

A herpetofaunal inventory of Barail Wildlife Sanctuary and adjacent regions, Assam, north-eastern India

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(with two text-figures)

ABSTRACT.— An inventory of amphibian and reptiles from the Barail Wildlife Sanctuary and its surroundings, Cachar District, Assam, north-eastern India is presented here. A total of 23 species of amphibians and 45 species of reptiles have been recorded from the study area. The observations include new locality records and natural history information of poorly known species such as *Tropidophorus assamensis* and *Eutropis quadricarinata*. Besides recording members of currently recognized species complex, the study also documents few species that were either conferred to closely related species (e.g., *Calotes cf. irawadi*) or their species identity remain to be ascertained (e.g., *Rhabdophis* sp. and *Amolops* sp.). The sharp slope in the species accumulation curve from the present study indicates that species count will rise further with additional surveys.

KEYWORDS.— Herpetofauna, Barail Wildlife Sanctuary, north-east India, inventory, new locality records.

Introduction

Barail Hill Range lies in North Cachar Hill District, and is the south-western extension of the Patkai Range, and runs in a south-westerly direction from southern Nagaland and parts of northern Manipur, up to the Jaintia Hill of Meghalaya (Fig. 1). The higher elevation (1,500–2,500 m) areas of the Range is located in southern Nagaland state, while low to mid-elevation areas are in the North Cachar and Cachar Districts, continuing up to the Jaintia hills of Meghalaya.

Barail Wildlife Sanctuary (BWS, 24°58'–25°05'N, 92°46'–52°E) spreads over an area of 326 sq km. This sanctuary mainly covers the low to mid elevation hills (< 30–1,100 m) of Cachar District of southern Assam. These low hill ranges are continuous with the more lofty mountainous parts of North Cachar Reserve Forest and contin-

uous with Barail Hill Ranges in the North Cachar Hills District. The sanctuary area is drained by a network of small perennial or seasonal streams that flow through small ravines and valleys, and join Jatinga River at the western boundary of the Sanctuary. The River Dolu runs through the eastern boundary of the Sanctuary. The Silchar-Half-long railway track and the Silchar-Half-long road pass along the western boundary of BWS. There are many villages on the western and southern boundary of the Sanctuary. The primary vegetation is tropical semi-evergreen to moist evergreen forest, corresponding to Cachar Tropical Evergreen Forest 1B/C3 and Cachar Tropical Semi-evergreen Forest 2B/C2 (Champion and Seth, 1968). The main secondary landscape elements are cultivated flatlands, secondary bamboo forest, plantations (*Tectona grandis*, betel vine plan-

tations and Pan Jhum), and village gardens. The climate of the study area is largely tropical tending toward little subtropical at the upper reaches. Precipitation varies from 2000mm to 6000 mm with a brief but predictable rainless period. The westernmost part of the sanctuary receives the highest rainfall in Assam (Choudhury, 1993).

Materials and methods

Field Surveys.— From March-September 2007, one of us (AD) spent 95 field days in and around Barail Wildlife Sanctuary, to document the her-

petofaunal diversity of the area. During that period, 17 localities (Table 1), representative of all the major habitat types of the Sanctuary, were surveyed. Collections were made randomly and opportunistically. An identified survey area was walked extensively, while visually searching for amphibian and reptile species and largely focusing on prospective microhabitats. However, active searches involving turning rocks and logs, peeling bark, digging through leaf litter, and excavating burrows and termite mounds also produced excellent results. During the day, be-

Table 1. Details of survey sites in the Barail Range during present study.

Site	Coordinates	Elevation	Habitat types
Lakhicherra	24°58.651'N 92°46.754'E	~55m	Rocky fast flowing stream with riparian vegetation. Extensive growth of wild Musa clumps along stream. The lower reaches of the stream having Jhum cultivation on surrounding hills.
Chamduba	24°58.720'N 92°47.183'E	~31m	Fast flowing stream with large boulders and thick riparian growth.
Tellacherra	24°58.692'N 92°47.491'E	~85m	Large stream with steep slope on one side and gravel flat land on the other.
Maruacherra	24° 58.342'N; 92° 46. 168'E	~30m	Village fringe, surrounded by cultivated area and degraded forests.
Barkhola	24°55'51.17"N 92° 44'55.58"E	40m	Human habitation with many ponds, plantations and open fields.
Barail WLS Teak Plantation	24°58.720'N 92°47.183'E	~100m	Extensive teak plantation with thick leaf litter.
Adakuchi Basti Nullah	24°59.550'N 92°44.544'E	~173m	Rocky streambed with steep slope and thick vegetation on either side, thick accumulated plant material on stream bank.
Chotorampur	24°57.127'N, 92°46.984'E	~36m	Degraded forest with many small streams and water puddles on the edge of a tea garden.
Lakhicherra Pahar	24°59.053'N, 92°46525'E	~ 300 m	Evergreen forest with patches of bamboo clumps.
Nunchuri, Bihara	24°57.351'N, 92°39.192' E	~22m	Degraded forest with bamboo clumps through which passes large rocky Harang stream. Rock mining area.
Sibtilla, Bihara	24°57.288'N, 92°39.357'E	~19m	Ficus trees and bamboo clumps on the slope at the edge of paddy field and human habitation.
Naraincherra	24°58.041'N, 92°44.554'E	~58m	Slow-flowing stream with large gravel flat land with grass and thick bushes on sides.
Bhaluknala	24°58.856'N, 92°46.863'E	~40m	Narrow stream of Lakhicherra with dense riparian and lithophytic vegetation.
Gubicherra hill	24°59.061'N, 92°46.507'E	~200m	Fast flowing stream with large bryophyte covered rocks and extensive growth of lithophytic vegetation.
Borthol	24°58.864'N, 92°47.330'E	~45m	Fast flowing stream with large bryophyte covered rocks.
Digorkhal	24°58.030'N, 92°34.520'E	~70m	Riparian vegetation. Large boulders on stream. Rocky collection trails.
Nirmatha Hill	25°01'17.79"N, 92°48'54.03"E	~ 1100m	Well canopied forest on a > 50° slope with large buttressed trees and thick leaf litter.

