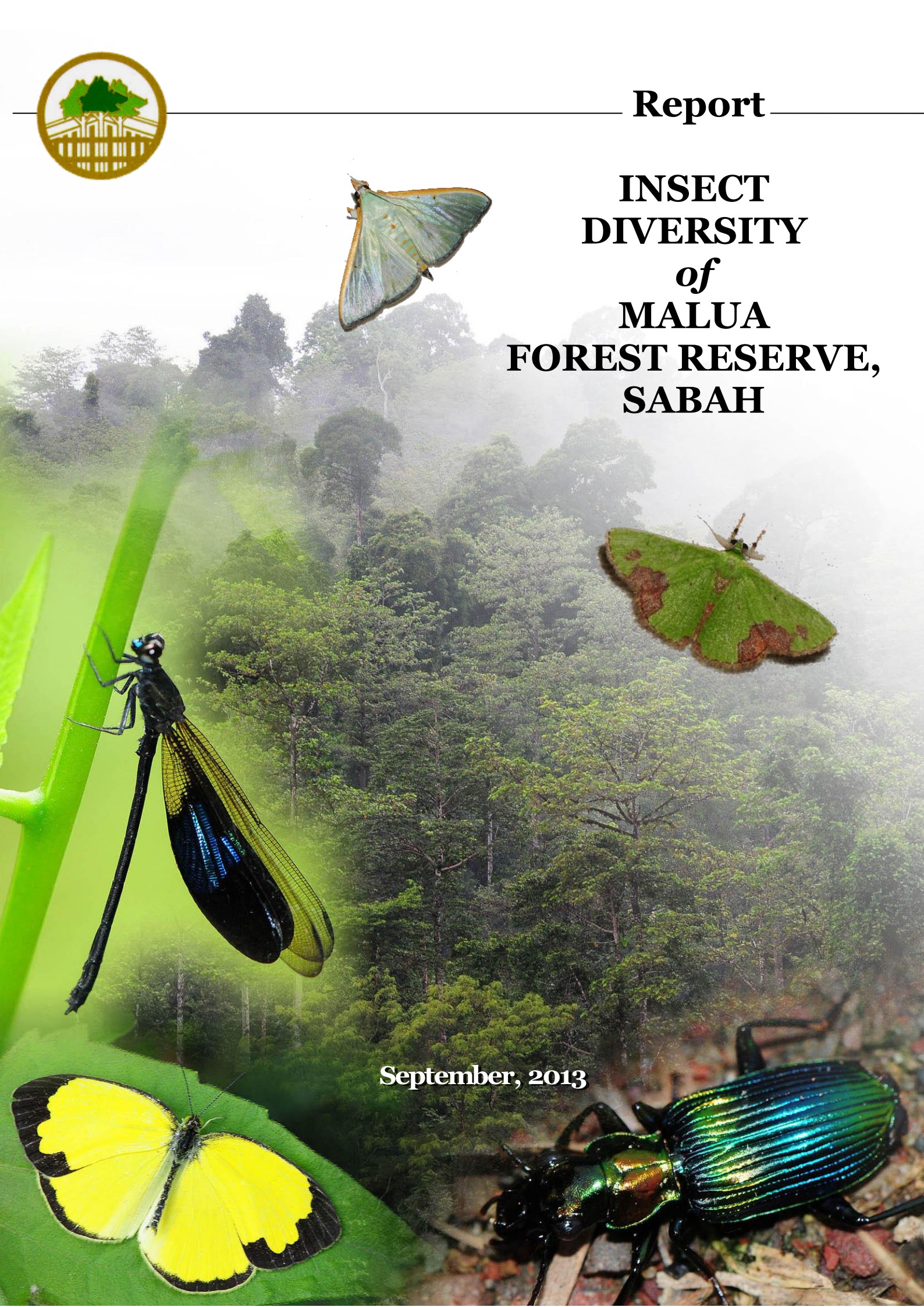
Report

INSECT DIVERSITY *of* MALUA FOREST RESERVE, SABAH



September, 2013

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INSECT DIVERSITY OF MALUA FOREST RESERVE, SABAH

Prepared for the District Forestry Office, Ulu Segama-Malua Forest Reserves

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SUMMARY

An insect diversity survey was carried out from 20th to 22nd of August, 2013 in Malua F.R. This is a Class I Forest Reserve (Protection), covering an area of 33,969 ha. The nocturnal insect diversity at Malua F.R. was moderately high when compared to other forest reserves surveyed earlier.

The Bornean endemics recorded during the survey were three moth species, one beetle species and one damselfly species, namely *Amata prepuncta Spilosoma griseabrunnea* and *Adites Sandakan* (moths), *Chalcosoma moellenkampi* (beetle) and *Euploea subnodalis* (damselfly). The iconic butterflies, such as the Rajah Brooke's Birdwing, *Troides* (*Trogonoptera*) *brookiana brookiana* and the Common Birdwing, *Troides helena mosyclus* were recorded in this reserve. Large and interesting moth species, such as the Moon Moths (*Actias selene* and *Actias maenas*) and Atlas Moth (*Attacus atlas*) were also recorded.

As no other insect survey has been conducted in this forest reserve in the past, this pioneer data will serve as baseline information for other research work in future. The endemic, rare and interesting insect species recorded during the survey provide salient information to enhance the conservation of this forest reserve as well as to provide value-added information for this FSC-certified forest reserve.

Note: The identification of some insects is still tentative and subject to confirmation. This report will be further improved with comments from various experts.

1. STUDY AREA & PURPOSE OF STUDY

Malua Forest Reserve is located in east Sabah, between longitude 117°E and 118°E and between latitude 5°N and 6°N (Figure 1). It forms part of the Ulu Segama-Malua F.Rs., situated immediately north of the Danum Valley Conservation Area (SFD 2008). Malua F.R. was formerly gazetted under a Class II (Commercial) Forest Reserve. In July, 2013, it was regazetted as Protection Forest Reserve (Class I), covering an area of 33,969 ha. The vegetation is mainly logged-over lowland mixed dipterocarp forest. Other forest types include upland mixed dipterocarp forest, ultramafic forest and a small area of freshwater swamp forest along the Malua River (Figure 2).

