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*Original Article*

# Reptiles of Lata Bukit Hijau, Kedah, Malaysia

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**Abstract**

Lata Bukit Hijau is located within the Banjaran Bintang Ranges on the west coast of northern Peninsular Malaysia. The reptile fauna in this pristine area was intensively investigated from 2008 to 2011 on 10 consecutive visits. A total 37 species of reptiles from 31 genera and 10 families were recorded to inhabit this area. Out of this number, 17 species were lizards (13 genera and four families), 17 species were snakes (15 genera and four families) and three species were freshwater turtles (three genera and two families). These preliminary data increased the number of lizards, snakes and freshwater turtles reported from Banjaran Bintang from 31 to 41, 30 to 44 and three to five species, respectively.

**Keywords:** lizard, snake, freshwater turtle, Lata Bukit Hijau, Kedah

## 1. Introduction

Lata Bukit Hijau is located within Gunung Inas Forest Reserve which forms a part of the Banjaran Bintang Range. It is situated in the district of Baling, Kedah, and is about 103 km due southeast of Alor Star, capital of Kedah state, and about 77 km due east of Georgetown, in the state of Penang. The main river, Sungai (River) Mempelam arises from Gunung (Mount) Inas, flows into Sedim and Muda Rivers and eventually empties into the Straits of Malacca.

The water in this river is clear, flows through cascades, waterfalls, riffles and pools over bottoms of sand and gravel. There are many granite rocks and boulders in the river and on both banks. Within the sampling areas, the width of the river is about 5-8 m. An attractive waterfall, approximately 10 m height is located about 500 m from the car park. Both sides of the river are lined by lowland dipterocarp forest with many valuable timber species such as *Scorodocarpus borneensis* (Kulim), *Macaranga sp*. (Mahang), *Shorea curtisii* (Meranti Seraya), *Dryobalanops aromatica* (Kapur), *Alstonia angustiloba* (Pulai) and *Neobalanocarpus hemii* (Cengal). The understorey of the forest is dominated by herbs, ferns, small trees, climbers, epiphytes, bamboos, fungi and others.

In the state of Kedah, studies on herpetofauna have been done in several areas such as Ulu Muda (Norhayati *et al.*, 2005), Gunung Jerai (Ibrahim *et al.*, 2006), Langkawi Archipelago (Grismer *et al.*, 2008), Beris Valley (Shahriza *et al.*, 2011b), Gunung Inas (Ibrahim *et al.*, 2012a) and Bukit Perangin (Ibrahim *et al.*, 2012b). All the studies mentioned above are more focused on amphibian diversity except the study in Langkawi Archipelago, Beris Valley and Bukit Perangin. In Langkawi Archipelago, 25 species of amphibians and 70 species of reptiles were recorded (Grismer *et al.*, 2008). In Beris Valley, 14 species of amphibians and 14 species of reptiles were reported (Shahriza *et al.*, 2011b), while in Bukit Perangin, 15 species of amphibians and 15 species of reptiles were reported (Ibrahim *et al.*, 2012b). Recently, many new species of lizards were discovered and described from Kedah, Malaysia, such as *Sphenomorphus langkawiensis* from Pulau Langkawi (Grismer, 2008), *Cyrtodactylus macrotuberculatus* from Pulau Langkawi (Grismer *et al.*, 2008), *Cyrdotactylus*

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*durio* from Sungai Sedim (Grismer *et al.*, 2010a), *Cnemaspis roticanai* from Pulau Langkawi (Grismer and Chan, 2010) and *Cnemaspis harimau* from Gunung Jerai (Chan *et al.*, 2010). Discovering many new species, especially the lizards, indicated that these areas are very rich with reptile species. Thus, more scientific expedition in unexplored environments needs to be executed to record more new species.

Currently, only a single study on amphibian diversity has been conducted at Lata Bukit Hijau (Shahriza *et al.*, 2011a), which reported the presence of 18 species of amphibians. To date, no study on reptile fauna has been conducted from this area, and thus this study was carried out to survey and document the reptile species that inhabit the area around Lata Bukit Hijau. These data are important in order to understand the composition and distribution of reptile species in northern Peninsular Malaysia, especially in the state of Kedah.