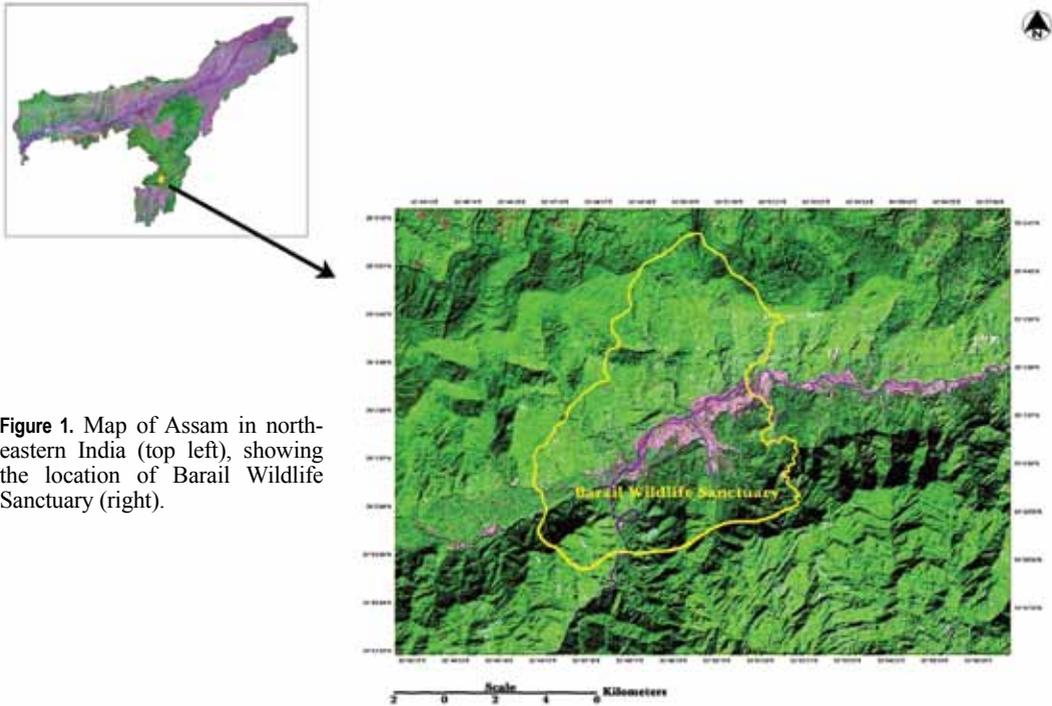


Figure 1. Map of Assam in north-eastern India (top left), showing the location of Barail Wildlife Sanctuary (right).

sides active search, heliothermic (basking) reptiles were also searched for along forest trails, forest edges and stream sides. For frogs, collections were sometimes made on the basis of calls heard along forest trail, forest edges and along streams between 1800–2200 h, aided by powerful flashlights. Aquatic search mostly involved examining watercourses, ephemeral and permanent pools, etc. Opportunistic observations of any species in the study area were also recorded. Records of road kills and animals collected or killed by neighbouring village people were also noted.

Data collection.— Locality, microhabitat, habitat, sex and reproductive data of individuals, sympatric species (if any noted) were collected. Behavioural observations were recorded in a field data sheet. Morphometric data on specimens were obtained for identification, which was supported by colour photographs taken with a Canon S3IS digital camera. Geographic coordinates for survey sites were recorded with a Garmin 12 receiver GPS. Interactions with local residents were held to make them aware of the local herpetofauna and to supplement field observations.

Species were identified using the keys of Smith (1931, 1935, 1943), Schleich and Kästle (2002), Das (1995), Dutta (1997) and David and Vogel (1996). Nomenclature and taxonomic arrangement in the text follows Frost (2009) for amphibian, and Das (2003) and Uetz (2007) for reptiles.

Abbreviations: ZSIC = Zoological Survey of India Kolkata; BMNH = The Natural History Museum, London; AMNH = American Museum of Natural History; BNHS = Bombay Natural History Society; and AD/BR = Abhijit Das/Barail Range field series.

Species accounts

Amphibia

Anura

Dicroglossidae

1. *Euphlyctis cyanophlyctis* (Schneider, 1799)

Material: None collected.

Abundant in different types of water bodies (ponds, rivers, forest streams, temporary water pools, village water holes and wells, and also swampy areas). Individuals from different areas

of the survey sites showed variation in dorsal pattern. The Moynagarh and Abang Punjee individuals have large dark blotches on the dorsum. Individuals from Jatinga River and other forest streams of Barail, however, are without any dark blotches but have longitudinal rows of large warts on the dorsum.

2. *Fejervarya* sp. 1

With a broad cream coloured mid dorsal stripe; dorsum with long skin fold. Forelimb and hind limb barred. Recorded abundantly in plantation area, open fields, temporary water pools, degraded forest edges, around human habitation and cultivated areas.

3. *Fejervarya* sp. 2

Individuals with very narrow or no mid dorsal line; reddish patch on dorsum. Sympatric with *Fejervarya* sp. 1, it inhabits areas with moist grass near seasonal and perennial water bodies.

4. *Fejervarya* sp. 3

Relatively small body size; narrow but distinct reddish mid dorsal line. Snout more pointed than sister species. Forelimbs not barred; encountered in slow flowing rocky evergreen forest stream.

Ao et al. (2003) recorded *F. nepalensis*, *F. teraiensis* from Nagaland. Borthakur et al. (2007) recognized four species (*F. nepalensis*, *F. teraiensis*, *F. pierrei* and *F. syhadrensis*) from Assam and also reported widespread occurrence of these species from the Kamrup district of Assam. However, the Barail population needs further study.

5. *Hoplobatrachus tigerinus* (Daudin, 1803)

Material: None collected.

Commonly encountered inside as well on the periphery of the Sanctuary, especially in stagnant water bodies, open fields and around human habitations. Considered a delicacy, and is locally consumed by villagers and tea garden workers.

6. *Limnonectes laticeps* (Boulenger 1882)

Material: AD/BR 09–10.

Three individuals (SVL 36–42 mm) were recorded on 1 April 2007 at 0830 h from un-

der leaf litter of a moist rocky stream bed of Puticherra nullah. Juveniles of the species are brick red in colour. When disturbed, they attempted to conceal themselves under leaf litter. In the Kamrup district of Assam, Choudhury et al. (2001) recorded the species from 80–105 m altitude, however, during this study, *L. laticeps* were recorded at ~ 36 m elevation.

7. *Occidozyga* sp.

Material: AD/BR 05–07.

Recorded on 29 March at 1100 h from Notbeng Hill. Individuals of the species (SVL 20–27 mm) were found under rocks of a streambed and in water seepage areas of moist evergreen forest. It was also recorded under bryophyte-covered rocks in Adakuchi Basti Nullah. We encountered >10 individuals.

Ranidae

8. *Amolops* sp.

Material: AD/BR 32.

An individual of SVL 58.12 mm was collected from Adakuchi Basti Nullah from under boulders near a rocky-bottomed, slow-flowing stream at 101 m altitude. When exposed, it took refuge amongst leaf litter underwater. On 27 May 2007, further individuals were encountered on large boulders of the fast-flowing Borthol Stream. During the day, they were seen hiding among vegetation growing on large stream boulders. Although similar to *Amolops gerbilus*, further studies are needed to confirm its identity.