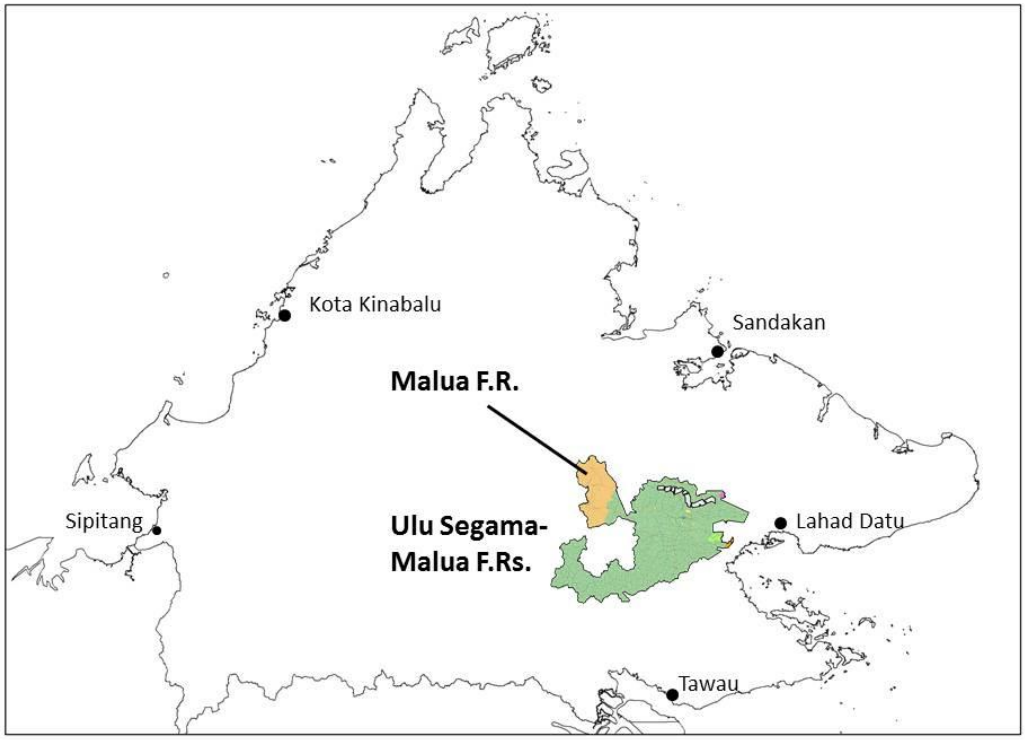

Figure 1: Location of Malua F.R. (orange colour) in Sabah.

The study was conducted from 20th to 22nd of August, 2013, based at the Malua Wildlife Office (N 05.09113°, E 117.61691° at 132 m a.s.l.), about three hours drive on a graveled road from the Silam junction.

The objective of this study was to document the insect fauna of Malua F.R. as requested by the DFO USM FRs. This is part of the value-added information for USM FRs which is certified under the Forest Stewardship Council (FSC).

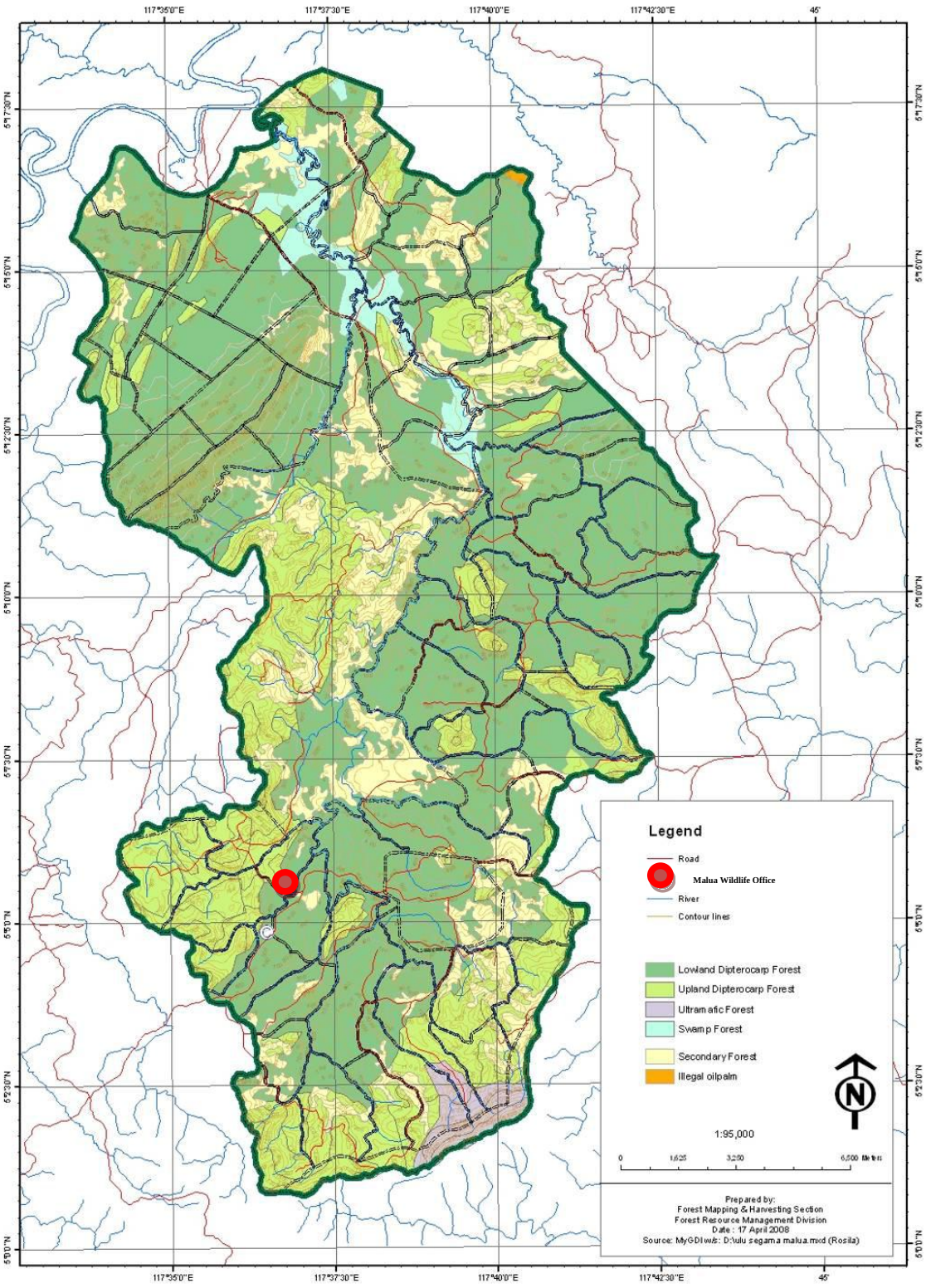

Figure 2: Vegetation map of Malua F.R. (based on SFD 2008).

Figure 3: Part of the logged-over forest viewed from the Malua Wildlife Office.

