The Bat Diversity of Panboola

Pambula, N.S.W.

An ecological report prepared for Pambula Wetlands Heritage Project Inc.

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Front Cover Photo

Gould's Wattled Bat (*Chalinolobus gouldii*) in flight. Photo copyright Steve Sass.

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Executive Summary

EnviroKey initiated dialogue with Aimee Curtis, the Coordinator of the Pambula Wetlands and Heritage Project Inc. (PWHP) in 2009 to undertake a bat survey and provide a report *probono* to provide PWHP with a greater understanding of the bats of Panboola.

A desktop analysis revealed that a total of 20 bat species have been recorded to date in the Bega Valley local government area; ten species of which are listed under the schedules of the NSW *Threatened Species Conservation Act* 1995. Given the diversity of habitats of Panboola including wetlands, open grassland, diverse tree plantings, large Casuarinas and water bodies, there is some likelihood that many of these species may use the habitats of Panboola from time to time, particularly for foraging.

A bat survey completed in December 2009 and February 2010 revealed a total of eight species of bat. Common bat species such as Gould's Wattled Bat (*Chalinolobus gouldii*) and Large Forest Bat (*Vespadelus darlingtoni*) comprised 48% of all activity recorded in this study. Three bat species as listed under the NSW *Threatened Species Conservation Act* 1995 were also detected. These being the Eastern Bentwing Bat (*Miniopterus orianae oceanensis*), Eastern Falsistrelle (*Falsistrellus tasmaniensis*) and the Eastern Freetail Bat (*Micronomus norfolkensis*).

Further surveys of the bat fauna of Panboola are likely to have multiple benefits and are recommended. Increased survey effort is likely to increase the number of bat species detected to date particularly for those species that are in low abundance. Future surveys delineated by habitat type may be able to provide information on habitat use at Panboola by bats, which could guide the future management of these areas. Finally, bats are the unseen heros of the regions biodiversity. They play a significant role in the control of many invertebrate species during their night time foraging and are essential entities to a healthy and balanced ecosystem. These traits, along with the ability of the Panboola site to host community based activities, presents an opportunity for the community to learn more about these creatures of the night.

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Table of Contents

1 INTRODUCTION

The bat diversity of Panboola has until now, received little attention despite the large-scale efforts being put into the restoration and management of this coastal wetland and floodplain. **EnviroKey** initiated dialogue with Aimee Curtis, the Coordinator of the Pambula Wetlands and Heritage Project Inc. (PWHP) in 2009 to undertake a bat survey and provide a report *probono* to PWHP which was accepted.

This report provides PWHP with:

- A desktop review of the bats that could occur at Panboola.
- The methods and results of the field survey.
- A greater understanding of the bats of Panboola.
- Recommendations for the future.

2 DESKTOP ANALYSIS

To gain an understanding of the bats that might occur at Panboola, a search was undertaken of the Department of Environment, Climate Change & Water NSW Atlas of Wildlife database of bat records for the Bega Valley local government area (DECCW 2010). This search revealed a total of 21 species of bat and a total of 2,348 records (Table 1). From these records, 11 species are listed under the schedules of the NSW *Threatened Species Conservation Act 1995* with a total of 392 records and one of these, the Grey-headed flying-fox are also listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.There appears to be a discrepancy with the NSW Atlas of Wildlife data. *Miniopterus australis* does not occur south of Sydney (Churchill 2008) and these records are likely to be the result of incorrect Anabat analysis.

Removing this species and its data from consideration, a total of 20 species and a total of 2,346 records comprising of 10 threatened species (50% of species) and 390 records (16.62% of records) are known to occur in the Bega Valley local government area.

Table 1: Bat species, their legal status and record count for the Bega Valley LGA (Source: DECCW NSW Atlas of Wildlife). P=Protected, Bold= Threatened Species, V= Vulnerable, NSW *Threatened Species Conservation Act* 1995.

Common Name	Scientific Name	Legal Status	Count
Chocolate Wattled Bat	*Chalinolobus morio*	P	405
Eastern Freetail Bat	***Micronomus norfolkensis***	**V**	**11**
Eastern Bentwing Bat	***Miniopterus orianae oceanensis***	**V**	**124**
Eastern Broad-nosed Bat	*Scotorepens orion*	P	43
Eastern Falsistrelle	***Falsistrellus tasmaniensis***	**V**	**104**
Eastern Freetail Bat	*Mormopterus ridei*	P	7
Eastern Horeshoe Bat	*Rhinolophus megaphyllus*	P	37
Golden-tipped Bat	***Phoniscus papuensis***	**V**	**7**
Gould's Long-eared Bat	*Nyctophilus gouldii*	P	283
Gould's Wattled Bat	*Chalinolobus gouldii*	P	28
Greater Broad-nosed Bat	***Scoteanax rueppellii***	**V**	**23**
Grey-headed Flying-fox	***Pteropus poliocephalus***	**V**	**76**
Large Forest Bat	*Vespadelus darlingtoni*	P	160
Large-footed Myotis	***Myotis macropus***	**V**	**41**
Lesser Long-eared Bat	*Nyctophilus geoffroyi*	P	239
Little Bentwing Bat	***Miniopterus australis***	**V**	**2**