## 2. Materials and Methods

The reptile fauna of Lata Bukit Hijau ($5^0$29'N/$100^0$ 48'E, elevation < 300 m asl) (Figure 1) was investigated from 2008 till 2011 on 10 consecutive visits. Observations and collections of the specimens were focused on two main forest trails. Trail 1 started from the car park area and upstream until 300 m while Trail 2 started from the car park area and downstream until 300 m. Surveys were conducted along the river and 3-5 m away from the river banks. Searching for reptile species, we rummaged under rocks, rock crevices, under dead wood, dead stumps, three buttresses, leaf litter, temporary pools, rock pools, small streams, ditches, wooden huts, shrubs, dense vegetations and other microhabitats were suspected to be hiding places for these creatures. We also collected the specimens were encountered on and beside the road during our way to Bukit Hijau (one km before the car park).

Samplings were conducted both in the daytime (for diurnal species) and at night (for nocturnal species), by search parties comprising 3-4 persons. In each visit, approximately six hours (1000 to 1600 hrs) were devoted for day sampling and four hours (2000 to 2400 hrs) for night sampling. The lizards were captured using bare hands while the snakes were captured using snake tongs or fish nets. In the laboratory, all captured specimens were identified, euthanized, measured and tagged. The specimens were fixed using 10% formalin, stored in 70% ethanol and later deposited at the School of Pharmaceutical Sciences, Universiti Sains Malaysia (USM), for future purpose. The live specimens were photographed prior to preservation using Olympus Digital Camera model SP800UZ with 30X optical zoom. Measurements of snout-vent length (SVL), tail length (TaL), total length (ToL) and head width (HW) of the lizards and snakes were carried out using digital caliper and measuring tape. Freshwater turtles were measured by the length of their carapace in a straight line. For identification of the species, we followed Tweedie (1983) and Stuebing and Inger (1999) for the snakes, Ibrahim *et al.* (2008) and Grismer (2011) for the lizards, Lim and Das (1999) and Auliya (2007) for the freshwater turtles.

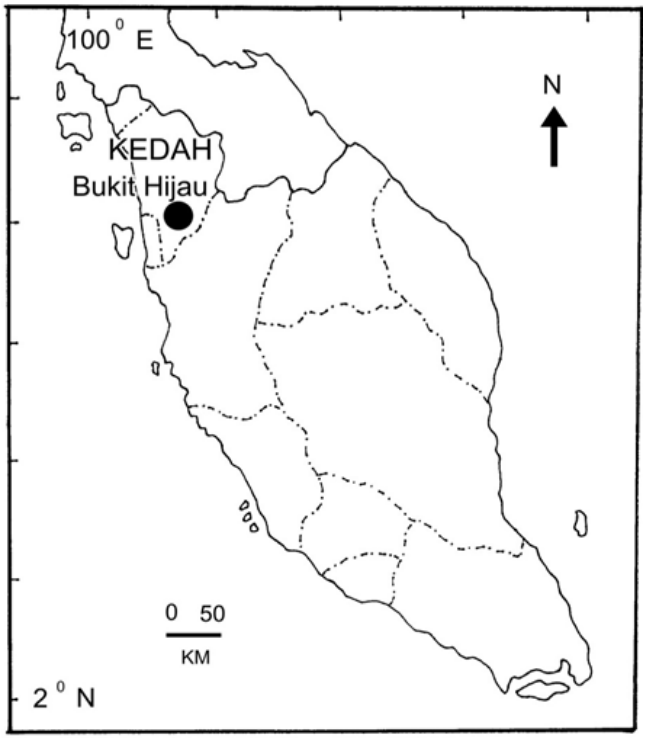


Figure 1. Location of Bukit Hijau, Kedah, Malaysia

## 3. Results

Thirty seven species of reptiles, including 17 lizards, 17 snakes and three freshwater turtles were documented to inhabit the forest around Lata Bukit Hijau. The lizards represent 13 genera from four families, snakes represent 15 genera from four families and freshwater turtles represent three genera from two families (Appendix 1).

### 3.1 Ecological notes

**Agamidae**

***Aphaniotis fusca* (Peters, 1864)**

An adult was sighted in August 2010 sleeping on a small branch of tree (approx. 1.5 m above ground) near the river bank.

***Bronchocela cristatella* (Kuhl, 1820)**

One specimen (09USM-BH-BC01) was collected in July 2009 while perching on leaves of a small tree (approx. 0.5 m above ground) about 5 m from the river.