Figure 4: A riverine area adjacent to the Malua Wildlife Office.

Figure 5: The Malua Wildlife Office at 132 m a.s.l.

2. MATERIALS & METHODS

2.1 Location and GPS points

A GPS gadget (Model: Garmin GPSMAP 60CSx) was used for recording locality of latitude and longitude. The GPS reading was taken according to WGS 72 (Datum Map) and in decimal degree hddd.dddd˚ position format.

Table 1. Details on POI during the survey. All data were downloaded from GPSmap 60CSx Garmin.

No.	Point of Interest (POI)	Lat	Long	Elevation (m)
1	Malua Wildlife Office	5.09118	117.61691	132
2	River adjacent to Malua Office	5.08948	117.61854	95
3	Malua Gate	5.05289	117.75763	234

2.2 Assessment using Google earth programme

Google Earth programme is a powerful tool in assessing real time images of places of interest. This programme allowed other affiliates file to be incorporated during the assessment e.g. Garmin GPS data .gdp. Investigating the real time images (images are subject to available given update) on places of interest could be benefiting the surveyors in understanding the real geographic picture in terms of road accessibility, elevation, in-place development progress and identifying good forest coverage. Figure 6 showed the incorporated data of GPS tracks with the addition of infogram (geometric attributes, elevation, slope, distance & etc) in the 4 localities. These are useful information in reporting areas that have been covered during the survey.

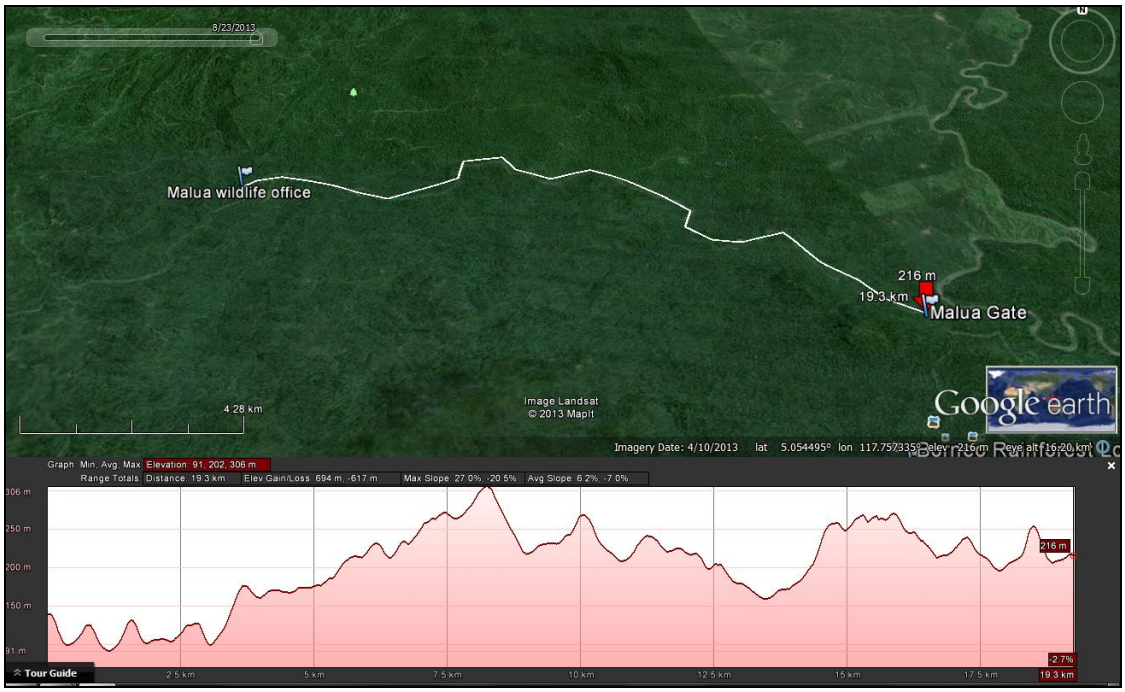

Figure 6: Road transect and distances within the survey area in Malua F.R.

2.3 Assessment by DIVA-GIS

DIVA-GIS is a free software programme that can be downloaded from the internet. It provides in-depth information for mapping and geographic data analysis. With the addition of the department's shape file info maps on location of forest reserves, soil association, elevation and river lines, all these data are useful in planning field work.