9. *Clinotarsus alticola* (Boulenger, 1882)

Material: AD/BR 13–16, AD/BR 24 (juv.).

On 27 May at 1420 h, a few juveniles (SVL 28.05–31.19 mm) were observed on branches of overhanging vegetation, above the Duiganga stream. On 30 August, at 1100 h, two individuals (SVL 45 mm and 56.39 mm) were recorded from vegetation growing on large rocks of Bhalknala. They released a pungent smell upon capture. Gravid female (SVL 59.25 mm) were obtained on 30 August, and at 1900 h, calling individuals were observed on rocks and vegetation near a stagnant pool along a stream.

10. *Humerana humeralis* (Boulenger, 1887)

Material: AD/BR 08.

Recorded on 2 April at 1000 h from near Lakhicherra stream. A gravid female (SVL 82.09 mm) was found under thick leaf litter accumulated on rocky stream bank, about ca. 1 m above stream. When disturbed, it jumped into the stream and took refuge among fallen leaves underwater.

Besides Myanmar and Nepal (see Schleich and Kästle, 2002), reported from Nagaland (Ao et al., 2003), Assam and Arunachal Pradesh States (Hussain et al., 2007).

11. *Hylarana leptoglossa* (Cope, 1868)

Material: AD/BR 18.

Frequently encountered along degraded forest edge and also around human habitation. One specimen was collected (SVL 56.06 mm). Vocalizations were heard throughout the study period. Individuals were encountered under vegetation in swampy areas and in roadside water puddles. One was found under a decomposed log in a secondary forest and others were observed under rotten logs near human habitation.

12. *Hylarana tytleri* Theobald, 1868

Material: AD/BR 31.

Recorded on 2 May 2007 at 1830 h from Bihara. Individuals were seen calling from water hyacinth (*Eichhornia crassipes*) and other emergent aquatic vegetations of perennial lentic waterbodies. Three individuals were also observed in waterlogged paddy fields. Calling aggregations were also recorded from Naraincherra and Barkhola localities of the study area. Choudhury et al. (2001) reported the species (as *Hylarana taipehensis*) as being abundant in Kamrup District, Assam, although Dey and Gupta (1999) noted it to be rare in Barak Valley, southern Assam. Ohler and Mallick (2002) reported that *H. taipehensis* is an inhabitant of the Indo-Chinese region and listed West Bengal, Orissa, Uttar Pradesh, north-eastern India, Bangladesh and Nepal in the distribution range of *Hylarana tytleri*. Ohler and Mallick (2002) also mentioned that *H. tytleri* differs from *H. taipehensis* in having two distinct brown lines on the inner side of latero-dorsal folds. However, in Kamrup District, sympatric populations of individuals with and without brown inner stripes have been

recorded (Saibal Sengupta, pers. comm.). *H. tytleri* (with distinct brown inner lines) was also recorded from Garbhanga Reserved Forest of Kamrup district (26°04'39.7"N, 91°43'30.6"E; 90 m asl), Panbari Reserved Forest of Golaghat District (26°37'334"N, 93°32.395"E, 65 m asl), Bansbari of Manas National Park (26°42.654'N, 90°59.847'E; 72 m asl) and Pakke Tiger Reserve (26°54'N, 92°36'E; 210 m asl) of Arunachal Pradesh (pers obs).

Microhylidae

13. *Kaloula pulchra* Gray, 1831

Material: AD/BR 28.

Calling aggregations were recorded from swampy and waterlogged areas in and around human habitations, as well as from forest edges during April to June. Calling was heard by day and at night. During July-August, however, no calling activity was recorded. Juveniles of the species were recorded during May-June. The characteristic yellow mark on side of the back is dark or nearly indistinct in adults, whereas it is bright yellow in sub adults and whitish in juveniles.

Although a burrowing frog, it is also a good climber, and is often seen at considerable heights above ground. In Barkhola, one individual was seen at a height of 3 m, climbing a bryophyte covered tree during a heavy shower. *Kaloula pulchra* has been reported from Nagaland (Romer, 1949), Meghalaya (Hooroo et al., 2002), Mizoram (Sailo et al., 2005), and Cachar District of Assam (Dey and Gupta, 2000). The record of the species from "5 miles north of Tinsukia (Assam)", (AMNH 53081) by Baldauf (1949) is based on a misidentified specimen of *Microhyla ornata* (see <http://entheros.amnh.org/db/emuwebamnh/pages/amnh/herpetology/ResultsList.php>)

14. *Microhyla ornata* Duméril & Bibron, 1841

Material: None collected.

Individuals (n > 10) were seen calling from under moist grasses in open areas around habitation as well as at forest edges during May-August. Chorus of the species are commonly heard in and around human habitation, as well as along forest edges and in plantations.

15. *Microhyla cf. butleri* Boulenger, 1900

Material: AD/BR 19–21.

Five individual (SVL 18.50–22.52 mm) were collected on 2 May from Shibtilla in Bihar. Individuals were active on ground in fallen bamboo leaves on a sloping area near paddy field at 1930 h. When disturbed, they jump onto leaves of low shrubs, 10–30 cm above the ground. More material needed to ascertain the systematic status of *M. cf. butleri* in Assam.

16. *Microhyla* sp.

Two individuals of this unidentified species were recorded in the month of April from under brick piles in Maruacherra village. They were sympatric with *M. ornata* but differs in having a relatively stout body, lack of typical dorsal pattern and dorsum with a mid dorsal series of distinct warts. We herein consider it as a member of *Microhyla ornata* complex (Saibal Sengupta, pers. comm.).

 Megophryidae

17. *Leptobrachium smithi* Matsui, Nabhitabhata & Panha 1998

Material: AD/BR 17.

Individuals of the species were heard calling from following localities Chandrapur, Maruacherra, Duiganga, Abong Punjee, and Damcherra.

The characteristic loud Quak..Quak..Quak... call typically starts at dusk and continues until ca. 2100 h. A lone individual (SVL 53.05 mm) was found sitting on a rock just near fast flowing Chamduba Stream at 2300 h. It did not attempt to escape when caught. Choudhury et al. (2001) recorded metamorphosed individuals of this frog during February; however during the present study, metamorphs were recorded during the month of April.

 Rhacophoridae

18. *Philautus* sp.

Material: AD/BR 22.

One individual (SVL 17.74 mm) was taken from on a leaf, ca. 2 m above ground in the Chandrapur area, in late March. A calling aggregation was observed on leaves of small bushes at forest edges and on degraded hill slopes.

19. *Polypedates leucomystax* (Gravenhorst, 1829)

Material: AD/BR 26.

Individuals were seen throughout the study period, in and around human habitations, plantations, secondary forest habitats, and roadside vegetation. Most were observed at a height of 0.3–2 m above ground.