***Calotes versicolor* (Daudin, 1802)**

A few species were observed near the car park, bushes and gardens. An adult male (10USM-BH-CV01) was collected

in March 2010 from the shrub (approx. 1 m above ground) near the car park area and kept as a voucher specimen.

***Draco melanopogon* (Boulenger, 1887)**

We sighted this species gliding and perching on a tree trunk (approx. 4 m above ground) at the edge of the forest but failed to capture it.

***Gonocephalus grandis* (Gray, 1845)**

This agamid lizard was usually encountered perching on tree branches or trunks along the river bank, especially along Trail 2 (downstream). We observed this species almost in all months except in February 2009 and April 2011. Two adult males (10USM-BH-GG01, 02) were collected in March 2010 while sleeping on horizontal tree branches (approx. 1-2 m above ground) adjacent to the river. The SVL, TaL, ToL and HW were 12.5, 32.3, 44.80 and 2.2 cm for individual one and 11.8, 31.5, 43.3 and 2.1 cm for individual two.

**Gekkonidae**

***Cyrtodactylus consobrinus* (Peter, 1871)**

A juvenile (10USM-BH-CC01) was captured in November 2010 while hiding inside a hole of rotting tree stump along Trail 2. The SVL, TaL, ToL and HW were 8.2, 10.1, 18.3 and 1.7 cm respectively. Two hatching clutch eggs adhesive inside the hole were also found at the same site.

***Cyrtodactylus quadrivirgatus* (Taylor, 1962)**

Two adults (09USM-BH-CQ01, 02) were caught in February 2009 while resting on leaves and small tree branch (approx. 1 m above ground) along Trail 1 (upstream). The SVL, TaL, ToL and HW were 6.0, 6.2, 12.2 and 1.2 cm for individual one and 6.2, 6.5, 12.7 and 1.2 cm for individual two.

***Gekko monarchus* (Dumeril and Bibron, 1836)**

One individual (08USM-BH-GM01) was captured in April 2008 while crawling on a cement wall of the toilet (approx. 2 m above ground). Two clutches of eggs were also found glued near the roof of the toilet.

***Gekko smithii* (Gray, 1842)**

A single adult (08USM-BH-GS01) was collected in October 2008 while hiding under the roof of a wooden hut (approx. 3 m above ground) along Trail 1. The SVL, TaL, ToL and HW were 18.4, 19.2, 37.6 and 3.7 cm respectively. Several other geckos such as *H. frenatus* and *G. monarchus* were also observed at the same site.

***Gehyra mutilata* (Wiegmann, 1835)**

Several individuals were sighted crawling on the cement wall and ceiling of the buildings near the car park. No specimens were collected.

***Hemidactylus frenatus* (Dumeril and Bibron, 1836)**

This common species was observed in all months during the survey period and usually found crawling on the wall and ceiling of the buildings, canteen, halls, stalls and wooden huts in the park.

***Hemidactylus platyurus* (Schneider, 1792)**

An adult (08USM-BH-HP01) was collected in October 2008 under the rotten wood near the car park.

***Ptychozoon kuhlii* (Stejneger, 1902)**

A single adult (10USM-BH-PK01) was captured in August 2010 while crawling on the wall of a wooden hut (approx. 3 m above ground) along Trail 1. The SVL, TaL, ToL and HW of the specimen were 8.8, 8.6, 17.4 and 1.7 cm respectively. Another specimen was also sighted at the same place but we failed to capture it. We also found *G. mutilata* and *H. frenatus* at the same site.

**Scincidae**

***Eutropis multifasciatus* (Kuhl, 1820)**

An adult (09USM-BH-EM01) was caught in July 2009 while hiding behind tree buttress near the river bank along Trail 1. Several others were observed foraging and basking on the rocks and woods near the river.

***Sphenomorphus scotophilus* (Boulenger, 1900)**

We found this species almost in all months during the sampling period and usually encountered foraging on tree trunks, buttress, stumps and rocks. An adult was collected (10USM-BH-SS01) in August 2010 while perching on a tree trunk (approx. 1.5 m above ground) along Trail 1.

***Sphenomorphus stellatus* (Boulenger, 1900)**

One individual was observed in November 2010 near the rock crevices along the river bank (Trail 1).

**Varanidae**

***Varanus salvator* (Laurenti, 1768)**

We sighted this species in all months during the sampling period but did not capture it. Usually this species were encountered foraging along the river banks, ditches and swampy areas. An adult with a total length approximately 1.5-2 m was observed in this area.