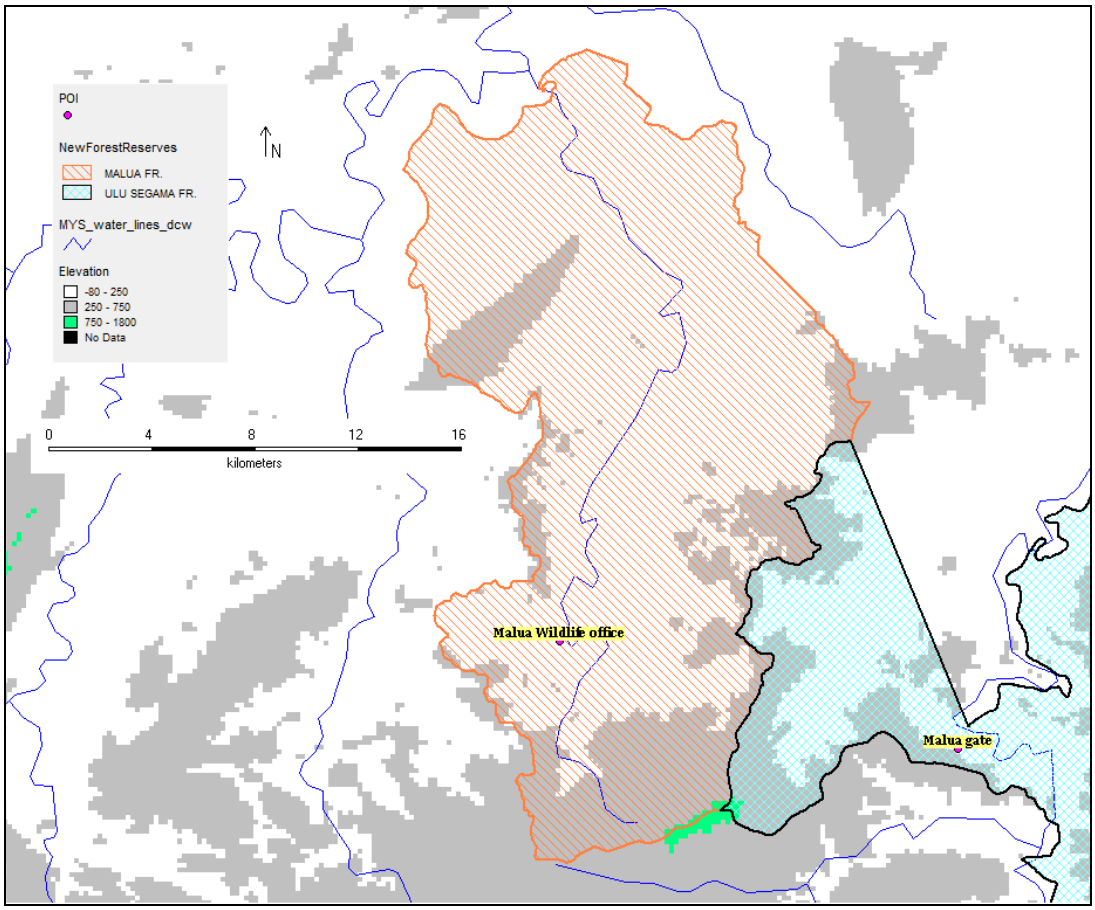

Figure 7: DIVA-GIS projection on point of interest and river lines.

2.4 Insect sampling methods

Light trap was used to sample nocturnal insects while sweep nets and forceps were used to sample diurnal insects.

2.4.1 Light trap

The trap consists of a vertical white sheet (2 X 2 m) illuminated by a 250W mercury-lithium bulb. The trap was set up in an open area facing the forest reserve, from 7:00 to 9:00 p.m. Temperature and humidity were taken with a digital hygrometer.

To evaluate diversity of the sampling area, insect species and individuals (≥ 5 mm) within the 1 X 1 m square of the white cloth were enumerated from 8:30 to 9:00 pm. This is a rapid biodiversity assessment method because by the end of the sampling time, species and individual numbers can be obtained, and the data can be used to calculate diversity indices, i.e. Shannon Wiener, Simpson and Fisher Alpha, using the Species Diversity & Richness version IV (SDR 2006). This method is simple, fast and

can be carried out by non-insect specialist. To avoid compounding human error, the same staff was assigned to count the species and individual numbers throughout the sampling period, and also for other sampling sites. Light-trapping sites are shown in Table 2.

Table 2: Light-trapping site in Malua F.R.

Sampling site	Coordinates	Elevation (m)	Temp. (^oC)	Humidity (%)	Sampling date	Remarks
BC1	N 05.09113^o E 117.61691^o	132	24.0	94	20 August	Full moon before 7:00 pm but turned cloudy and rained just before 9:00 pm
BC2	N 05.09113^o E 117.61691^o (facing different direction)	132	-	-	21 August	Light trapping was not able to be conducted due to some technical problems.

BC= Base Camp

Figure 8: Specimen counting during light-trapping.

2.4.2 Sweep net & manual collection

Sweep nets were used to collect flying insects while other insects were sampled using fine forceps. Butterflies were put in triangle papers while other specimens were put in vials with 75% ethanol solution. Sampling was conducted along the road, open and riverine / stream areas within the forest adjacent to Malua Wildlife Office.

2.4.3 Insect specimens and identification

In this survey, focus was given to certain insect groups, i.e., butterflies, moths, beetles and dragonflies. Only interesting and potential indicator insect species were sampled, as to minimize the workload at the laboratory in preparing the specimens for identification. Photographs were taken with DSLR Nikon D300 and Coolpix S9500 cameras to facilitate identification. Common insects were not sampled but photographs were taken for record purposes.

Photographs of specimens were identified based on the FRC Entomology Collection and various reference materials, e.g. Otsuka (1988 & 2001) for butterflies; Holloway (1983, 1985, 1986, 1988, 1989, 1993, 1996a, 1997, 1998a & b, 1999, 2001, 2003, 2005, 2008, 2009 & 2011) and Robinson *et al.* (1994) for moths; Fujita (2010), Makihara (1999) and Tung (1983) for beetles; Orr (2003) and Tang *et al*. (2010) for dragonflies. Some other insects were identified based on Hill and Abang (2005).

3. RESULTS & DISCUSSION

3.1 Overall insect diversity

As indicated by the diversity index in Table 3, the nocturnal insect diversity was moderate. The Shannon Index was 3.516 while Simpson Index was 20.72 and Fisher Alpha Index was 52.36. During light-trapping, the temperature was 24^0C with humidity of 94% (Table 1). The distribution of insect species from the light-trapping is reflected in the species-rank abundance curve in Figure 9. A small short-horned grasshopper (Orthoptera, Acridiidae) was the most abundant species with 18 individuals, followed by a species of Tiger Moth, with six individuals.

Table 3: Insect diversity within a one-square-metre, as sampled through light-trapping in Malua F.R.

No.	Sampling site	Species	Ind.	Shannon	Simpson	Fisher Alpha
1.	BC1	52	89	3.516	20.72	52.36

