

THE CONSERVATION STATUS OF MAMMALS AND BIRDS IN THE IMAWBUM MOUNTAINS, KACHIN STATE, NORTHERN MYANMAR

Vincent Nijman



Yangon

Fauna and Flora International

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ACRONYMS AND GLOSSARY

ASEAN	Association of Southeast Asian Nations
ASEAN-WEN	ASEAN-Wildlife Enforcement Network
BANCA	Biodiversity and Nature Conservation Association (Myanmar)
CBD	Convention on Biodiversity (also known as Rio Convention)
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora (also known as Washington Convention)
Endemic	A species native to and confined to a particular geographical region.
EBA	Endemic Bird Area: an area supporting at least two Restricted Range Species.
FFI	Fauna and Flora International
Globally threatened	A species assigned a category of threat in the IUCN Red Lists of Threatened Species; the term includes species that are listed as Vulnerable, Endangered and Critically Endangered but excludes species listed as Near Threatened or Data Deficient.
IUCN	International Union for the Conservation of Nature
m asl	metres above sea level
NTFP	Non-timber forest products
RRS	Restricted Range Species: a bird species with a global breeding range of less than 50,000 km ² .
TRAFFIC	The Wildlife Trade Monitoring Network
WWF	World Wide Fund for Nature (World Wildlife Fund in the USA)

EXECUTIVE SUMMARY

This report is an account of biodiversity surveys undertaken between February 2010 and March 2014 in the Imawbum Mountains, Kachin State, northern Myanmar. The objective of this report is to report on this period of fieldwork by providing baseline data on the birds and mammals of the area, to put this into context, and to make recommendations for future work which can serve as a basis and provide guidance for planning the subsequent programme of activities leading to the establishment of a national park in the Imawbum Mountains.

The objectives of this survey were to undertake baseline biological surveys within the Imawbum Mountains to determine the international, regional and national importance of the site for biodiversity conservation, and to ascertain the status of key elements of the biodiversity and to identify key conservation requirements. The Imawbum Mountains are best known as the area where in 2010 the Myanmar snub-nosed monkey *Rhinopithecus strykeri* was discovered and it is one of two areas where the species has been confirmed to date (the other being in an area adjacent to the Imawbum Mountains in China). As such particular consideration is given to the needs of protecting this species, its habitat, as well as other high-conservation value species.

The proposed Imawbum Mountains National Park covers an area of ~2,000 km² and borders Yunnan's Three Parallel Rivers World Heritage Site (including the Gaoligongshan nature reserves) in China. The area is covered in a mixture of subtropical forest, temperate rainforest on higher slopes, rhododendron, pine and coniferous forest at even higher elevations, and alpine shrubs on the highest peaks and ridges. Throughout the area, especially in the highest parts extensive areas of shrubland, grassland and bamboo forest are present. The area is mountainous with several peaks of >3,500 m asl: the highest peak in the area is Mt Imawbum, at 4,004 m asl, after which the area is named. The area is dissected by several rivers and close to the rivers, especially on the western side of the proposed park numerous small villages are found. Situated in the northernmost part of Myanmar, bordering the eastern Himalayas, the Imawbum Mountains experience strong seasonal climatic changes and the higher parts of the area are covered in snow from December until March – April, thus restricting access.

A total of 49 mammals were documented to be present in the area. Noteworthy species are 8 species of primate (Bengal slow loris *Nycticebus bengalensis*, Myanmar snub-nosed monkey, Shortridge langur *Trachypithecus shortridgei*, Assamese macaque *Macaca assamensis*, stump-tailed macaque *M. arctoides*, rhesus macaque *M. mulatta*, northern pig-tailed macaque *M. leonina*, and eastern hoolock gibbon *Hoolock leuconedys*), 14 species of carnivore (dhole *Cuon alpinus*, red panda *Ailurus fulgens*, Asiatic black bear *Ursus thibetanus*, sun bear *Helarctos malayanus*, masked palm civet *Paguma larvata*, large-toothed ferret-badger *Melogale personata*, hog badger *Arctonyx collaris*, stripe-backed weasel *Mustela strigidorsa*, yellow-throated marten *Martes flavigula*, spotted linsang *Prionodon pardicolor*, clouded leopard *Neofelis nebulosa*, leopard cat *Prionailurus bengalensis*, marbled cat *Pardofelis marmorata*, and Asian golden cat *Catopuma temminckii*) and 8 species of odd-toed ungulates (Eurasian wild pig *Sus scrofa*, red muntjac *Muntiacus muntjak*, Gongshang muntjac *M. gongshannensis*, tufted deer *Elaphodus cephalophus*, takin *Budorcas taxicolor*, Chinese serow *Capricornis milneedwardsi*, red serow *C. rubidus*, and Chinese goral *Naemorhedus griseus*).

Probably four groups of Myanmar snub-nosed monkey occur in the Imawbum Mountains – one group was found to be present in an area north from where the original three groups were found when the species was first discovered by an FFI / BANCA research team in 2010. Camera trap photographs and video footage from within three of these four group's ranges was obtained. The species occurs generally above the 2,600 m asl line, but appear to show some signs of seasonal altitudinal migration (with groups moving higher up on the mountains

in summer and moving to lower elevations, and thus closer to the villages, in winter). Additional groups may be found in the southeastern part of the Imawbum Mountains, close to the border with China.

A total of 176 species of bird were recorded during the surveys, including the globally threatened rufous-necked hornbill *Aceros nipalensis*, beautiful nuthatch *Sitta formosa*, Blyth's tragopan *Tragopan blythii* and Ward's trogon *Harpactes wardi*. In addition to Blyth's tragopan, 4 Restricted Range Species (i.e. species with a breeding range <50,000 km²) were recorded: grey sibia *Malacias gracilis*, streak-throated barwing *Actinodura waldeni*, white-naped yuhina *Yuhina bakeri* and brown-winged parrotbill *Suthora brunneus*. One species, the white-throated laughingthrush *Garrulax albogularis*, was observed in flocks and as singles: the records of this species appear to be the first for Myanmar.

The main threats to the biodiversity of the Imawbum Mountains are commercial logging and logging road construction, hydropower dam construction (leading to an increase in access to the area), bushmeat trade, collection of timber and non-timber forest products (NTFP) and the commercial wildlife trade across the border into China.

During the surveys in the Imawbum Mountains, and by obtaining information from local villagers and hunters, it was clear that the area had recently seen a change in how people use the land and its natural resources, and how mammals and birds are exploited. In 2001 Chinese commercial timber companies started operating in the area. The roads they build and the roads they are still building allow easy access to markets in China. Trade is furthermore facilitated by the presence of logging camps and road construction camps employing Chinese workers. Over the last 15 years local hunters shifted from subsistence hunting to commercial hunting and bushmeat and medicinal plants are now traded in substantial volumes. While specifically targeting a small number of high-value species, such as Asiatic black bear, sun bear, serow, and certain medicinal plants, a large number of other species are taken as well. Future access to the area may furthermore increase with the construction of several dams in the Maykanp River, to the west of the Imawbum Mountains, allowing hunters not only to penetrate further into the area but also giving them year-round access.

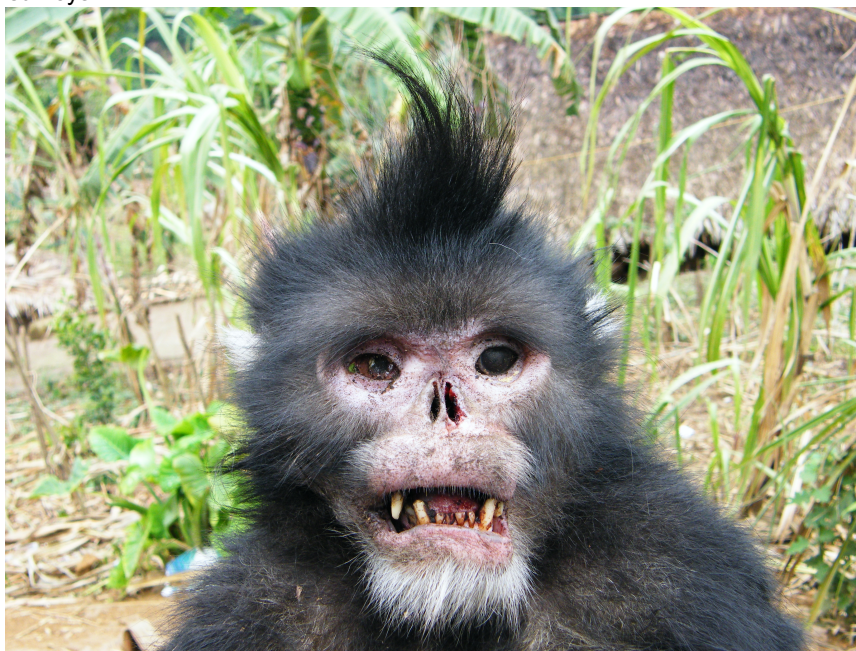
To further our understanding of the biodiversity of the Imawbum Mountains it is recommended that future surveys target additional taxa and increase the geographic coverage of the park. The local people are key to protection the biodiversity in the area –and in mitigating threats to habitats and fauna—and it is important to gain better insight in their use of natural resources in the wider Imawbum Mountains. Finally, levels of targeted and non-targeted hunting need to be assessed and commercial trade, especially where it pertains to cross-border trade to China, needs to be monitored to ensure it does comply with Myanmar's domestic legislation as well as with the rules and intentions of international treaties to which both Myanmar and China are signatories.

INTRODUCTION

Conserving biodiversity in tropical forest ecosystems is of more importance now than ever before. Forest biodiversity, including the trees, other plants, and animals residing in it, be it permanently or seasonally, is under increasing threat from a large variety of human-driven processes. Forest is being lost as is being converted to other land-uses, including permanent agriculture, cattle ranches and water reservoirs, and it is being degraded by unsustainable use. In Myanmar the remaining natural forests are subject to logging for timber and for pulp, replacement with cash crops, non-indigenous fast growing tree species as well as clearance for permanent agriculture. While little primary forest remains in Myanmar as a whole, several States still have substantial areas of forest remaining, and, importantly, compared to other parts of Southeast Asia the percentage of forest that is under threat is relatively low (Anonymous 2014, Leimgruber et al. 2005; Lynam et al. 2006, Rao et al. 2002, 2013). As such there are still good opportunities to invest in biodiversity conservation.

This report gives an overview of the results of several faunal surveys that were conducted in the Imaubum Mountains in Kachin State in Northern Myanmar. The area became the focal point for conservation when in 2010 a primate species hitherto unknown to science was discovered in the area – the Myanmar snub-nosed monkey *Rhinopithecus strykeri* (Geissmann et al. 2010). Four congeners were known from China and Vietnam, with the geographically and phylogenetically nearest species, the black snub-nosed monkey *R. bieti* occurring in an area some 150 km to the west, with the two species being separated by both the Salween and Mekong Rivers. Between February 2010 and March 2014 surveys were conducted to assess the geographic distribution and status of this species –through field surveys, camera trapping and interviewing villagers living in and adjacent to the Imaubum Mountains. Proposals have been drafted to ensure that the biodiversity in the area where the Myanmar snub-nosed monkeys were found as well as the wider region will be preserved for future generations. Here details are presented of the mammals and birds that were recorded during the surveys and the conservation challenges that were encountered during the surveys.

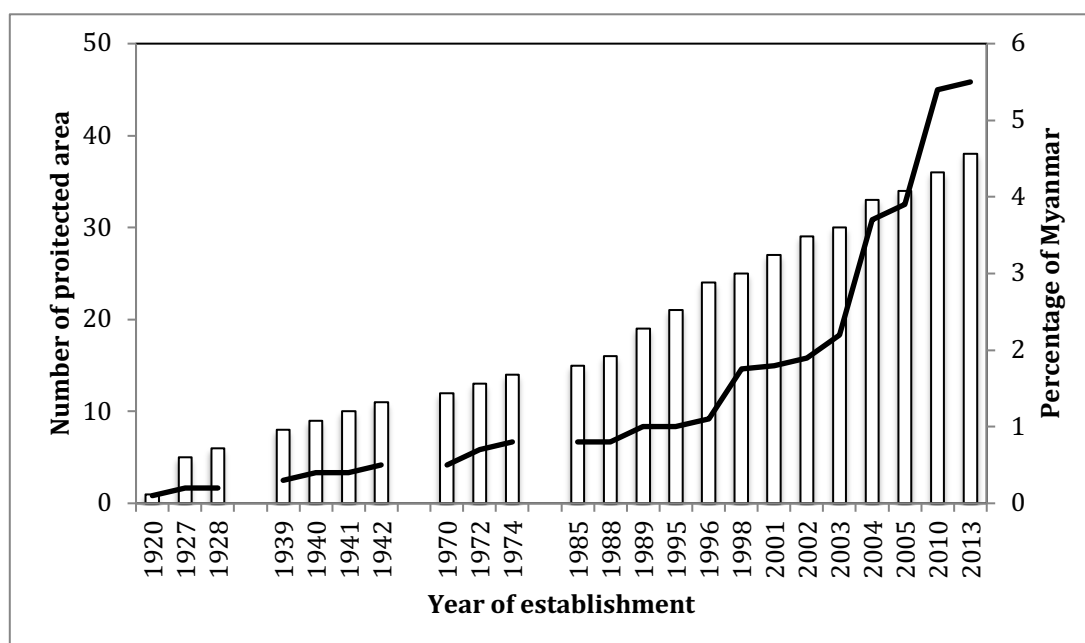
Figure 1. The Myanmar snub-nosed monkey *Rhinopithecus strykeri*, a newly described species of primate from the Imaubum Mountains, Kachin State, Northern Myanmar, was the focus of the biodiversity surveys



Protected Area Network in Myanmar

In order to fulfill its commitments to the Convention on Biological Diversity (CBD), Myanmar is establishing protected area to conserve biodiversity, and to maintain diverse, representative ecosystems and biodiversity. Since 2009 the protected area coverage increased from 35 (26,214 km²) to 38 (37,932 km²) (Figure 1) (Anonymous 2014). Myanmar's protected areas include the sub-temperate forests in the north and mangrove and tropical rain forests in the south. Among the 38 protected areas, seven are ASEAN Heritage Parks (AHPs), which is the highest number among the ASEAN member states. Another seven areas with significant biodiversity, representing a further 1.19% (8,063 km²) of the country's area, are notified as proposed protected areas. As of January 2015 their establishment is in process, and including these proposed parks, Myanmar currently has 5.61% of its total area included in the protected area network

Figure 2. Establishment of protected areas in Myanmar from 1920 to 2014 (from Anonymous 2014)

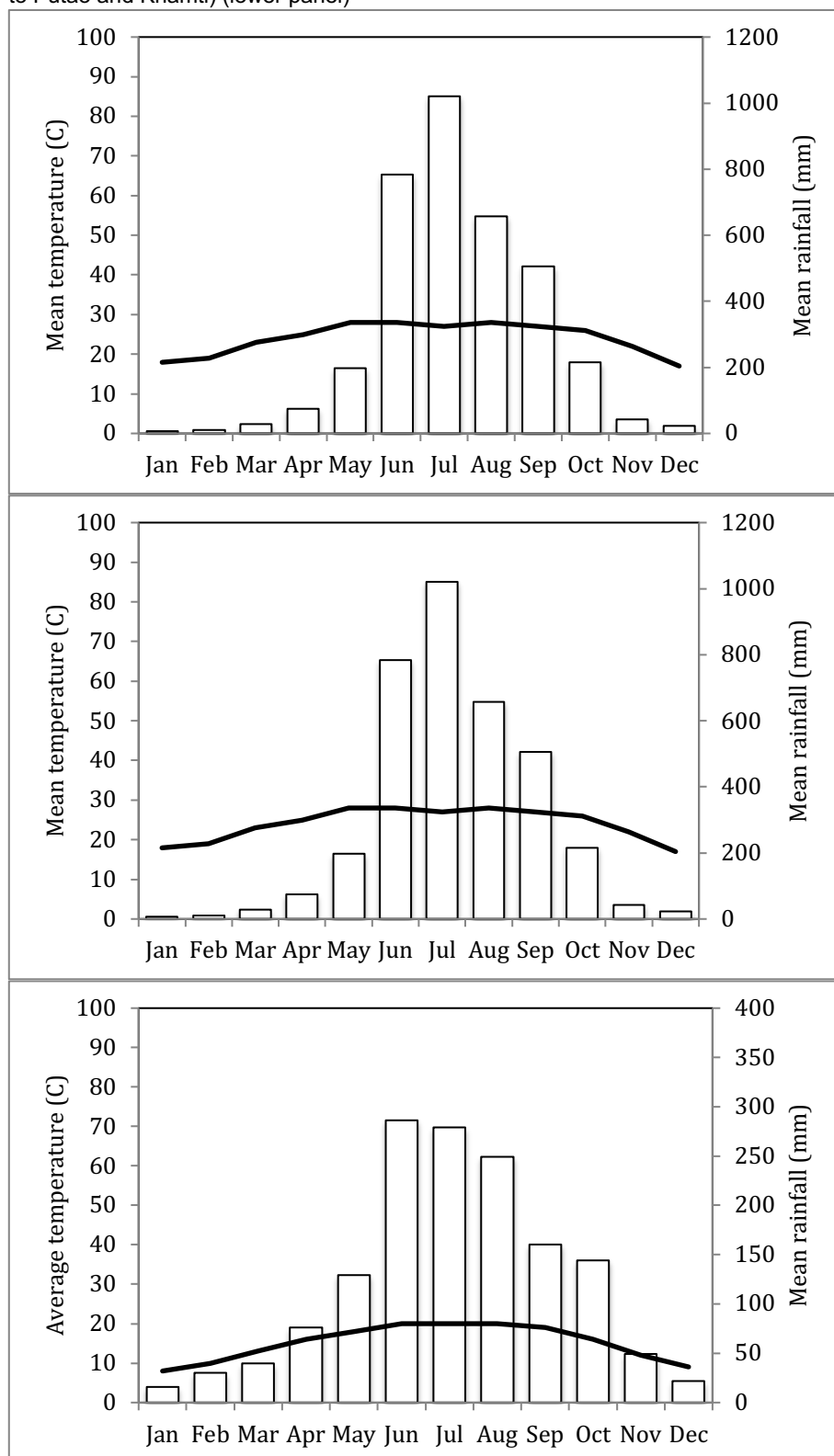


Climate of Northern Myanmar

Myanmar has a tropical monsoon climate, characterized by strong monsoon influences, with large amounts of sun, a high rate of rainfall, and high humidity year-round. There are three more or less distinct seasons in Myanmar: a cold and dry season, from November to February, a hot-dry season from March to April and a wet season between May and October. The annual average temperature in the lowland ranges somewhere between 22 to 27°C, with an annual rainfall in the central parts of the country of approximately 2,500 mm. But climatic differences are pronounced between the north and the south, and even more so between the lowlands and areas at higher elevations, even if situated at similar latitudes. Mountain ranges dissect Myanmar in various ways, with especially the northern part of the county being characterised by the presence of impressive mountains (forming part of the Himalayas).

With increasing altitude the temperature drops, approximately by about 0.6°C for each rise of 100 metres. Heat is more quickly lost from high altitudes at night, and therefore the daily temperature fluctuations are greater in the mountains than in the lowland, viz ~15-20°C compared to ~5-8°C.

Figure 3. Climatic profiles of three sites surrounding the Imawbum Mountains, i.e. Khamti (146 m asl) annual rainfall 3569 mm (upper panel), Putao (409 m asl) annual rainfall 4001 mm (middle panel) and Tengcheng (1,649 m asl) annual rainfall 1478 mm (note the different scale on the rainfall axis compared to Putao and Khamti) (lower panel)



Since cool air is heavier than warm air, when air cools down at night, it naturally will flow down slopes. If, however, there is no slope down which it can flow, for example in hollows, valleys or plateaus, the air will get progressively colder, especially during the dry season when the night sky is more clear.

There is no long-term weather station in the vicinity of the Imawbum Mountains so it is not possible to reflect on the actual climatic conditions in the study area. However, three climate diagrams from Putao (409 m asl), northwest of Imawbum, Khamti (146 m asl), south of Imawbum and Tengcheng (1,649 m asl) east of Imawbum in Chinese Yunnan, give a good representation of what the long-term climatic conditions are in the study area. Putao and Khamti illustrate well the seasonality in rainfall with small amounts (<50 mm) falling in November to February, and very large amounts (>500 mm) in June through to September. The total amount of rainfall averages 4,001 mm for Putao and 3,569 mm for Khamti. Mean monthly temperatures are in the teens in the winter months and at or above 25°C in the summer months. The climate profile of Tengcheng, being situated at a considerable higher elevation, demonstrates the effects of altitude. The mean monthly temperatures in December and January fall below 10°C and in summer it just reaches 20°C. The amount of rainfall in November to February is comparable to that in Putao and Khamti, but in the summer months appreciably less rainfall falls (i.e., typically between 150-300 mm per month).