20. *Polypedates* sp.

Material: AD/BR 25.

One individual (SVL 57 mm) was collected from among bushes along Gubicherra stream in the month of August. Resting individuals were encountered in thick overhanging vegetation and banana clumps near flowing streams with large boulders. Resembles *P. leucomystax* in colouration, size and dorsal body pattern but differs in lacking skin co-ossified to forehead.

21. *Rhacophorus maximus* Günther, 1858

Material: AD/BR 23.

A single individual (SVL 104 mm) was recorded from near Maruacherra stream on the outskirts of Marua village during the month of August 2007. It was sitting on a tree fern (*Cyathea* sp.), ca. 1.3 m above ground.

Reported from Halflong (Chanda, 1994) as well as from Barail Reserved forest (Pawar and Birand, 2001), which is now a part of Barail wildlife sanctuary.

Breeding activity of the species was observed during March–April in following localities: Cherrapunjee (25° 17.016'N, 91° 44.114'E) of Meghalaya, Kamlang Wildlife Sanctuary (27°45.913'E, 96°21.432'E; 530 m asl), Mehao Wildlife Sanctuary (28°03'40.1N, 95°56'13.8"E; 750 masl), Deban (27°29'32.5"N, 96°22'54.0"E, 455 m asl) of Namdapha National Park of Arunachal Pradesh, Khonoma village (25°36.898'N, 93°57.240'E; 1,895 m asl) of Nagaland and Panbari RF (26°36.164'N, 93°30.024'E; altitude: 160 m asl).

22. *Rhacophorus bipunctatus* Ahl, 1927

Material: AD/BR 11.

Two calling individuals (SVL 34 mm and 38 mm) were observed on shrubs at 1.5 m off the ground near a forest trail at Bandarkhal area of the Sanctuary during June 2007. Earlier, this species was recorded from near the western

boundary (Digorkhal village) of the Sanctuary (Bhaktiar Hussain, pers. comm.).

Bufoanidae

23. *Duttaphrynus melanostictus* (Schneider, 1799)

Material: None collected.

Commonly observed in various habitats including forest edges, plantations, road side areas, tea gardens and human habitations, etc. Inger et al. (1984) also noted that the species occurs in variety of habitats, especially in disturbed areas.

Reptilia Squamata: Sauria

Scincidae

1. *Eutropis multifasciata* (Kuhl, 1820)

Material: None collected.

Encountered on 28 March 2007 at 1000 h in Maruacherra, and subsequently recorded from Abong Punjee, Doloo TE, Digorkhal, Naraincherra, Bandarkhal and Nunchuri. Most sightings were in secondary and degraded forest areas, as well as plantations, roadside areas and around human habitations. At night (1900 h–2200 h), individuals were seen resting within bushy vegetation, and also in tree holes, ca. 1–2 m above ground.

2. *Eutropis macularia* (Blyth, 1853)

Material: AD/BR 29.

Recorded from under leaf litter in a dry stream bed inside secondary forest of Chotampur at ca. 1430 hr. A gravid female was collected in mid June 2007 from bamboo clumps near Naraincherra. Activity also noted at night (1800–2000 h), particularly near forest trails.

3. *Eutropis quadricarinata* Boulenger, 1887

Material: ZSIC 25807.

On 16 June 2007 at about 2100 h, a gravid female (SVL 50.70 mm; TL 102.85 mm) was seen resting on a dry branch over a puddle on the edge of secondary forest of Naraincherra. The area had extensive cane and bamboo thickets with isolated trees. Four days later (on 20 June, 2007), it produced three eggs, measuring

10.57–10.79 mm in length and 6.31–6.51 mm in width.

Annandale (1905) described *Mabuya anakular* from the Cachar District, which was synonymised with *Mabuya quadricarinata* by Smith (1935). Our individual agrees with Smith's (1935) description of the "Cachar variety" in having uniform brown colouration, without darker markings above. The type specimen of *M. anakular* (ZSIC 2357) is in now in a poor state of preservation. Thus, the present Barail material provides an important addition to the museum collection and also provides a record after a gap of over 100 years from Indian limits. Elsewhere, it has been reported from Myanmar's Chattin Wildlife Sanctuary (Zug et al., 1998).

4. *Eutropis* sp. 1

Material: Not collected.

We sighted this species during two field visits to the Duiganga area of the Sanctuary. An individual was observed foraging among lianas and tree branches next to a water pool. It was seen active among the top fronds of vegetation up to height of ca. 4–5 m, often coming down but rapidly climbing up. It is superficially similar to *E. multifasciata*, but lacks markings on the flanks (in *E. multifasciata*, white spots on the flank region are often present) and is plain coloured dorsally.

5. *Sphenomorphus maculatus* (Blyth, 1853)

Material: ZSIC 25817.

An individual in breeding colour was recorded on 28 March 2007 at 1030 h from Notbeng from the bank of a rocky evergreen forest stream. Another individual in breeding colour was collected 2 April 2007 from Lakhicherra Nullah at 0830 h. It was moving among overhanging vegetation and nearby fallen branches along a small stream. We provisionally refer our specimens to *S. maculatus*, although the dorsal colouration and pattern differs from typical *S. maculatus* and thus could be a cryptic species within the *Sphenomorphus maculatus* complex.

6. *Tropidophorus assamensis* Annandale, 1912.

Material: ZSIC 25813, BNHS 1783.

The first individual (SVL 67 mm; TL 68 mm+, tail tip missing) was encountered in

Adakuchi Basti Stream at 1215 h. It was secreting itself beneath a bryophyte covered boulder on a dry stream bed. A juvenile (SVL 41.23 mm, TL 57 mm) was found under rock at the same area. A third individual was collected in an identical situation near the Chamduba area on 2 April. Unlike other skinks, they remained motionless when uncovered.

The type locality is Harigaj Range, Sylhet Hills (Smith, 1935), then within greater Assam state, and presently within the political boundaries of Bangladesh. This nominal species has been rediscovered at Nengpui WLS of Mizoram after a gap of ~90 years after the original description (Pawar and Birand, 2001). Mathew (2006) reported an individual from a bamboo thicket near a stream from Lunglei District, Mizoram state. However, the present record of *T. assamensis* constitutes the first report of the species from Assam State.

Lacertidae

7. *Takydromus khasiensis* Boulenger, 1917

Material: AD/BR 30.

A gravid female (SVL 40 mm) was collected on 2 April. It was actively foraging among leaf litter at 1230 h near Lakhicherra stream, ca. 1.5 m from water. Two older specimens are present in the collection of Zoological Survey of India, Kolkata (ZSIC 12045–46), from Cachar District, Assam. Das (2002) reports the distribution of this species as Meghalaya, Mizoram and Assam States, as well as Bangladesh and northern Myanmar. Earlier, we had encountered the species among grassy patches near a stream in Cherrapunjee (25°18'29.80"N, 91°42'27.16"E; ~1,200 m asl), Meghalaya State.