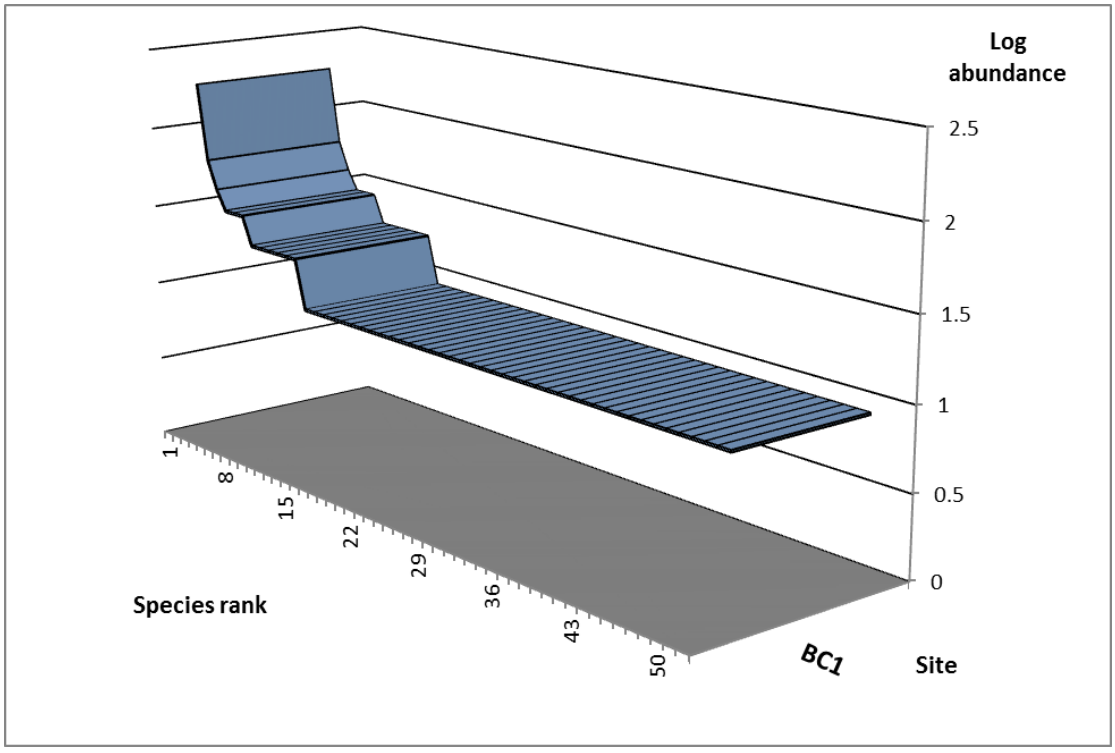

Figure 9: Species-rank abundance curves of the light-trapping site in Malua F.R.

When the nocturnal insect diversity is compared with other forest reserves from previous studies, Malua F.R. appeared to be moderately high although much of the forest was heavily logged in the past.

Some Bornean endemic species were recorded from Malua F.R. during the survey, as listed in Table 4. The endemics included three moth species, one beetle species and one damselfly species. This information provides input towards recommendations on High Conservation Value Forest (HCVF) of the area, namely HCV 1.3 (WWF-Malaysia 2009).

Table 4: Bornean endemic insect species recorded from Malua F.R. during the survey.

No.	Species	Order	Family	Subfamily
1	*Spilosoma griseabrunnea* Holloway	Lepidoptera	Arctiidae	Arctiinae
2	*Adites sandakan* Holloway	Lepidoptera	Arctiidae	Lithosiinae
3	*Amata prepuncta* Holloway	Lepidoptera	Arctiidae	Syntominae
4	*Chalcosoma moellenkampi* Kolbe	Scarabaeidae	Dynastinae	
5	*Euphaea subnodalis* Laidlaw	Odonata	Euphaeidae	

3.1.1 Butterfly (Lepidoptera)

A total of 13 butterfly species were recorded as listed in Appendix 1 with some showcased in Plate 1. The Rajah Brooke's Birdwing (*Troides brookiana brookiana*) was sighted at the Malua Wildlife Office while the Common Birdwing (*Troides helena mosyclus*) was sighted at the riverine area adjacent to the Malua Wildlife Office. Both species are protected under the Sabah's Wildlife Conservation Enactment 1997.

3.1.2 Moth (Lepidoptera)

Forty five moth species were recorded from this study (Appendix 2) and three are endemic to Borneo; all from the family Arctiidae (Figure 10). *Adites sandakan* is a small moth, measuring less than 10 mm. The creamy white moth with pale brown pattern on the wings is distinctive for this genus. As its name suggests, this species was named after the Sandakan town. According to Holloway (2001), this species range extends from lowlands to coastal areas. *Spilosoma griseabrunnea* is the largest among the four endemic arctiids, with a length of about 23 mm. Descriptions of this species are provided by Holloway (1998). The identity of this species, however, has been explored further in relation to a number of very similar species in Southeast Asia (Holloway, 2011). Although its distribution is only confined to Borneo, it is common in disturbed habitats, agricultural areas and secondary vegetation from the lowlands to 1,200 m. Robinson *et al.* (2001) did not have any hostplant information for *S. griseabrunnea*. Chey (1996) reported this species defoliating *Gmelina arborea*. Chung (2012) also recorded this species feeding on the hybrid orchid *Vanda* Amani. *Amata prepuncta* is a wasp-like moth, mostly from the understory of lowland rainforest.

Although light-trapping was not able to be set up on the second night, hundreds of the common Laran defoliator, *Arthroschista hilaralis* was observed attracted to the light

at the Malua Wildlife Office, indicating a high abundance of its hostplant within that area.

Some of the non-endemic moth species are shown in Plate 2.

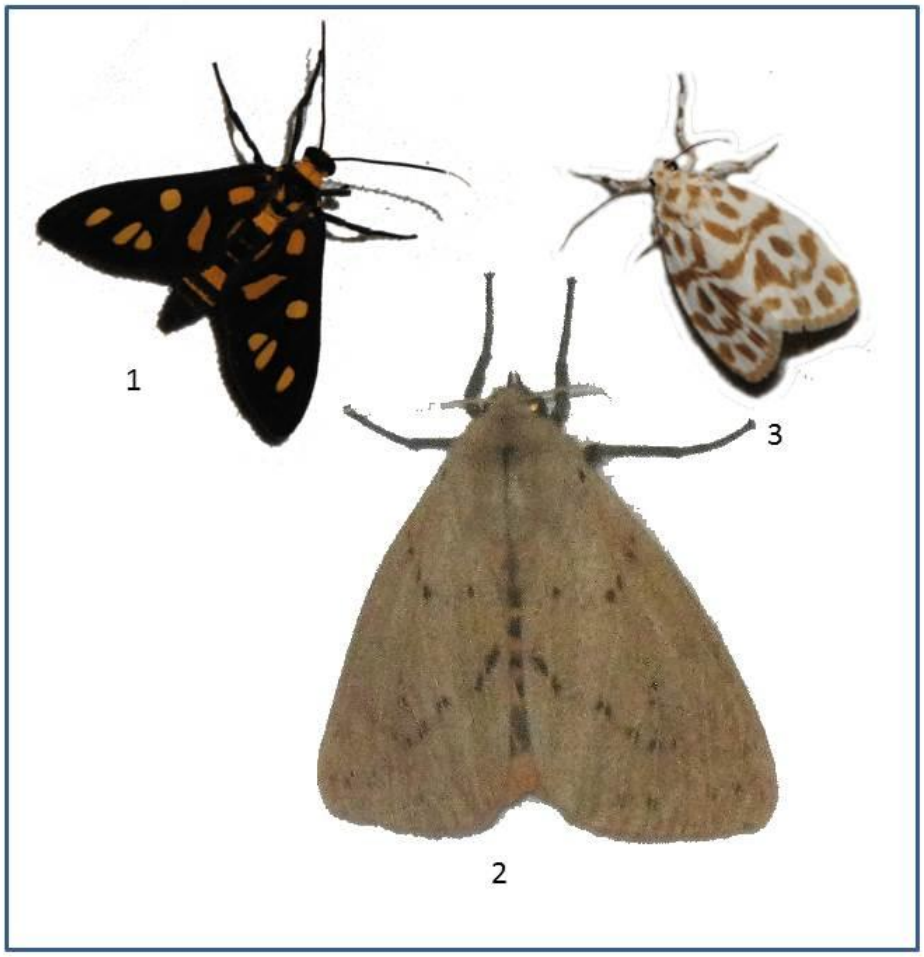

Figure 10: Bornean endemic moths (not to scale) recorded from Malua F.R. during the survey: 1. *Amata prepuncta*, 2. *Spilosoma griseabrunnea*, 3. *Adites Sandakan.*