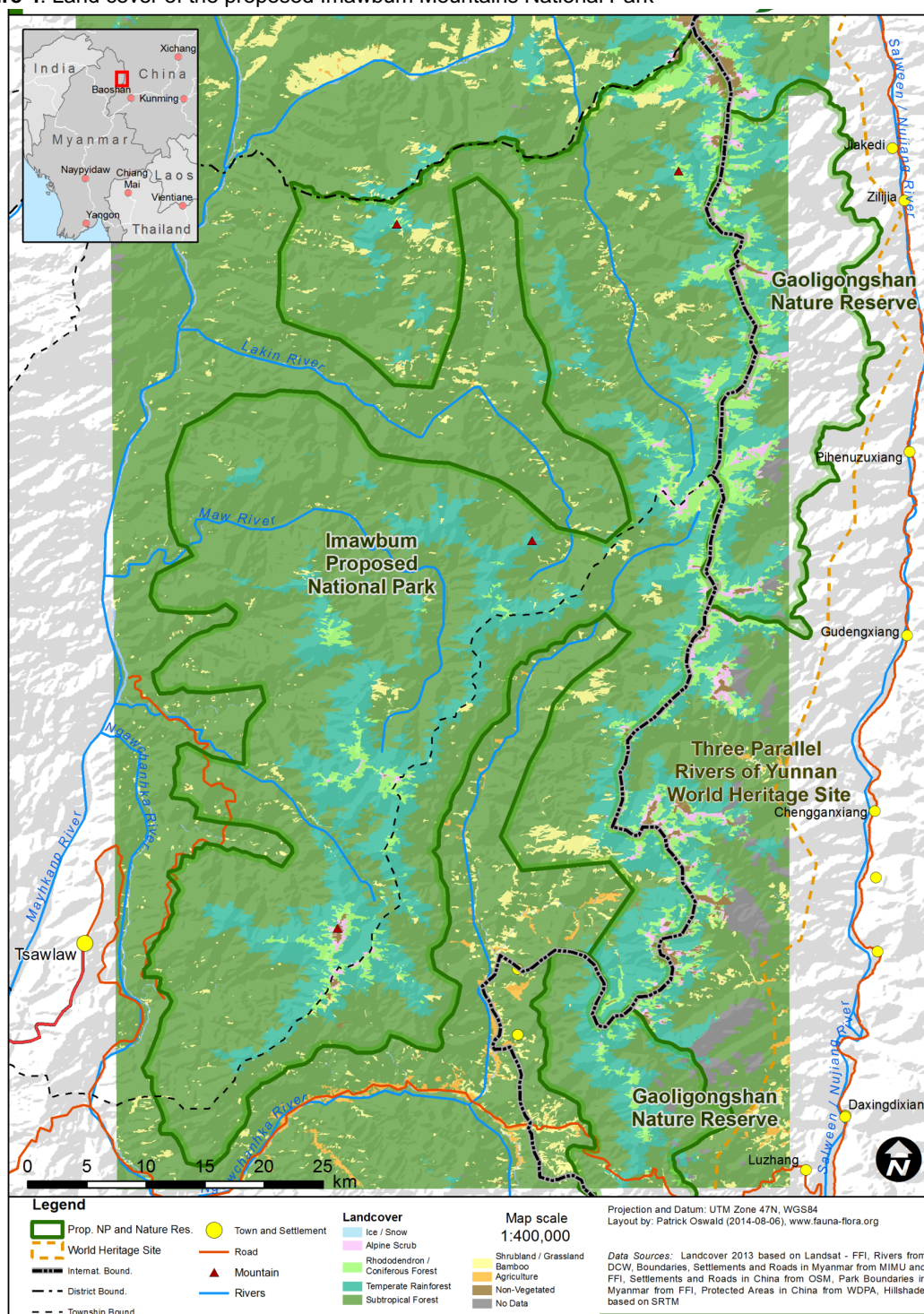
Snow is a regular feature of the landscape and climate in areas above the 2,000 m asl line, with the first snow typically falling at the end of November and continuing to fall until February – March. Snow cover remains present in many higher areas until early April. As explained above, temperature and hence the occurrence of snow and the presence of snow cover, is dependent on altitude as well as the microclimate of specific sites, but for many animals in the Imawbum Mountains snow cover is something they have to deal with annually for shorter or longer periods. Altitudinal migration –moving down to lower elevations when the weather turns colder or when the first snow cover appears, and moving to higher elevations once the temperatures rise-- is part of this process.

Habitat Types in the Imawbum Mountains

Large parts of Northern Myanmar are still covered in forest (Leimgruber et al. 2005). Natural forest comes in two broad types in Myanmar, i.e. evergreen forest and deciduous forest (Whitmore 1975). Evergreen forest, in which the leaves remain green all year round, are found in areas with a short dry season (typically less than three consecutive months) and a large amount of annual rainfall (typically more than 1,500 mm a year). They can be found at almost all altitudinal levels, including high mountains. Deciduous forest, where in response to water stress trees shed their leaves, is found in areas with more than three consecutive months of restricted rainfall and that typically receive less than 1,500 mm of precipitation a year. It tends to be more common in the lowlands (as even in drier areas due to stowage mountains receive increased levels of rainfall). Most of the natural forest in Northern Myanmar is evergreen forest.

In the Imawbum Mountains we can distinguish five distinctive habitat types, i.e., subtropical forest, temperate rainforest on higher slopes, rhododendron, pine and coniferous forest at even higher elevations, and alpine shrubs on the highest peaks and ridges. Throughout the area, especially in the highest parts extensive areas of shrubland, grassland and bamboo forest can be found.

The **subtropical forest** covers almost three-quarters of the proposed Imawbum Mountains National Park; this is the richest type of forest in terms of species number and composition, and the forest is characterised by a well-developed canopy. It is mostly found below the 1,800 – 2,000 m asl line, above which it transitions into temperate rainforest. Subtropical forest covers large areas of especially the western and northern part of the area.

Figure 4. Land cover of the proposed Imawbum Mountains National Park

Temperate rainforest is generally found between altitudes of 1,800 to 2,700 m asl, making up ~15% of the Imawbum Mountains. At the lower parts it is represented by a truly broadleaved forest and this transitions into a more mixed forest at 2,000-2,200 m asl. This forest type is found mostly in the central part of western Imawbum Mountains, as well as, more prominently, along the border with China and Yunnan's Three Parallel Rivers World Heritage Site and Gaoligongshan nature reserve.

Figure 5. Selected habitats in the Imawbum Mountains, Kachin State, northern Myanmar



Rhododendron, pine and coniferous forest. These forest types are found at even higher elevations, typically above the 2,700 m asl line. Floristically unique and representing an important component of the biodiversity in the area, it covers probably not more than some 5% of the Imawbum Mountains.

Alpine shrub occupies the highest parts of the Imawbum Mountains, typically covering only the highest peaks and plateaux. Trees are largely absent, and at the higher reaches the shrub gives way to alpine meadows. Alpine shrub formations are found around the peak of Mt Imawbum in the south and on the highest ridges that form the boundary between Myanmar and China. All in all alpine shrub covers less than 1% of the Imawbum Mountains.

Shrubland, grassland and bamboo forest occupies the higher parts of the Imawbum Mountains, partially there where the original habitat has been disturbed, and can be found in different altitudinal zones. Significant areas are found in the northernmost section of the Imawbum Mountains as well as in the southeast. Combined the area covered in shrubland, grassland and bamboo forest represents some 10% of the Imawbum Mountains.

Mammals of Northern Myanmar

In Myanmar 240 species of wild land mammals have been recorded, of a total of 12 Orders. The most diverse Orders are the bats Chiroptera with 80 species, rodents Rodentia with 63 species and carnivores with 37 species. The Myanmar mammal fauna is characterized by large species such as the Asian elephant *Elephas maximus*, gaur *Bos frontalis*, Asiatic black bear *Ursus thibetanus* and tigers *Panthera tigris*, and, until recently both Javan rhinoceros *Rhinoceros sondaicus* and Sumatran rhinoceros *Dicerorhinus sumatrensis* (Shepherd and Shepherd 2012; Parr and U Thin Than 2009). While the species richness is high, partially because the country is situated on the borders of the Indo-Malayan, Indian and Eastern Palearctic Regions and thus having representatives of all their faunas within its borders, levels of endemism (at the country level) are low¹. Even many of the mammal species with globally small geographic ranges are often found in neighbouring countries such as India to the west, China to the north and east and Thailand to the southeast. It seems that the only endemic mammals are three species of bat and one rodent, i.e. Anthony's pipistrelle *Hypsugo anthonyi*, Joffre's pipistrelle *H. joffrei*, Myanmar pipistrelle *H. lophurus* and popa soft-furred rat *Millardia kathleenae*. The Myanmar snub-nosed monkey, initially perceived as a Myanmar endemic, is now known to occur across the border into China.

Birds of Northern Myanmar

Northern Myanmar is ornithologically a very rich area, with often strikingly different avifaunas at different altitudes (e.g. the lowland plains, hills and lower montane areas, upper montane areas). As with the mammals the levels of endemism is generally low, as most species that are found in northern Myanmar also occur across the border in China and/or India. Renner and Rappole (2011) analysed the distribution ranges of 67 of the 413 species of bird that have been recorded in Northern Myanmar. These 67 bird species represent about half of the residents with restricted distributions and were all known to be breeding in the area (thus excluding migrants, non-breeding residents, and wide-ranging species). Over 90% of these species are also found in the eastern Himalayan Mountains and over 60% were also found in western Yunnan. Affinities with avifaunas of northwest Thailand or southern Myanmar (Tenasserim) were more restrictive.

BirdLife has defined Endemic Bird Area as an area where at least two restricted range bird species (birds with a breeding range of less than 50,000 km²) co-exist. Myanmar has four Endemic Bird Areas, one, the Irrawaddy Plains EBA occurs entirely in Myanmar, the other three (East Himalayas EBA, Yunnan Mountains EBA and Andaman Islands EBA) shared with neighbouring countries. Of relevance to the conservation of birds in the Imawbum Mountains

¹ The level of endemism in Myanmar is partially dependent on what taxonomic treatment one follows. Recent taxonomic revisions of for instance the ungulates (Groves and Grubb 2011) suggests that the number of species in Southeast Asia is higher than previously thought – some of these species may turn out to be Myanmar country endemics.

are the East Himalayas EBA and Yunnan Mountains EBA. A small portion of the Eastern Himalayas EBA lies in the north of Myanmar along the borders with India and China. Most of this EBA lies well to the west as far as Nepal, and to the south into India. It is extremely rich in restricted-range species: Stattersfield et al (1997) listed 22, to which we can add a scimitar-babbler described from Myanmar by Rappole et al. in 2010. Ten of these occur possibly in northern Myanmar:

Blyth's tragopan *Tragopan blythii* (Vulnerable) living in undergrowth (especially bamboo) in evergreen forest and rhododendron forest between 1,800 to 3,300 m asl.

Sclater's monal *Lophophorus sclateri* (Vulnerable) living mostly in silver fir forest with rhododendron undergrowth, subalpine rhododendron scrub, rocky slopes and grassland between 2,500 to 4,000 m asl (migrating to lower elevations in winter, and moving higher up the mountains in summer).

Ward's trogon *Harpactes wardi* (Near Threatened), living in broadleaf evergreen forest and bamboo between 1,500 to 4,200 m asl.

Rusty-bellied shortwing *Brachypteryx hyperthra* (Vulnerable) also living in broadleaf evergreen forest and bamboo between 1,800 to 3,000 m asl (migrating to lower elevations in winter, and moving higher up the mountains in summer)

Wedge-billed wren-babbler *Sphenocichla humei*, living in evergreen forest and bamboo between 900 to 2,300 m asl.

Grey sibia *Heterophasia gracilis*, living in evergreen and deciduous forest and pine forest between 900 and 2,800 m asl (migrating to lower elevations in winter, and moving higher up the mountains in summer)

Streak-throated batwing *Actinodura waldeni*, living in broadleaf evergreen and mixed forest, rhododendron and bamboo forest between 1,500 to 3,300 metres (migrating to lower elevations in winter, and moving higher up the mountains in summer)

Beautiful sibia *H. pulchella*, living in evergreen forest between 2,100 to 3,000 m asl (migrating to much lower elevations –c. 500 m asl – in winter).

White-naped yuhina *Yuhina bakeri*, living in broadleaf evergreen forest between 600 to 2,000 m asl.

Naung Mung scimitar-babbler *Jabouilla naungmungensis* – found in the understory of premontane temperate rainforest. Thus far only recorded in the Naung Mung area of Kachin State, at altitudes of 530-540 m asl but the species is expected to occur at higher elevations as well.

Yunnan Mountains EBA, which is chiefly in the Yunnan Province of China, extends into a small area of northeastern Myanmar. Three restricted range species could potentially occur in Myanmar:

White-speckled laughing thrush *Garrulax bieti* (Vulnerable) living in bamboo thickets above 3,050 m asl.

Yunnan nuthatch *Sitta yunnanensis* (Vulnerable), living in pine forest above 2,440 m asl.

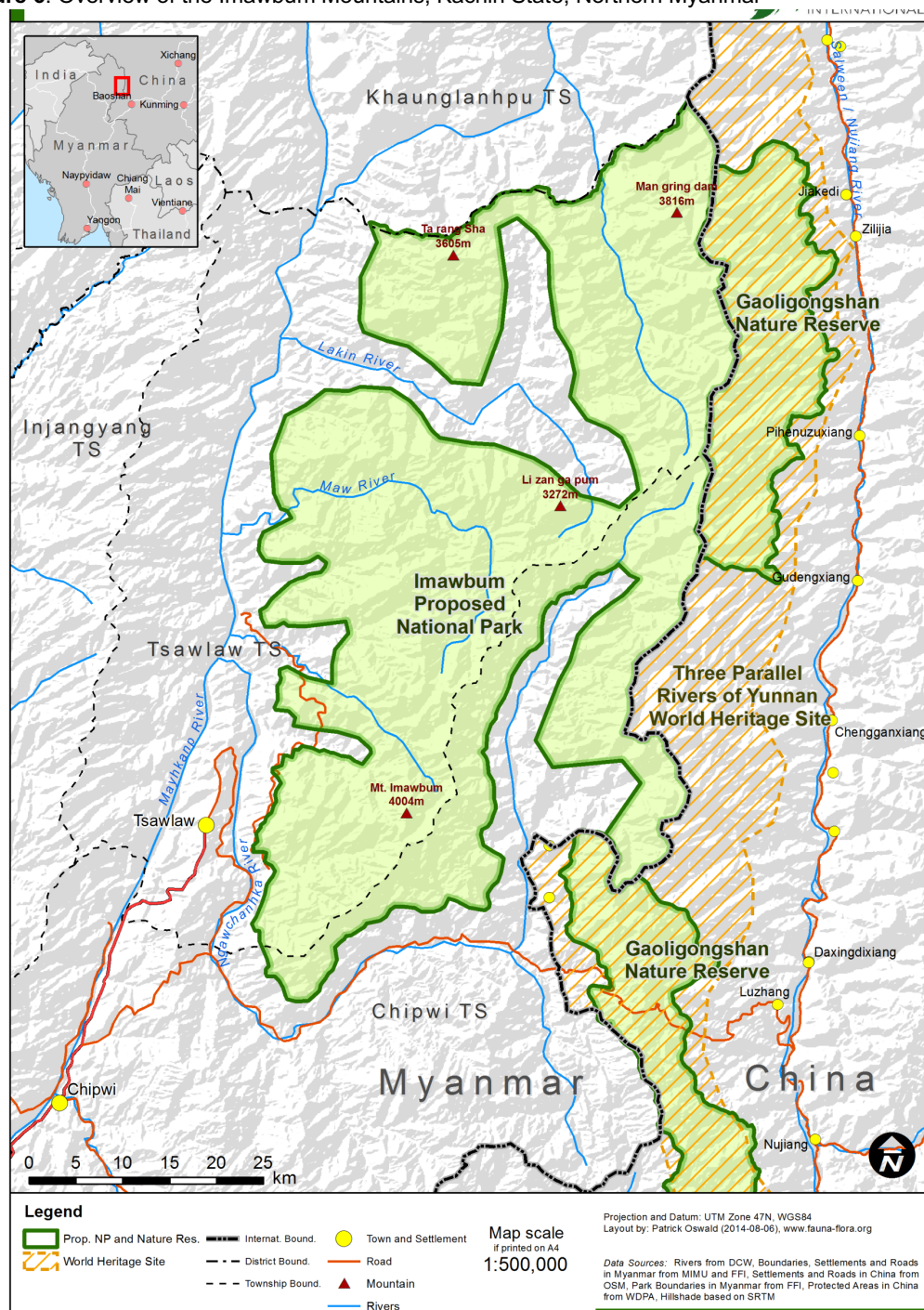
Brown-winged parrotbill *Paradoxornis brunneus*, living in bamboo thickets, long grass, scrub and agricultural land between 1,500-3,650 m asl.

METHODS

Imawbum Mountains: Demarcation of the Study Area

The geographic area covered in this report includes the area that includes most forested land in the eastern part of the Tsawlaw Township and the northernmost part of Chipwi Township, both in Kachin State.

Figure 6. Overview of the Imawbum Mountains, Kachin State, Northern Myanmar



Its northern border follows that of the border of Tsawlaw Township with Khaunglanpu Township and the eastern border follows the international border with China. In the northeast it borders the Gaoligongshan Nature Reserve and in the southeast it borders Yunnan's Three Parallel Rivers World Heritage Site, both in China. The area is dissected by, amongst others, the Lakin River and Maw River, both of which are tributaries of the Mayhkanp River, flowing to the west of the Imawbum Mountains.

The total area encompassed by the proposed Imawbum Mountain National Park is some 2,000 km²; east-west it covers a distance of ~60 km and north-south ~90 km.

The altitudinal range of the area is from about 400 to 500 m asl in the west nearest to the Mayhkanp River and rises to above 3,000 m asl on the border with China. The highest peaks are Mt Imawbum (4,004 m asl), after which the collective area is named, in the south; Mt Ta Rape Sha (3,606 m asl) and Mt Man Gring Dam (3,816) in the north; and Mt Li Zan Ga Pom (3,272 m asl) in the central part of the Imawbum Mountains.

The surveys were focussed mainly in the central-western part of the Imawbum Mountains, in the mountains north and south of the Maw River, and in the area south of the Lakin River. One survey targeted the area northeast of the Lakin River. Camera trapping was conducted mainly in the area south of the Maw River. Interviews were conducted in villages along the Mayhkanp River, the Lakin River and the mouth of the Maw River (no villages are situated further upstream). Combined the camera trap and survey area covers an area of ~30 km², with the area where the village interviews were conducted adding an additional 100 km² to this total.

Field Surveys

The field survey had two main objectives. Firstly, to undertake baseline faunal surveys within the Imawbum Mountains to determine the international, regional and national importance of the site for biodiversity conservation. Birds and mammals were chosen as representatives for the overall biodiversity value. Secondly, to ascertain the status of the birds and mammals in the area and to identify key conservation requirements; special attention was given to the status and needs of the Myanmar snub-nosed monkey.

Specific objectives included to:

- To conduct baseline biodiversity surveys of the Imawbum Mountains to ascertain the status of the biodiversity.
- To identify those biodiversity components of high conservation value and place them within an international, regional and national context.
- To provide lists of the birds and mammals recorded during the survey and to identify species of conservation concern likely to be affected by current human use of the area.
- Provide recommendations for future monitoring and evaluation of the biodiversity within the survey area.

The surveys were undertaken in February-Mar 2010, November 2011-January 2012, March-April 2012, December 2012-March 2013 and February-Mar 2014, with the camera traps operating more or less over this entire period.

The mammal and bird survey team typically consisted of between three and six persons, with additional support provided by porters recruited from nearby villages. During the survey all mammal species were recorded, although no specific efforts were made to sample the Order Chiroptera (bats) and, from the Order Rodentia, the families Muridae (rats and mice) and Cricetidae (voles). While the team members were familiar with the fauna of the area, it is relevant to note that no specialized ornithologist joined the team. Birds were recorded largely visually and identification was largely, if not exclusively, based on visual characteristics. No

mist-netting was conducted, no systematic playbacks were used, and no systematic nocturnal surveys were conducted. While the total number of birds that was recorded during the survey was impressive and gives a good indication of the avifaunal richness of the Imaubum Mountains, this undoubtedly will have led to the underrepresentation of certain taxa in the species list. Especially the richness of smaller understory birds, cryptic warblers and nocturnal birds, is expected to be higher than this reports indicates.

The faunal surveys in the Imaubum Mountains were carried out utilising three methods as follows;

Field surveys - Walks around and from camp sites, and from and to camera trap sites: Walks along pre-established roads and paths were undertaken most days, as well as small ventures into the forest during these walks. This was in response to the extreme ruggedness of the terrain in the forest which rendered establishment of transects almost impossible at most locations. These walks were done by single persons or in groups of two, and were undertaken at a slow pace. All mammals and birds encountered during these walks were noted down, and . Small ventures into the forest were made during these walks.

Camera traps – at 40 sites camera traps were set up and left for one or several months to record the presence of wildlife. Camera traps were established between elevations of 2,564 and 3,331 m asl, and these were left in the field for a combined total of close to 4,000 cameratrap days. These camera traps were set largely such as to maximise the chances of photographing and filming Myanmar snub-nosed monkeys, and to record the animals that were present in the areas where the snub-nosed monkeys were known or expected to occur. As such the results of the camera trapping do give a good indication of the presence and for some species also abundance in these areas. However, prudence is called for when generalising these results or when extrapolating these data to other parts of the Imaubum Mountains.

Figure 7. Camera trap sites and villages where interview were held to assess the status of mammals and birds in the Imaubum Mountains

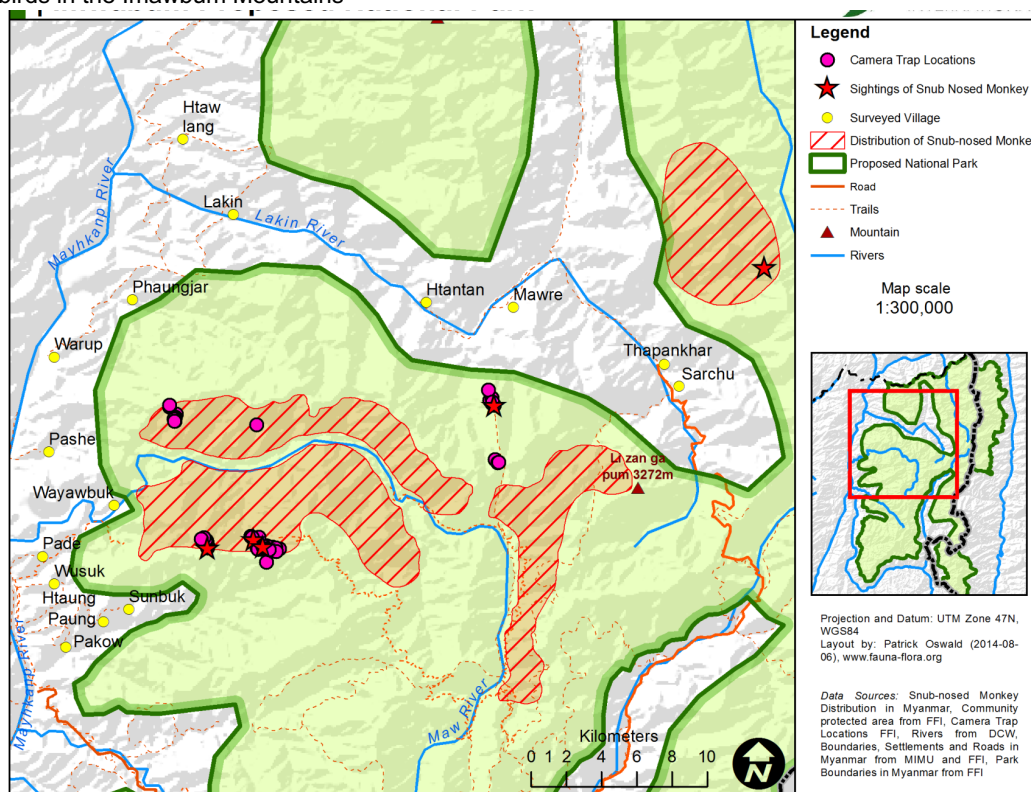


Table 1. Camera trapping effort in the Imawbum Mountains, stratified by elevation.

