3. Survey

Field surveys and reporting to comply with the DGRs were split into four major groups. For each major group, Roads and Maritime commissioned specialists to conduct field surveys and prepare separate reports. These reports have been used to prepare relevant sections of this report:

- Birds (winter and spring components) nghenvironmental (2013a and 2013b):
  - Winter - Regent Honeyeater, Swift Parrot, Little Lorikeet and Glossy Black Cockatoo.
  - Spring – all other species including woodland birds.
- Microchiropteran bats (microbats) – WSP (2013).
- Squirrel Gliders – Australian Research Centre for Urban Ecology (ARCUE) (2013).
- Box-Gum Woodland and hollow-bearing trees – GHD (2013).

3.1 Specific survey requirements

The survey method and effort for each major group were developed and designed to build on existing data collected for the ecological assessment (GHD 2012a) and in line with the specific survey requirements listed in Appendix 1 of the DGRs (Appendix A). The survey method and effort outlined in section 3.2 largely adheres to these required methods, however, a review of the proposed survey effort prior to conducting specialist surveys highlighted a requirement for changes to some survey techniques. Any changes to survey requirements outlined in the DGRs were discussed and approved with OEH Regional Biodiversity Conservation Officer, Matt Cameron prior to the start of surveys. A summary of the modifications of survey methods in the DGRs is outlined in Table 6.

Table 6 - Modifications of DGR survey requirements agreed with OEH.

Subject species	Survey requirement	Survey modification	Rationale
BIRDS (WINTER SPECIES)			
Little Lorikeet *Regent Honeyeater* *Swift Parrot*	Transects should be 50 metres wide (i.e. 25 metres either side of transect midline).	Species also recorded within 50 metres either side of the transect midline.	Ability to survey a wider transect to capture more species.
	Transects must be surveyed at a maximum rate of 100 metres per 10 minutes.	Agreed that survey rate could be increased slightly in open areas.	Following the first day of surveys it was noted that bird species were detected at a faster rate.
	Each survey must be undertaken over two days, with transects on the second day located midway between those walked on the first day (i.e. transects on a given day will be 100 metres apart).	No change in surveys undertaken over two days, however transects on second day were not located midway.	Species are detectable without having transects 25 metres apart. Survey effort considered excessive for winter species and the same results would be achieved without walking transects midway on the second day.
	Surveys must be conducted during winter and timed where possible to coincide with periods of peak food availability. Surveys must be undertaken from sunrise to four hours after sunrise on clear, still days.	The four hour time restriction was lifted until midday.	Due to the cold weather and bird activity extending beyond four hours from sunrise, the restriction could be extended.
BIRDS (SPRING SPECIES)			
Woodland birds	Each survey must be undertaken over two days, with transects on the second day located midway between those walked on the first day (i.e. transects on a given day will be 100 metres apart). All birds seen or heard within the transect or flying over must be recorded.	Some second transect surveys could not be completed on a consecutive day. Each follow up survey was completed as soon as possible following the initial survey.	Inclement weather conditions prevented consecutive day surveys.

Subject species	Survey requirement	Survey modification	Rationale
MICROBATS			
	Surveys using Anabat recorders and stag watching should aim to identify the number and location of roost sites for the subject bats and identify important foraging habitat in the study area and locality.	Stage watching requirement removed and replaced with roost searches. Proposed approach agreed with OEH via email with RMS.	Targeted surveys conducted with an integrated survey approach using a range of techniques, including Anabat recorders and diurnal roost inspections. Surveys targeted areas known to be focal points for foraging, drinking, roosting and commuting.
SQUIRREL GLIDERS			
	Appropriately sized cage traps (200 x 170 x 500 millimetres) must be used.	Cage traps were 200 x 200 x 500 millimetres.	
	Each site should be trapped for a minimum of seven consecutive nights. As a guide, survey effort per site should approximate 100 trap nights.	Sites within three kilometres of the proposal were trapped for at least seven nights and sites further away were trapped for four to six nights. Survey effort per site ranged from 25 to 192 trap nights.	Objective of trapping at sites up to 10 kilometres away being to determine the distribution of the population in the locality. Objective achieved once species detected. Documenting the movement of gliders in and around the proposal site required extra trap nights and efforts were concentrated along the existing Olympic Highway and the proposed new alignment. Decreased survey effort at some sites was due to the closing of traps to prevent the recapture of animals and also due to stolen traps. Approach agreed by OEH to ensure the welfare of gliders that may be in traps when stolen.
FLORA AND ECOLOGICAL COMMUNITIES			