**Colubridae**

***Ahaetulla mycterizans* (Linnaeus, 1758)**

An adult was found in April 2011 entwined around a dead branch of a small tree (approx. 1.5 m above ground) along Trail 1. The ToL is about 75 cm.

***Boiga dendrophila* (Boulenger, 1896)**

An adult was sighted in February 2009 creeping on the forest floor (approx. 6 m from the river) along Trail 1. The ToL was about 150 cm.

***Chrysopelea ornata* (Werner, 1925)**

An adult (ToL approx. 70 cm) was spotted in July 2011 resting on a small tree in the bush near the car park.

***Coelognathus flavolineatus* (Schlegel, 1837)**

One individual (ToL approx. 150 cm) was encountered in March 2010 crossing the forest trail and moving to the forest.

***Coelognathus radiatus* (Boie, 1827)**

An adult (ToL approx. 85 cm) was found dead on the road near the entrance gate of the park probably hit by a car.

***Dendrelaphis formosus* (Boie, 1827)**

A single individual (ToL approx. 100 cm) was encountered in March 2010 creeping on the wet forest floor near a big tree buttress.

***Dendrelaphis pictus* (Gmelin, 1789)**

We sighted this species creeping on dense vegetation near the car park (August 2010) and on a small tree near the forest edge (September 2011). Their ToL was about 90 and 110 cm respectively.

***Enhydris enhydris* (Schneider, 1799)**

An adult (ToL approx. 60 cm) was found in April 2008 swimming in a temporary pool (2 m x 3 m) close to the river after heavy rains.

***Homalopsis buccata* (Linnaeus, 1758)**

An individual (ToL approx. 55 cm) was spotted in August 2010 swallowing a small fish in a rock pool at the edge of the river after heavy rains.

***Ptyas korros* (Schlegel, 1837)**

We found this species in September 2011 beside the road, near an oil palm plantation along the way to the park. The ToL was about 150 cm.

***Xenochrophis trianguligera* (Boie, 1827)**

A single specimen (08USM-BH-XT01) was collected in October 2008 from a rock pool at the edge of the river along Trail 1. The measurements of SVL, TaL and ToL were 51, 23 and 74 cm respectively.

**Elapidae**

***Bungarus flaviceps* (Reinhardt, 1843)**

We captured an adult specimen (09USM-BH-BF01) in February 2009 on the forest floor near a big boulder (approx. 5-6 m from the river) along Trail 2. The measurements of SVL, TaL and ToL of the snake were 119, 45 and 164 cm respectively.

***Naja kaouthia* (Lesson, 1831)**

This is the common snake in Peninsular Malaysia and can be found everywhere including the villages, urban areas, gardens, paddy fields, plantations and forests. In Lata Bukit Hijau, we found this species creeping near the entrance gate of the park in April 2008 (ToL approx. 80 cm), near a small stream along Trail 1 in March 2010 (ToL approx. 150 cm) and near a hut along Trail 2 in July 2011 (ToL approx. 100 cm).

***Ophiophagus hannah* (Cantor, 1836)**

An individual (ToL approx. 2 m) was encountered in April 2011 crossing the river and moving to the other side of the bank. According to the staff of State Forestry Department, a huge specimen (ToL approx. 3-4 m) exists in this area.

**Pythonidae**

***Python reticulatus* (Schneider, 1801)**

A subadult (10USM-BH-PR01) was captured in March 2010 while crossing the road, near an oil palm plantation, about 0.5 km to Bukit Hijau. The measurements of SVL, TaL and ToL were 121, 21 and 142 cm respectively.

**Viperidae**

***Calloselasma rhodostoma* (Boie, 1827)**

An adult was captured (10USM-BH-CR01) in March 2010 coiled near a big rotten stump on the forest floor (Trail 1) about 2 m from a small forest stream. The measurements of SVL, TaL and ToL were 54, 11 and 65 cm respectively.

***Tropidolaemus wagleri* (Wagler, 1830)**

A juvenile was encountered in September 2011 resting on the branch of a bamboo tree (approx. 1.5 m above ground) along Trail 2. The ToL was about 30 cm.

**Bataguridae**

***Cuora amboinensis* (Daudin, 1801)**

A juvenile was found in a ditch with shallow water near the entrance gate of the park in October 2008. The length of carapace was 12 cm.