No	Altitude range	Stations	Effort (camera trap days)
1	2564-2635 m asl (mean 2602 m asl),	6	343
2	2656-2735 m asl (mean 2695 m asl)	13	967
3	2766-2807 m asl (mean 2800 m asl)	8	571
4	2868-2893 m asl (mean 2879 m asl)	9	1251
5	2948-3331 m asl (mean 3184 m asl)	4	714

Interviews - The survey team carried out semi-structured interviews with villagers, including hunters and trappers, as well as workers in the various (Chinese-operated) logging camps. Trophies in these villages were sought out and details recorded; the same was done for wild birds of mammals kept as pets or that were kept alive to be sold on or consumed later. Wherever animals or their parts caught in traps or snares were encountered, be it in the field or in villages, they were identified and details were recorded.

Identification of Mammals and Birds

The current report comprises a compilation of records made of mammals and birds as recorded during surveys in the Imawbum Mountains and that were reported in individual trip reports. Information on mammals and birds photographed by camera traps were obtained from six camera trip reports. Many mammal species were recorded by various means, i.e. by direct sightings in the field, individuals or their parts caught in snares or iron traps and observed in situ, carcasses or other body parts directly observed in villages, trophies, and camera trap photos. The presence of some species such as red panda was additionally confirmed through observation of their distinctive faeces. As such identification of most species of mammal was not considered problematic for the purpose of this report. Where it was, or where records are unusual and unexpected (for instance when a lowland species was recorded at unusual high altitudes) this is indicated. For reference for the latter, local and regional reference books were consulted (e.g. Corbett and Hill 1992; Francis 2008; Smith and Xie 2008; Parr and U Thin Than 2009; Shepherd and Shepherd 2012).

Identification of birds was less well documented, and many species were recorded visually only, in the field, without detail regarding identification included in the trip reports. Several ground-dwelling species were recorded by the camera traps, and numerous other species were photographed at least once. Generally all species that were included in the trip reports are reported here, apart from ones that were highly unlikely to have occurred in the area. The latter was based on a review of the birds recorded in Northern Myanmar, or adjacent areas in India and China, as documented and summarised by Rappole et al. (2011), MacKinnon and Phillips (2000), Robson (2008), and numerous publications focussing on individual taxa. New country records were only accepted if there was good documentation (photographs, descriptions) and their behaviour (flock size, altitude at which the birds were recorded) matched that what could be expected.

It is acknowledged that the people that live in the Imawbum Mountains are a rich source of information concerning the mammals and birds in their area, and it is worth remembering that the discovery of the Myanmar snub-nosed monkey probably would not have happened if not for local people informing researchers from BANCA and FFI surveying the area for gibbons about its existence. For the present report information from local people about the presence of certain mammal or bird species, as well as information about their perceived abundance, was included only if the presence of these species had been verified by other means as well.

Table 2. Villages in and surrounding the Imawbum Mountains where interviews were held to assess the status of mammals in the area.

Village Name	Location (lat/long)	Elevation (m asl)	Households (N)	Population
Phamawzup	N26.36635° E98.30165°	385	2	10
Wusuk	N26.41172° E98.29234°	453	10	80
Pashe	N26.47043° E98.29161°	504	7	70
Htanpaungku	N26.46352° E98.32652°	1717	3	20
Wayawbuk	N26.45167° E98.33991°	1749	2	15
Eight-mile	N26.43360° E98.31807°	1202	3	15
Pade	N26.42486° E98.31237°	1012	7	40
Warup	N26.52652° E98.30798°	798	7	60
Phaungjar	N26.55604° E98.34741°	982	15	80
Jaryan	N26.59506° E98.36208°	1211	6	50
Lakin	N26.60069° E98.40063°	1022	12	70
Htantan	N26.55563° E98.49789°	1533	15	80
Mawre	N26.55245° E98.54201°	1719	20	100
Lanse	N26.57736° E98.56474°	1464	40	200
Kangkung	N26.59975° E98.57505°	1644	10	70
Thapankhar	N26.52380° E98.62013°	1662	20	100
Sarchu	N26.51161° E98.62844°	1862	3	15
Chichitago	N26.48587° E98.64373°	1880	10	50
Htawlang	N26.63874° E98.37347°	1047	27	200
Ngaya	N26.66960° E98.37876°	1380	19	120
Chawng dam	N26.70770° E98.38169°	1105	8	76
Hta hpong	N26.81729° E98.44809°	1482	20	190
Guaehta	N26.82238° E98.49003°	984	3	10
Nampchang	N26.85536° E98.58912°	1387	32	270
Hkindammy	N26.87102° E98.59670°	1280	2	6
Thalanhton	N26.85477° E98.60006°	1315	4	16
Manjardan	N26.83535° E98.57010°	1327	6	40
Mahkunghta	N26.82963° E98.58382°	1351	6	45
Mahkungdan	N26.82018° E98.58147°	1497	16	90

MAMMALS

A total of 49 species of mammal were encountered during the survey, either in the field, dead or alive, observed directly or on camera trap photos, or in the villages, again dead or alive.

Table 3. Mammal species encountered during surveys in the Imawbum Mountains. Direct refers to direct visual observations in the field of dead animals (including ones in snares or traps) or live ones; Camera refers to species photographed using camera traps; Village refers to species observed in villages, dead or alive, in whole or in parts, that were caught locally.

No	Species	Status	Direct	Camera	Village
1	Long-tailed mole <i>Scaptonyx fuscicauda</i>		x		
2	Chinese water shrew <i>Chimarrogale styani</i>		x		
3	Smoke-bellied nivierventer <i>Niviventer eha</i>			x	
4	Northern treeshrew <i>Tupaia belangeri</i>			x	
5	Chinese mole-shrew <i>Anourosorex squamipes</i>				x
6	Chinese pangolin <i>Manis pentadactyla</i>	TP			x
7	Bengal slow loris <i>Nycticebus bengalensis</i>	P			x
8	Myanmar snub-nosed monkey <i>Rhinopithecus strykeri</i>		x	x	x
9	Shortridge's langur <i>Trachypithecus shortridgei</i>	TP	x	x	x
10	Assamese macaque <i>Macaca assamensis</i>	P	x	x	x
11	Stump-tailed macaque <i>Macaca arctoides</i>	P	x		
12	Rhesus macaque <i>Macaca mulatta</i>	P			x
13	Northern pig-tailed macaque <i>Macaca leonine</i>	P	x		
14	Eastern hoolock gibbon <i>Hoolock leuconedys</i>	TP	x		
15	Dhole <i>Cuon alpinus</i>		x		x
16	Red panda <i>Ailurus fulgens</i>	TP	x	x	x
17	Masked palm civet <i>Paguma larvata</i> *	P		x	
18	Large-toothed ferret-badger <i>Melogale personata</i>				x
19	Hog badger <i>Arctonyx collaris</i>				x
20	Stripe-backed weasel <i>Mustela strigidorsa</i>				x
21	Yellow-throated martin <i>Martes flavigula</i>	P	x	x	x
22	Spotted linsang <i>Prionodon pardicolor</i>	TP	x	x	
23	Clouded leopard <i>Neofelis nebulosa</i>	TP			x
24	Leopard cat <i>Prionailurus bengalensis</i> *	P	x	x	x
25	Marbled cat <i>Pardofelis marmorata</i>	TP		x	x
26	Asian golden cat <i>Catopuma temminckii</i>	TP			x
27	Asiatic black bear <i>Ursus thibetanus</i>	P	x		x
28	Sun bear <i>Helarctos malayanus</i>	TP		x	x
29	Eurasian Wild Pig <i>Sus scrofa</i>		x	x	x
30	Red Muntjac <i>Muntiacus muntjak</i>	SP			x
31	Gongshang muntjac <i>Muntiacus gongshannensis</i>	SP	x	x	x
32	Fea's Muntjac <i>Muntiacus feae</i>	TP			x
33	Tufted Deer <i>Elaphodus cephalophus</i>		x	x	
34	Takin <i>Budorcas taxicolor</i>	TP	x	x	x
35	Chinese serow <i>Capricornis milneedwardsi</i>	TP		x	x
36	Red Serow <i>Capricornis rubidus</i>	TP			x
37	Chinese Goral <i>Naemorhedus griseus</i>	TP			x
38	Malayan porcupine <i>Hystrix brachyura</i>		x	x	x
39	Brush-tailed Porcupine <i>Atherurus macrourus</i>				x
40	Chinese bamboo rat <i>Rhizomys sinensis</i>		x		
41	Little Himalayan rat <i>Niviventer eha</i>		x		
42	South China wood mouse			x	
43	Perny's long-nosed squirrel <i>Dremomys pernyi</i>			x	
44	Himalayan striped squirrel <i>Tamias maclellandii</i>		x		
45	Pallas's squirrel <i>Callosciurus erythraeus</i>		x	x	
46	Yunnan giant flying squirrel <i>Petaurista yunnanensis</i>				x
47	Red giant flying squirrel <i>Petaurista petaurista</i>				x
48	Lesser giant flying squirrel <i>Petaurista elegans</i>		x	x	
49	Moupin pika <i>Ochotona thibetana</i>				x

Key: TP = totally protected under Myanmar's New Wildlife Act of 1994; P = normally protected; SP = Seasonally protected. * masked palm civet and leopard cat could be protected as the New Wildlife Act of 1994 lists 'wild cat / civets' as normally protected species, with however 'wild cats' listed in the Burmese texts, 'Viverridae' in the Latin text, and 'wild cat / civets' in the English text.

Species Accounts Mammals

Long-tailed mole *Scaptonyx fuscicauda*

During the survey a carcass of a single long-tailed mole was observed on 17 December 2012 (N.26.13373°, E.98.67851°, elevation 2939 m asl). According to local people, long-tailed mole is rarely seen in survey area.

Long-tailed moles are distributed mainly in central South China, including small areas of northern Myanmar and northern Vietnam. This small mole is fully fossorial and appears to be restricted to high altitudes, typically between 2,000 to 4,000 m asl (Smith and Yan 2008). Currently not considered threatened.

Chinese water shrew *Chimarrogale styani*

This species was observed the Wasuk Stream (N26.41384 E98.29765, elevation 546 m asl) near the Wasuk village, in February 2014. According to local people this species is very rarely seen in the Imawbum Mountains.

Chinese water shrew is distributed mainly in central South China, including small areas of northern Myanmar. This water shrew are perfectly adapted to aquatic live and it appears to be restricted to high altitudes, typically between 1,700 and 3,500 m asl (Smith and Yan 2008); the record reported here possibly indicates that the altitudinal range extents further into the lowlands than previously thought, or it may due to misidentification with for instance the sympatric Himalayan water shrew *C. himalayica* typically occurring at lower elevations down to 250 m asl (Smith and Yan 2008). Currently not considered threatened.

Chinese mole-shrew *Anourosorex squamipes*

The carcass of mole-shrew was observed at Pawaku village (N.26.13373°, E.98.67851°, elevation: 2939 m asl) on 17 December 2012.

This species is found in central and southern China and northern Southeast Asia, with a disjunct population in northeast India. In Myanmar it has been recorded from the northern and eastern parts. This is a fully fossorial species, mainly associated with montane forests at intermediate elevations between 1,200-3,000 m asl) (Molur 2008; Smith and Yan 2008). The species is listed as Least Concern in view of its wide distribution, presumed large population, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category (Molur 2008).

Chinese pangolin *Manis pentadactyla*

On 15 of March 2014 a single Chinese pangolin was observed between Chibwe (N 25.88614, E 98.12851; elevation 257 m asl) and Shan Ngaw. A local person carried the pangolin but no information could be obtained on where the species was caught.

Chinese pangolin occurs in Nepal, southern Bhutan, northeast India, and southern China, south to northern and western Myanmar through to northern Viet Nam. However, it has likely been extirpated from parts of its current range, the limits of which are poorly known and may never be elucidated, due to high levels of exploitation historically (Challender et al. 2014).

Figure 8. Selected species of mammals encountered during the surveys (1) Long-tailed mole (2) Chinese pangolin (3) Brush-tailed porcupine (4) Yunnan flying squirrel



This species is listed as Critically Endangered due to high levels of poaching for meat and scales, both targeted and untargeted, across its range (Pantel and Chin 2009; Challender and Hywood 2011). Chinese pangolins have been used across its range historically, but at present much of the hunting is done to meet the market demand from China. The species has been virtually wiped out over much of its former range and populations in or close to China have suffered the most, but with decreasing availability populations further to the south and west, as well as into the more remote mountain areas, are now targeted as well.

Bengal slow loris *Nycticebus bengalensis*

In January 2011 the survey team encountered a juvenile Bengal slow loris downhill from Saw Law (N 26.15396, E 98.27053; elevation 1,541 m asl) on the way back to Chibwe (N 25.88614, E 98.12851; elevation 257 m asl). The hunter informed us he caught it in his shifting cultivation. A captive Bengal slow loris was recorded in Phimaw Internally Displaced

Person's camp in February - March 2013. According to the owner it was caught in January 2013 near Saw Law. According to local people, slow lorises are rarely seen in this area and are not easy to find.

The Bengal slow loris is one of the more widespread species of slow loris, ranging from Bangladesh, and northeast India into China, most of Myanmar, Thailand, Cambodia and Vietnam. Bengal slow lorises were previously considered part of the greater slow lorises *N. coucang*, but in fact may comprise more than one species (KAI Nekaris pers. comm. 2014), with their respective ranges being considerably reduced. Bengal slow lorises are listed as Vulnerable according to IUCN threat criteria due to a combination of habitat loss and severe pressures from hunting. Hunting in Myanmar has been poorly documented but data from the town of Mong La on the China border suggests that in this single market alone over 1,000 Bengal slow lorises are traded a year (Nijman et al. 2014). Combined with other cursorily observations this suggests that indeed in Myanmar trade is a clear impediment to their conservation.

Myanmar snub-nosed monkey *Rhinopithecus strykeri*

This species of odd-nosed monkey was discovered in the western part of the Imaumbum Mountains in 2010, and described as new to science in the same year (Geissmann et al. 2010). The species was initially thought to be endemic to Myanmar, separated by its congeners from China by the Salween and Mekong Rivers. Subsequent surveys in China (Long et al. 2012; Chi et al. 2014) demonstrated the species to be present there as well. The most obvious differences between the Myanmar snub-nosed monkey and its congener the black snub-nosed monkey *R. bieti* that can be observed in the field is that the former appears to be all black and the latter (despite its English name) is black and white coloured (i.e. ventrally it is white or cream coloured, with a white tail tip and a largely white face), and from the limited data available it seems that the Myanmar snub-nosed monkey is somewhat smaller. During the present survey information was obtained suggesting that perhaps morphologically the Myanmar snub-nosed monkey is less uniform in its pelage colour than previously assumes. In March-April 2012 two hunters (Thar Kyar Hpa and Sar Lay Ya) from Larolo (N26.27795° E98.57893°) indicated that there are two types of snub-nosed monkey in their area. One type is all black although some individuals having a white vent, whereas the other has more extensive amounts of white ventrally and is possibly larger. Sar Lay Ya encountered the latter type in the Maluhou mountain range in June 2011, and described it as having a black body, with a white chest and a white vent and has an estimated body mass of between 17 and 34 kg ("10 to 20 viss") which appeared to be larger than the all-black type.

The Myanmar snub-nosed monkey was the focal of the faunal surveys in the Imaumbum Mountains, and a considerable amount of information, both direct and indirect, was obtained considering its status in the area. An account of this is given more or less chronologically below:

In February-March 2010 a freshly killed carcass was observed at Pashe village. It got iron trapped about 15 km away from the village. In May 2010 in Maw Ban village one skull of a snub-nosed monkey was observed in the headman's house. The hunter was not present; therefore it was not possible to confirm when or where the monkey was shot. In San Buk village a second hunter named Maw Ban Laum Daung was interviewed, who had shot four snub-nosed monkeys in the last ten years (i.e. in the years between 2000 and 2010). All three hunters from San Buk village confirmed the presence of one large group (about 80 individuals) in the area between Camp 1 (2,552 m asl) and the conifer zone. They also heard from villages located north of San Buk that there was a second group of snub-nosed monkeys in the area north of the Maw river, but have not been in that forest themselves.

In Jan 2011 the team was informed of a snub-nosed monkey that was caught in 2009, north of Maw River. A hunter from Wayawbuk village assured that the species was particularly easy

to find when it was raining. A hunter from Lakin village reported that 9 years ago (i.e. in 2003) one or possibly two groups containing ~ 20 individual was occasionally encountered north of Maw River.

On 1 May 2010, Le Me A Si and Dai Laum, two of our local survey team members from San Buk village, encountered a group of snub-nosed monkeys counting at least six adult individuals and one infant at 1.3 km northeast of Camp 3 (N 26.43300°, E 98.41393°, elevation 2,503 m asl). The habitat at this site was mountain forest with moss-covered rhododendron and maple trees in the upper forest storey and bamboo and ferns in the under storey. Le Me A Si believed that this group was a temporary splinter group of the large band of 60 to 80 individuals usually encountered in this area. He had shot two adults between Camp 1 and Camp 2 (N 26.42814°, E 98.37643°, elevation 2,488 m asl) in May 2009, and he had shot four snub-nosed monkeys (including one infant) in the lower conifer zone (N 26.43457°, E 98.43764°, elevation 3,187 m asl) in December 2009.

Near the site where snub-nosed monkeys were encountered on 1 May 2010, we met the hunter Bo Sar Ye from Ngwapaka village near Kangfang. This hunter has been hunting and trapping wildlife in this area for the past three years. He last saw a group of ~ 80 snub-nosed monkeys at the beginning of April 2010. He encountered this group both in mountain forest and conifer forest and reported that their home range was very large, but that encounters were rare. This hunter was using iron traps baited with meat to catch bears. In 2009, he caught three adult snub-nosed monkeys in his iron traps.

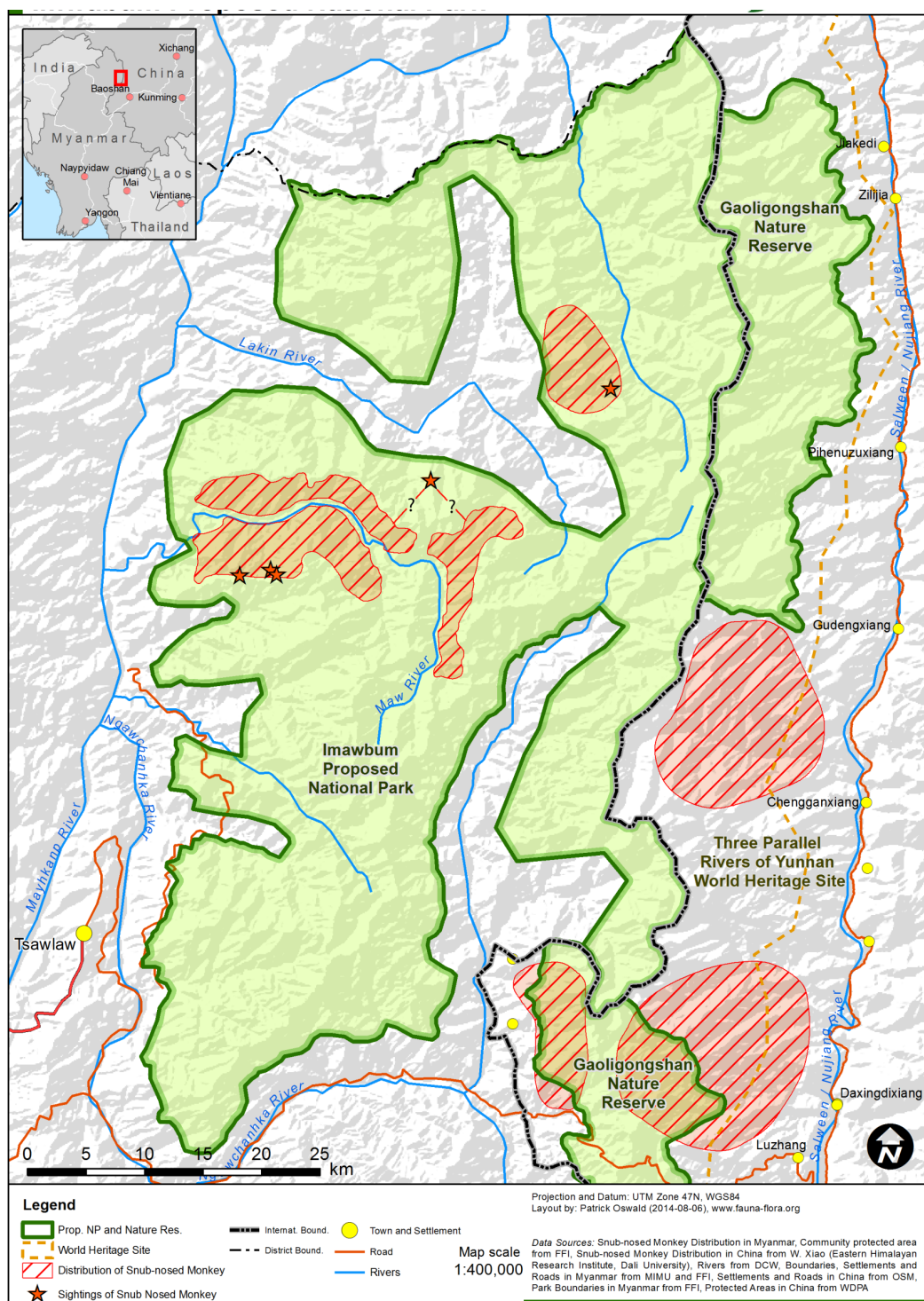
In November-December 2010 local hunters from the villages near the estimated group range 3 informed the team that a large group of Myanmar snub-nosed monkeys occurs on the mountain ranges near Chitchitago village (N26.48587° E98.64373°; elevation 1,880 m asl) during the rainy season and normally stays there only for a few days. They had no knowledge regarding the group's 'normal' range.