Subject species	Survey requirement	Survey modification	Rationale
Woolly Ragwort	The study area should be systematically surveyed using evenly spaced transects located about 20 metres apart through all areas of woodland habitat.	No survey conducted.	Surveys for the species were not necessary based on lack of suitable potential habitat in the study area. Approach agreed by OEH.
Box-Gum Woodland	Condition surveys in the locality	No low condition survey conducted	Community has low benchmarks and occurs commonly in low condition in the landscape. Little valuable information would be collected though would be labour intensive. Approach agreed by OEH.

3.2 Survey method and effort

3.2.1 Flora and Box-Gum Woodland

Woolly Ragwort

Woolly Ragwort is found on the upper parts of south to east-facing slopes of rocky outcrops (Burrows 2001) in dry sclerophyll forest and open woodland in association with *Eucalyptus macrorhyncha, E. goniocalyx, Acacia doratoxylon, A. implexa* and *Brachychiton populneus* (DoE 2008).

There are no rocky outcrops or dry sclerophyll forests in the study area and targeted surveys for this species in the study area were not considered appropriate due to a lack of suitable potential habitat attributes. This approach was agreed by OEH and is further discussed in section 5.2.

Box-Gum Woodland

Vegetation within the locality was viewed using aerial photography. OEH provided GHD with the most recent vegetation mapping for the locality that included mapping of vegetation types using the Vegetation Classification Assessment (VCA). Vegetation types classified as Box-Gum Woodland were filtered and overlayed on the aerial photography to produce a map showing locations of Box-Gum Woodland in the locality. This method is mostly limited to an analysis of the overstorey vegetation with varying levels of confidence on the classification of each patch.

Using this map, aerial photograph interpretation and specialists' knowledge of vegetation types in the locality, targeted areas that required investigation in the locality were highlighted for discussion and agreed prior to field surveys.

Targeted field surveys were conducted in the study area and locality from 31 July to 20 August 2013. A total of 28, 50 metre by 20 metre plots (with nested 20 metre by 20 metre plots) were surveyed in the study area and locality (Figure 6 and Figure 7). This included plots surveyed during the preparation of the ecological assessment and other projects in the study area and locality. This allowed verification of the presence of Box-Gum Woodland. Within each plot, ten variables were recorded as per the BBAM. These variables were:

- Number of trees with hollows.
- Proportion of overstorey regeneration.
- Total length of fallen logs.
- Number of native plant species.
- Percent native overstorey cover.
- Percent native midstorey cover.
- Percent native groundcover grasses.
- Percent native groundcover shrubs.
- Percent native groundcover other.
- Percent exotic plant cover.

Cover abundances for all species were also recorded.

In woody vegetation, the vegetation is considered to be in low condition if:

- Native overstorey per cent foliage cover is less than 25 per cent of the lower value of the overstorey per cent foliage cover benchmark for that vegetation type; and
  - Less than 50 per cent of groundcover vegetation is indigenous species; or

  - Greater than 90 per cent of groundcover vegetation is cleared (DECC 2009).

No plots outside the subject site were undertaken in vegetation in low condition due to the highly degraded state of low condition vegetation in the locality and the common occurrence of low condition Box-Gum Woodland across the locality.