***Heosemys spinosa* (Gray, 1831)**

We spotted this species foraging on the forest floor near a small stream in July 2009 and in a temporary puddle in November 2010. The length of their carapace was 19 and 20 cm respectively.

**Trionichydae**

***Dogania subplana* (Geoffroy Saint-Hilaire, 1809)**

A subadult was encountered diving at the bed of the river near the cascade area in February 2009 and the length of carapace was about 14 cm.

## 4. Discussion

Currently, only a single study on amphibian diversity has been conducted at Lata Bukit Hijau and 18 species of frogs from 12 genera and six families were recorded to inhabit in this area (Shahriza *et al.*, 2011a). As for the reptiles, this study reports the presence of 17 species of lizards, 17 species of snakes and three species of freshwater turtles in the area.

Thus, this preliminary data increased the number of reptile species in Banjaran Bintang from 64 (Grismer *et al.*, 2010b) to 90 species. The new record of reptiles included 10 species of lizards (*Aphaniotis fusca, Calotes versicolor, Cyrtodactylus consobrinus, Gekko smithii, Hemidactylus frenatus, H. platyurus*, *Ptychozoon kuhlii, Sphenomorphus scotophilus, S. stellatus* and *Varanus salvator*), 14 species of snakes (*Ahaetulla mycterizans, Boiga dendrophila, Chrysopelea ornata, Coelognathus flavolineatus, C. radiatus, Dendrelaphis formosus, D. pictus, Enhydris enhydris, Homalopsis buccata, Ptyas korros, Xenochrophis trianguligera, Naja kouthia, Calloselasma rhodostoma* and *Tropidolaemus wagleri*) and two species of freshwater turtles (*Cuora amboinensis* and *Dogania subplana*).

At Lata Bukit Hijau, a wide variety of habitats and microhabitats such as rivers, streams, waterfalls, temporary pudles, rock pools, granite boulders, rock crevices, shrubs, open areas, leaf litters, buttress, stumps, tree canopy and tree holes contributed to the high number of amphibian and reptile species. In additions, the clean and unpolluted river and minimal disturbance from human activities were also assumed to be contributing factors to this good state of affairs, as far as reptile numbers are concerned.

Five species of agamid lizards, including one commensal species, *C. versicolor* were found in this area. Most of the species were sighted perching on tree branch, leaves and trunk. Only a single species of flying lizard, *Draco melanopogon* was observed during the survey period. Many species of lizards from genus *Draco* were sighted in this area but we failed to capture or even photographed them. The Great Angelhead lizard, *Gonocephalus grandis* is very common and usually found perching on three branches or trunks near the rivers and streams.

Eight species of geckos including the flying gecko, *P. kuhlii* were found here. Compared to agamid lizard, all geckonids are nocturnal except for *H. frenatus* that were sometimes sighted crawling on the ceilings or walls in the day time. Most of the geckos here are adapted to live in the structures created by human such as chalets, toilets and resting huts located near or in the forest. All the gecko species, including the Forest Gecko, *G. smithii* and Kuhl's Gliding Gecko, *P. kuhlii* were observed and captured in the structures mentioned above, except for the two *Crytodactylus* species that were collected in the forest.

Except for *S. stellatus*, three species of skinks encountered here are common species and could be found everywhere. The Sun Skink, *Eutropis multifasciatus* is usually sighted foraging on the forest floor, near or far away from the rivers. The two S*phenomorphus* species*, S. scotophilus* and *S. stellatus* were found close to the streams or rivers. Only a single varanid species, *V. salvator* was found here, but according to the villagers another species of varanid, *V. nebulosus* was also found here but we could not confirm this.

As for the snakes, we found 11 species representing the family Colubridae, three species of Elapidae, two species of Viperidae and one species of Pythonidae. Most of the snake species were only sighted or observed and not captured, because of the difficulty and safety factors. We only captured some species of snakes such as *X. trianguligera, Bungarus flaviceps, Python reticulatus* and *C. rhodostoma* as voucher specimens. The snakes are very difficult to locate because of their secretive behaviour and camouflage colouration. Some species of snakes, such as *A. mycterizans, C. flavolineatus, C. radiatus*, *D. formosus, H. buccata, P. korros, B. flaviceps, Ophiophagus hannah* and *T. wagleri* were sighted once only. We also observed other snake species but could not get close enough to photograph or identify them. According to the villagers, a huge *P. reticulatus* (ToL approx. 4-5 m) and *O. hannah* (ToL approx. 3-4 m) were sighted in this area but we could not confirm this either.