Kaung Jone, a hunter from Pamawzup village, interviewed in April 2011, caught a snub-nosed monkey with his iron trap between Camp 1 and Camp 2 in June 2010. Another hunter, Ar Phone, encountered 15-20 snub-nosed monkeys between Camp 1 and the Chinese logging camp in April 2011. San Tan from Pade village, encountered 10-15 snub-nosed monkeys in July 2011 when he checked his iron traps near Camp 2 (N 26.44303, E.98.37706, elevation 2,693 m asl). Two local hunters from Kangfang and Wusuk (N 26.41094, E 98.29216, elevation 1,357 m asl), they encountered a group of 40-50 individuals near the same site on 17 November 2011.

Smoked skeletons were observed at Wasuk village (N 26.41094, E 98.29216, elevation 1,357 m asl). The owner bought the smoked skeleton from a hunter and intended to trade it onwards together with smoked macaques to Kangfang. Trade of Myanmar snub-nosed monkeys to Wasuk village was confirmed by Naw Pu, who caught a snub-nosed monkey near Camp 1 (N 26.44303, E.98.37706, elevation 2,693 meter) with an iron trap on 5 April 2011. He smoke-dried the specimen and sold it to someone in Wasuk for 100 Yuan.

A skull and a foot were found at a hunter's house in Mawre village in February-March 2013. Four local hunters informed the survey team that they had shot the monkey at its sleeping site on Shaw Mountain on 23 February 2013. Upon return from the forest where they had been hunting, they encountered a sleeping site (N26.50893°, E98.53563°, elevation: 2,777 m asl) and one of the monkeys was shot. According to the hunters, this group consists of more than 100 individuals and inhabits in this area from February through October. Local hunters claim that the monkeys were sleeping on the bamboos and this group normally sleeps this site in every year April.

Figure 9. Distribution of Myanmar snub-nosed monkey. Stars refer to sights where the species was recorded on camera traps. The species distribution in China is generalised after Chi et al. (2014).



A local hunter from Pabe village, spoken to in February-March 2014, encountered 10-15 snub-nosed monkeys when they checked their iron trap in July 2013 at the Grass Land Camp (N 26.44303, E.98.37706, elevation 2,693 m asl). During interviews, two hunters from Pawaku village indicated to have encountered snub-nosed monkey groups east of their village in 2007 and 2010 before commercial logging began in that area. In recent years the monkeys were no longer recorded in that area, and the hunters suspected that the group had moved on due to disturbance caused by people.

On 4 January 2013 two team members encountered a group of 7 Myanmar snub-nosed monkeys in the Hka Ku Chaung survey site, east of Chinwin Village (N.26.57249°, E.98.67546°, elevation: 3,077 m asl). The monkeys were moving quickly and no photographs could be made. The fruit tree on which the snub-nosed monkeys were feeding was recorded, faeces were collected and footprints were observed. Three hunters, one of whom acted as a guide to the survey team, had encountered groups of 10 or more individuals at this site in December 2011, and March, August and September 2012, suggesting this location is used year-round by the monkeys.

On 19 April 2011 three of the porters (Aung Ko Win, Zong Long and Daw Long Song) encountered a group of Myanmar snub-nosed monkeys of ~25-30 individuals (including 2 or 3 infants) near Camp 3 (N 26.43323, E 98.41404; elevation 2,535 m asl). Most of the monkeys were on the ground with a few feeding in the trees. Upon detecting the porters, the group fled, and one female left her infant on the ground. The infant was taken to the Camp, but it could not be kept alive.

Information on the killing of Myanmar snub-nosed monkeys was obtained through interviews with hunters as well as by inquiring about origins when body parts of Myanmar snub-nosed monkeys were encountered in villages. Although probably not extensive, the table below gives a summary of the findings.

Table 4. Number of Myanmar snub-nosed monkeys hunted based on interviews; not all hunter names were recorded, and no specific information was obtained pertaining to monkeys killed in 2012.

Hunter's village	Hunter name	2009	2010	2011	2013
Chichitago	Kyar Hpu Ye	3 juveniles			
Pashe	--	1			
San Buk	Le Me A Si	6 (incl 1 infant)			
Ngaw Phar Kar	Bo Sa Ye	3			
Wayawbuk	--	1			
Htantan	--		1 made into handbag		
Pade	La Kan Kaung Kyun		1		
Pade	--		1		
Pamawzup	Kaung Jone		1		
San Kyar Hoe	--			1 juvenile	
Wasuk	Naw Pu			1	
Mawre	--				1

The altitudinal distribution of the snub-nosed monkey includes as recorded during the survey in the Inawbum Mountains is from 1,880 to 3,187 m asl, with most of the records originating from between 2,400-2,800 m asl. From the interview data it is clear that at least some groups display altitudinal movements in relations to the seasons, moving down to lower elevations in winter –thus bringing them closer to the areas inhabited by humans—and returning to higher elevations when the weather improves and snow-cover disappears.

The Myanmar snub-nosed monkey is listed as Critically Endangered on the basis of criteria A4cd - an estimated and projected population reduction of more than 80% over the three generation period (18 years), based on (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat and/or (d) actual or potential levels of exploitation. Geissmann et al. (2010) estimated the population at 260 and 330 individuals in three groups in Myanmar. Chi et al. (2013), working on the Chinese populations added between 490-620 individuals (in ten groups) to this estimate and indicates that there are (probably) additional groups across the border into Myanmar. While the present survey found the species to range in an area north of from where they were originally reported, thus suggesting the presence of 4 groups, these are located too far north to be contiguous with the groups found by Chi et al. (2013) that were living closest to the China-Myanmar border. If Chi et al. (2013) are correct in their assumption that their group 7 and 10 range into Myanmar, then there are Myanmar

snub-nosed monkeys additional to the groups recorded in the Maw River area of the Imawbum Mountains.

Chi et al. (2013) recorded 19 cases of hunting of Myanmar snub-nosed monkeys in the Chinese populations (15 of them were hunted before the year 2000), and overall they suggested that levels of hunting were low at present. Geissmann et al. (2010) reported that at least 13 Myanmar snub-nosed monkeys were hunted in 2009 in the Maw River area. Based on more extensive interviews and surveys conducted during follow-up surveys, it appears that the number of snub-nosed monkeys that are annually killed in the Imawbum Mountains is likely to be small—in the order of less than a dozen a year—with probably an equal number being hunted actively (with guns or crossbows) and passively (iron traps). Alternatively, the number of Myanmar snub-nosed monkeys is higher but the killed individuals are rapidly sold onto other markets and the remains do not stay in the area, or hunters are reluctant to inform outsiders about true levels of hunting.

Shortridge's langur *Trachypithecus shortridgei*

This rare, little-known species with a small geographic range was recorded at least 15 times, both alive in the field or as pets with freshly killed individuals and their parts observed in villages.

In February-March 2010, two groups of Shortridge's langurs (comprising 4 to 5 individuals each) were observed near the Me River. In December 2011 a group of was encountered between the Eighth miles village (N26.43360, E98.31807, elevation 1,202 m asl) and Chinese Logging Camp (N.26.43144, E.98.34770, elevation 1,813 m asl): this group comprised of five or six individuals. In March 2012 three individuals of were encountered on the way of Larolo village (26.27795° N 98.57893° E, 1,770 m asl), and Camp 3 (26.43246° N 98.41794° E elevation 2,537 m). On 25 February 2014, a troop of about 5-10 individuals was encountered on the way to the Chinese logging camp, mentioned above.

Shortridge langurs were caught on camera traps once: a series of three photos (all of a single individual) at 2,766 m asl (N26.42991, E98.42033) in April-May 2011.

Local hunters in San Buk and Maw Ban village interviewed in April-May 2010 state that Shortridge's langurs occur in forest around the villages, up to elevations of 2,000 m asl but they are absent from the higher mountain forests. Hunters in Wusuk village state that Shortridge's langur occurs in the forest around their village, up to elevations of 1740 m asl, especially near the streams.

In February-March 2010, one Shortridge's langur kept as a pet was observed in a village along the Me River.

In February-Mar 2010 a fresh carcass of Shortridge's langur was observed at Pashe village near Nmai Hka river; in April-May 2010 one skull was observed in San Buk village (N 26.39701°, E 98.34699°; elevation 1,541 meters) and two skulls and two tails in Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 meters); in January 2011 the smoked skeleton of a Shortridge's langur was recorded in Wusuk village; in December 2011 a single individual was caught in a snare near Camp 1 in the Wusut Area. In December 2012 a skull of Shortridge's langur was recorded at Sadulaw village (coordinates: N26.17864° E98.61581°, elevation: 1,885m) close to Kangfang on the Myanmar-China border; the langur was shot with shotgun. A bag made of the Shortridge's langur skin was recorded in February-March 2013 at a hunter's in Mawre village. The hunter had shot the langur with cross bow next to Labyue creek near Mawre village the year before. Finally in February 2014 a skeleton of Shortridge's langur was recorded in Wasuk village. According to the hunter, he had caught the langur with an iron trap.

According to local hunters San Buk and Maw Ban village interviewed in April-May 2010 Shortridge's langur are rarely hunted, as their meat is considered less tasty than other animals. Hunters interviewed in Wusuk village in January 2011 stated that the population there has declined because of over-hunting to supply the demand for trade.

Shortridge's langur occurs in a small area encompassing the Dulongjiang Valley in northwestern Yunnan and northeastern Myanmar. In Myanmar, south of the Hukaung valley, it is found only east of the Chindwin River. It occurs primarily in evergreen and semi-evergreen forests, and records with known altitudes range from 200 to 2,500 m asl (Pocock 1939). Given its apparent abundance in the Chindwin lowlands and the rarity at which it was encountered by collecting expeditions in the higher regions, according to Htun et al. (2008) it is possible that the species does not have viable populations in montane areas above 1,300 to 1,900 m asl. During the survey the langurs are found between elevations of around 400-500 m asl along the Maw River, between 1,200 and 1,800 m asl, between 1,800 and 2,500 m asl and at 2,766 m asl; whereas data from villagers suggest their presence at 450 m asl (Wusuk), 1,500 m asl (San Buk), 1,700 to 1,750 and up to 2,000 m asl (Mawre and Maw Ban). This then suggests that the species does indeed occupy almost the entire altitudinal range in the area.

Shortridge's langur is listed as Endangered on the IUCN Red List as it probably has declined by at least 50% over the past three generations (~36 years) due to habitat loss (including areas along the Chindwin River scheduled to be inundated by the Tazone hydro-electric power dam), hunting and trade (Htun et al. 2008). In Myanmar the langurs are hunted for food and traditional medicine, with at least a proportion of the quarry being exported into China.

Assamese macaque *Macaca assamensis*

This species of macaque, one of four that occurs in the Imawbum Mountains, is commonly observed around the villages and occurs at higher elevations than the rhesus macaques. Villages from where the species is recorded are San Buk (1,541 m asl), Saw Law (1,541 m asl), Peda (970 m asl)

Assamese macaques are regularly caught in iron traps, and trophies are frequently displayed in villages. In April-May 2010 ten skulls were displayed in a house in San Buk village (N 26.39701°, E 98.34699°; elevation 1,541 m asl). In January 2011 smoked skeletons were displayed in hunter's house in Wayawbuk village (N.26.45128, E 98.333942 elevation 1,741 m asl). A smoked carcass was observed being packed into a plastic bag in Wusuk village (N 26.41094, E 98.29216, elevation 1,357 m asl) in January 2011: the owner had bought it from another hunter and it was intended for the Chinese market (most likely via the town of Kangfang). A skeleton of this species was observed in Sadulaw village (N26.17864° E98.61581°, elevation: 1,885 m asl) on 17 December 2012; it was shot near the village. On 8 March 2014, a smoked skeleton of an Assamese macaque was observed in Paungjar village.

Hunters indicate that Assamese macaques are frequently caught in iron traps and indeed one individual caught in such a trap was observed near one of the survey camps (N26.44360 E98.37816, elevation: 2,693 m asl) on 25 November 2010. In December 2011 the right hand of an Assamese macaque was observed in an iron trap near the Camp 2.

On 19 November 2011, one live Assamese macaque was observed caged in Kyi htan Village.

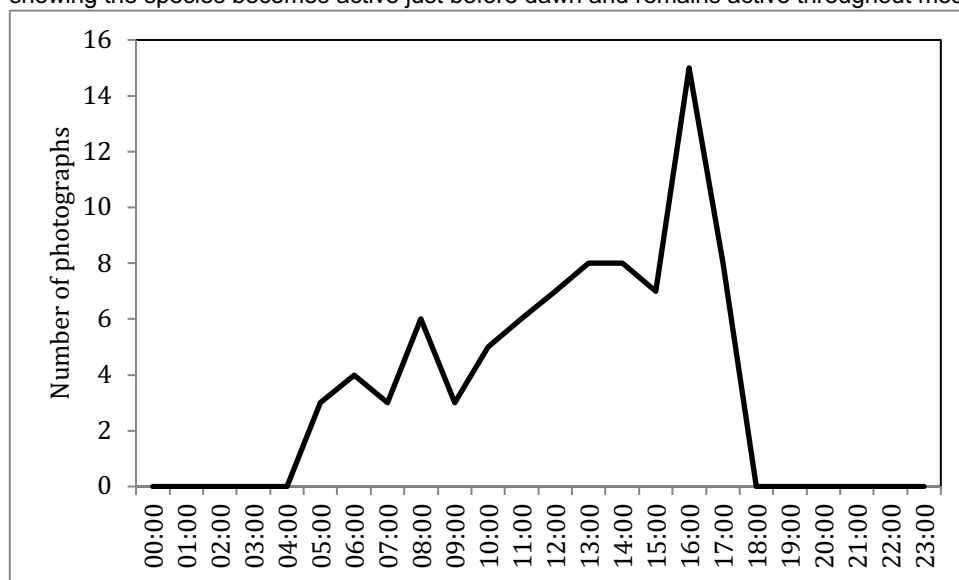
Assamese macaques were occasionally observed in the field. A group of 20-25 individuals was observed in the camera trapping area (N26.42890 E98.42322, elevation 2876 m) and on 10 October 2011 a group of 10-15 individuals was observed near the Lisue Camp. In December 2011 one group of Assamese macaques as well as one single individual were observed near Camp 2 (N 26.44303, E.98.37706, elevation 2693 m asl). In March-April 2012 six groups of Assamese macaques, totalling nearly 80 individuals were observed in the

Wusut Area, between 2,127 and 2,552 m asl. A group about 15 was observed on 4 and 5 January 2013 in the Hkaku survey site (N.26.57249°, E.98.67546°, elevation: 3077 m asl). A group of 20-25 Assamese macaques was observed in February 2014 in the Wusut Area (N 26.44303, E.98.37706, elevation 2,693 m asl). A group of eight individuals including some juveniles was encountered in Shaw Mountain (N26.500657° E98.537109°, elevation: 2900 m asl) on 26 February 2013.

Assamese macaques were frequently photographed by the camera traps. It was recorded in a total of 86 sessions at 14 stations, with the highest camera trap rates at elevations of around 2,750 m asl. From the camera trap data it is clear that the species is active for most of the day.

Assamese macaques are found from Nepal through to Myanmar and China, east to Laos and Vietnam and south to Thailand. The species is listed as Near Threatened as while it is experiencing declines due to hunting and habitat degradation and fragmentation, these declines are not large enough for the species to justify a listing as Vulnerable (Boonratana et al, 2008). While the species is typically associated with the high mountains, occurring up to 4,000 m asl in the Himalayas, its altitudinal range does include low-lying areas as well. Records from the Imawbum Mountains are from altitudes between 970 – 2,900 m asl.

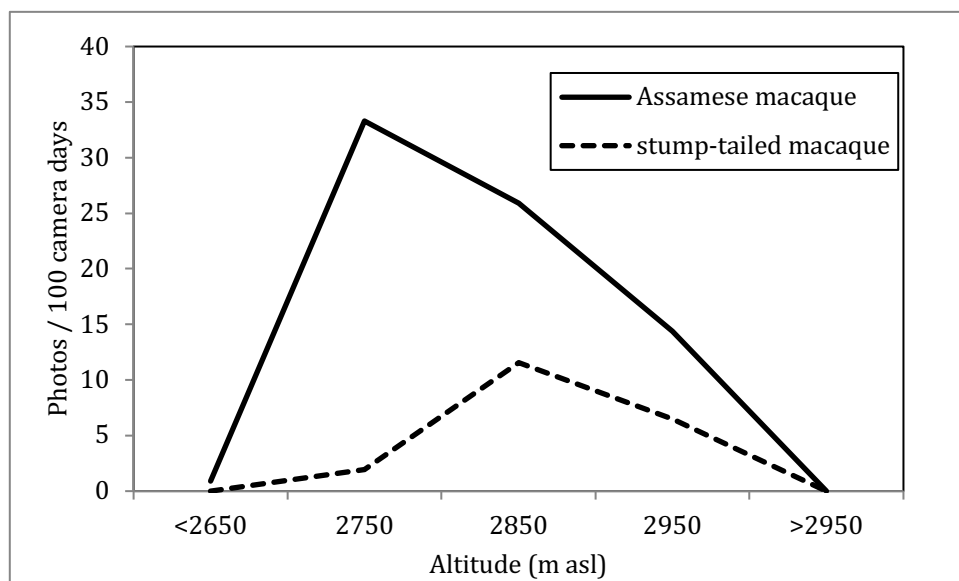
Figure 10. Time of day photos were taken of Assamese macaques by camera traps in 83 sessions, showing the species becomes active just before dawn and remains active throughout most of the day.



Stump-tailed macaque *Macaca arctoides*

Stump-tailed macaques are occasionally recorded in the Imawbum Mountains. Three groups of stump-tailed macaques were observed in April – May 2010 between Camps 2 and 3 (first group, at least three individuals, N 26.42452°, E 98.39655°, elevation 2,787 m asl; second group, at least ten individuals, N 26.42594°, E 98.39451°, elevation 2,791 m asl; third group, six individuals, N 26.42597°, E 98.39026°, elevation 2,874 asl). On 26 November 2010 a group of ~10 individuals was observed in the high montane forest (N26.43991 E98.37677, elevation: 2757 m asl). In March 2012 a group of 8 stump-tailed macaques were encountered in Tharkyar Camp 1 (26.49826° N 98.43938° E elevation 2,552 m asl).

Figure 11. Results of camera traps efforts for two species of macaque stratified by altitude. Assamese macaque, 653 photos taken during 86 sessions at 14 stations; stump-tailed macaque, 166 photos taken during 18 sessions at 6 stations



Interviews with villagers and hunters reveal that they consider the species still common in the area; this includes the surroundings of the villages of Saw Law (1,541 m asl) and Peda (970 m asl). Just like the Assamese macaque, according to local hunters, this species is frequently caught in iron traps. Indeed in November 2010 one stump-tailed macaque was observed trapped in an iron trap set at 2,757 m asl attempting to release itself.

Stump-tailed macaques were frequently recorded by the camera traps with photos taken on 18 sessions at 6 stations. The highest success rates with the camera traps was at altitudes of around 2,850 m asl, i.e. slightly higher than that of Assamese macaques (Figure 4).

Stump-tailed macaques are distributed over large parts of mainland Southeast Asia; in Myanmar records are confined to the far north and the border areas with Thailand. The range of habitats it occupies is equally large and includes tropical semi-evergreen forest to tropical wet evergreen forest and tropical moist deciduous forest. The species' altitudinal range includes lowland areas at ~50-100 m asl as well as upland areas up to 2,200 m asl (Myanmar), 2,400 m asl (China) and 2,700 m asl (India) (Htun et al. 2008). The observations in the Imawbum Mountains show that the species' altitudinal range in Myanmar is larger than perhaps previously records indicated, at least to 2,950 m asl and possibly higher.

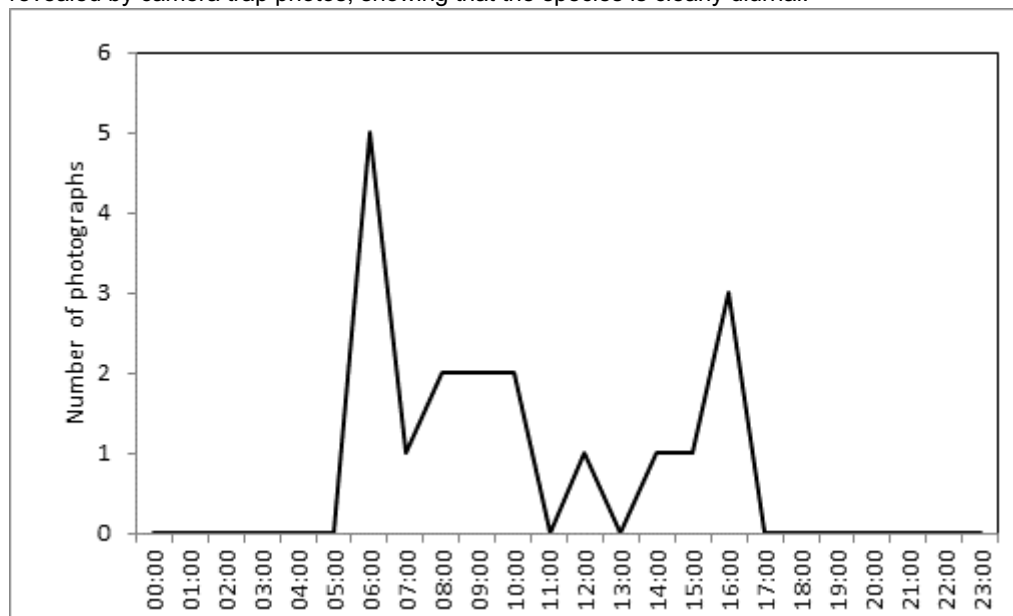
Stump-tailed macaques are listed as Vulnerable primarily because of hunting and continued rates of habitat loss (mainly as a result of logging and timber extraction) (Htun et al. 2008).

Rhesus macaque *Macaca mulatta*

Rhesus macaques occur mainly in the lower areas of the Imawbum Mountains. In April-May 2010 local hunters informed the survey team that rhesus macaques occur around their villages or at elevations below the villages. In certain areas they are considered pests as they intrude on their farms and eat crops. The smoked skeletons of rhesus macaques were recorded amongst other primate skeletons in Phamawzup village (elevation 385 m asl) and four skulls were displayed in a hunter's house in Man Baw village (elevation 1,750 m asl).