Agamidae

8. *Calotes emma* Gray, 1845

Material: ZSIC 25806.

A male (SVL 66 mm; TL 170 mm) was observed on 28 March at 1430 h near Tellacherra nullah, a fast flowing stream within evergreen forest. It was sitting on a boulder and jumped into water when approached. Another male was found on 1 September at 1100 h at Gubicherra Pahar (200 m asl). It was basking on a small banana plant, ca. 1 m above ground. A gravid

female (SVL 91 mm; TL 235 mm) was observed on 17 April, 2007 at Herhse (23°58'N, 92°41'E; 310 m asl) in Kolasib District, Mizoram.

In north-eastern Thailand, Schaedla (2004) recorded nocturnal feeding by *C. emma* which is unique among the members of diurnal active lizards of the genus *Calotes* (Erdelen, 1988; Günther, 1864; Subba Rao, 1970, 1975).

9. *Calotes versicolor* (Daudin, 1802)

Material: None collected.

This is the commonest agamid in the study area and is typically associated with human-modified habitats, and recorded from throughout the study sites. Individuals were sighted in habitats such as tea gardens, teak plantations, around human settlements, on roadside vegetation, near ponds, forest-habitations and forest-agriculture field edges. Most sightings were in arboreal situations, up to 3 m above ground. Gravid female individuals were collected in the month of September.

10. *Calotes* cf. *irawadi* Zug, Brown, Schulte & Vindum, 2006

Material: ZSIC 25816.

On 4 September 2007, an individual was found near Tellacherra stream at 2030 h. It was resting inside a bushy thicket, 1.30 m above ground and 3 m away from the stream. The dorsal colouration was yellowish with blackish spots. When excited, a middorsal series of black diamond shaped spots was seen. Morphologically, the individual is similar to *Calotes irawadi* (see Manthey, 2008). Collection of fresh material and subsequent comparison with recently described species of *Calotes* from Myanmar (Zug et al., 2006) will probably help in identifying this species.

11. *Calotes jerdoni* Günther "1870" 1871

Material: ZSIC 25815.

A female (SVL 13 cm, TL 29 cm) was recorded in September, at 1140 h. It was collected from shrubs (1 m off ground) at the edge of a jhum field, on a slope near Jatinga village. *C. jerdoni* is a common montane agamid of north-eastern India. In our previous field surveys in southern Nagaland (Kohima) and Ukhrul district of northern Manipur (25°07.409'N; 94°26.547'E, 2,025 m asl), *C. jerdoni* was com-

monly encountered around habitations, roadside shrubbery, agricultural lands and along forest trail between altitudes 1500–2350 m. In Nagaland, both green and brown colour morphs were observed, the two Ukhrul individuals were green with two distinct longitudinal brown lines on dorsum; however, the Barail specimen was uniform green in colour. A black colour morph of the species is also known. (Ulrich Manthey, pers. comm.).

12. *Japalura planidorsata* Jerdon, 1870

Material: ZSIC 25808, ZSIC 25809, ZSIC 25810.

Five individuals of this species were recorded on 2 April. They were observed among thick foliage along a fast flowing stream at around 1230 h. The male individuals (SVL 33.00–38 mm; TL 62.00–73 mm) are smaller than the females (SVL 39.00–42 mm; TL 73.00–75 mm). Breeding males are with yellowish-cream stripe from snout to shoulder. The gular region of males are orange coloured. When disturbed, tried to take refuge under large bryophyte covered rocks near the streams, using a hopping motion to escape. When handled, one male individual feigned death.

Gekkonidae

13. *Cyrtodactylus khasiensis* (Jerdon, 1870)

Material: Not collected.

A single individual of the species was encountered on 24 May at 1900 h in Chandrapur area of Naraincherra. The individual was seen on the side of forest trail.

14. *Gekko gecko* (Linnaeus, 1758)

Material: None collected.

On 29 March 2007 at 0930 h, we heard the call of this species in Notbeng, a degraded forest on a hill slope besides Jatinga River. Six individuals were seen on a *Ficus* tree at 5 m above ground in Chotorampur area. Vocalization was heard intermittently on the next day from hills near Lakhicherra Nullah. Zug et al. (1998) observed that *G. gecko*, presumably males, call irregularly throughout the day and night from February into June. On 24 May, two juveniles were observed on a *Ficus* tree, ca 2 m above ground near Naraincherra.

15. *Hemidactylus frenatus* (Duméril & Bibron, 1836)

Material: None collected.

This species was recorded largely from human habitations and dilapidated houses at various localities of the study area. Within human surroundings, this species was mainly observed in cracks of walls and crevices, up to a height of 4 m. Individuals were also seen in a *Ficus* tree hole, ca. 1m above ground.

16. *Hemidactylus platyurus* (Schneider, 1792)

Material: ZSIC 25819.

This species was recorded in the morning of 28 March near Maruacherra, a single individual was seen basking on a tree. The surrounding area was covered with secondary forest with extensive bamboo growth.

In Nilachal hills near Guwahati city, these geckos are often found in association with *Ficus* trees and large rocks during the day (Das, 2002), this microhabitat also noted by Schleich and Kästle (2002).

Varanidae

17. *Varanus bengalensis* (Daudin, 1802)

Material: Not collected.

A single individual was sighted on 15 April, at 0945 h near Bhandarkhal ca. 1 km away from human habitation. It was basking on the roadside (slope >70°).

Varanus is consumed locally. We have seen photographs of *Varanus* on sale in local market at fringe areas. According to villagers, the *Varanus* population declined over the years in and around study area.

Squamata: Serpentes

Typhlopidae

1. *Typhlops diardii* Schlegel, 1839

Material: ZSIC 25812.

Recorded on 16 June, at 1830 h, from Chandrapur forest edge. Known to lead a secretive subterranean existence (Khan, 1998), but this individual was found under tree bark, at 40 cm above water level of a waterlogged area. The freshly collected individual was dull whitish in colouration. Two day later, it shed its skin and

regained its usual dark brown metallic colouration.

Pythonidae

2. *Python molurus bivittatus* (Linnaeus, 1758)

Material: None collected.

On 2 April, we encountered a dead individual on Lakhicherra Pahar, at 339 m elevation. The individual was ca. 3 m in total length. We presume that the snake died from forest fire which completely destroyed the undergrowth vegetation of the hill slope.

Subsequently, another male (SVL 2.3 m, TL 106 cm) was rescued from human habitation of Moynagarh, in the month of July.

Colubridae

3. *Amphiesma stolatum* (Linnaeus, 1758)

Material: None collected.