3.1.3 Beetle (Coleoptera)

A total of six species of macro-beetles were recorded (Appendix 3 & Plate 3). An unidentified iridescent coloured Ground Beetle of the family Carabidae was recorded. The Bornean endemic but locally common Three-horned Beetle, *Chalcosoma moellenkampi*, is a large beetle recorded in this survey. It is remarkable for its size that can reach a length of about 25–60 mm in the female. As common in some Scarabaeidae, the male is larger than the female, reaching a length of about 60–100 mm. The male has specialised horns on the head and thorax that use to fight with each other to gain mating rights with female.

3.1.4 Dragonfly & Damselfly (Odonata)

Some dragonflies and one damselfly were sighted along the riverine area and beside the road within this forest reserve. A total of 5 species were recorded during this short survey, with one endemic species, namely *Euphaea subnodalis*. The male of this species has brilliant blue-green metallic patches on the hindwing. However, it can be easily confused with other species of the same genus. *E. subnodalis* has a longer hindwing of 27-28 mm. Other Odonata are listed in Appendix 4 and some are shown in Plate 4.

3.1.5 Other insects

Other insects recorded during the survey are listed in Appendix 5 and some of them are shown in Plate 5. The Assassin Bug (USM4905) and the Short-horned Grasshopper, *Stenocatantops* sp. (USM4916) are common inhabitants within the Malua Wildlife Office area.

4. CONCLUSION

From this study, the nocturnal insect diversity in Malua F.R. was moderately high when compared to other forest reserves surveyed earlier. A few endemic species were recorded. As no other insect survey has been conducted at this forest reserve in the past, this pioneer data will serve as baseline information for other research work in future. The endemic, rare and interesting insect species recorded during the survey provide salient information to enhance the conservation of this forest reserve as well as to provide value-added information for this FSC-certified forest.

ACKNOWLEDGEMENTS

We thank the DFO of Ulu Segama-Malua, Indra Sunjoto and his staff for logistics and field support. The FRM Division (Rosila Anthony) and Jumri Abd. Hamid of FRC provided the maps and information. The Deputy Director (R&D), Dr Lee Ying Fah and Head of FRC Insect Diversity Programme, Dr Chey Vun Khen are also acknowledged for their support.

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Plate 1. Selected butterflies sampled from Malua Forest Reserve (20-22 August, 2013).

Eurema blanda blanda
(Pieridae)

Leptosia nina malayana
(Pieridae)

Pachliopta aristolochiae antiphus
(Papilionidae)

Troides brookiana brookiana
(Papilionidae)

Mycalesis anapita fucentia
(Nymphalidae)

Neptis hylas sopatra
(Nymphalidae)

Parthenos Sylvia borneensis
(Nymphalidae)

Ypthima pandocus sertorius
(Nymphalidae)

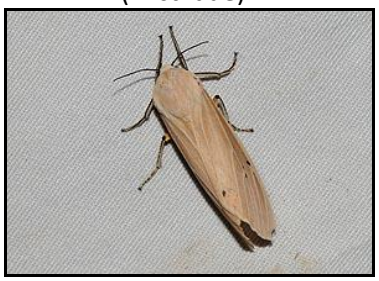
Unidentified
(Lycaenidae)

Plate 2. Selected non-endemic moths recorded from Malua Forest Reserve (20-22 August, 2013).

Tinoliodes dehanna
(Arctiidae)

Cyana malayensis
(Arctiidae)

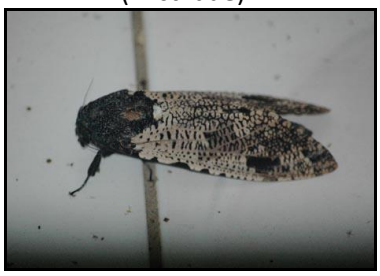
Oeonistis altica
(Arctiidae)



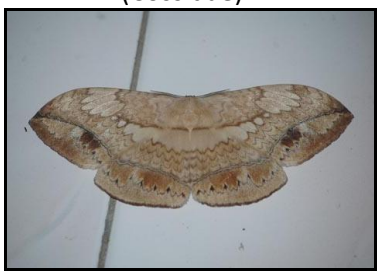
Creatonotos transiens
(Arctiidae)

Xyleutes adusta
(Cossidae)

Xyleutes mineus
(Cossidae)



Xyleutes strix
(Cossidae)

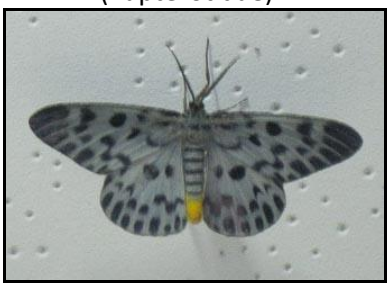


Eupterote asclepiades
(Eupterotidae)

Ganisa plana
(Eupterotidae)

Celerena signata
(Geometridae)

Amblychia hymenaria
(Geometridae)



Dysphania malayanus
(Geometridae)

Ornithospila ?submonstrans
(Geometridae)

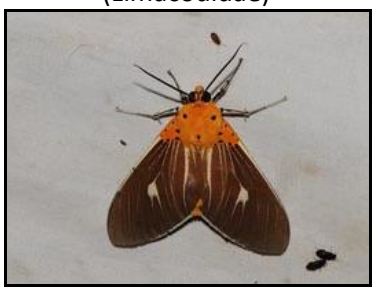
Metanastria gemella
(Lasiocampidae)

Cania striola
(Limacodidae)

Scopelodes sp.
(Limacodidae)

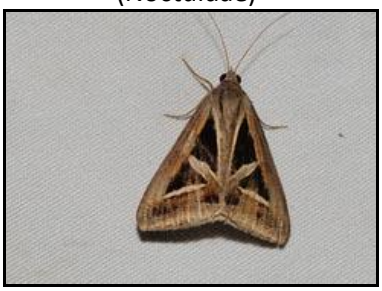
Nygmia fumosa
(Lymantriidae)

Asota heliconia
(Noctuidae)