Common Name	Scientific Name	Legal Status	Count
Little Forest Bat	*Vespadelus vulturnus*	P	487
Little Red Flying-fox	*Pteropus scapulatus*	P	3
Southern Forest Bat	*Vespadelus regulus*	P	181
White-striped Freetail Bat	*Austronomus australis*	P	85
Yellow-bellied Sheathtail Bat	***Saccolaimus flaviventris***	**V**	**2**

Given the diversity of habitats of Panboola including wetlands, open grassland, diverse tree plantings, large Casuarinas and water bodies, there is some likelihood that many of these species may use the habitats of Panboola from time to time, particularly for foraging. An evaluation of the likelihood of occurrence for threatened bat species is provided in section 3.2.2.

3 BAT SURVEYS

3.1 METHODOLOGY

3.1.1 Field Survey

The bat survey was conducted under both a current Scientific License issued under Clause 22 of the *National Parks and Wildlife Regulation 2002* and section 132C of the *National Parks and Wildlife Act 1974* by the NSW Department of Environment, Climate Change and Water and an Animal Research Authority approved by, and in accordance with, the Animal Care and Ethics Committee (ACEC) of the Director-General of the NSW Department of Primary Industries. The survey effort is outlined within Table 2.

Table 2: Field survey effort during this study.

Survey type	Survey Methods and Effort
ANABAT echolocation call recording	15.12.2009 – Between 9pm and 10.30pm using an ANABAT SD1 unit with a PDA for active monitoring. The vehicle was driven slowly (~10kmph) around the vehicular tracks of Panboola. 26.02.2010 – Between 9pm and 11pm using an ANABAT SD1 unit with a PDA for active monitoring and a Mobile Monitoring System mounted to the roof of a vehicle. The vehicle was driven slowly (~10kmph) around the vehicular tracks of Panboola.

3.1.2 Anabat Analysis

Calls collected during the field survey were identified using AnalookW software by visually comparing call traits with those within 'The Bat Calls of NSW: Region based guide to the echolocation calls of microchiropteran bats' (Pennay *et al.* 2004) and 'Australian Bats 2nd Edition' (Churchill 2008), guided by experience of the author in anabat analysis. Due to the lack of local reference calls, and the high level of intra-specific variability and inter-specific overlap in call characteristics, a conservative approach was taken when analysing calls. It should be noted that members of the *Nyctophilus* genus were unable to be identified to species level due to a lack of differentiation between species and are identified to genus level only.

A call was defined as a sequence of three or more consecutive pulse of similar frequency. A pulse separated from another sequence by a period of five seconds was considered to be a separate call. Scattered sequences, where intermittent pulses were not separated by more than five seconds, were recognised as a single pass. Due to variability in the quality of calls and the difficulty in distinguishing some species, each file was assigned a confidence rating as follows:

D = Definite: Species identification not in doubt.

PR = Probable: Call most likely to represent a particular species, but there exists a low probability of confusion with species of similar call types.

PO = Possible: Call characteristics are comparable with the species, but there exists a reasonable probability of confusion with one or more bat similar species or the quality or length of call prohibits a confident identification.

With regard to threatened species and in consideration of the precautionary principle, any file thought to be that of a threatened species regardless of confidence rating will be considered to be present.

3.1.3 Nomenclature

Nomenclature within this report follows that used by Churchill (2008).

3.2 RESULTS

3.2.1 Species Richness

December 2009 Survey

A total of 13 files were recorded during the December 2009 survey which were then analysed into bat and non-bat origin resulting in the identification of four bat species from 11 bat files including one threatened species (Table 3).

Table 3: Summary of November 2009 survey results (bold denoted species listed under the NSW *Threatened Species Conservation Act* 1995).

Species	Confidence Ranking			
	PO	**PR**	**D**	**Total**
Not bat (likely insects)	-	-	2	2
Chalinolobus gouldii	1	1	-	2
Falsistrellus tasmaniensis	-	4	1	5
Vespadelus regulus	-	3	-	3
Vespadelus vulternus	-	1	-	1
			Total	13

February 2010 Survey

A total of 41 files were recorded during the February 2010 survey which were then analysed into bat and non-bat origin resulting in the identification of five bat species from 41 bat files including two threatened species (Table 4).

Table 4: Summary of February 2010 survey results

Species	Confidence Ranking			
	PO	**PR**	**D**	**Total**
*Unknown (*definitely a bat call, but poor quality did not allow for identification)	-	-	6	6
Chalinolobus gouldii	2	7	5	14
Miniopterus orianae oceanensis	-	1	-	1
Micronomus norfolkensis	-	1	1	2
Mormopterus ridei	3	3	2	8
Vespadelus darlingtoni	4	3	3	10
			Total	41

Pooled Survey Results

Pooling the data from Table 3 and 4 being the results of the December 2009 and February 2010 surveys, a total of eight species of bat were recorded at Panboola during this study (Table 5).