This species is listed as Least Concern in view of its wide distribution, which includes most of south Asia, its presumed large population, its occurrence in a broad range of habitat and because it is unlikely to be declining at anything close to the rate required to qualify for listing in a threatened category (Timmins et al. 2008).

Figure 12. Activity pattern of stump-tailed macaques at altitudes between 2,500 and 3,100 m asl as revealed by camera trap photos, showing that the species is clearly diurnal.



Northern pig-tailed macaque *Macaca leonina*

Information received from hunters and villagers both in April-May and November-December 2010 suggests that pig-tailed macaques are common around villages located in the mountain forests. On 1 May 2010 a group of at least six adult pig-tailed macaques near Camp 3 (N 26.42831°, E 98.41069°, elevation 2,625 m asl), and one 7 February 2011 a group of pig-tailed macaque was encountered near another survey camp (N 26.49347, E.98.37126 elevation 2,530 m asl). The main threat to the pig-tailed macaques in the Imawbum Mountains is the same as for the other macaques, i.e. hunting and, because of their terrestrial habits, getting caught in iron traps.

The northern pig-tailed macaque is listed as Vulnerable according to IUCN threat criteria, largely due to a loss of habitat and hunting. Little is known about the species status in Myanmar, or indeed its distribution. Boonratana et al. (2008), referring to a personal communication with S. Htun, state that the species in Myanmar is found at altitudes between 190-400 m asl, in line what is found in other, more southern parts of the species' range. However, records from Chinese Yunnan come from altitudes of up to 2,000 m asl (Boonratana et al. 2008) making the high-altitude observations in the Imawbum Mountains perhaps unusual but not unexpected.

Eastern hoolock gibbon *Hoolock leuconedys*

The eastern hoolock gibbon, and its congener the western hoolock gibbon *H. hoolock* were the focus of a Myanmar-wide survey between 2005 and 2010 (Geissmann et al. 2010) and that ultimately led to the discovery of the Myanmar snub-nosed monkeys in the Imawbum Mountains. Gibbons tend to prefer the lowlands and hill forest and are thus not found sympatric with the snub-nosed monkeys. Eastern hoolock gibbons were recorded in the southern part of the Imawbum Mountains, i.e. south of Mt Imawbum. The species is expected to be present in other low-lying parts of the Imawbum Mountains as well.

Eastern hoolock gibbons are listed as Vulnerable on the IUCN Red List, and the vast majority of the species' range is situated in Myanmar making the country a top-priority for global gibbon conservation (Geissmann et al. 2010).

Figure 13. Selected species of mammals encountered during the surveys (1) Shortridge's langur (2) Assamese macaque (3) and (4) Myanmar snub-nosed monkey, (5) Bengal slow loris



Dhole *Cuon alpinus*

According to hunters interviewed in April-May 2010, the dhole is rare in the Imawbum Mountains. One individual was caught in an iron trap in 2008 near Camp 3 (N 26.42831°, E 98.41069°, elevation 2,625 m asl). The smoked skeleton of a dhole was observed in a Chinese logging camp in the Wusut area (N.26.43144, E.98.34770, elevation 1,813 m asl) on 25 February 2014. According to the hunter who caught it it was trapped with an iron trap. He indicated that this species is rarely seen in the surrounding area.

The dhole's range includes large parts of Asia, including the Indian Subcontinent, East Asia and Southeast Asia, but in most places it is rare, and especially in the northern part of its range it is extirpated over vast areas. It is classified as Endangered following IUCN threat criteria, given that it faces a wide range of threats (habitat loss, poaching, depletion of its prey base) and on account of its small population size (Durbin et al. 2008). Little is known about the status of dholes in Myanmar: while it is widely distributed throughout the country no quantitative studies have been undertaken to assess its status.

Red panda *Ailurus fulgens*

Red pandas are largely confined to the Himalayan region, with the populations in the Imawbum Mountains probably representing the species' easternmost range (Kandel et al. 2015 modelled the range of the species and found two geographic clusters of highly suitable habitat – one with its core in Nepal and the other with its core in western Yunnan, bordering the Imawbum Mountains). Red pandas were recorded in the field (both visually and their signs, primarily faeces), on the camera traps and their parts were observed in villages and in the field.

On 1 May 2010, a red panda was encountered south of Camp 3 (N 26.42831°, E 98.41069°, elevation 2,625 m asl). A carcass, foot prints and faeces of this species were observed at Pawaku (N.26.13240°, E.98.70128°, elevation: 3,273 m asl) on 19 December 2012. According to villagers from Pawaku, red pandas can be found near the village when there is snow on the higher mountain range. A skin was recorded at Sadulaw village (N.26.17864°, E.98.61518°, elevation: 1,885 m asl) on 23 December 2012. The tail and smoked body parts of a red panda was recorded at an abandoned Chinese logging camp on Saw Mountain (N26.468654°, E98.547013°, elevation: 3,428 m asl) on 27 February 2013. On 25 of February 2014, the dead body of red panda was observed in a snare, near a Chinese logging camp in the Wusut Area (N.26.43144, E.98.34770, elevation 1813 m asl). According to the hunter who set the snare, he does not targets red panda but occasionally, especially when the snow cover is heavy, red pandas come down to lower elevation and are caught in these snares. Two tails were founded in a Lisu logging camp in January 2013.

Faeces and foot prints of red panda were observed in January 2011 (N 26.50191, E 098.37101, elevation 2,948 m asl). In March 2012 red panda was recorded between the Yahko logging camp (N 26.33372° E 98.55209°) and Camp 3 (N 26.43246° E 98.41794° elevation 2,537 m asl). Red panda faeces was observed in Tharkyar Camp 2 (N26.49069° E98.43927°, elevation 2,251 m asl). A pair of red pandas walking through the river bank, as well as red panda faeces were encountered at Sankyarho (N26.3314° E.98.69583°, elevation: 2,906 m asl) on 24 December 2012. In Hkaku, faeces and foot prints, as well as one single individual were observed near the survey camp (N.26.57724°, E.98.66051°, elevation: 3,059 m asl) on 2 January 2013. A local way guide observed one red panda (N.26.57249, E.098.67546, elevation: 3,077 m asl) on 5 January 2013. Faeces of red panda were observed between altitudes of 2778-2879 m in the Wusut Area in February-March 2014.

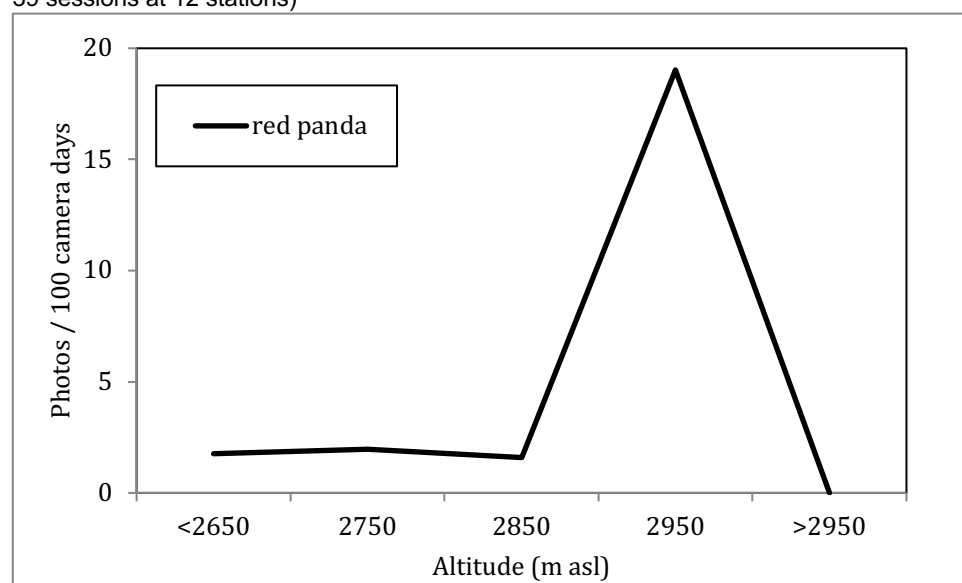
According to hunters from Wasuk village, spoken to in February-March 2014, the population of red panda is much lower at present than even five years ago, because of the large number

of iron traps that have been set in the area. It is generally agreed upon that red pandas are not a target species for hunting, because their meat is not considered tasty. However, red pandas do get caught in the iron traps, perhaps especially so during the winter months when snow fall is heavy and the animals are encountered more often in the forest lower down.

The altitudinal distribution of red pandas as recorded during the present surveys was between 1,813 and 3,428 m asl, with the majority of records from the 2,000-2,500 m asl zone. Data from camera traps yielded similar results (Fig. 5). A total of 284 photos were taken during 39 sessions at 12 stations. The highest camera trap success (i.e. most photographs per camera trap effort) was at elevations of around 2,900 m asl. As indicated above, many of the hunters indicated considerable altitudinal migration along the altitudinal gradient, with red pandas moving down to lower altitudes when snow cover is most severe, and thus bringing them in closer contact to the villages and to humans.

Red panda is considered Vulnerable according to IUCN threat criteria, with its population size estimated at less than 10,000 mature individuals with a continuing decline of greater than 10% over the next 30 years (Wang et al. 2008). The main threat is habitat loss and fragmentation and poaching, with in Myanmar and China poaching posing a greater threat than habitat loss.

Figure 14. Results of camera traps efforts for red panda stratified by altitude (284 photos taken during 39 sessions at 12 stations)

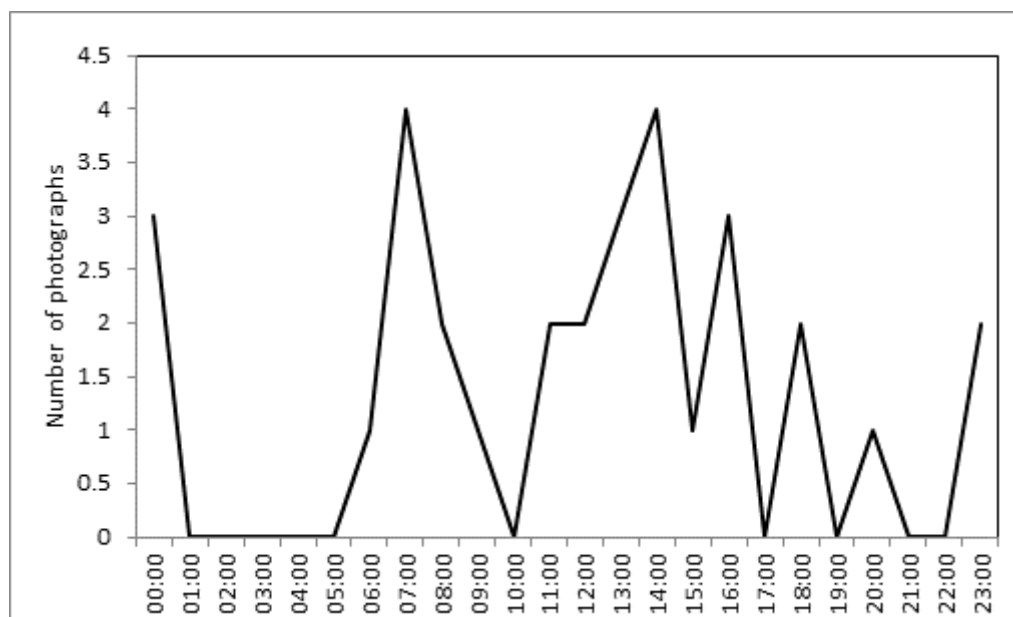


Masked palm civet *Paguma larvata*

According to local hunters, spoken to in November-December 2010 this civet is common in this area. They usually get trapped in the iron traps. While no direct sightings were recorded in the field, camera trap data support the notion that the species is indeed present in the area as the species was photographed on 42 different occasions. These data also reveal the species to be largely, but not exclusively, nocturnal (Figure 7), hence explaining the lack of direct sightings during the day time.

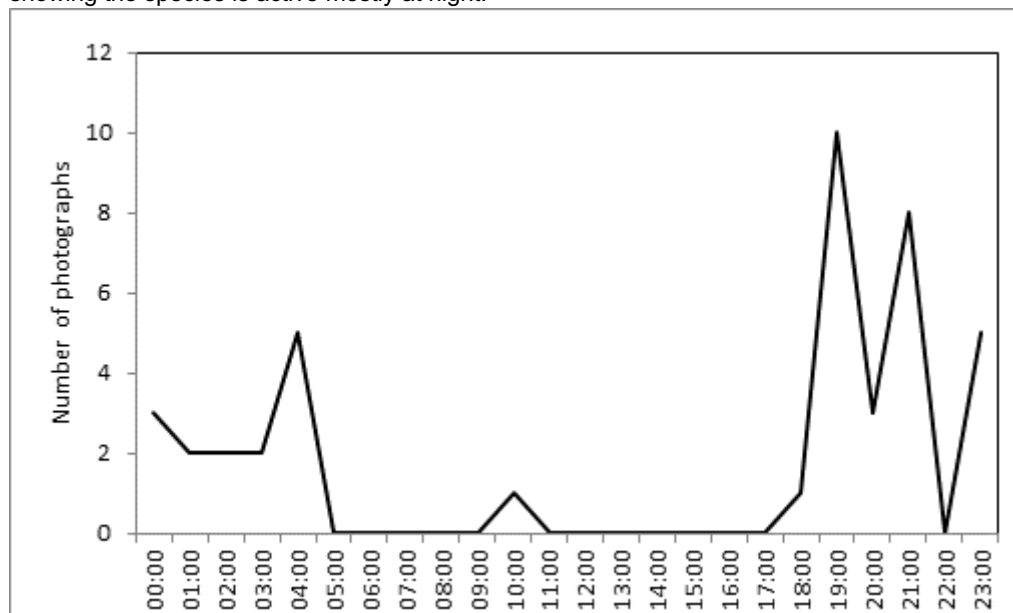
Masked palm civets were photographed at 13 sites, ranging in altitude between 2,564 and 2,876 m asl, with most records between 2,600 – 2,800 m asl.

Figure 15. Time of day photos were taken of red panda by camera traps in 31 sessions, showing the species is active over the entire 24 hour cycle.



The species has a very wide geographic range in Asia and while it is trapped and traded locally—especially in China—overall the species is not considered threatened Duckworth et al. (2008) cite a report by Thinley et al. as evidence that masked palm civets range up to 2,500 m asl. All the camera traps where the species was photographed in the Imawbum Mountains were set at higher elevations, and indeed the species was recorded at higher altitudes, albeit not much higher.

Figure 16. Time of day photos were taken of masked palm civet by camera traps in 42 sessions, showing the species is active mostly at night.



Large-toothed ferret-badger *Melogale personata*

In February-Mar 2010 one or more trophies of this species was observed in a village or in villages in the Wusut Area. Further details are lacking (given that a trophy or trophies were observed it is here assumed that it is indeed large-toothed ferret-badger that was observed and not small-toothed ferret-badger *M. moschata*; both species are indistinguishable in the field but easily identified in hand by differences in dentition).

Large-toothed ferret-badger is found from India to China, Myanmar, Thailand and Vietnam. It is listed as Data Deficient in view of the absence of recent information on its current geographical distribution, status, ecological requirements, and response to the habitat conversion and non-specific hunting almost ubiquitous across its range.

Hog badger *Arctonyx collaris*

In February-Mar 2010 one or more trophies of this species was observed in a village or in villages in the Wusut Area. Further details are lacking,

The hog badger is widespread in South and Southeast Asia; it is threatened locally by hunting.

Stripe-backed weasel *Mustela strigidorsa*

A single dead individual was observed in Pamazup village in March 2014. The owner informed the survey team that he obtained it close to the Pamazup stream (N26.36626 E98.30152, elevation 395 m asl) with an iron trap. According to villagers of Pamawzup (N26.54988 E98.36139, elevation 1,011 m asl), stripe-backed weasels are found in their village and are feared by the villagers as they come in at night and kill their domestic chickens.

The species is widely distributed in mainland Asia and given its large distribution range and presumed large population size at present it is not considered globally threatened.

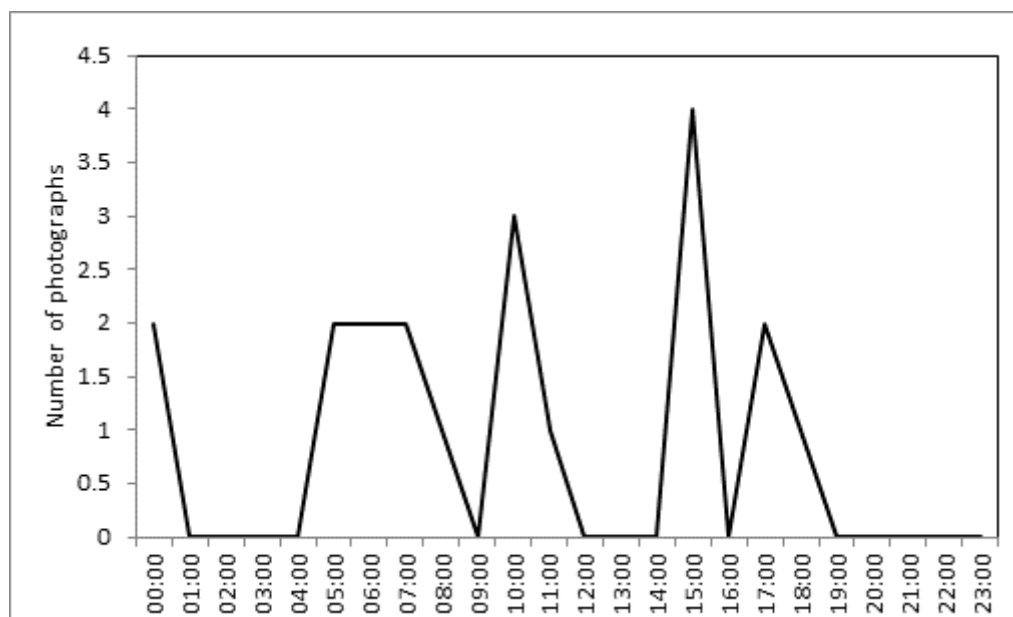
Yellow-throated martin *Martes flavigula*

In December 2011 this species was recorded between the Chinese Logging Camp (N.26.43144, E.98.34770, elevation 1,813 m asl) and Ice Camp. In March 2012 a single yellow-throated martin was observed in Tharkyar Camp 2 (26.49069° N 98.43927° E elevation 2,251 m). On 4 January 2013 a pair was encountered near the Hkaku camp (coordinates: N.26.57249°, E.98.67546°, elevation: 3,077 m asl). The tail of a yellow-throated martin was found at Lisu camp. According to a hunter from this area, the species is not rare in the survey area, and they sometimes encounter it when they are in the forest.

The species was commonly captured on the camera traps, with 90 photos taken during 22 sessions at 7 stations. The species was captured at all times of the day, confirming the assertion by Than Zaw et al. (2008) that the species is not nocturnal, or at least not in all parts of its range.

Than Zaw et al. 2008 reviewed the altitudinal range of the species in Myanmar and, on the basis of camera trap surveys concluded that the species was found at altitudes between 300 and 2,680 m asl – the records from the Imawbum Mountains also indicate that the species has a considerable altitudinal range, with indeed the highest records originating from areas above the 3,000 m line.

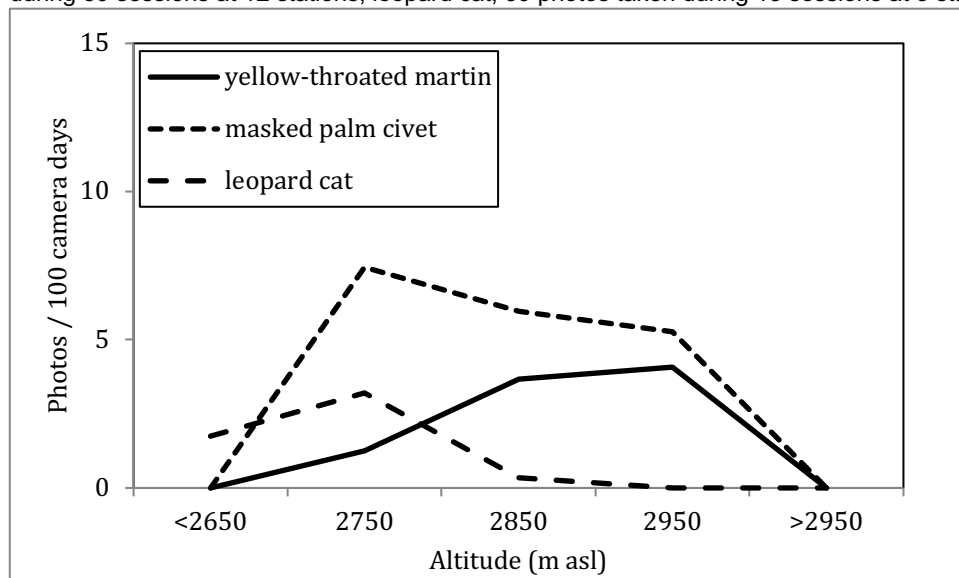
Figure 17. Activity pattern of yellow-throated marten in the Imawbum Mountains between 2,500 and 3,100 m asl as revealed by camera trap photos.



Spotted linsang *Prionodon pardicolor*

In December 2011 this species was recorded near Camp 4 (Wusut Area, N'maiHka River Catchment). It was caught in a snare.

Figure 18. Results of camera traps efforts for three carnivore species stratified by altitude (Yellow-throated marten, 90 photos taken during 22 sessions at 7 stations; masked palm civet, 172 photos taken during 59 sessions at 12 stations; leopard cat, 39 photos taken during 13 sessions at 5 stations)



Clouded leopard *Neofelis nebulosa*

In February-Mar 2010: Three clouded leopard skins were observed at Pashe village N26.47043° E98.29161° elevation 504 m asl). The animals were shot with guns within the last year and skins were kept for sale. In December 2011 a hunter who was hired by the survey

team reported to have seen a clouded leopard on the way to the Ice Camp (Wusut Area, N'mai Hka River Catchment).

The clouded leopard is found from the Himalayas and southern China and mainland Southeast Asia; it is mostly found in dense rainforest but can be found over a wider range of forest types, up to ~1,500 m asl in the Himalayas (and up to 3,000 m asl in Taiwan) (Smith and Xie 2008). While deforestation is a serious threat to the species, trade poses an additional significant threat. Nijman and Shepherd (2015) documented the trade wild cats in Myanmar and found the clouded leopard to be the most common large cat in the markets. Both skins and other body parts (especially bones and skulls) are traded for decorative and perceived medicinal purposes. Listed as Vulnerable on the IUCN Red List.