Survey and observation at Lata Bukit Hijau is still ongoing to discover and record more species of amphibians and reptiles. We expect the list of the herpetofaunal species in this area will expand in the next few years as a wider sampling area will be covered.

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**Appendix 1 Reptiles of Lata Bukit Hijau, Kedah, Malaysia**

| Taxa | Month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | | 2009 | | 2010 | | | 2011 | | |
| | Apr | Oct | Feb | Jul | Mac | Aug | Nov | Apr | Jul | Sep |
| **a) Lizards (17 species)** | | | | | | | | | | |
| Agamidae (5) | | | | | | | | | | |
| *Aphaniotis fusca* | | | | | | X | | | | |
| *Bronchocela cristatella* | | | | X | | | | | X | |
| *Calotes versicolor* | | X | X | | X | | X | X | | |
| *Draco melanopogon* | | | X | | | | | X | | |
| *Gonocephalus grandis* | X | X | | X | X | X | X | | X | X |
| Gekkonidae (8) | | | | | | | | | | |
| *Cyrtodactylus consobrinus* | | X | | | | | X | | | |
| *Cyrtodactylus quadrivirgatus* | | | X | X | | | X | | X | |
| *Gekko monarchus* | X | | X | | | X | | X | | |
| *Gekko smithii* | | X | | | X | | | | X | |
| *Gehyra mutilata* | | | X | | | | X | | X | |
| *Hemidactylus frenatus* | X | X | X | X | X | X | X | X | X | X |
| *Hemidactylus platyurus* | | X | | X | | | | | | |
| *Ptychozoon kuhlii* | X | | | X | | X | | | | |
| Scincidae (3) | | | | | | | | | | |
| *Eutropis multifasciatus* | | | X | | X | X | X | X | | X |
| *Sphenomorphus scotophilus* | X | X | | X | X | X | | X | X | |
| *Sphenomorphus stellatus* | | | | X | | | X | | | X |
| Varanidae (1) | | | | | | | | | | |
| *Varanus salvator* | X | X | X | X | X | X | X | X | X | X |
| **b) Snakes (17 species)** | | | | | | | | | | |
| Colubridae (11) | | | | | | | | | | |
| *Ahaetulla mycterizans* | | | | | | | | X | | |
| *Boiga dendrophila* | | | X | | | X | X | | | |
| *Chrysopelea ornata* | X | | | | | | | | X | |
| *Coelognathus flavolineatus* | | | | | X | | | | | |
| *Coelognathus radiatus* | | | | X | | | | | | |
| *Dendrelaphis formosus* | | | | | X | | | | | |
| *Dendrelaphis pictus* | | | | | | X | | | | X |
| *Enhydris enhydris* | X | | | | | | X | | | |
| *Homalopsis buccata* | | | | | | X | | | | |
| *Ptyas korros* | | | | | | | | | | X |
| *Xenochrophis trianguligera* | | X | | | | | X | | | |
| Elapidae (3) | | | | | | | | | | |
| *Bungarus flaviceps* | | | X | | | | | | | |
| *Naja kaouthia* | X | | | | X | | | | X | |
| *Ophiophagus hannah* | | | | | | | | X | | |
| Pythonidae (1) | | | | | | | | | | |
| *Python reticulatus* | | X | | | X | | | | X | |
| Viperidae (2) | | | | | | | | | | |
| *Calloselasma rhodostoma* | | | X | | X | | | | | |
| *Tropidolaemus wagleri* | | | | | | | | | | X |

**Appendix 1 (Continued)**

| Taxa | Month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | | 2009 | | 2010 | | | 2011 | | |
| | Apr | Oct | Feb | Jul | Mac | Aug | Nov | Apr | Jul | Sep |
| **c) Freshwater turtles (3 species)** | | | | | | | | | | |
| Bataguridae (2) | | | | | | | | | | |
| *Cuora amboinensis* | | X | | | | X | | | | |
| *Heosemys spinosa* | | | | X | | | X | | | |
| Trionichydae (1) | | | | | | | | | | |
| *Dogania subplana* | | | X | | | | | | | |
| Number of species (37) | 9 | 12 | 11 | 12 | 12 | 12 | 13 | 8 | 12 | 7 |