Detailed survey methods are in Appendix M.

Hollow-bearing trees

All hollow-bearing trees in the subject site and study area were recorded using a handheld GPS and the following attributes were recorded for each tree:

- Tree species.
- Diameter at breast height (dbh).
- Number of hollows in five different size classes:
  - Less than five centimetres diameter.
  - Five to 10 centimetres diameter.
  - Greater than 10 to 20 centimetres diameter.
  - Greater than 20 to 30 centimetres diameter.
  - Greater than 30 centimetres diameter.
- Hollow types (branch, spout or trunk).
- Observations of any evidence of use by fauna species eg wash, scratch marks, landing pads etc.

Hollow-bearing tree transects of 100 metres in length by 50 metres wide were undertaken at 26 representative locations in the locality. Transects were completed in a number of different vegetation types and were not restricted to Box-Gum Woodland (Figure 6 and Figure 7).

3.2.2 Birds

Winter species

A desktop review of previous records and site reconnaissance was undertaken to identify potential habitat within the subject site, study area and study locality for targeted winter birds surveys. The site reconnaissance involved traversing the site mostly in a 4WD to determine appropriate locations for transect surveys. Potential control sites within the locality were also investigated at this time. Six person-hours were spent on the site reconnaissance (nghenvironmental 2013a).

Timed walking transects were undertaken that were 100 metres wide (ie 50 metres either side of transect midline) and surveyed at a maximum rate of 100 metres per 10 minutes. This rate was increased slightly in open areas where there was no canopy vegetation. Each survey was undertaken over two days for each survey period with each survey period separated by about 30 days (see Table 7 and Figure 8).

Nest surveys were conducted for the Glossy Black Cockatoo in the study area and locality to identify the presence of potential nest sites. Potential nest trees were defined as per Cameron (2006):

- Nest site had to be greater than eight metres above the ground.
- Nests had to be located in the stem or branch of the tree and greater than 30 centimetres in diameter.
- The angle of the branch / stem not more than 45 degrees from vertical.

To identify areas of potential nesting habitat, aerial photography was used to identify areas of hollow-bearing trees, which were then traversed during surveys. All nest trees identified during winter 1 surveys were revisited and assessed during the winter 2 survey period. Detailed survey methods are in Appendix I.

Foraging habitat in the locality is limited to *Allocasuarina* vegetation in the locality which occurs in Pomingalarna Reserve. Despite targeted surveys to identify foraging areas and potential flight patches, no individuals were recorded. As a result, no flight path surveys in the locality were completed because no birds were recorded.

Spring species

A desktop review was undertaken to gain an understanding of landscape context of woodland bird species occurring in the region. Species recorded, predicted or likely to occur in the LGA were noted, with a second search conducted focusing on birds recorded within a 10 kilometre radius of the subject site (nghenvironmental 2013b).

Timed walking transects were undertaken that were 50 metres wide (ie 25 metres either side of transect midline) and surveyed at a maximum rate of 100 metres per 10 minutes. Birds within 50 metres either side of the transect midline were also recorded as well as opportunistic observation across the study area. Transect observations targeted woodland birds, however all bird species were recorded. Each survey was undertaken over two days for each survey period with each survey period separated by about 30 days (see Table 7 and Figure 8).

Flight path surveys for the Superb Parrot were conducted in the study area and locality with potential flight paths identified using aerial photography and previous known records of the species.

To determine flight paths within the study area, two ecologists positioned themselves at designated sighting points at higher altitudes within the landscape. Each ecologist used binoculars and a 20 - 60 x 60 spotting scope to follow Superb Parrots along flight paths. The observation locations were selected to identify flight paths running north/south, east/west and north/east. In addition to these surveys, opportunistic records of Superb Parrot flights paths were recorded during woodland bird transect surveys. Flight path surveys were undertaken from sunrise for a period of two hours for a total of four days during spring 1 and spring 2 surveys.