Leopard cat *Prionailurus bengalensis*

The leopard cat is the most commonly traded cat in the Imawbum Mountains – in total the survey teams documented two carcasses and 12 skins and the species was photographed frequently by the camera traps.

Figure 19. Selected species of mammals encountered during the surveys (1) leopard cat (2) marbled cat (3) red panda (4) spotted linsang



Local hunters perceive the leopard cat is common in the area and claim that the species is often trapped near the villages.

In April-May 2010 a leopard cat was trapped near Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 m asl) one week before the survey team arrived. Four leopard skins were observed in Maw Ban. In February-Mar 2010 three leopard cat skins were observed at Htantan village (N26.55563° E98.49789°, 1,533 m asl); these skins were kept by the owner to be sold on. In November-December 2010 a skin of leopard cat was recorded at Thapankhar village (N26.52245° E98.62071°; elevation 1,674 m asl). It was caught near the village.

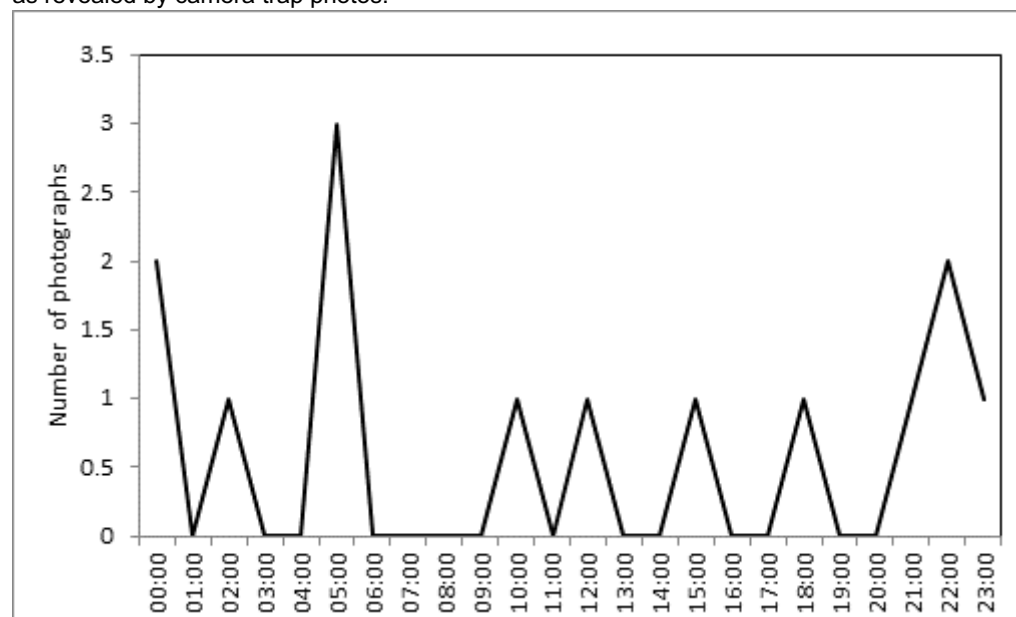
In January 2011 one leopard cat skin at the Wayawbuk village (N.26.45128, E 98.333942 elevation 1,741 m asl), in October one skin was observed in Pade village, with the animal having been trapped close to the village. In December 2011 a skin of leopard cat was observed in Chinese Logging Camp (N.26.43144, E.98.34770, elevation 1,813 m asl); the animal was caught with an iron trap higher up the mountains.

In Mar 2012 a skin of a leopard cat was observed in Larolo village (26.27795° N 98.57893° E). It was caught with an iron trap.

A single freshly killed individual was observed at 11 Miles, near Pamazup village in March 2014. According to a local hunter from 11 Miles Village, this species came into the village and had killed one or more chickens.

Leopards cats were frequently photographed by the camera traps, especially the ones that were stationed at lower altitudes (i.e. between 2,600 – 2,800 m asl). The species is active both at night and during the day. Leopard cats are widely distributed over Asia and are found in a range of habitats from tropical rainforest in Southeast Asia to the conifer forests of northern China. They are found from sealevel up to 3,000 m asl. The skins of the species used to be traded internationally in the hundreds of thousands each year, primarily from China, but this has been much reduced in recent years. Leopards cats are hunted throughout their range, for their meat, skin or other body parts and because they are perceived as pests. In Myanmar trade in the skins and other body parts is significant (Nijman and Shepherd 2015).

Figure 20. Activity pattern of leopard cats in the Imawbum Mountains between 2,500 and 3,100 m asl as revealed by camera trap photos.



Marbled cat *Pardofelis marmorata*

According to local hunters, this cat is not common in the area northwest of Larolo village. A marbled cat skin was recorded in Sankyarho village (N.26.38612, E.98.65961, elevation 2,028 m asl). According to the hunter who obtained it the animal was caught in an iron trap to the east of the village.

The marbled cat is widely distributed in Southeast Asia as well as the eastern Himalayas and southern China. It is found in different forest types from sealevel to 3,000 m asl. The marbled cat appears to be forest-dependent, and its habitat in Southeast Asia is rapidly disappearing due to logging and conversion into other land uses. It is infrequently observed in the trade (Nijman and Shepherd 2015) it is valued for its skin, meat and bones. Indiscriminate snaring is prevalent throughout much of its range and is likely to pose a major threat – the species is listed as Vulnerable on the IUCN Red List (Grassmann et al. 2008).

Asian golden cat *Catopuma temminckii*

In February-Mar 2010 one skin of the Asian golden cat was observed at Htantan village (N26.55563° E98.49789° 1,533 m asl).

The Asian golden cat is widely distributed from India to China and most of Southeast Asia. It occurs over a wide altitudinal range, up to 3,170 m asl in Yunnan (Smith and Xie 2008). As most wild cats in Myanmar the species is threatened by a combination of habitat loss and hunting. Nijman and Shepherd (2015) reported on the trade in Asian golden cat –mainly skins and skulls—in Myanmar and their data suggest that trade could be a clear impediment to their conservation.

Asiatic black bear *Ursus thibetanus*

Bears are the main target species for trapping in the Imawbum Mountains. Information obtained from hunters suggests that up until 10-15 years ago (i.e. prior to the year 2000), bears were only hunted with guns and occasionally snared. Since the start of Chinese logging in 2001, both the demand for wildlife products and availability of Chinese iron traps increased, which led to a drastic increase in the hunting pressure on bears. The use of meat-baited iron traps is now the main hunting method for bears. Some Lisu hunters are now specialised in bear hunting, and their livelihood is hunting and trapping for the Chinese wildlife market. These specialised bear hunters typically set about 50 to 100 iron traps, checking them every 5 to 7 days. One local hunter who acted as a guide to the survey team, A Sar, claimed he had caught five black bears in the period 2000 to 2011, all with iron traps. According to hunters Asiatic Black bear is the main target species in the camera trapping area (thus including the area where Myanmar snub-nosed monkeys are found).

Hunters agreed that the population of both Asiatic black bear and sun bear have declined in recent years due to the high hunting pressure.

In February-Mar 2010, many Asiatic black bear skulls, tied at the trophy boards, were observed at the villages. Further details are lacking. In April-May 2010 two skulls of Asian black bears were displayed at the house of Luan Taung in San Buk village (N 26.39701°, E 98.34699°; elevation 1,541 m asl). At the house of Maw Ban Luan Taung in Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 m asl) four Asiatic black bear skulls were recorded. On 26 November 2010, the tracks of an adult black bear were recorded near the small stream south of camp at N26.43843 E98.37945, elevation 2,707 m asl. On 29 November, the tracks and claw marks were observed again at the same place. At the same day, gall bladder, meat, fat, caws and legs of black bear were observed at the hunter camp

(N26.43847 E98.39278, elevation 2,693 m asl). The bear was trapped in an iron trap about two days ago east of the hunter's camp.

The claw mark and the signs of what was probably an Asiatic Black bear were observed on 5 of November 2011 (N.26.2554, E.98.2456.2, elevation 2,572 m).

Asiatic black bear occurs over much of East and Southeast Asia, roughly from Pakistan eastwards to the Thai-Malay Peninsula and north to Japan. In mainland Southeast, including in large parts of Myanmar, it lives sympatrically with the sun bear. Asiatic black bears are found in a variety of forested habitats, including broad-leaved and coniferous, and range from near sea level to 4,300 m asl. Habitat loss due to logging, expansion of human settlements, roadway networks, and hydro-power stations, combined with hunting for skins, paws and especially gall bladders are the main threats to this species (Garshelis and Steinmetz 2008). Shepherd and Nijman (2008) gave an overview of the trade in bear parts in Myanmar, showing that the majority of bears in trade are Asiatic black bears (as opposed to sun bears) and that they are amongst the more common species in the wildlife markets in Myanmar. All parts of the species are traded, including paws, claws, skulls and skins, but the most valuable body part is the gall bladder, which is traded for its purported medicinal properties. Live bears—mostly caught as cubs—are traded in large numbers as well, in part to meet the demand for pets and bear farming (whereby bears are kept in cages so that their gall can be extracted). A significant part of the trade is directed towards China.

Sun bear *Helarctos malayanus*

In several villages in the Imawbum Mountains hunters, independently from one another, claimed the presence of both Asiatic black and sun bear. Both species are heavily targeted for the illegal wildlife trade

In April-May 2010 the presence of both Asian black bear and sun bear were confirmed. One skull of a sun bear was displayed at the house of Luan Taung in San Buk village N 26.39701°, E 98.34699°; elevation 1,541 m asl). At the house of Maw Ban Luan Taung in Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 m asl), the skulls of five sun bears were recorded.

The sun bear is distributed over large parts of Southeast Asia. Large-scale deforestation has dramatically reduced the available habitat for the species and sun bear numbers have been reduced by uncontrolled exploitation for body parts. It is expected that commercial exploitation will continue during the next 30 years unless abated by the implementation of significant anti-poaching measures. The species is listed as Vulnerable on the IUCN Red List (Fredriksson et al. 2008). Sun bears appear to be less common in trade in Myanmar than Asiatic black bears (Shepherd and Nijman 2008).

Eurasian Wild Pig *Sus scrofa*

Eurasian pigs are commonly hunted in the Imawbum Mountains and their smoked skulls can be seen in many houses. There are caught around villages and farms as well as further away from the villages.

In January 2011 the tracks and dens of wild pigs were encountered frequently during the field survey (N 26.49347, E.98.37126 elevation 2,530 m asl). The smoked testes of wild pigs were observed at the Chinese Camp; they are used for medicinal purposes. One male wild pig was observed near the base camp on 15 November 2011 (N 26.42364, E.98.40440, elevation 2535 m asl). In December 2011 and January 2012 tracks and nests of Eurasian wild pig were observed during the field survey in the Wusut Area. The species was seen in March 2012 between Yahko Logging Camp (26.33372° N 98.55209° E elevation 3,058 m asl) and Camp 3

(26.43246° N 98.41794° E elevation 2,537 m asl) as well as near the Maluhou Camp (26.45936° N 98.48795° E elevation 2,127 m asl).

Eurasian wild boar is distributed throughout most of Eurasia and North Africa

Red Muntjac *Muntiacus muntjak*

Red muntjac were observed in many villages, and it appears that this is one of the main species that is hunted in the area. According to hunters the species is found only at lower elevations, including, frequently, in the vicinity of the villages. The villages where remains were observed were all situated at altitudes between 500 and 1,750 m asl. Red muntjacs are caught in iron traps or with snare, and are hunted with guns. The price of a whole carcass is around 300 Yuan in Wusuk.

The remains or whole carcasses of red muntjac were observed in Wusuk village (one carcass, one skull), Chaungmo village (carcass and five skins), Chitchtago village (one skull) San Buk village (one skull), Maw Ban village (one skull).

Red muntjak is distributed over large parts of South and Southeast Asia including most of Myanmar. It is debatable whether or not the species is best considered to comprise one species (*M. muntjak*), two (*M. vaginalis* in the northern part of its range, including Myanmar, and *M. muntjak* in the southern part of its range) or three or more. In northern Myanmar, red muntjak is largely found in the lowlands, typically below the 1,500 m asl line, with other species, including Gongshang muntjak occurring at higher elevations. This indeed seems to be the pattern that emerges from the surveys in the Imawbum Mountains (see also below). While locally the species may be threatened by conversion of habitat and especially over-exploitation (primarily for meat and secondary for its antlers), at the global level the species (one or two) are currently listed as Least Concern (Timmins et al. 2008).

Gongshang muntjac *Muntiacus gongshannensis*

The Gongshang muntjac was recorded frequently in villages (carcasses, trophies, skins, etc.), in the field and on camera trap photos. This muntjak is the main bushmeat target species in the Imawbum Mountains, together with the Chinese serow. Hunting methods are snares, iron traps and hunting with shotguns. A significant proportion of the trade in Gongshang muntjak is to meet the demand from Chinese logging camps or traders in China; Kangfang village is used as the main trading post for wildlife heading to China.

Local hunters believe the species is common in the Imawbum Mountains.

In April-May 2010 a dead Gongshang muntjak was seen in a snare trap between Camp 1 and Camp 2 (N 26.42821°, E 98.38210°, elevation 2,519 m asl), and another one in an iron trap near Maw Ban village. One skin and two skulls in San Buk village (N 26.39701°, E 98.34699°; elevation 1,541 m asl) and four skins and ten skulls in Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 m asl). On 26 November 2010 a Gongshang muntjak was found caught in a snare trap near the survey camp (N26.44366° E98.37815°; elevation 2,693 m asl); a hunter took it to his village for it to be sold. On 28 November three hunters carrying three fresh carcasses were observed; they had caught them with iron traps, and were now on their way to the village to sell their quarry. Three skulls were found at the hunter's camp (N26.43847 E98.39278, elevation 2,693 m asl) on the rack above the fireplace. A skin and skull were observed in Chinwin Village (coordinates: N26.56273° E98.57607°, elevation: 1,642 m asl) on 28 December 2012. It was killed with a short gun to the east of the village. Several hunting trophies of this species were recorded at Mawre village in February-Mar 2013.

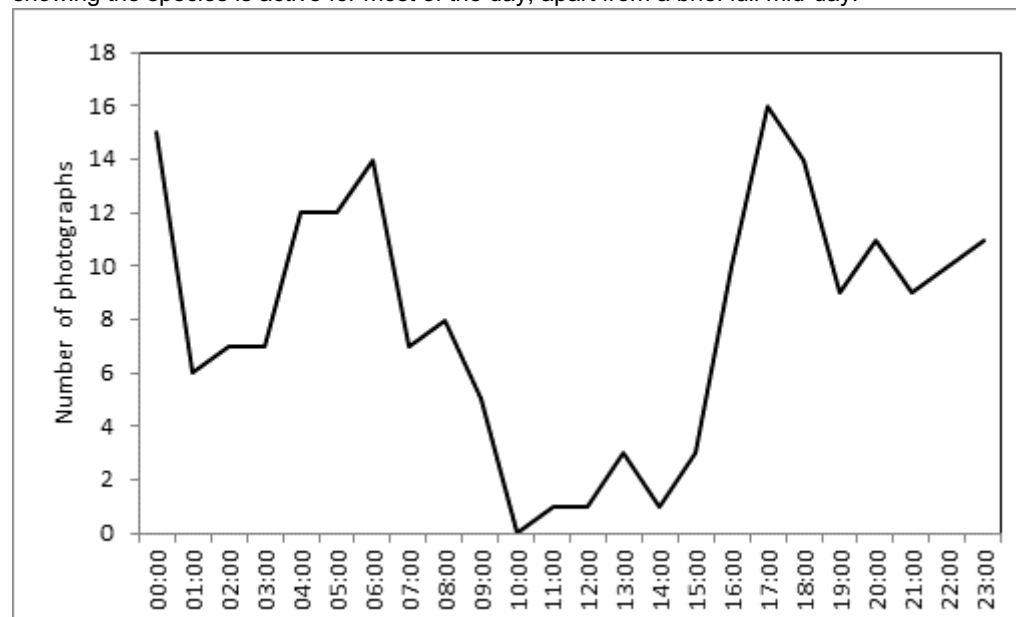
A carcass of a Gongshang muntjac was encountered on 12 March 2014 in 11 Miles village (N26.30363 E98.37574, elevation 1,754 m asl). The hunter said that he caught it with an iron trap and that he will travel to Kangfang Village on the Chinese border where he sells the whole carcass for 600 Yuan.

In April-May 2010 a Gongshang muntjak carcass was found between Camp 1 and 2 (N 26.42725°, E 98.37157°, elevation 2,436 m asl). The animal had apparently been killed by a predator (a yellow-throated marten according the hunters). Between December 2011 and January 2012 the species was recorded near the Camp 2 and Chinese Logging Camp N.26.43144, E.98.34770, elevation 1,813 m asl). In March 2012 Gongshang muntjac was recorded near Tharkyar Camp 1 (26.49826° N 98.43938° E elevation 2,552 m asl), Tharkyar Camp 2 (26.49069° N 98.43927° E elevation 2,251 m asl) and Maluhou Camp (26.45936° N 98.48795° E elevation 2,127 m asl).

The species was recorded on camera traps during 192 sessions, at all altitudes between 2,600 and 3,000 m asl, but it appears to be more common at the lower elevations. The species is active both at night and during the day.

Gongshang muntjac is known from Yunnan and northern Myanmar - here is, however considerable taxonomic confusion concerning the muntjacs in this area, resulting in the species to be listed as Data Deficient on the IUCN Red List. It is clear that muntjacs in the area –irrespective of what species they represent—are threatened by hunting for meat and skins, both for subsistence but also for the (international) wildlife trade.

Figure 21. Time of day photos were taken of Gongshang muntjac by camera traps in 192 sessions, showing the species is active for most of the day, apart from a brief lull mid-day.



Fea's Muntjac *Muntiacus feae*

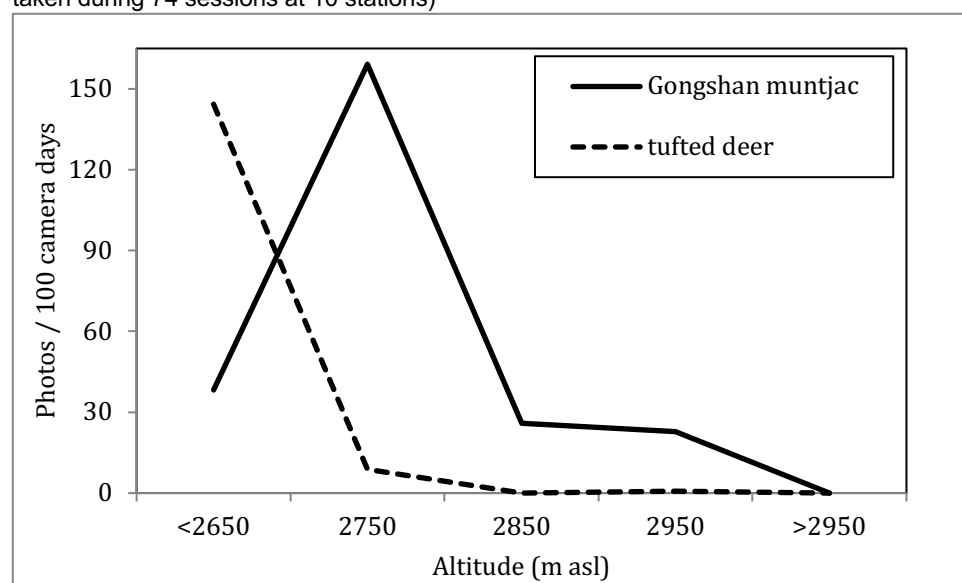
The taxonomy of muntjacs has changed considerably in recent years (Groves and Grubb 2011), and what is now generally accepted as Fea's muntjac in the past included other taxa. The distribution of Fea's muntjac is in the southern part of Myanmar and Thailand south to the Isthmus of Kra on the Thai-Malay Peninsula. However, there are indications that the species occurs in southern China and Timmins et al. (2008) suggested that the species may in fact also be present in northern Myanmar (prior to 2008 a photograph taken at 1,250 m asl in

Hponkanrazi Wildlife Sanctuary in northern Myanmar shows a male with some features similar to *M. feae*).

In February-March 2010 a trophy or trophies attributed to this species were observed in a village or in villages in the Wusut Area, Hmai Hka catchment. No further details are available and the record is best considered provisional at the moment.

In light of uncertainty about the species distribution (which may be restricted to a small area in southern Myanmar and southern Thailand or which may in fact include large parts of Myanmar, Thailand and southern China) Fea's muntjak is listed as Data Deficient.

Figure 22. Results of camera traps efforts for Gongshang muntjak and tufted deer stratified by altitude (Gongshang muntjak, 2102 photos taken during 205 sessions at 24 stations; tufted deer, 615 photos taken during 74 sessions at 10 stations)



Tufted Deer *Elaphodus cephalophus*

The tufted deer was recorded occasionally in the field and never in villages (trophies or skins) but was frequently recorded on the camera traps. Local hunters consider the deer rare.

In April-May 2010 one tufted deer was observed at N 26.43160°, E 98.41587° at an elevation of 2,580 m asl. No skulls or skins were recorded in the villages. A tufted deer was encountered on 12 October 2011 near Camp 3 (N 26.42364, E.98.40440, elevation 2,535 m asl).

The species was photographed 615 times, taken during 74 sessions at 10 stations, with most photos being taken at the lower stations, i.e. below 2,700 m asl.

Tufted deer is distributed in north-eastern Myanmar and south-eastern China. It is considered very rare in Myanmar (Francis, 2008), while it is wide-spread in south-eastern China. Its conservation status is Near Threatened (IUCN, 2010), but it is considered vulnerable to snaring because it lives in a well-defined home territory where it travels along on well-established paths (Smith and Xie, 2008).

Figure 23. Selected species of mammals encountered during the surveys (1) Takin (2) Chinese serow (3) tufted deer (4) Eurasian wild pig *Sus scrofa* (5) red muntjac and Malay porcupine (6) Gongshang Muntjac



Takin *Budorcas taxicolor*

Takin are targeted by hunters in the Imawbum Mountains and during the surveys numerous skulls of the species were present in villager's houses. The species is caught with snares, iron traps, and guns – snares and traps are often set close to salt licks that are visited by the takin. Despite the clear heavy hunting pressure, numerous signs of takin were observed in the field.

