or more pulses separated from one another by a period of 3 seconds (Law, Anderson & Chidel 1998). The calls were automatically recorded after 5 seconds (monitor mode) and stored as individual 8 digit bat files. These files were then compared with reference calls recorded from bats captured during other bat surveys in the region (Lumsden 1995, Kirsten 1998). Certain characteristic elements of individual species calls were used for identification including minimum frequency, average characteristic frequency, pulse duration, time between pulses and shape (Law, Anderson & Chidel 1998).

At the commencement of each anabatting session ambient temperature, humidity, wind speed, cloud cover and phase of moon were recorded. A total of 7 hours of anabatting was conducted over 6 nights between dusk and 3.5 hours after dusk. Five hours (70%) of the anabatting was conducted between 1-1.5 hours after dusk.

Searches for Roost Trees

Searches for roost trees were conducted at the selected high priority sites by a combination of stagwatching (dead trees) and observation of suitable hollows in live trees shortly before and after dusk. Potentially suitable trees were identified during the day. Approximately 10-20 trees along the route were checked during the available survey period. Anabat recording at suitable hollow trees was attempted to provide further information on the numbers of bats and their identification.

Observations of Bat Activity

Two spotlights (1x35watt, 1x50watt) were used intermittently during the recordings of bat calls to determine the flightpaths of bats and to allow for the bat detector to be pointed in the direction of oncoming bats and therefore receive the strongest signals. The spotlights were also trained on waterbodies considered as potential habitats for *M. macropus*. This species has been observed and identified on many occasions in a spotlight and can be identified by its flight pattern over the water.

Review of Relevant Literature

Relevant background information relating to the threatened bat fauna along the proposed route came from previous surveys conducted during the initial environmental impact study (EIS\EES). Additional information was sourced from the New South Wales National Parks and Wildlife Service (NSW NPWS) Wildlife Atlas, local information (Charles Sturt University,CSU) and selected references.

RESULTS

Weather Conditions During the Survey

Varying weather conditions were experienced however apart from one evening the temperatures dropped sharply on or about dusk.Three nights were suprisingly cool with temperatures ranging from 11-12.4°C in the first 30 minutes after dusk. One night was balmy (29\10) with the temperature rising from 17.3°C at 1900hrs to 18.9°C at 2000hrs and the humidity >75%. Steady rain on 30\10 continued throughout the night. Bat detectors do not perform well in rainy or windy conditions and this night (30\10) was cancelled. Three nights were cloudless and starry with no visible moon. These nights coincided with the lower temperatures. The other three nights were cloudy and only slightly warmer (temp range 14-18.9°C).

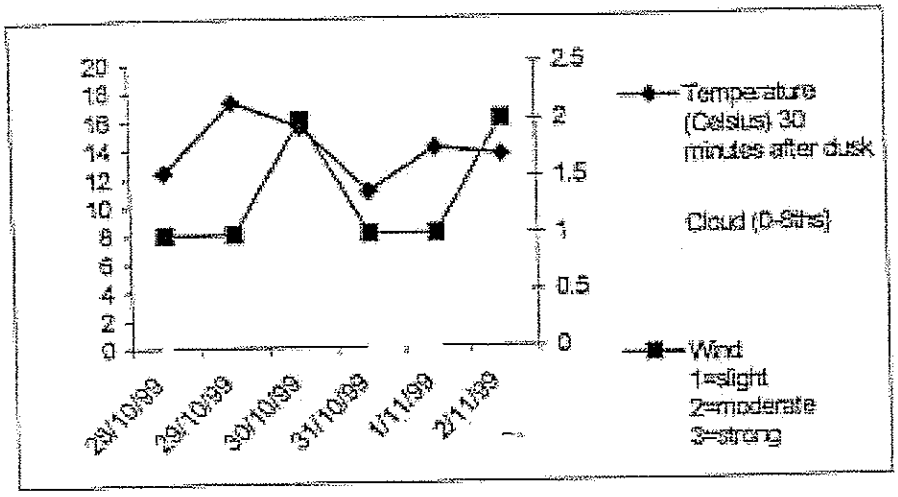

Figure 1; Weather conditions during the proposed Albury bypass freeway threatened bat surveys