Recorded as abundant from Dolu tea estate, Barkhola village, Subhong Punjee, Balachera and Bihara, all around human habitation and secondary forest edges. Many were seen as road kills, mainly near human habitation on the Silchar-Halflong road. Threat display consists of erection and expansion of the first third of the body.

4. *Ahaetulla prasina* (Reinwardt in Boie, 1827)

Material: AD/BR 50.

A male (SVL 730 mm; TL 425 mm) was recorded on 20 June at 0930 h from forest edge at Chandrapur. The velvety green individual was observed on a banana clump, devouring a medium sized *Calotes* cf. *versicolor*.

5. *Boiga cyanea* (Duméril, Bibron & Duméril, 1854)

Material: AD/BR 38.

A male (SVL 1205 mm; TL 375 mm) was recorded on 30 August at 0930 h from Lakhicherra stream. It was resting among overhanging branches of a large streamside tree, ca. at 1.8 m above flowing water. When captured, it tried to climb up rapidly. It was in pre-moulting condition, with distinct eye caps.

6. *Boiga ochracea* (Günther, 1868)

Material: AD/BR 57.

A single female (SVL 540 mm; TL 145 mm) was found inside a dry bamboo internode in Putschera area. The locality is a degraded forest on a low hill with extensive bamboo clumps.

7. *Coelognathus radiatus* (Boie, 1827)

Material: None collected.

A single female was collected from a *Ficus* tree, at ca. 1.5 m height in the late afternoon. When threatened, it formed 2–3 loops with the fore body, keeping the mouth wide open and vibrating its tail. Our individual feigned death when handled. According to local people, this species is frequently encountered in paddy fields during the harvesting seasons.

8. *Dendrelaphis cyanochloris* Wall, 1921

Material: AD/BR 40.

A female (SVL 850 mm; TL 343 mm) was encountered on 30 August, at 1430 h, among woody shrubs on a Bhaluknala streamside slope (> 50°). Sensing our presence, it climbed up and took refuge on a top frond (6 m high) of a *Duabhangia grandifolia* sapling. When caught, it flattened its forebody, exposing the sky blue and white interstitial skin and attempted to bite.

9. *Dendrelaphis pictus* (Gmelin, 1789)

Material: AD/BR 41.

The first juvenile was recorded at noon from the Chotorampur area, from the edge between degraded forest and tea garden, and was seen among high grass (*Saccharum* sp.). Another was encountered while crossing a forest trail near a jhum field in Abong Punjee. A third individual, a gravid female (SVL 705 mm; TL 355 mm) was collected from a bamboo clump near human habitation of Naraincherra during the month of April. A male undergoing ecdysis was recorded from high grass in the Chandrapur area during June. When caught, the snake exposed the sky blue interstitial scales, but did not attempt to bite.

10. *Lycodon aulicus* (Linnaeus, 1758)

Material: None collected.

One individual (SVL 530 mm, TL 130 mm) of this widely distributed species was recorded inside a thatched house at 2000 h, from Abong Punjee.

11. *Lycodon jara* (Shaw, 1802)

Material: AD/BR 37.

On 16 June 2007, a female (SVL 320 mm; TL 74 mm) found crossing a waterlogged area, at the Naraincherra forest edge. When handled, it tried to hide its head under its body coil and never attempted to bite.

12. *Oligodon albocinctus* (Cantor, 1839)

Material: AD/BR 64.

During June, a juvenile (SVL 270 mm; TL 47 mm) was found among the prop roots of an unknown tree at 0820 h at ca. 30–40 cm above ground, on a hill slope (~60°), well canopied with extensive growth of *Calamus* sp. in the understory.

13. *Psamodynastes pulverulentus* (Boie in: Boie, 1827)

Material: ZSIC 25814.

On 28 March at 1230 h, a juvenile (SVL 160 mm; TL 45 mm) was recorded from dry leaf litter from Borthol Teak plantation area. On 5 June at 1000 h, another female (SVL 402 mm; TL 95 mm) was recorded from Chandrapur. It was found among fallen leaves on the steep stream bank. Both individuals were recorded below 80 m elevation. David and Vogel (1996) reported that the species is found from sea level up to 2000 m inhabiting lowland tropical wet and dry forests, tropical and subtropical wet montane forests, bamboo forests, moist scrublands, marshes and swamps, rice paddies, hedges and gardens in the suburban areas.

14. *Ptyas korros* (Schlegel, 1837)

Material: Not collected.

One individual was seen resting inside thick grassy clump near Tellacherra nullah (40 m asl) at around 1900 h. David and Vogel (1996) mentioned that this species is known from sea level up to 1,500 m. However, in north-east India, this species has been recorded at an elevation of 2,000 m from Khonoma village in Nagaland, where it occurs sympatrically with *Ptyas nigromarginatus* (Das and Ahmed, 2007).

15. *Ptyas mucosa* (Linnaeus, 1758)

Material: AD/BR 63.

This species was recorded in Doloo Tea Estate, Abong Punjee, Naraincherra, Nunchuri and

was always encountered in and around human habitation. A female (SVL 1300 mm; TL 390 mm) was killed by local villagers near Maruah Village.

16. *Pareas monticola* (Cantor, 1839)

Material: AD/BR 56.

A road kill was recorded near Bandarkhal village during August. The road segment bordered a swampy area on one side and forested hill on the other.

In Mizoram, an individual was found resting among the leaf of *Forrestia* sp. growing along a forest stream. The species was reported from Kaziranga National Park (Mathew, 1983) and we observed the species from Podumoni Wildlife Sanctuary (27°24'51"N, 95°18'39"E, 120 m asl) in Tinsukia District, Hengrabari (26°09'.53.4"N, 91°47'33.0"E, 175 m asl), Kamrup District, Assam. Individuals from Upper Assam and that from Mizoram show variations in dorsal pattern, also noted by Athreya (2006).

17. *Rhabdophis subminiatus* (Schlegel, 1837)

Material: ZSIC 25821.

A male (SVL 427 mm; TL 160 mm) was recorded from tea garden-forest edge of Naraincherra.

18. *Rhabdophis* sp.

Material: ZSIC 25825, ZSIC 25826, ZSIC 25827, ZSIC 25828.

The first individual of this natricine was encountered on 28 March 2007 at 1100 h near Lakhicherra Nullah. A male (SVL 495 mm; TL 145 mm) was seen near a water puddle among leaf litter. On 2 April 2007 at 1630 h, the second female (SVL 465 mm; TL 123 mm) was collected from human habitation of Maruahcherra. When handled, it regurgitated a partly digested *Hylarana leptoglossa*. The third male (SVL 610 mm, TL 195 mm) was collected on 26 May 2007, at 0945 h, from among accumulated plant material near a water puddle, ca. 3 m away from the fast flowing Lakhicherra stream. The fourth and the largest male (SVL 600 mm, TL 230 mm) was captured from Lakhicherra Jhum field on a hill slope above Lakhicherra stream. It was active at dusk.