Hollow-bearing tree searches for the Superb Parrot in the subject site and study area were conducted to identify the presence of potential nest sites. Potential nest trees for Superb Parrots were defined according Manning *et al* (2006), Higgins (1999) and Webster (1988):

- Entrance to the nesting cavity ranges from seven to 34 metres above the ground for areas along watercourses and five to 13 metres above the ground for nest trees on the inland slopes.
- Birds are known to nest deep within the hollow, with the same nest sites used in successive years (if birds were seen foraging, they were then focused on to see if they would head back to a specific hollow).
- Diameter of hollow entrances are usually less than 10 centimetres

All nest trees identified during spring 1 surveys were revisited and assessed during the spring 2 survey period. Detailed survey methods are in Appendix J.

Stick nest surveys were conducted for the Little Eagle and Spotted Harrier in the subject site and study area to identify the location of potential nest sites. Surveys were conducted during woodland bird transect surveys and included searches of isolated paddock trees. All nest trees identified were revisited during the spring 1 and spring 2.

Hollow-bearing tree searches for the Barking Owl in the subject site and study area were conducted to identify the presence of potential nest sites. Potential nest trees were defined according to Debus 1997, Higgins 1999 and Taylor *et al* 2002:

- Nest sites usually comprise of a large open hollow, often sloping or vertical in the trunk or spout of a eucalypt tree.
- Nest hollow entrances are two to 35 metres above the ground.
- Diameter of hollow entrances range from 20 to 46 centimetres.

A detailed search of each potential nest trees for the Barking Owl was undertaken within a 20 metre radius to identify signs of presence such as whitewash and scats. All nest trees identified during spring 1 surveys were revisited and assessed during the spring 2 survey period. Detailed survey methods are in Appendix J.

3.2.3 Microbats

A review of landscape aerial images was conducted to identify potential habitat within the subject site and locality. The survey effort was aligned to both NSW (DEC 2004) and Commonwealth bat survey guidelines (DEWHA 2010).The survey effort focused on areas of remnant vegetation, large trees, culverts and sites adjacent to water. Water bodies are also known as areas of high bat activity and are used for both foraging and as a drinking resource. The final survey design including survey location selection was based on discussions with Michael Pennay (NSW OEH) and the authors' professional experience (WSP 2013). A total of 13 sites were surveyed using harp traps (five in the study area and eight in the locality).

Bat capture rates using harp traps reduce considerably at a site the longer a trap is deployed, as the animals learn of the existence of the trap, and are able to avoid capture. For this reason traps were deployed for only two nights at each of the 13 sites. Bat traps were located at primary activity sites eg under large old trees, flyways in the form of vehicle / walking tracks, creeks, dams and culverts (Figure 6 and Table 7). Detailed survey methods are in Appendix K.

Chemiluminescent tags commonly referred to as light-tags or glow-sticks were attached to 10 bats to monitor movement and for recording reference calls. The light tag is attached with PVA glue to the fur on the chest of the microbat. Light-tags are regularly used for short term studies (1 night) to observe foraging behaviour, recording voucher calls and locate roost sites (WSP 2013, Gration 2013).

Five bat detectors were deployed at 12 sites (Figure 6 and Table 7). Bat species and levels of activity were analysed each morning to assess the suitability of the site for trapping. Bat detectors were also deployed at The Rock, approximately 25 kilometres south of the subject site. This site, located outside of the study area, was selected to gain an understanding of the bat species that may occur on a regional scale.

Two vehicle based bat detector surveys were also undertaken, a method used successfully to monitor bat activity at a regional scale (Gration 2007a and Gration 2007b). The first survey transect was approximately nine kilometres in length, beginning within the study site and terminating just south of the Wagga Wagga Central Business District. The second vehicle survey began at The Rock and terminated at the study site, a distance of 27 kilometres.

Bat detectors were deployed for a total of 17 bat detector nights. Bat detectors were also used to record the reference calls of four species.