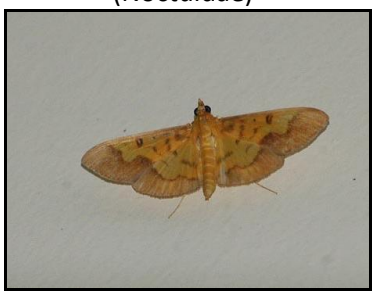


Asota producta
(Noctuidae)

Episparis costistriga
(Noctuidae)

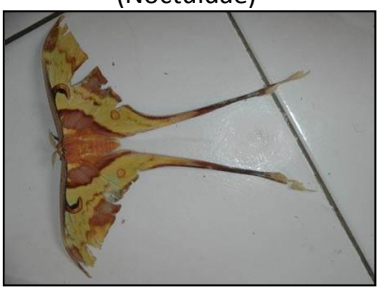


Trigonodes hyppasia
(Noctuidae)



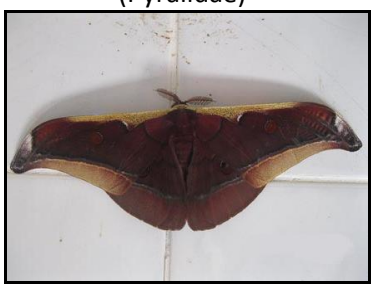
Botyodes asialis
(Pyralidae)

Unidentified
(Pyralidae)



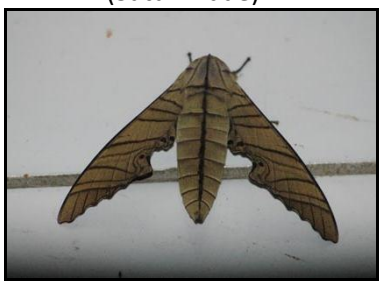
Actias maenas
(Saturniidae)

Actias selene
(Saturniidae)



Antherana assamensis
(Saturniidae)

Attacus atlas
(Saturniidae)



Marumba sp.
(Sphingidae)

Panacra variolosa
(Sphingidae)

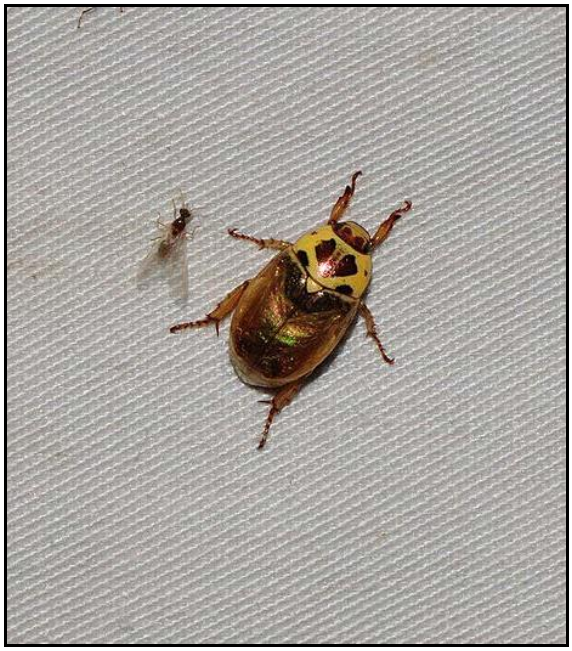
Theretra rhesus
(Sphingidae)

Plate 3. Beetles recorded from Malua Forest Reserve
(20-22 August, 2013).

To be identified later
(Carabidae)

To be identified later
(Chrysomelidae)

Alaus sp.
(Elateridae)



Lutera ?lineola
(Scarabaeidae)

Plate 4. Dragonflies and damselfly recorded from Malua Forest Reserve (20-22 August, 2013).

Euphaea subnodalis
(Euphaeidae)

Orthetrum testaceum
(Libellulidae)

Neurothemis terminata
(Libellulidae)

Trithemis festiva
(Libellulidae)

Plate 5. Other insects recorded from Malua Forest Reserve (20-22 August, 2013).

'Water Strider'
(Hemiptera)

'Yellow Assassin Bug'
(Hemiptera)

Hymenopus sp.
(Mantodea)

Stenocatantops sp.
(Orthoptera)

'Short-horned Grasshopper'
(Orthoptera)

Short-horned Grasshopper'
(Orthoptera)

'Pointed Nose Grasshopper'
(Orthoptera)

Valanga nigricornis
(Orthoptera)

Aschiphasma annulipes
(Phasmida)

APPENDICES

Appendix 1: Tentative butterfly list from Malua F.R., Sabah (20-22 August, 2013)

No.	Species	Author	Family	Photo	Remarks
1	*Eurema blanda blanda*	Yata	Pieridae	USM4918	
2	*Leptosia nina malayana*	Fruhstorfer	Pieridae	USM4959	
3	*Pachliopta aristolochiae*	Fabricius	Papilionidae	USM5013	
4	*Papilio memnon memnon*	Linne	Papilionidae	Spotted	
5	*Troides brookiana brookiana*	Wallace	Papilionidae	DSC5134	Protected, WCE 1997
6	*Troides helena mosyclus*	Fruhstorfer	Papilionidae	Spotted	Protected, WCE 1997
7	*Mycalesis anapita fucentia*	Fruhstorfer	Nymphalidae	USM4937, USM4984	
8	*Neptis hylas sopatra*	Fruhstorfer	Nymphalidae	USM4904	
9	*Parthenos sylvia borneensis*	Staudinger	Nymphalidae	USM5004	
10	*Ypthima pandocus sertorius*	Fruhstorfer	Nymphalidae	USM4956	
11	Unidentified		Lycaenidae	USM4935	
12	*Notocrypta clavata*	Staudinger	Hesperiidae	USM4954	
13	Unidentified		Hesperiidae	USM4897	

Appendix 2: Selected moths recorded from Malua F.R. (20-22 August, 2013).