The species closely resembles *Rhabdophis himalayanus*, but differs from the type specimens (BMNH 1946.1.23.75 and BMNH 1946.1.13.15) in having a reddish chevron mark (vs. a distinct collar in *R. himalayanus*) on the neck and having an unpatterned venter (vs. ventrals with dark mottling in *R. himalayanus*).

All individuals were docile, never attempting to bite when handled. The largest male broke its tail while being handled, a phenomenon reported in *Xenochrophis*, *Rhabdophis subminiatus*, *Amphiesma stolatum*.

19. *Xenochrophis piscator* (Schneider, 1799)

Material: AD/BR 60–62.

The first individual was collected at 2000 h from a pond with extensive aquatic vegetation near Naraincherra. A second specimen was collected while it was basking on overhanging vegetation of a pond. The third was seen on a moist rocky streambed in degraded forest at Chorampur.

The three individual differ in dorsal colouration. AD/BR 60: is olive with a narrow inverted V nuchal mark; faint dorsal markings only on anterior part; posterior body and tail without any markings; no postocular stripe. AD/BR 61: yellowish with dorsal scales edged with black only anteriorly, posterior part unpatterned; no nuchal markings but two distinct postocular stripes present. AD/BR 62: dorsum with conspicuous large black blotches darker anteriorly, lighter posteriorly; an inverted “V” nuchal mark; post ocular stripe distinct.

However, in all three individuals, the venter was white, with the scales darker only at the outer edge. Vogel and David (2006) remarked that, in the closely related species *X. schnurrenbergeri* and *X. flavipunctatus* the ventral and subcaudal scales all with entire, broad, dark markings.

Viperidae

20. *Cryptelytrops erythrurus* (Cantor, 1839)

Material: AD/BR 42–43 AD/BR 55, ZSI 25820.

A male (SVL 435 mm; TL 134 mm) was collected on 14 June 2007 from Naraincherra village. It was found among piled up pumpkins kept 2 m above ground. Another male (SVL 325

mm; TL 75 mm) was encountered on the bank of Jatinga River at 2200 h. A large female (SVL 670 mm; TL 100 mm) was recorded on 4 September at 2200 h from Borthol. This individual was seen coiled among leaves of an overhanging branch 3 m above fast flowing Borthol stream.

21. *Ovophis monticola* (Günther, 1864)

Material: ZSIC 25811.

On 16 October, a single juvenile (SVL 200 mm; TL 45 mm) was found under boulders of a landslide area near Jatinga Village (~800 m asl). Earlier, this species was mainly encountered between an altitude of 1,000–2,000 m asl in Meghalaya and Nagaland. In Nagaland, we noted gravid individuals in the months of June–July.

Elapidae

22. *Bungarus niger* Wall, 1908

Material: AD/BR 52.

On 25 August, we encountered a male (SVL 832 mm; TL 135 mm) near Damcherra Village. It was crossing the Silchar–Halflong road at ca. 1900 h. Earlier reported from Cachar District by Grosselet et al. (2004). Wall (1909, 1911) recorded it from elevations up to 4,000 ft (= 1,220 m) from northern West Bengal. Schleich and Kästle (2002) reported the occurrence of the species up to 1,450 m asl.

23. *Bungarus fasciatus* (Schneider, 1801)

Material: None collected.

A single individual was observed near human habitation of Maruacherra Basti, at 1930 h. The locals informed us that they often encounter this species at night, especially after heavy showers.

24. *Naja kaouthia* (Lesson, 1831)

Material: None collected.

The brown variety was collected from Abong Punjee during the survey. This individual was under stacked firewood of a degraded forest edge. Recorded from human habitation of Dolu Tea Estate and paddy fields of Barkhola Village.

25. *Ophiophagus hannah* (Cantor, 1836)

Material: None collected.

On August, a male (SVL 303 cm; tail missing) was killed by villagers in Nunchuri when it ventured near a house during the day. Prior to

this survey, an adult was rescued by members of a local NGO from human habitation at Bihara Village (photographic evidence). We saw a piece of skin from Maruacherra Village, which was reported to have been killed by villagers in 2005, from adjoining Pan Jhum field when it attacked their hunting dog during day time. Local Khasi tribesmen believed that the tail of the species has medicinal value. In north-eastern India, this species is recorded up to 1,700 m elevation (Das et al., 2008).

Testudines

Testudinidae

1. *Manouria emys* (Schlegel and Müller, 1844)

Material: None collected.

One live individual (SCL 30 cm) was seen in a village house at Bandarkhal. The owner reported that he collected it on "Bandarkhal hill" at the northern boundary of Barail Wildlife Sanctuary, from a bamboo thicket during February 2007 with the help of his dog, and was kept as a pet.

In north-eastern India, this species has been recorded from Loomajooting in Nagaland; Tarapung area, Kalyani Reserved Forest, Near Maibong, Langting-Mupa Reserve Forest, Barail Range, Innerline Reserve Forest of Assam; Nongkhyllam Wildlife Sanctuary, Balpakram National Park of southern Garo hills of Meghalaya, Phura and Sangu in Saiha District and Dampa Tiger Reserve of Mizoram (Anderson, 1871, 1872; Das, 1995; Choudhury, 1996; Choudhury, 2001, Pawar and Choudhury, 2000).

Geoemydidae

2. *Cuora mouhotii* (Gray, 1862)

Material: None collected.

On 31 May 2007, we examined a shell of a freshly-killed individual from Bandarkhal Village. The owner of the shell stated that he collected it in November 2006 near a rocky forest stream on Nimatha Hill (1,100 m asl). Subsequently, another shell was examined from Chorampur village of Bijoypur TE, which was collected near a logging trail on Maruacherra Hill during the winter. According to Ernst and

Barbour (1989), the species is terrestrial and seldom enters water.

This species was reported from Cachar Hills and Kopali River of North Cachar Hills by Anderson (1871). Elsewhere it was reported from Dhansiri Reserved Forest of Karbi Anglong (Choudhury, 1993); Garo and Khasi hills of Meghalaya (Das, 1991); Durpong RF of Papum Pare District of Arunachal Pradesh (Choudhury, 1995), Mehao Wildlife Sanctuary, Namdapha National Park of Arunachal Pradesh (Bhupathy and Choudhury, 1992; Das, 1991).

- *Cyclemys gameli* Fritz, Guicking, Auer, Sommer, Wink & Hundsdörfer, 2008

Material: Not collected.