In February- Mar 2010 the carcass of a taking was observed at Phaungjar village (N26.55604° E98.34741° 982 m asl); the animal was shot about 6 km away from the village. In April-May 2010 three to four takin skulls both adults and juveniles were displayed in San

Buk village (N 26.39701°, E 98.34699°; elevation 1,541 m asl) and Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 m asl). In November 2010 a smoked skull and a dried skin were found at the hunter's camp (N26.43847 E98.39278, elevation 2,693 m asl). The animal was caught with an iron trap about four days ago; the meat was already sent to the village. Also in November 2010, a single skull was displayed in a hunter house in Chitchitago village (N26.48587° E98.64373°; elevation 1,880 m asl). The front skull of takin was observed with a snare at the mountain ridge (N 26.43479°, E 98.44246°, elevation 3313 m asl). In December 2011 or January 2012 a takin was caught with an iron trap near the Camp 2 by a hunter from Laung Naw Dan village. The animal was sold for 3100 Yuan to Chinese Timber Merchants who would send it onwards to China. During the survey in December 2012, skulls were seen hanging on the wall as hunting trophy at three villages: Pawaku (N26.18670° E98.65918°, elevation: 2199 m asl) Ngaw Kay Law and Chitwin (N26.56273° E98.57607°, elevation: 1642 m asl). According to the villagers from Pawaku village, this species used to be common in the mountain area near their village before logging was done in this area. On 8 of March 2014, takin horns were observed in Paungjar village, and two skulls were recorded at a hunter's house in Mawre village in February-Mar 2013. The hunter shot them on Maw Mountain (26.469884°N 98.527252°E, elevation: 3,406 m asl) in 2011.

In April-May 2010 the tracks and feeding signs of takin were recorded on 9 April 150 meters east of Camp 2 (N 26.42846°, E 98.39023, elevation 2,772 m asl). Takin feeding signs were also recorded between Camps 2 and 3 (N 26.42449°, E 98.39623°, elevation 2,810 m asl). Hunters from San Buk village reported recent sightings and hunting of takins in the conifer zones, especially at a salt lick (N 26.43457°, E 98.43764°, elevation 3187 m asl). On 28 November 2010, takin track were recorded about 1 km away east of the survey camp (N26.44366° E98.37815°; elevation 2693 m asl). On 24 April 2011 takin tracks and feeding signs were recorded east of Camp 3 (N 26.42958°, E 98.4229°, elevation 2,891 m asl). Takin tracks and feeding signs were recorded on 29 May 2011 east of Camp 3 (N 26.42958°, E 98.4229°, elevation 2,891 m asl). Tracks, sleeping and feeding signs were recorded on 12 Oct 2011 east of Camp 3 (N 26.42958°, E 98.4229°, elevation 2,891 m asl) and in December 2011 these same signs were recorded on the way of Camp 3 (26.42951 N 98.41888 E, elevation 2,709 m asl). Takin tracks, sleeping and feeding signs were recorded on 4 March 2014 on the way back from Grassland Camp, Wusut Area, at an elevation of ~2,500 m asl.

Traditionally one species of takin is recognised, with three or four subspecies; they show an allopatric distribution from eastern India northern Myanmar and southern China. Recently Groves and Grubb (2011) revised takin taxonomy and recognised four different species. The nominate that occurs in northern Myanmar is threatened primarily by hunting. Takin regularly visit salt-licks which renders them very vulnerable to poachers who lay in ambush or who set iron traps. Takins seasonally migrate; in spring and early summer they gather in large groups and move to higher altitudes whereas in autumn and winter they break down in smaller groups and move to forested areas at lower altitudes. Altitudinal migration and gathering in large groups makes them vulnerable to poaching. Song et al. (2008) note that while in Myanmar the species is known to occupy the high mountain slopes above 2,750 m asl in Kachin State, there is no recent distribution data.

Chinese serow *Capricornis milneedwardsi*

A large number of skulls, skins and other body parts were observed in the villages. Hunters consider Chinese serow to be common in the Imaibum Mountains and use snares, iron traps and shotguns to hunt them. A significant proportion of the serow hunted are intended for trade, including cross-border trade to China.

In February-Mar 2010 numerous skulls of Chinese serow, tied at trophy boards, were observed in villages in the Wusut area. In April-May 2010, in San Buk village (N 26.39701°, E 98.34699°; elevation 1,541 m asl), 14 skulls were on display in hunters' houses. During 2009,

one hunter, Le Me A Si, caught ten Chinese serow with iron traps near San Buk village. In Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 m asl) three skins and 17 skulls were recorded. In April 2011 a freshly killed Chinese serow was observed in Sanbuk village (N 26.39701°, E 98.34699°; elevation 1,541 m asl). It was caught it near Camp 1 with a shot gun. According to the hunter, Ar Si, Chinese serow is easy to shoot in the raining season; the most valuable parts (horn, feet and tongue) and meat were sold for over 100 Yuan to people in Wusuk village as well as to Chinese construction workers in Pashe village.

The skinning of Chinese serow was observed at Taung Tin village (N 26.05700, E 98.18951, elevation 353 m asl) on 16 May 2011. The animal was caught some 4 km east of village. The skins were to be sold to traders in Chibwe. A second skin was observed in hunter house near Chinese camp. The animal was caught near Camp 1 (N 26.44303, E.98.37706, elevation 2,693 meter asl) with an iron trap. The different body parts (horn, feet and tongue) and meat can be sold for 100 Yuan or more to traders in Wusuk village. On 24 of February 2014 two skulls and horns of Chinese serow were recorded in a Chinese logging camp in the Wusut Area (N26.43284 E98.43791, elevation 3,234 m asl). According to the hunter he catches Chinese serows with iron traps in that area. The smoked skull and feet of the Chinese serow were recorded at a hunter's house, in Mawre village in February-March 2013. The hunter shot it in 2011 on Maw mountain (coordinates: 26.469884°N 98.527252°E, elevation: 3,406 m asl).

Chinese serow occurs in much of Myanmar, Cambodia, south and central China, Laos, Thailand, and Viet Nam, where it occurs both in steep mountainous areas as well as gentler hilly land. As all other species of serow the Chinese serow is highly prized for its meat, and its body parts, the latter of which are used for purported medicinal purposes. The species is listed as near-Threatened on the IUCN Red List.

Red Serow *Capricornis rubidus*

In April-May 2010 in San Buk village (N 26.39701°, E 98.34699°; elevation 1,541 meters), one skull of the red serow was recorded and in Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 meters) two skulls. In February-Mar 2010 one or more skulls of red serow kept as trophies observed in a village or in villages in the Wusut area, Hmai Hka catchment

Red serow appears to be endemic to northern and western Myanmar, but there is uncertainty about this because of identification problems with other reddish serows from neighbouring countries. Hitherto only specimens from Myanmar have been assigned unambiguously to this species.

Duckworth and Than Zaw (2008) summarized the threats to the species as follows:

"The threats to this species are not known, but there is significant hunting of other large mammals in the area. The serow [this includes more than one species] in Myanmar is one of the most heavily traded species in the local trade. Every market surveyed by TRAFFIC in Myanmar in 2006 had serow, and in most markets, this was the most commonly observed species, with the bulk of the parts observed being horns and heads. [] Serow are very heavily hunted in Myanmar, with meat usually being consumed locally, but parts, including the forelegs, heads, horns and fat from the stomach region being the most sought after for use in traditional medicines. These parts are rendered down and the oil is sold in small bottles. According to dealers, this oil is applied externally to treat skin ailments and joint problems. Horn tips are also exported from Myanmar to Thailand to be attached to the spurs of fighting cocks".

In the most recent assessment of serows in 2008, the threat levels of the red serow was not large enough for it to be considered globally threatened, listing it as Near Threatened instead. It was recognised that red serow was believed to be in significant decline not enough for it to qualify for it to be listed as Vulnerable, and that the true status of the species may be better or

worse than this. Future revisions of this classification may reflect true changes in status, or may simply reflect better information (Duckworth and Than Zaw 2008).

Chinese Goral *Naemorhedus griseus*

At least seven skulls of this species were observed in Paungjar Village on 8 March 2014. The owner caught the Chinese gorals with iron traps in the area to the east of the village. Chinese goral bones were observed in a pot, to be boiled down for traditional medicine. The skulls and horns, as well as the medicine are sold in Kangfang.

Chinese goral is found in western and eastern Myanmar, China, northeastern India, Thailand, and Viet Nam. It is facing a decline throughout its range, mainly due to over-hunting, and goral are frequently hunted or snared by local people for meat, fur and medicines. These animals are hunted in the northern portion of Myanmar for their pelts (Duckworth et al. 2008). Habitat loss is less of a threat as it is largely confined to rugged, inaccessible areas.

Malayan porcupine *Hystrix brachyura*

In February 2012 four photos of Malayan porcupines were taken in 3 series by a camera-trap at an altitude of 2,807 m asl (26.42978° N 98.42119° E). In April-May 2010 two Malayan porcupine skulls were observed in a hunter's house in Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 m asl). In March 2014, a skull was observed in Paungjar village (987 m asl); the owner caught it with an iron trap in the nearby shifting cultivation fields.

Carcasses of Malayan porcupines were observed on several occasions. A single carcass in November-December 2010 at a Chinese logging camp (N26.43145 E98.34763, elevation 1,835 m asl), a single carcass in February 2011 Chaungmo village and a single carcass in January 2012 in Wusuk village (N 26.41094, E 98.29216, elevation 1,357 m asl). The first was caught near the logging camp with a snare, the latter was caught in an iron trap near the village. The hunter in Chaungmo informed us that they consume the meat locally and use the quills for medicinal purposes, and that they are not sold onto the Chinese market. Hunters claim this species to be common in the area.

Malayan porcupine occurs in large parts of South Asian, southern China and Southeast Asia, where, according to Lunde et al. (2008), it occurs up to elevations of 1,300 m asl. According to Parr and Thin Tan (2005) its altitudinal range is slightly larger, i.e. up to 1,500 m asl. The records from the Imawbum Mountains increase the altitudinal range considerably by some 1,300 m at least. While the specimens observed in the villages and in the Chinese logging camp could have been trapped at lower elevations, the camera trap photographs were taken at 2,800 m asl thus providing hard evidence that the species indeed does occupy the upper zones of the Imawbum Mountains.

Malayan porcupines can be found in various forest habitats, and in scrubby, open areas close to forest, including, at least in the Imawbum Mountains, the rhododendron zone. Malayan porcupine is included on the IUCN Red List as Least Concern because of its wide distribution, its tolerance of a degree of habitat modification, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category. While it is hunted for food in large parts of its range this not thought to impact populations (Lunde et al. 2008).

Brush-tailed Porcupine *Atherurus macrourus*

In December 2011 and January 2012 the remains of brush-tailed porcupines were observed in Saw Law (N 26.15396, E 98. 27053; elevation 1,541 meters). The owner had caught them with iron traps set near the shifting cultivation. A skull of a brush-tailed porcupine was

observed in Paungjar village on 8 March 2014). Like in Saw Law it was caught with an iron trap in the nearby shifting cultivation fields.

Brush-tailed porcupine is found over large parts of mainland Southeast Asia and inhabits a wide range of habitat types; given this large range and the fact that it faces a low level of threat it is not considered globally threatened.

Chinese bamboo rat *Rhizomys sinensis*

A single Chinese bamboo rat was observed on 8 of November 2011 in a small iron trap at Lisue Camp (N 26.2345, E 98.52.0, elevation 2,641 m asl).

This species is found in southern China, northern Myanmar, and northern Viet Nam, where its altitudinal range is between 1,200–4,000 m asl (Lunde et al. 2008). It is largely confined to the bamboo thickets in the montane forest, although it can be found in pine forest (Smith and Xie 2008). It has moderate tolerance to human disturbance, and, while it is hunted and heavily harvested for food, it is listed as Least Concern by the IUCN Red List (Lunde et al. 2008).

Little Himalayan rat *Niviventer eha*

Six photographs in two series were taken in February–April 2011 by a camera-trap at an elevation of 2,735 m asl (N26.49742, E098.37450).

Little Himalayan rat ranges in the mountains of Nepal and northern India, southern China and northern Myanmar (Smith and Xie 2008), where it occurs at altitudes between 2,000 to 3,700 m asl (Musser et al. 2008) or more narrowly 2,500–3,330 m asl (Smith and Xie 2008). In terms of habitats it can be found in wet montane coniferous forest, rhododendron forests and bamboo shrubs. While it has been listed as Least Concern on the IUCN Red List, it is noteworthy that hunting for subsistence is identified as the major threat to the species in South Asia and that it is not known with certainty if it occurs in any protected area within its range (Musser et al. 2008).

Perny's long-nosed squirrel *Dremomys pernyi*

In February–April 2011 seven photographs in a single series were taken of Perny's long-nosed squirrel at an elevation of 2,635 m asl.

This species is widely distributed through northern South Asia, central and southern China and mainland Southeast Asia. In China it is typically found between 2,000 and 3,500 m asl (Smith and Xie 2008). Perny's long-nosed squirrel is listed as Least Concern on the IUCN Red List because of its wide distribution, its presumed large population, its tolerance of a degree to habitat modification, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category (Lunde and Molur 2008).

Himalayan striped squirrel *Tamias maclellandii*

In March 2012 six individuals of western striped squirrel were recorded in Tharkyar Camp 1 (26.49826° N 98.43938° E elevation 2,552 m) and Tharkyar Camp 2 (26.49069° N 98.43927° E elevation 2,251 m).

This widespread small squirrel has been recorded from northern South Asia, southern China and mainland Southeast Asia. Its altitudinal range is reported as up to 1,500 m asl in South Asia (Molur et al. 2005) and up to 1,700 m asl in China (Smith and Xie 2008). If the records in

the Imawbum Mountains indeed refer to Himalayan striped squirrel this probably represents a considerable altitudinal range extension. Alternatively, it could be misidentified Swinhoe's striped squirrel *T. swinhoei*. According to Smith and Xie (2008) where Swinhoe's and Himalayan striped squirrels meet, and this included northern Myanmar, the former occupies mostly altitudes between 2,500 and 3,000 m asl, and the latter altitudes between 300 and 600 m asl.

Both Himalayan striped squirrel and Swinhoe's striped squirrel are listed as Least Concern on the IUCN Red List because of their wide distributions, their presumed large populations, their tolerance of a degree to habitat modification, and because neither species is unlikely to be declining fast enough to qualify for listing in a more threatened category (Duckworth et al. 2008; Duckworth and Lunde 2008).

Pallas's squirrel *Callosciurus erythraeus*

A Pallas's squirrel was encountered on 28 February 2013 in the Shaw mountains (26.499069°N 98.539070°E, elevation: 2869 m asl). Two photographs in one series were taken in February-April 2011 by a camera-trap at 2,868 m asl (26.50106°N 98.37095°E).

Pallas's Squirrel is widely distributed in South Asia through to south and central China and Southeast Asia. It occurs mainly at low elevations but it may be found in subalpine coniferous forest or in a mix of confers and broadleaf trees at altitudes above 3,000 m asl (Smith and Yan 2008). It is active at dawn and dusk. Pallas's squirrel is listed as Least Concern on the IUCN Red List because of its wide distribution, its presumed large population, its tolerance of a degree to habitat modification, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category (Duckworth et al. 2008).

Giant flying squirrels are amongst the largest of the squirrels with head-body lengths of over 50 cm. The genus has a largely Indo-Malayan distribution with some species extending into the Palearctic. The taxonomy and systematics of these flying squirrels is in need of revision. None of the three species observed in the Imawbum Mountains are considered globally threatened but all have been assessed as part of three wide ranging species. When multiple species are indeed recognised, all of which occupy only parts of the range of the species complex this will necessitate conservation reassessments.

Yunnan giant flying squirrel *Petaurista yunnanensis*

A female giant flying squirrel was shot by a hunter with gun on Shaw mountain at coordinates: 26.507621°N 98.546735°E, elevation: 2314 m at night on 25 February 2013.

This giant flying squirrel was until recently considered part of the Indian giant flying squirrel *P. philippensis* species group (which ranges over a large part of Asia) but molecular data reveal that it is best considered as species endemic to southern China and northern Myanmar (Li et al. 2013; Yu et al. 2008). It appears to have a broad altitudinal distribution, ranging from the lowlands to over 2,000 m asl. Their nocturnal behaviour in combination with the fact that several species can occur sympatrically, makes identification in the field problematic. In Yunnan the species is known to regularly visit salt licks with up to 20 individuals visiting a single site at a night (Xian and Harding 2013). The species has not been assessed by the IUCN Red List: it is included as part of the Indian giant flying squirrel *P. philippensis* which is considered Least Concern (Walston et al. 2008). Throughout their range giant flying squirrels are hunted for their meat and for them to be used in traditional medicine.

Red giant flying squirrel *Petaurista petaurista*

In February-March 2010 a trophy was observed in a village or in villages in the Wusut area, Hmai Hka catchment. Further details are lacking.

This arboreal and nocturnal species is a widely distributed species from northern South Asia, southern China and Southeast Asia. It has a wide altitudinal range, from the lowlands up to 3,100 m asl, and it occurs in moist evergreen broadleaf forest, temperate forest, coniferous forests, and scrub forest, as well as rocky outcrops. It is classified as Least Concern by the IUCN Red List (Walston et al. 2008)

Lesser giant flying squirrel *Petaurista elegans*

In January-February 2011 one series of three photographs of a lesser giant flying squirrel was taken with a camera-trap at 2,618 m asl in the area northeast of Wayakbuk village [N26.43081, E98.41678]. In March 2012 the survey team observed the lesser giant flying squirrel near Sawlaw.

This widely distributed species is from South Asia, to southern and central China, into Southeast Asia. In parts of its range (e.g. northern South Asia) it is largely found at elevations between 3,000-4,000 m asl whereas it occurs at lower elevations elsewhere. It is found in temperate pine forests, wet tropical evergreen forest and dry evergreen forest, both in tall forest and in rhododendron scrub and on rock cliffs (Smith and Xie 2008). It is listed as Least Concern on the IUCN Red List (Walston et al. 2008).

Moupin pika *Ochotona thibetana*

In March 2012 Moupin pika were encountered near the Yahko logging camp (3058 m asl) and between Yahko logging Camp and Camp 3 (2,537 m asl).

Moupin pika occurs in the mountains of the eastern Tibetan Plateau and along the Himalayan massif in China, parts of India, Bhutan and northern Myanmar. This pika usually occurs between 2,400 and 4,100 m in elevation, but has been recorded as low as 1,800 m (Smith and Xie 2008). This is a social, burrowing pika that occurs in bamboo and rhododendron forest at lower low elevations and in subalpine forest at higher elevations, where it inhabits rocky areas under the forest canopy. In southern China, moupin pika may be threatened by deforestation, in India by India habitat loss due to agriculture, settlement, deforestation, and road construction, whereas in Central China it is targeted as a pest (Smith and Boyer 2008). The Moupin pika is considered Least Concern by the IUCN Red List as it is a widespread species that is not known to be experiencing a severe decline.

Abundance of Mammals in the Imawbum Mountains

While the surveys were not designed to establish measures of abundance (such as densities or encounter rates) it is clear from the above species accounts that some species were encountered more often than others, even within taxonomic groups. Thus of the xx species of primates encountered during the survey

Table 5. Abundance of mammals as captured on camera traps. Muntjacs, tufted deer, macaques, takin, red pandas and masked palm civets are commonly photographed.

Species	Total photos	Total series	Photos per 100 camera trap days	Series per 100 days
Smoke-bellied niviventer	12	4	0.31	0.10
Northern treeshew	12	2	0.31	0.05
Treeshew spp	3	2	0.08	0.05
Myanmar snub-nosed monkey	36	4	0.94	0.10
Assamese macaque	653	86	16.98	2.24
Stump-tailed macaque	166	18	4.32	0.47
Unknown macaque	7	3	0.18	0.08
Shortridge's langur	3	1	0.08	0.03
Red panda	284	39	7.38	1.01
Yellow throated martin	90	22	2.34	0.57
Spotted linsang	11	15	0.29	0.39
Masked palm civet	172	59	4.47	1.53
Leopard cat	39	13	1.01	0.34
Marbled cat	5	3	0.13	0.08
Sun bear	3	1	0.08	0.03
Gongshang muntjac	2102	205	54.65	5.33
Unknown muntjak	32	7	0.83	0.18
Tufted deer	615	74	16.00	1.92
Takin	182	8	4.73	0.21
Chinese serow	61	6	1.59	0.16
Eurasian wild pig	70	8	1.82	0.21
Malayan porcupine	4	3	0.10	0.08
Lesser flying squirrel	6	2	0.16	0.05
Pemy's long-nosed squirrel	7	1	0.18	0.03
Pallas squirrel	2	1	0.05	0.03
Unidentified squirrel	41	30	1.07	0.78
South China wood mouse	9	1	0.23	0.03

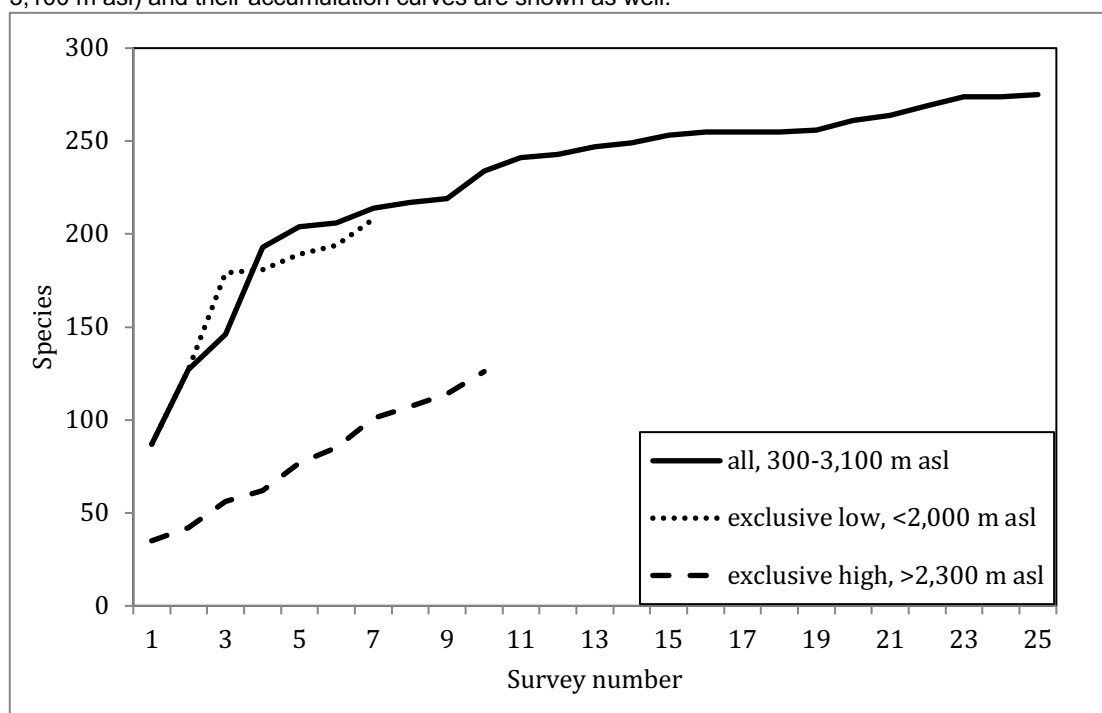
BIRDS

A total of 176 species were recorded during 25 surveys in five periods (February-March 2010; November 2011-January 2012; March-April 2012; December 2012-Mar 2013; February-March 2014).