No.	Species	Author	Family	Subfamily	Photo	Remarks
1	*Spilosoma griseabrunnea*	Holloway	Arctiidae	Arctiinae	IMG0424	Endemic to Borneo
2	*Tinoliodes dehanna*	Pagenstecher	Arctiidae	Arctiinae	IMG0632	
3	*Adites sandakan*	Holloway	Arctiidae	Lithosiinae	USM4836	Endemic to Borneo
4	*Cyana malayensis*	Hampson	Arctiidae	Lithosiinae	USM4841	
5	*Oeonistis altica*	Linnaeus	Arctiidae	Lithosiinae	USM4840	
6	*Amata prepuncta*	Holloway	Arctiidae	Syntominae	USM4859	Endemic to Borneo
7	*Creatonotos transiens*	Walker	Arctiinae	Arctiinae	USM4825	
8	*Xyleutes adusta*	Roepke	Cossidae		USM4851	
9	*Xyleutes mineus*	Cramer	Cossidae		DSC5680	
10	*Xyleutes strix*	Linnaeus	Cossidae		DSC5684	
11	*Eupterote asclepiades*	Felder	Eupterotidae		DSC4244	
12	*Ganisa plana*	Walker	Eupterotidae		IMG0388	
13	*Celerena signata*	Warren	Geometridae	Desmobathrinae	USM4869	
14	*Amblychia hymenaria*	Guenee	Geometridae	Ennominae	IMG0035	
15	*Biston insularis*	Warren	Geometridae	Ennominae	IMG0633	
16	*Hypochrosis binexata*	Walker	Geometridae	Ennominae	USM4860	
17	*Comibaena* sp.		Geometridae	Geometrinae	USM4856	
18	*Dysphania malayanus*	Guerin-Meneville	Geometridae	Geometrinae	IMG0625	
19	*Eucyclodes charma*	Prout	Geometridae	Geometrinae	Spotted	
20	*Ornithospila ?submonstrans*	Walker	Geometridae	Geometrinae	USM4832	
21	*Antitrygoden divisavia*	Walker	Geometridae	Sterrhinae	USM4880	
22	*Metanastria gemella*	Lajonquiere	Lasiocampidae		IMG0425	
23	*Cania striola*	Hering	Limacodidae		IMG0423	
24	*Scopelodes* sp.		Limacodidae		USM4835	

25	*Nygmia fumosa*	Snellen	Lymantriidae		USM4826
26	*Asota heliconia*	Linnaeus	Noctuidae	Aganainae	USM4828
27	*Asota producta*	Butler	Noctuidae	Aganainae	USM4846, USM4852
28	*Episparis costistriga*	Walker	Noctuidae	Catocalinae	USM4829
29	*Trigonodes hyppasia*	Cramer	Noctuidae	Catocalinae	USM4876
30	*Arthroschista hilaralis*	Walker	Pyralidae	Pyraustinae	USM4881
31	*Botyodes asialis*	Guenee	Pyralidae	Pyraustinae	DSC6237
32	*Pachynoa purpuralis*	Walker	Pyralidae	Pyraustinae	Spotted
33	Unidentified		Pyralidae		USM4882
34	*Actias maenas*	Doubleday	Saturniidae		DSC2808
35	*Actias selene*	Hubner	Saturniidae		DSC3193
36	*Antherana assamensis*	Helfer	Saturniidae		IMG0559
37	*Archaeoattacus staudingeri*	Rothschild	Saturniidae		Atlas Moth (1)
38	*Attacus atlas*	Linnaeus	Saturniidae		DSC3796
39	*Acosmerys anceus*	Stoll	Sphingidae		USM4855
40	*Ambulyx canescens*	Walker	Sphingidae		Atlas Moth (1)
41	*Callambulyx rubricosa*	Walker	Sphingidae		spotted
42	*Marumba* sp.		Sphingidae		DSC6232
43	*Panacra variolosa*	Walker	Sphingidae		USM4850
44	*Theretra rhesus*	Boisdural	Sphingidae		USM4847
45	*Lyssa menoetius*	Hopffer	Uraniidae		DSC3181

Appendix 3: Beetles recorded from Malua F.R. (20-22 August, 2013).

No.	Species	Author	Family	Remarks	Photo
1	To be identified later		Carabidae	20mm	USM5031, USM5050
2	To be identified later		Chrysomelidae		USM4924
3	*Cosmodela aurulenta*	Fabricius	Cicindellidae		Spotted
4	*Alaus* sp.		Elateridae		USM5044
5	*Chalcosoma moellenkampi*	Kolbe	Scarabaeidae	Endemic to Borneo	Spotted
6	*Lutera* ?*lineola*	(Linnaeus)	Scarabaeidae		USM4857

Appendix 4: Dragonflies recorded from Malua F.R. (20-22 August, 2013).

No.	Species	Author	Family	Photo	Remarks
1	*Euphaea subnodalis*	Laidlaw	Euphaeidae	USM4949, USM5000	hw=28mm, endemic to Borneo
2	*Orthetrum testaceum*	Burmeister	Libellulidae	USM4912	
3	*Neurothemis terminata*	Ris	Libellulidae	USM4968	
4	*Orthetrum glaucum*	Brauer	Libellulidae	USM4988	
5	*Trithemis festiva*	Rambur	Libellulidae	USM4993	

Appendix 5: Other insects recorded from Malua F.R. (20-22 August, 2013).

No.	Species	Author	Order	Family	Remarks	Photo
1	*Sarcophaga* sp. 1		Diptera		Flesh fly	USM4909
2	To be identified later		Diptera			USM4972
3	To be identified later		Hemiptera	Gerridae	Water strider	USM4945
4	To be identified later		Hemiptera		Assassin bug	USM4905
5	To be identified later		Hemiptera		Sap-sucking bug	USM4986
6	To be identified later		Hymenoptera	Apidae		USM5016
7	*Polyrhachis* sp. 1		Hymenoptera	Formicidae		USM4907
8	*Polyrhachis* sp. 2		Hymenoptera	Formicidae		USM4922
9	*Camponotus gigas*	(Latreille)	Hymenoptera	Formicidae		USM4991
10	*Provespa anomala*	Saussure	Hymenoptera	Vespidae		USM4843
11	To be identified later		Hymenoptera		Wasp	USM4977
12	*Hymenopus* sp.		Mantodea		Flower mantis	USM4839
13	To be identified later		Mantodea		Praying mantis	USM4844
14	To be identified later		Neuroptera	Mantispidae		USM4830
15	To be identified later		Orthoptera	Acrididae	Grasshopper	USM4925
16	*Stenocatantops* sp.		Orthoptera	Acrididae	Short-horned grasshopper	USM4916
17	To be identified later		Orthoptera	Acrididae	Grasshopper	USM4925
18	To be identified later		Orthoptera	Acrididae	Short-horned grasshopper	USM4975
19	To be identified later		Orthoptera	Acrididae	Short-horned grasshopper	USM4979
20	*Nisitrus vittatus*	de Haan	Orthoptera	Gryllidae	Field cricket	USM5001
21	To be identified later		Orthoptera		Pointed grasshopper	USM4915
22	*Valanga nigricornis*	(Burmeister)	Orthoptera	Acrididae	Valanga grasshopper	USM4966
23	*Aschiphasma annulipes*	Westwood	Phasmida	Aschiphasmatidae	Black & Green Phasma	USM4813