Table 5: Total pooled data from this study.

Species	Confidence Ranking			
	PO	**PR**	**D**	**Total**
*Unknown (*definitely a bat call, but poor quality did not allow for identification)	-	-	6	6
Not bat (likely insects)	-	-	2	2
Chalinolobus gouldii	3	8	5	16
Falsistrellus tasmaniensis	-	4	1	5
Miniopterus orianae oceanensis	-	1	-	1
Micronomus norfolkensis	-	1	1	2
Mormopterus ridei	3	3	2	8
Vespadelus darlingtoni	4	3	3	10
Vespadelus regulus	-	3	-	3
Vespadelus vulternus	-	1	-	1
			Total	54

It should be understood that the total number of calls cannot be used to indicate species abundance as multiple calls could have been made by one bat. It can however, provide some indication of relative activity in relation to other bat species. Common species such as Gould's Wattled Bat (*Chalinolobus gouldii*) and Large Forest Bat (*Vespadelus darlingtoni*) comprise 48% of all activity recorded in this study (Table 5).

3.2.2 Threatened Species

Three bat species as listed under the NSW *Threatened Species Conservation Act* 1995 were detected during the field surveys. These being the:

- Eastern Bentwing Bat (*Miniopterus orianae oceanensis*), Vulnerable
- Eastern Falsistrelle (*Falsistrellus tasmaniensis*), Vulnerable
- Eastern Freetail Bat (*Micronomus norfolkensis*), Vulnerable

No bats listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 were recorded during the study.

Given the limited amount of survey effort during this study, an evaluation of the likelihood of other threatened bat species occurring has been completed (Table 6).

3.3 LIMITATIONS

While the field surveys were completed when conditions were conducive to detecting bat fauna, a lack of replication over consecutive nights and multi-seasonal sampling can lead to either low detection rates or false absences being reported for some species. For this reason, it should be recognised that it may be impossible to rule out species absence for some species during field surveys. Only after extensive surveys can an accurate understanding of species occurrence be better understood.

Table 6: Evaluation of likelihood of occurrence of threatened bat species at Panboola.

Biota & Status	Recorded during survey	Recorded previously in LGA	Potential habitat in study area	Likelihood of species occurring within study area
BATS				
Eastern Bentwing bat *Miniopterus orianae oceanensis* *V TSC*	Yes	Yes	Likely to be foraging only	Yes, confirmed by this study
Eastern Falsistrelle *Falsistrellus tasmaniensis* *V TSC*	Yes	Yes	Yes	Yes, confirmed by this study

Biota & Status	Recorded during survey	Recorded previously in LGA	Potential habitat in study area	Likelihood of species occurring within study area
Eastern Freetail bat *Micronomus norfolkensis* *V TSC*	Yes	Yes	Yes	Yes, confirmed by this study
Golden-tipped Bat *Kerivoula papuensis* *V TSC*	No	Yes	No	No
Greater Broad-nosed Bat *Scoteanax rueppellii* *V TSC*	No	Yes	Yes	Possible
Grey-headed Flying-fox *Pteropus poliocephalus* *V TSC* *V EPBC*	No	Yes	Yes, flyover to adjacent forest, potential roosting by Pambula River	Possible
Large-footed Myotis *Myotis macropus* *V TSC*	No	Yes	Yes, over water bodies	Possible
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* *V TSC*	No	Yes	Yes	Possible

4 CONCLUSION AND RECOMMENDATIONS

This study has revealed the presence of eight bat species at Panboola. Three of these are listed under the schedules of the NSW *Threatened Species Conservation Act* 1995. Species diversity is considered relatively high considering the small amount of survey effort employed during the study. This is likely due to the extent and quality of potential foraging habitats particularly the water bodies of Panboola. The direct correlation between species presence and levels of activity is likely to be food or water related. The presence of both of these resources is likely to be the direct influence on the results of this study.

Twenty species of bat are known to occur within the Bega Valley local government area. Given the diversity of habitats of Panboola including wetlands, open grassland, diverse tree plantings, water bodies and large Casuarinas, there is some likelihood that many of these species may use the habitats of Panboola from time to time, particularly for foraging. While three threatened bat species were recorded, another four species are also likely to use Panboola.

Further surveys of the bat fauna of Panboola are likely to have multiple benefits and are recommended. Increased survey effort is likely to increase the number of bat species detected to date particularly for those species that are in low abundance. Secondly, surveys delineated by habitat type may be able to provide information on habitat use at Panboola by bats which could guide the future management of these areas. Finally, bats are the unseen heros of the regions biodiversity. They play a significant role in the control of many invertebrate species during their night time foraging and are essential entities to a healthy and balanced ecosystem. These traits, along with the ability of the Panboola site to host community based activities, presents an opportunity for the community to learn more about these creatures of the night.

5 REFERENCES

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