Field Trapping

A total of 20 harp-trap\nights were conducted along the route amongst the remnants of native vegetation. Harp traps were set across flowing watercourses (2 harp-trap\nights), pools of water along watercourses (10 harp-trap\nights) and in open woodland under overhanging tree branches (8 harp-trap\nights). The harp-trapping effort for each of the priority sites in shown in Table . Three distinct vegetation communities, mixed species box woodlands (Sages Reserve and "Illu Langi"), *E. blakelyi* dominated damp depressions (Ettamogah Road) and waterways (Bell Road intersection) and *E. camaldulensis* riparian floodplain (Oddies Creek) were sampled.

Only 5 bats were captured in the harp traps, Lesser Long-eared Bat *Nyctophilus geoffroyi* (3), Goulds Wattle Bat *Chalinolobus Gouldii* (1) and Chocolate wattle Bat *Chalinolobus morio* (1).

Mistnets were set up at 3 sites, around a dam at "Illu Langi", in open *E. blakelyi* woodland at Ettamogah Road and across Oddies Creek and adjacent billabongs in *E. camaldulensis* woodland. Only one bat was captured, a *N. geoffroyi* in the open woodland at Ettamogah Road.

3. Anabatting

A total of 7 anabat\hours resulted in 417 bat passes (recorded as bat files) being obtained with 5 bats being identified to species level, *Chalinolobus gouldii*, *C. morio*, *Vespadelus darlingtoni*, *V. regulus* and *V. vulturnus*, two genera *Nyctiphilus* and *Mormopterus* and two taxa associations. Bats calls were recorded at 5 of the 6 sites with only Ettamogah Road being unsuccessful. Sages Reserve and Oddies Creek had the highest level of bat activity and Eight Mile Creek the lowest (Table 1). There is considerable overlap between the calls of some species and consequently there was a 'lumping' of taxa such as Cm\Vv = *Chalinolobus morio*\ *Vespadelus vulturnus*, Cg\Mp = *Chalinolobus gouldii**Mormopterus sp*, and the identification to genera level only, ie Mp = *Mormopterus sp* and Nyct = *Nyctiphilus*. None of the species in these taxa are regarded as threatened. Less than 50% of the calls were of good enough quality for identification (Table 2).

Table 1: Results of anabat detector surveys during the Albury Freeway bypass threatened bat surveys

SITE	Anabat Effort (minutes)	Bat Files	Bat Files\Minute
Sages Reserve	190	202	1.06
"Illu Langi"	60	58	0.97
Bells Road	30	18	0.6
Eight Mile Creek	30	13	0.43
Ettamogah Road	30	0	0
Oddies Creek	80	126	1.58
Totals	420	417	0.99

Table 2: Bat taxa identified using the Anabat Detector along the proposed Albury bypass route

Cg = *Chalinolobus gouldii*, Cm = *Chalinolobus morio*, Cm\Vv = *Chalinolobus morio\ Vespadelus vulturnus*, Ta = *Taphozous australis*, Cg\Mp = *Chalinolobus gouldii\Mormopterus sp*, Nyct = *Nyctophelus sp*, Mp = *Mormopterus sp*, Vd = *Vespadelus darlingtoni*, Vr = *Vespadelus regulus*, Vv = *Vespadelus vulturnus*, Unid = Unidentified.

SITES	Cg	Cm	Cm \Vv	Ta	Cg \mp	Nyct	Mp	Vd	Vr	Vv	Vesp	Unid	Totals
Bells Road	1	5					1	1			4	7	19
Eight Mile Ck	3	1		1							2	6	13
Illu-Langi	6	1	3					1		9	9	19	48
Oddies Creek	10	15			9		6		1		26	70	137
Sages Reserve	21	5		1	27	2	1				3	138	198
Totals	41	27	3	2	36	2	8	2	1	9	45	240	417

4. Searches of Roost Trees

Observations of possible roost trees were made at Sages Reserve and Oddies Creek. At Sages mature hollow bearing E. melliodora and dead stags and at Oddies Creek Large dead E. camaldulensis stags were watched on dusk. No observations were made of roosts. C. gouldii are known to use roosts in dead branches of large trees including E. camaldulensis and E blakelyi with heights ranging from 3-14 metres (Kirsten 1998).