Tree hollows, nest boxes (Silvalite Reserve), decorticating bark and culverts were inspected during the day by an accredited tree climber. Thirteen sites were inspected each for a 20 minute period.

3.2.4 Squirrel Gliders

A total of 16 sites were trapped for Squirrel Gliders over a total of 1127 trap-nights. The location of individual trap sites was recorded with a GPS (see Figure 6). Wire cage traps (20 cm x 20 cm x 50 cm) were nailed to the trunk of trees at a height of three to four metres above the ground and baited with a mixture of rolled oats, peanut butter and honey. A mixture of honey diluted with water was sprayed above each trap to act as an attractant.

The original DGRs specified trapping for at least seven nights per site. After discussion with OEH, it was agreed that trapping for longer periods in close proximity to the study area and for fewer nights in the locality was appropriate for the following reasons:

- The objective of conducting surveys in the locality was to determine the distribution of the population in the locality. After individuals were detected at sites in the locality, this objective had been achieved and additional trapping would not reveal more useful information.
- Trapping in the study area was attempting to document the movement of individuals in and around the study area. The likelihood of detecting movements across the existing Olympic Highway and the subject site was low, unless extra trap nights could be conducted.

Consequently, traps in the locality were taken down after a minimum of four nights if individuals were captured, and extra trapping effort put into trapping at new sites in the study area to better estimate population sizes and detect movements across the subject site and study area.

The number of traps set at each site varied from five to 20, depending on the patch shape, size and extent of suitable habitat at each site. Traps were set at approximately 100 metre intervals, and most sites within three kilometres of the subject site were trapped for at least seven consecutive nights. Sites in the locality were trapped for four to six nights.

All captured individuals were removed from traps at dawn, processed and immediately released after processing at the point of capture. Processing involved identifying and weighing each individual and recording tooth-wear and reproductive condition. All animals were individually marked using an ear tattoo (unique number/letter combination in the ear flap) and a microchip inserted between the shoulder blades. The combination of a tattoo and microchip allows confident identification of each individual upon recapture. Detailed survey methods are in Appendix L.

Table 7 - Survey method and effort for subject species, population and ecological communities.

Survey type	Dates	Method	Effort
FLORA AND ECOLOGICAL COMMUNITIES			
Box-Gum Woodland	16 November 2007 (previous surveys) 6 December 2011 31 July 2013 13 to 15 August 2013 20 August 2013	50 metre by 20 metre plots with nested 20 metre by 20 metre plots. Visual assessment in low condition (no plots)	Eight, 50 metre by 20 metre plots in the study area. 18, 50 metre by 20 metre plots in the locality.
Hollow-bearing trees	6 December 2011 14 March 2012 13 to 15 August 2013 20 August 2013	50 metre by 100 metre transects.	All hollow-bearing trees in the study area. 26, 50 metre by 100 metre transects in the locality.
MICROCHIROPTERAN BATS			
See Table 3 for relevant species	7 to 12 April 2013	Harp trapping. Anabat detection and analysis. Roost inspections. Light tags. Voucher calls.	26 trap-nights over two consecutive nights, at 13 sites. 12 detector nights over two consecutive nights, at 6 sites. Five detector nights over one night, at 5 sites. One 60 minute walking transect using detector. One 27 kilometre vehicle transect using detector. One 9.5 kilometre vehicle transect using detector. 260 minutes of roost inspections (20 minutes per site at 13