On 2 April 2007, a male was collected from thick leaf litter of Lakhicherra plateau (ca. 300 m asl). It measured: straight carapace length 107 mm, straight carapace width 90 mm, curve carapace width 103 mm, greatest plastral length 98 mm. The specimen was subsequently released.

A shell was examined at Naraincherra village, which measured as follows: carapace length 220 mm, greatest plastral length 190 mm, shell height 80 mm. These measurements are close to the higher end of the range reported by Schleich and Kästle (2002) and Das (2002).

In a recent revision of the *Cyclemys*, Fritz et al. (2008) described *C. gameli* based on a collection from Tezpur to Arunachal Pradesh, 5 km to border of Arunachal Pradesh, Jia Bhoroli River Region, Assam, India. They revealed that, *Cyclemys* in north-east India, northern West Bengal, Uttar Pradesh (Nepal Border) are *C. gameli* and not *C. oldhami* as was previously believed (see Fritz et al., 1997). We assigned the Barail specimen to *C. gameli* based on extended morphological description of *Cyclemys gameli* by Praschag et al (2009).

Discussion

The present inventory comprises 45 species of reptiles and 23 species of amphibians. Among reptiles, the lizards are represented by 17 species in five families and 10 genera; snakes consist of 25 species in five families and 19 genera and tortoise and turtles comprise three species in two families and three genera. Among the saurians, Scincidae is the dominant family (six species) followed by Agamidae (five species) and Gek-

konidae (four species). The saurian families, Lacertidae and Varanidae, are represented by a single species each, i.e., *Takydromus khasiensis* and *Varanus bengalensis*, respectively. The recorded snake diversity is dominated by members of the family Colubridae (17 species) followed by Elapidae (four species) and Viperidae (two species). The families Typhlopidae and Pythonidae are represented by one species each, i.e., *Typhlops diardii* and *Python molurus bivittatus*, respectively.

All 23 recorded species of amphibians were anurans, and are distributed in six families and 16 genera. Dicroglossidae is the most diverse family, represented by seven species followed by Ranidae and Rhacophoridae (five species each) and Microhylidae (four species). The families Bufonidae and Megophryidae are represented by a single species, *Duttaphrynus melanostictus* and *Leptobranchium smithi*, respectively.

The highlight of the present study is the record of rare and poorly known forest skink species- *Tropidophorus assamensis* and *Eutropis quadricarinata*. Both these lizards have rarely been reported since their description. We also present the first reproductive data of *Eutropis quadricarinata* (see Das, 2002).

During the present survey, several herpetofaunal species were recorded, the identity of which are either unknown or conferred to closely related species. The positive identification of these species will follow with additional survey, the generation of new data and further collaborative work with appropriate specialists. These provisionally identified species may represent previously unknown species, or variants of species already included in this list. Among amphibians these poorly identified species include *Occidozyga* sp., *Amolops* sp., *Philautus* sp. and *Microhyla* sp. and among reptiles, includes *Rhabdophis* sp.

Many of the species encountered during the survey are still members of cryptic species complexes. Species complexes

are groups of morphologically similar species that in the past have been recognized as single species such as *Polypedates leucomystax* (fide Inger, 1999). According to Bain et al. (2003), most of the species complexes are widespread, although the member species can have only limited ranges within this broad range. Among reptiles, some species complexes encountered are *Boiga ochracea* (fide Smith, 1943), *Ovophis monticola* (fide Leviton et al., 2003), *Calotes emma* (Manthey, 2008), *Cyrtodactylus khasiensis* (fide Samrat Pawar, pers comm.) and *Ophiophagus hannah* (fide Das, 2002).

The number of species encountered in our study is lower than that of other known inventory in the north-eastern India (Pawar and Birand, 2001; Sengupta et al., 2000; Ahmed et al., 2004; Athreya, 2006). Our results are based on a survey constrained by time, and comprised a single rainy season. Extensive and long term field surveys will no doubt significantly add to the herpetofaunal records of this area. This assumption is supported by the sharp slope in the species accumulation curve (Fig. 2) from the present survey. This prevents from making any approximation of the species diversity in the study area. Species that were not recorded during this survey but are known from Cachar and the adjoining North Cachar Hills include *Boiga siamensis* (ZSIC 8718), *Boiga gokool* (ZSIC 14746), *Chrysopelea ornata* (ZSIC 14734) and *Oligodon cyclurus* (ZSIC 14731). Discussion with the local inhabitants indicated the presence of few interesting “tree frogs” and “green-backed forest stream dwelling frogs.”

Among the recorded species, *Python molurus bivittatus* and *Varanus bengalensis* have been

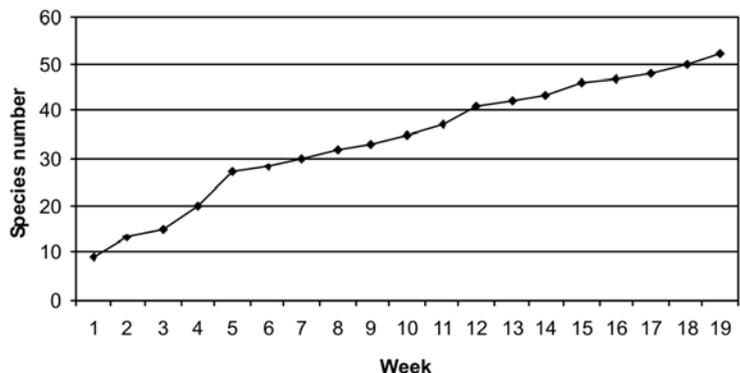


Figure 2. Species accumulation curve for the present study.

accorded the highest legal protection status, under Schedule I of the Indian Wildlife (Protection) Act, 1972. Four species- *Naja kaouthia*, *Ophiophagus hannah*, *Ptyas mucosa* and *Xenochrophis piscator* are listed in Schedule II, all other snake species are listed under Schedule IV of the Act. Five species, namely, *Naja kaouthia*, *Ophiophagus hannah*, *Ptyas mucosa*, *Manouria emys* and *Cuora mouhotii* are listed in Appendix II of CITES. Two species of Testudines recorded in the area, *C. mouhotii* and *M. emys*, are also categorized as "Endangered" under the IUCN Red List. Unfortunately, due to lack of awareness and also literally non-existent law enforcement machinery, species like *Varanus bengalensis*, *Hoplobatrachus tigerinus* and turtles are killed and consumed by many locals. During the field survey period, discussions with locals were held to increase awareness of the importance of conserving herpetofaunal species.

Barail Wildlife Sanctuary harbours some of the last remaining lowland evergreen forest patches in north-eastern India. Considering the scarcity of knowledge of diversity, distribution and many other aspects of the herpetofauna of the region, the present study assumes significance. Further exploration of the region, including the interior mountain area of Nagaland and the North Cachar Hill District, is our next priority.

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