Observations of Bat Activity

For the first three nights very little activity was noticed by either spotlighting or anabatting. On the first evening , the 28\10 at Sages Reserve anabatting was carried out in a cleared area adjacent to the swampy depression and a pool of water with dimensions of 20x3-6 metres. After 90 minutes of recording only 28 bat passes were recorded. At "Illu Langi" on the second night (29\10) the conditions were very conducive to bat activity with temperatures around 17°C on dusk and rising to 18.3°C by 1.5 hrs after dusk and high humidity. During this relatively warm period we were manning mistnets surrounding a dam adjacent to the roadway. Conditions appeared to suitable for bats to be visiting the watercourse to drink. During 90 minutes of observations no bats were seen or passes recorded. The third night was washed out by heavy rain.

At Oddies Creek on the fourth night small bats were observed in the spotlight flying around the upper middle and upper canopy of E. camaldulensis trees. Up to six bats at a time were observed circling a particular clump of trees. The bat detector was aimed in the direction of the trees and 125 bat passes were recorded in 90 minutes.

On the 5th night "Illu Langi" bats were observed using a flightpath between a small clump of regenerating eucalypts on the road reserve adjacent to the gateway. On the 6th night at Sages Reserve bats were observed foraging around the crowns of E. melliodora.

Table 3: Total survey effort during the proposed Albury bypass freeway threatened bat survey.

Date	Site	Harp Trap\Nights	Anabatting (hrs)	Mistnetting (hrs)
28-29/10/99	Sages Reserve	6	3.1	0
29-30/10/99	"Illu Lanai"	4	1.0	3.0
30-31/10/99	Bells Road	4	0.5	0
30-31/10/99	Eight Mile Ck	2	0.5	0
31/10/99	Ettamogah Rd	0	0.5	1.5
1/11/99	Oddies Ck	4	1.4	1.4
	Totals	20	7.0	5.9

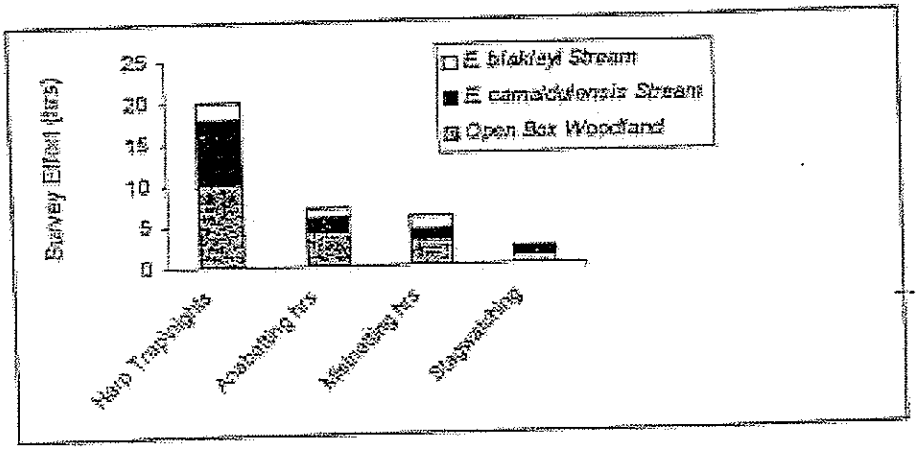

Figure 2: Survey effort across habitat types during the proposed Albury freeway bypass threatened bat survey.

DISCUSSION

Weather conditions during the survey period probably restricted the numbers of bats that were active and their nocturnal activity patterns. The predominance of cooler nights meant that bats were not visiting the waterbodies to drink or to hawk insects and consequently the trapping results were at these sites were poor. The study period co-incided directly with the previous surveys undertaken by Gunninah Consultants for the EIS. They also experienced unfavourable weather conditions that made ultrasound recording difficult. Apart from one night of rain, we were able to successfully detect significant numbers of bats, particularly when their foraging behaviour was observed with the spotlighting.