Survey type	Dates	Method	Effort
			sites). 10 bats attached with light tags. 10 voucher calls attempted.
BIRDS			
Winter birds See Table 3 for relevant species	17 June 2013 26 June to 1 July 2013 (Winter 1). 31 July to 2 August 2013 (Winter 2).	Vehicle reconnaissance 100 metre wide transects (all species). Glossy Black-cockatoo nest surveys. Opportunistic surveys	Six person hours. Six, 100 metre by 100 metre transects in the subject site, traversed four times each for a total of 8.6 kilometres. Twelve, 100 metre by 100 metre transects in the study area, traversed four times each for a total of 32 kilometres. All suitable nest trees surveyed within the study area on two occasions, totalling 52 person hours.
Spring birds	11 to 13 September, 16 to 17 September, 19 to 20 September, 24 to 25 September 2013 (Spring 1). 4 October, 7 to 11 October, 15 to 17 October, 22 to 25 October 2013 (Spring 2).	50 metre wide transects (all species). Little Eagle and Spotted Harrier nest surveys. Barking Owl nest surveys. Superb Parrot foraging area and flight path surveys. Superb Parrot nest surveys. Opportunistic surveys.	28, 50 metre by 100 metre transects in the subject site and study area, traversed four times each for a total of 64 kilometres. All suitable nest trees surveyed within the study area on two occasions, totalling: – 20 person hours for Spotted Harrier – 20 person hours for Little Eagle – 20 person hours for Barking Owl – 20 person hours for Superb parrot Flight paths surveyed from designated sighting points for four person hours on four days in each survey period, totalling 32 hours.

Survey type	Dates	Method	Effort
MAMMALS			
Squirrel Glider	8 to 20 April 2013	Cage trapping.	1127 trap nights over at least seven consecutive nights, at 16 sites in the study area and locality.

520,000 530,000

6,120,000 6,110,000 6,100,000

Murrumbidgee River
Olympic Highway
Sturt Highway
Sturt Highway
Sydney to Melbourne Rail Line
Olympic Highway

LEGEND

- Squirrel Glider trap location
- Bat survey
- Flora survey plot
- Hollow-bearing tree transect
- Anabat vehicle transect
- Sydney to Melbourne Rail Line
- Highway
- Murrumbidgee River
- Subject site
- Study area
- Locality

Paper size A3

0 1 2 4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
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Squirrel Glider, bat, hollow-bearing tree and flora survey locations in the locality

Job Number 23-1410701
Revision 0
Date 20 Nov 2013

Figure 6

G:\23\14107\GIS\Maps\SIS_maps\23_1410701_SISFig6_SurveyLocationsLocality.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia **T** 61 2 6923 7400 **F** 61 2 6971 9565 **E** wgamail@ghd.com **W** www.ghd.com

Data source: NSW Roads and Maritime Services: Proposal site - 2012, aerial photography - 2011; NSW Government: Highways, railways, river, suburbs - 2012. Created by:rtrobinson

526,000 527,000 528,000 529,000 530,000

6,113,000 6,112,000 6,111,000 6,110,000 6,109,000

LEGEND

- Squirrel Glider trap location.
- Bat survey
- Flora survey plot
- Anabat vehicle transect
- Drainage line
- Rail line
- Subject site
- Study area

Paper size A3

0 100 200 400

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Roads and Maritime Services
Kapooka bridge replacement SIS

Squirrel Glider, bat and flora survey locations in the study area

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Date 20 Nov 2013

Figure 7

G:\23\14107\GIS\Maps\SIS_maps\23_1410701_SISFig7_SurveyLocationsStudyArea.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia T 61 2 6923 7400 F 61 2 6971 9565 E wgamail@ghd.com W www.ghd.com

Data source: NSW Roads and Maritime Services: Proposal site - 2012, aerial photography - 2011; NSW Government: Highways, railways, river, suburbs - 2012. Created by:rtrobinson

530,000

6,110,000

6,110,000

530,000

LEGEND

- Winter bird survey transect
- Spring bird survey transect
- Rail line
- Subject site
- Study area

Paper size A3

0 100 200 400

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Roads and Maritime Services
Kapooka bridge replacement SIS

Winter and spring bird survey locations in the study area

Job Number 23-1410701
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Date 20 Nov 2013

Figure 8

G:\23\14107\GIS\Maps\SIS_maps\23_1410701_SISFig8_BirdSurveyLocationsStudyArea.mxd

Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia **T** 61 2 6923 7400 **F** 61 2 6971 9565 **E** wgamail@ghd.com **W** www.ghd.com

Data source: NSW Roads and Maritime Services: Proposal site - 2012, aerial photography - 2011; NSW Government: Highways, railways, river, suburbs - 2012. Created by:rtrobinson

3.3 Survey timing

3.3.1 Weather conditions

Surveys for fauna groups were conducted at the time of year considered optimal for respective species or fauna groups in consultation with OEH. A summary of climatic conditions during surveys for each group are outlined in Table 8. No optimal seasonal or climatic conditions were specified by OEH for ecological communities in the DGRs and surveys were able to be conducted at any time of year (see Appendix A).

Table 8 - Weather conditions during survey periods for fauna survey groups

Dates	Rainfall (mm)	Temperature (C°)		Maximum wind gust (km/h)
		Min	Max	
BIRDS (WINTER SPECIES)				
26 June 2013	0	1.3	17.6	17
27 June 2013	0	2.3	16.0	19
28 June 2013	0	6.7	15.7	20
1 July 2013	0.2	4.2	11.9	17
31 July 2013	0	0.6	16.3	19
1 August 2013	0	1.4	16.1	20
2 August 2013	0	8.3	15.2	37
BIRDS (SPRING SPECIES)				
11 September 2013	0	4.9	15.7	39
12 September 2013	0	1.5	16.5	35
13 September 2013	0	4.6	16.6	52
16 September 2013	1.0	10.4	14.0	33
17 September 2013	23.8	11.0	18.2	50
19 September 2013	0	6.2	15.3	35
20 September 2013	0.4	4.1	15.2	48
24 September 2013	0	14.0	22.1	44
25 September 2013	0	8.8	25.5	26
4 October 2013	0	0.5	19.0	19
7 October 2013	0	5.4	20.3	33
8 October 2013	0	5.0	21.4	30
9 October 2013	0	3.5	27.8	37

Dates	Rainfall (mm)	Temperature (C°)		Maximum wind gust (km/h)
		Min	Max	
10 October 2013	0	9.4	31.3	56
11 October 2013	0	6.2	20.1	52
15 October 2013	0.2	-0.3	20.8	33
16 October 2013	0	3.2	26.9	54
17 October 2013	0	10.1	19.4	69
22 October 2013	1.2	18	26.6	50
23 October 2013	0.2	14.1	17.7	43
24 October 2013	0	7.0	17.2	56
25 October 2013	0	0.1	19.3	44
MICROBATS				
7 April 2013	0	11.1	26.1	26
8 April 2013	0	10.5	27.1	26
9 April 2013	0	11.4	26.8	28
10 April 2013	0	10.8	27.2	26
11 April 2013	0	10.2	27.7	28
12 April 2013	0	16.0	27.9	31
SQUIRREL GLIDERS				
7-12 April 2013 (see microbat entries above)				
13 April 2013	0	11.3	28.2	31
14 April 2013	0	13.8	29.8	30
15 April 2013	0	16.8	25.6	33
16 April 2013	0	8.5	24.2	26
17 April 2013	0	9.1	22.6	31
18 April 2013	0	6.5	23.2	39
19 April 2013	0	7.5	19.7	48
20 April 2013	0	3.1	22.5	35
FLORA AND ECOLOGICAL COMMUNITIES				
31 July 2013	0	0.6	16.3	19

Dates	Rainfall (mm)	Temperature (C°)		Maximum wind gust (km/h)
		Min	Max	
13 August 2013	0.6	4.6	14.2	N/A
14 August 2013	0	3.9	18.6	N/A
15 August 2013	6.0	1.6	13.9	N/A
20 August 2013	4.2	1.3	10.2	N/A