The open woodland\rural landscape of isolated stands, linear strips and individual mature eucalypts with no understorey made it difficult to locate corridors where traps could effectively be sited. In fact, trappable corridors were non-existent. The most "corridor like" trapping sites that were chosen for this study were formed between the trunks of large eucalypts and drooping foliage crowns. However there still remained a huge airspace in and around the trees for the bats to use. Spotlighting revealed that bat activity was confined to the mid-upper canopies of the large eucalypts. The height of the foraging bats also rendered the mist-nets ineffective. Recordings of bat ultrasound was the most effective surveying technique with reasonable numbers of calls being detected at five out of the six sites.

The yield of all stationary sampling techniques, such as bat detectors, harp traps and mist nets, depend on the structure of the immediate habitat (Kirsten 1998). Different methods are more appropriate in under different conditions and for different species and therefore a variety of survey techniques should be employed to comprehensively survey a bat community (Parnaby 1992, Schulz & de Oliveira 1995 in Kirsten 1998). At least 3 and up to 5 different survey techniques were used in this survey at each of selected priority survey sites. Although capture rates and species sampled were low using the harp traps

and mist nets the bat detector efficiently recorded a range of bat species of several different taxa at all sites, except one. Duffy et al (in Press) found that in study of 284 sites across three bio-regions in Victoria bat detectors were more efficient than harp-trapping in the more open box-ironbark regions, which are similar to the open rural landscape of the Albury region.

The range of species of microbats recorded was comprehensive and comparative to other more exhaustive studies. At least nine (9) species of bats were identified by this survey which is comparable to larger individual studies (Kirsten 1998, 11 species in 232 harptrap\nights) and similar sized studies (Gunninah Consultants 7 species). No new species were added to the list of 13 species compiled by Gunninah Consultants (Appendix 3) or from the studies undertaken by Kirsten (1998).

The three main habitat types along the route were encompassed by this survey, open box woodlands, *E blakleyi* and *E. camaldulensis* riparian zones and were adequately sampled.

The two threatened species most likely to occur along the freeway route the Large-footed Myotis *Myotis macropus* and Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris* were not detected during this study. In the case of *M. macropus* it was probably due to a lack of suitable habitat and for *S. flaviventris, possibly due to the survey period.*

There are several records of the Large-footed Myotis *Myotis macropus* occurring along inland rivers including the Goulburn and Murray, including one record 100km to the west of Albury on the Murray River (Menkhorst 1995). It is the species most likely to occur in the Albury region, particularly to the south of the city along the red-gum riverine floodplains of the Murray River. Oddies Creek was a permanent stream on the Mrray River floodplain that may have at some stage been suitable habitat for *M. macropus*. However it is now completely choked with willows *Salix spp.* and there are no flightpaths that *M. macropus* would be able to utilise. Harptrapping, mistnetting, spotlighting and ultrasound recordings failed to detect *M. macropus* at this site. Other waterbody sites along the proposed freeway route were investigated and assessed as possible *M.macropus* habitat. Bells Creek was also a permanent stream that graduated from a muddy trickle to open deep pools with fringing vegetation. Spotlighting and harptraps set across the water failed to detect the species at this site. Creeks at Sages Reserve, "Ilu-langi", Eight Mile Creek and Ettamogah Road were very narrow with deep and steep banks unsuitable for foraging bats. *M. macropus* can be difficult to detect and distinguish from *Nyctophilus* with ultrasound calls, although certain characteristics of its call are diagnostic (R. chick pers comm.). However only one *Nyctophilus* file was identified in the total of 417 calls recorded and it had none of the characteristics of a *M. macropus*. It is unlikely that *M. macropus* occurs along the proposed freeway route. This species may occur along the Murray River where it would be difficult to trap.

Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris* is another species also likely to occur in the Albury region. It is regarded as a seasonal visitor to temperate Australia and all records (only 15) for Victoria have been between January to June (Menkhorst 1995). It has been recorded in riparian habitats along the Murray and Murrumbidgee Rivers (Gunninah Environmental Consultants 1999). It is a large high-flying species, although it has been recorded foraging within 2 metres of the ground in open spaces, that can be identified in a spotlight (Churchill 1998, pers obs.). Its characteristic ultrasonic call is between 18-24khz which does not overlap with any other species and is therefore easily identifiable. It was not recorded during this survey. *S. flaviventris* are recorded as roosting solitarily apart from late winter and early spring, when they form small groups. If they were present in the Albury area during this survey, and roosts comprised of small groups, then they would most likely have been detected. A similar sized species that uses a similar foraging strategy is the White-striped Mastiff Bat *Tadarida australis*. This species was recorded at each site by the anabat and from the audible parts of its call. If *S. flaviventris* do occur in the area in autumn and roost singularly then the removal of a small number of trees is unlikely to have an significant impact.

Two other threatened species who's distributional ranges include the Albury region are the Eastern Pipistrelle *Falsistrellus tasmaniensis* which is essentially confined to the ranges and not usually found in open woodland and agricultural landscapes and the Large Bent-wing Bat *Miniopterus schreibersii*, a specialist cave-dwelling species. Both of these species, if found in the vicinity of the Albury freeway bypass route, would most likely be vargrant individuals, rather than resident populations.

The Albury area is on the eastern-most margin of the distribution range for the Greater Long-eared Bat *Nictophilus timoriensis*. It is a species that is described as uncommon to rare across its entire range (Reardon and Flavel 1987). They are rarely caught and little known and are usually associated with semi-arid environments (Menkhorst 1995, Churchill 1998). There are only four records of the species for Victoria and all are in the north-western section of the state. Previous studies and this study have failed to

detect the presence of this species in the Albury region and is unlikely that significant populations exist in the area.

Conclusions and Recommendations

This survey and previous surveys did not detect the presence of any threatened species of microbats and at present there are no threatened species of microbat listed for the Albury area (Atlas of New South Wales Wildlife). Only the large-footed Myotis Myotis *macropus* is known from the region with one record less than 100 kilometres from Albury along the Murray River (Menkhorst 1995).The species lists drawn up for this study and previous studies (Kirsten 1998) used broad-based distribution mapping for species ranges across Australia and include species records at the limits of their ranges.

More than 90% of the 40 kilometres of the proposed freeway has been cleared and would not impact directly on the bat populations, threatened or otherwise. However the percieved scarcity of available roosting sites in the largely disturbed and degraded landscapes means that their may be competition for what roosts are left. However finding roosts via observation is at best opportunistic and based on chance. To assess the importance of individual trees as bat roosts would require more intensive type research involving tracking individual bats.

The optimum time for bat surveys in the Albury area would be mid-late summer when the maximum population of bats (adults and newly fyling young) are available for trapping, naive young are in the trappable population and may be more easily trapped and bats are more dependent on water and are therefore trappable at waterbodies which is likely to result in better capture rates. Additionally, the reproductive data collected would possibly provide information on the local status of the captured bats and allow observers to distinguish between resident populations and vagrant individuals. Further survey, if required, should be conducted in late summer/early autumn.

Sages reserve and Oddies Creek showed relatively high levels of bat activity, in relation to the the other more open sites, and should be regarded as important high priority habitats for microbats in general. Both of these sites contained numerous potential roosting sites for microbats and were important foraging areas during the period of this survey. Fragmentation of these sites should be avoided. Consideration should be given to encouraging research into the populations of bats that roost in trees at these two sites. Capturing and radio tracking of individualk bats to roosts would be the most appropriate techniques.

The Large-footed *Myotis macropus* may occur along the Murray River and bridge construction should incorporate design features that provide roosting sites for this species.

Personal Communications

Rick Webster and Evelyn Buckley, Remnant habitat Assessments for Travelling Stock Routes (TSR's)

Ryan Chick, Arthur Rylah Institute, Heidelberg, Melbourne

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