Species Richness and Abundance of Birds in the Imawbum Mountains

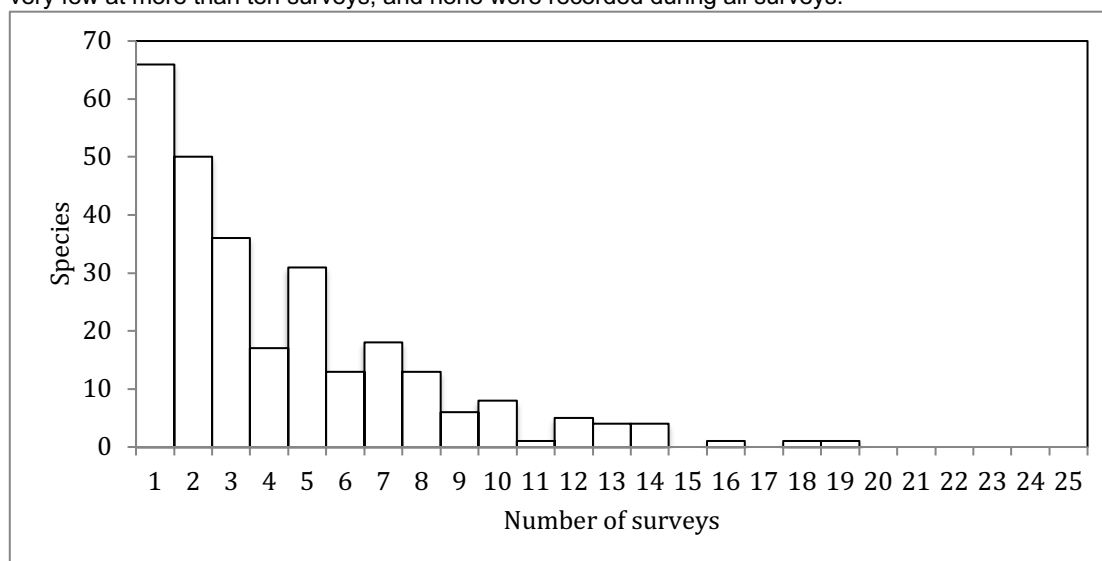
More species are recorded in the lower parts of the Imawbum Mountains than in the higher parts, but both areas act as important refuges for imperilled bird species. Seven surveys were conducted exclusively in the lower regions – including surveys in villages along the main rivers flowing through the area—and nine surveys were exclusively conducted in areas above 2,300 m asl (more surveys covered both the lower and higher regions, thus not allowing to distinguish between the two). From the species accumulation curves (Figure 12) it is clear that the initial species richness (i.e. the number of species recorded during the first survey) is higher in the lower than in the higher parts, but the latter has not yet reached an asymptote after the nine surveys. Combining all the 25 surveys, the species accumulation curve starts reaching an asymptote.

Figure 24. Accumulation curve of new bird species detected in the Imawbum Mountains between February 2010 (survey 1) and March 2014 (survey 25). Seven surveys were conducted exclusively in the lower regions (between 300-2,000 m asl) and ten exclusively in the higher regions (between 2,300-3,100 m asl) and their accumulation curves are shown as well.



As expected many of the bird species were recorded only a few times and few were recorded many times. More specifically, almost 70 species were recorded only during one survey (during which a single individual may have been recorded or multiple large flocks), and only three species were recorded during more than 15 of the 25 surveys. Given that the surveys were conducted in widely different habitats, not a single species was recorded during all surveys.

Figure 25. Commonness of bird species in Imawbum, Myanmar. Indicated is the frequency at which species were recorded during surveys. Most species were recorded only during one of two surveys, very few at more than ten surveys, and none were recorded during all surveys.



Data from the camera traps gave some indication of the commonness or rarity of different group birds (Table 4). Temminck's tragopan was the most frequently recorded ground bird, with 82 photographs in 15 series. It was active mostly during the early hours of the day. The two species of partridge and two species of thrush were also regularly photographed.

Table 7. Abundance of birds as captured on camera traps. All species are frequently found on the forest floor, and especially pheasants and partridges and thrushes are commonly photographed.

Species	Total photos	Total series	Photos per 100 camera trap days	Series per 100 days
Temminck's tragopan	82	15	2.13	0.39
Hill partridge	4	2	0.10	0.05
Rufous-throated partridge	7	1	0.18	0.03
Spotted laughing thrush	6	2	0.16	0.05
Scaly thrush	17	7	0.44	0.18
Blue-whistling thrush	5	1	0.13	0.03
Orange-flanked bush robin	6	2	0.16	0.05
White-browed bush robin	6	2	0.16	0.05
White-browed fulveta	18	6	0.47	0.16

Birds of Conservation Concern

Three globally threatened and six Restricted Range species were recorded, with one, Blyth's tragopan, falling in both categories.

Rufous-necked hornbill *Aceros nipalensis*

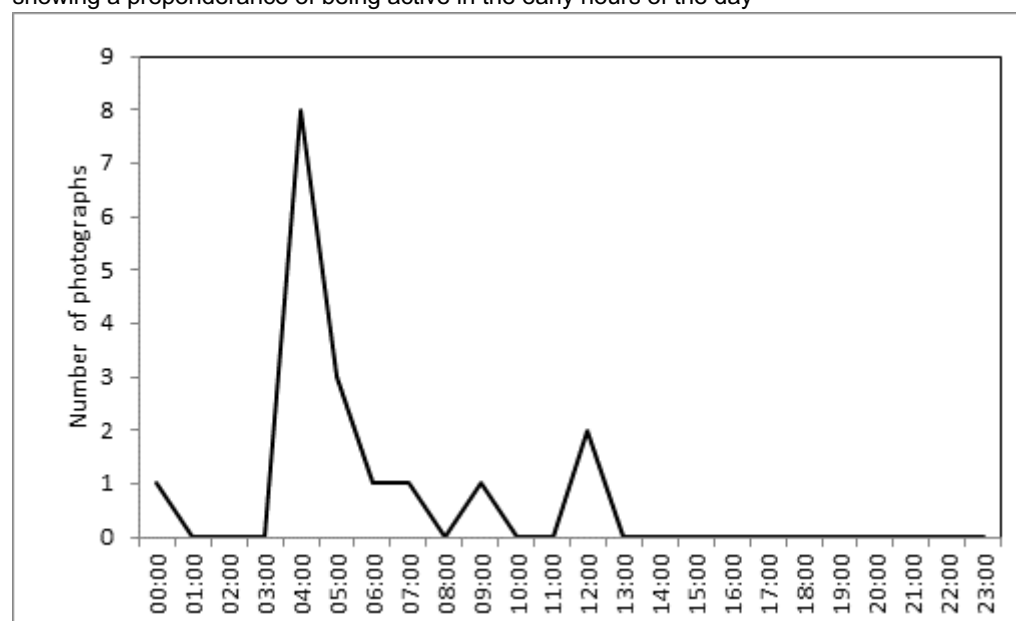
This species inhabits mature broadleaved forest, between 600-1,800 m asl and up to 2,200 m asl, needing tall large diameter trees for nesting. Its global range is broadly disjunct with one centre in Bhutan, north-east India, northern Myanmar, and south-east Tibet, China, and a second centre in southern Yunnan, China, northern Thailand, Laos, Vietnam and eastern Myanmar. It has declined dramatically and is now very rare across much of its historical range.

(BirdLife 2012). While it has been recorded historically in various parts of Myanmar, including Kachin State, recent (post 1980) records are rare, and seem to be confined to Putao, where the ornithologist Ben F. King found them “fairly common” in January–February 1998 (BirdLife International 2001) and Hkakabo Razi north of Putao, where it was recorded by Rappole et al. (2011). The present record comes from the area east of Wusuk village, where the species was recorded in February 2014 at an elevation of 1,800+ m asl. The species is classified as Vulnerable largely because it is threatened by a combination of habitat loss and hunting; human population growth and encroachment of forested land in the species’ range have proceeded apace in recent years, characterised by habitat degradation and increased hunting pressure (BirdLife International 2001).

Beautiful nuthatch *Sitta formosa*

The species is generally scarce in high-altitude evergreen forests, between 1,500–2,400 m asl, occasionally lower, ranging from the eastern Himalayas of northeastern India and Bhutan and the northern mountains of Myanmar to those of Laos and Vietnam. It has been recorded historically in Kachin State, but recent (post-1980) records are rare, with BirdLife International (2001) mapping just one locality (“c. 40 km to the north-west of Putao, c. 20 in several different groups, 600–1,100 m asl, January and February 1998”) and Rappole et al. (2011) recording it in Hkakabo Razi. Beautiful nuthatch is listed as Vulnerable on the IUCN Red List, with the main threat being forest loss, degradation and fragmentation, predominantly as a result of shifting cultivation, and, locally, large-scale timber extraction (BirdLife 2012).

Figure 26. Temminck’s tragopan activity pattern based on 19 series of camera trap photographs showing a preponderance of being active in the early hours of the day



Blyth’s tragopan *Tragopan blythii*

Blyth’s Tragopan ranges in the mountains of northeast India, Bhutan, south-eastern Tibet and northwest Myanmar, where it lives at elevations between 1,800–2,400 m asl, occasionally down to 1,400 m asl (winter) or up to 3,300 m asl (summer). Its range is small enough for it to be considered a Restricted Range Species. Recent (post-1980) records for Kachin are rare, with BirdLife International (2001) mapping one locality, i.e. Putao, 1998, at 2,500 m asl, and possibly a second one, Dawang, 2,440 m asl, on the border between China and Myanmar

that could have been from either country [while BirdLife International (2001) in a footnote indicate that the record comes from the border between China and India, the latter is probably in error given that the site is situated on the Myanmar border]. Rappole et al. (2011) recorded the species in Hkakabo Razi. The species was recorded once in the Imawbum Mountains, i.e. in January 2012, in Camp 4 in the Wusut area. Blyth's tragopan qualifies as Vulnerable according to IUCN Red List criteria because its total population is believed to be small and declining, that is scattered in subpopulations; widespread high levels of hunting and continuing habitat destruction will inevitably exacerbate this situation (BirdLife International 2001).

Ward's trogon *Harpactes wardi*

Ward's trogon ranges from the northeastern parts of the Indian subcontinent eastwards to mainland Southeast Asia, including parts of Bhutan, India, China (Tibet), Myanmar, and Vietnam. It is confined to tall broadleaved evergreen forest. In this forest Ward's trogon is found in the lower storey, undergrowth and bamboo between 1,500 and 3,200 m asl, with evidence of altitudinal migration down to 1,200 during the winter months. This species is threatened by forest clearance and degradation, particularly through subsistence logging and shifting cultivation. It is also probably susceptible to hunting, at least in parts of its range. Little is known about its distribution in northern Myanmar with BirdLife (2012) commenting that formerly it was locally common in north, but there are no recent records and it is thought to be generally uncommon. Recorded once in the present survey.

Apart from Blyth's tragopan, the following Restricted Range Species (i.e. species with a breeding range of less than 50,000 km²) were recorded:

The **grey sibia *Malacias gracilis***, is found in evergreen and deciduous forest and pine forest between 900 and 2,800 m asl. The species migrates to lower elevations in winter; it was recorded between 1,800-2,500 m asl in February – March 2014 in the areas around the Grassland Camp and at around 1,000 m asl in March 2014 in Phaungjar.

Streak-throated barwing *Actinodura waldeni* is found in broadleaf evergreen and mixed forest, rhododendron and bamboo forest between 1,500 to 3,300 metres. It was recorded at various sites in February – March 2013 and February – March 2014, at altitudes between 900 and 2,700 m asl.

White-naped yuhina *Yuhina bakeri* is generally found in broadleaf evergreen forest between 600 to 2,000 m asl. It was recorded between altitudes around 2,700 m asl in February-March 2013 and between 1,000-1,700 m asl in March 2014.

The **brown-winged parrotbill *Suthora brunneus*** is found in bamboo thickets, long grass, scrub and agricultural land between 1,500-3,650 m asl. Recorded once in February-March 2013 at around 1,700 m asl.

Bird Species Newly Recorded in Myanmar

One new country record was documented in the Imawbum Mountains, viz. the white-throated Laughingthrush *Garrulax albogularis*. This species is found in the Himalayas, from Afghanistan and Pakistan through Nepal, India, and Bhutan, stretching eastwards through Chinese Yunnan to northern Vietnam. While this species has been recorded close to the border of Myanmar in India and China, thus far it has not been confirmed as occurring in Myanmar. According to BirdLife (2013) it is rare and local, possibly even extinct in Pakistan; common and widespread in Nepal, abundant in Bhutan, frequent to very rare in India, fairly common to locally common in China and locally uncommon in Vietnam. The species is found

in broadleaved evergreen forest, secondary growth and bamboo, typically above altitudes of 1,600 m asl, locally descending down to 600 m asl. In the summer months it is found in small flocks of 6 to 12 individuals, but in the winter months they gather in congregations of over 100 individuals.

During the present survey, groups totalling about 60 individuals were encountered in the Wusut Area (24-25 February 2013; 5-7 Mar 2013). It was recorded between camp 1 and camp 4, where it was particularly abundant. Six groups were observed with a combined total of some 300 individuals. It appears that these are the first records of white-throated laughingthrush in Myanmar; from the species' distribution range –with populations occurring right across the border in China and India, the species occurrence in Myanmar is not unexpected. The fact that multiple flocks were observed, including large ones of over 50 individuals, suggests that the species is not just a vagrant to the Imawbum Mountains, but instead it is most likely a year-round breeding resident.

Figure 27. Selected species of bird encountered during the surveys (1) Blyth's tragopan *Tragopan blythii* (2) Hill partridge *Arhorophila torqueola* (3) White-throated laughingthrush *Garrulax albogularis* (4) Ward's trogon *Harpactes wardi*



Table 8. Birds recorded in the Imawbum Mountains, Kachin State, northern Myanmar between February 2010 and March 2014

			Kang Fang- Dabamhka - Mawre	Mawre- Hayapege camp	Hayapege camp	Grass land Camp, Wayawbuk, Chinese Camp	Paungjar	Pawmawzu, 11 Mile
	Family	Species	19 Feb-9 Mar 2013	19 Feb-9 Mar 2013	19 Feb-9 Mar 2013	23 Feb-5 Mar 2014	7-9 Mar 2014	9-14 Mar 2014
1	PHASIANIDAE	Hill partridge <i>Arborophila torqueola</i>	+	+	+	+	+	+
2		Mountain bamboo-partridge <i>Bambusic olafytchii</i>	+			+		
3	FALCONIDAE	Crested goshawk <i>Accipiter trivirgatus</i>	+					
4		Himalayan buzzard <i>Buteo burmanicus</i>	+	+				
5		Black eagle <i>Ictinaetus malayensis</i>	+		+	+		
6		Crested serpent-eagle <i>Spilornis cheela</i>				+		
7		Common kestrel <i>Falco tinnunculus</i>				+		
8	COLUMBIDAE	Speckled wood pigeon <i>Columba hodgsonii</i>						
9		Spotted dove <i>Streptopelia chinensis</i>				+		
10		Mountain imperial pigeon <i>Ducula badia</i>				+	+	+
11	CUCULIDAE	Green-billed malkoha <i>Rhopodytes tristis</i>				+	+	
12	STRIGIDAE	Mountain scops-owl <i>Otus spilocephalus</i>	+					
13		Himalayan wood-owl <i>Strix nivicola</i>			+			
14		Tawny owl <i>Strix aluco</i>				+	+	
15		Collared owlet <i>Glaucidium brodiei</i>	+			+	+	+
16	APDIDAE	House swift <i>Apus affinis</i>				+	+	+
17	TROGONIDAE	Red-headed trogon <i>Harpactes erythrocephalus</i>				+	+	
18	CORACIIDAE	Dollar bird <i>Eurystomus orientalis</i>				+	+	
19	ALCEDINIDAE	Common kingfisher <i>Alcedo atthis</i>		+				
20		Crested kingfisher <i>Ceryle lugubris</i>		+				
21	MEROPIDAE	Blue-bearded bee-eater <i>Nyctornis athertoni</i>				+	+	
22	UPUPIDAE	Common hoopoe <i>Upupa epops</i>	+	+	+			
23	BUCEROTIDAE	Wreathed hornbill <i>Aceros undulates</i>	+					

24		Rufous-necked hornbill <i>Aceros nipalensis</i>				+		
25	RAMPHASTIDAE	Great barbet <i>Megalaima virens</i>	+	+	+	+	+	+
26		Golden-throated barbet <i>Megalaima franklinii</i>	+			+	+	+
27		Blue-throated barbet <i>Megalaima asiatica</i>				+	+	+
28	PICIDAE	Crimson-breasted woodpecker <i>Dendrocopos cathpharius</i>			+	+	+	+
29		Darjeeling woodpecker <i>Dendrocopos darjellensis</i>			+	+	+	+
30		Rufous-bellied woodpecker <i>Hypopicus hyperythrus</i>				+		
31		Greater yellownape <i>Chrysophleg maflavinucha</i>	+					
32		Bay woodpecker <i>Blythipicus pyrrhotis</i>		+	+	+	+	+
33	EURYLAIMIDAE	Long-tailed broadbill <i>Psarisomus dalhousiae</i>				+	+	
34	VIREONIDAE	White-browed shrike-babbler <i>Pteruthius flaviscapis</i>			+	+	+	+
35		Black-eared shrike-babbler <i>Pteruthius melanotis</i>				+	+	
36	CAMPEPHAGIDAE	Black-winded cuckoo-shrike <i>Coracina melaschistos</i>					+	+
37		Scarlet minivet <i>Pericrocotus speciosus</i>				+	+	
38		Common woodshrike <i>Tephrodornis pondicerianus</i>				+	+	
39		Bar-winged flycatcher-shrike <i>Hemipus picatus</i>				+	+	+
40	RHIPIDURIDAE	Yellow-bellied fantail <i>Chelidorhynch hypoxantha</i>	+			+	+	+
41		White-throated fantail <i>Rhipidura albicollis</i>				+	+	+
42	DICRURIDAE	Black drongo <i>Dicrurus macrocercus</i>				+		
43		Ashy drongo <i>Dicrurus leucophaeus</i>				+	+	+
44		Bronzed drongo <i>Dicrurus aeneus</i>				+	+	+
45		Lesser racket-tailed drongo <i>Dicrurus remifer</i>				+	+	
46		Greater racket-tailed drongo <i>Dicrurus paradiseus</i>				+	+	+
47		Hair-crested drongo <i>Dicrurus macrocercus</i>				+	+	
48	CORVIDAE	Large-billed crow <i>Corvus japonensis</i>	+	+	+	+		
49		Spotted nutcracker <i>Nucifraga caryocatactes</i>			+			
50		Common green magpie <i>Cissa chinensis</i>	+					
51		Red-billed blue magpie <i>Urocissa erythrorhyncha</i>	+					
52		Yellow-billed blue magpie <i>Urocissa flavirostris</i>				+	+	+
53		Grey treepie <i>Dendrocitta formosae</i>				+	+	+
54		Collared treepie <i>Dendrocitta frontalis</i>				+		
55	LANIDAE	Long-tailed shrike <i>Lanius schach</i>				+		
56		Grey-backed shrike <i>Lanius tephronotus</i>				+	+	+

57	NECTARINIIDAE	Green-tailed sunbird <i>Aethopyga nipalensis</i>		+	+		+	
58		Black-throated sunbird <i>Aethopyga saturata</i>	+	+		+	+	+
59		Plumbeous water-redstart <i>Arachnothera longirostra</i>				+		
60	DICAEIDAE	Fire-breasted flowerpecker <i>Dicaeum ignipectus</i>	+	+	+			
61	CLOROPSIDAE	Orange-bellied leafbird <i>Chloropsis hardwickii</i>	+			+	+	
62	PRUNELLIDAE	Alpine accentor <i>Prunella collaris</i>			+			
63		Maroon-backed accentor <i>Prunella immaculata</i>	+			+	+	
64	ESTRILDIDAE	White-rumped munia <i>Lonchura striata</i>						+
65	PASSERIDAE	Eurasian tree-sparrow <i>Passer montanus</i>					+	
66		Olive-backed pipit <i>Anthus hodgsoni</i>				+	+	+
67	MOTACILLIDAE	White wagtail <i>Motacilla alba</i>		+		+	+	+
68		Eastern yellow wagtail <i>Motacilla tschutschensis</i>				+	+	+
69	FRINGILLIDAE	Common rosefinch <i>Carpodacus erythrinus</i>	+					
70		Dark-rumped rosefinch <i>Carpodacus edwardsii</i>				+	+	+
71		Vinaceous rosefinch <i>Carpodacus vinaceus</i>				+	+	+
72		Spot-winged grosbeak <i>Mycerobas melonozanthos</i>				+		
73		Crimson-browed finch <i>Propyrrhula subhimachala</i>			+	+	+	+
74	EMBERIZIDAE	Little bunting <i>Emberiza pusilla</i>	++					
75	CERTHIIDAE	Hodgson's treecreeper <i>Certhia hodgsoni</i>		+				
76		Rusty-flanked treecreeper <i>Certhia nipalensis</i>				+		
77	SITTIDAE	Chestnut-vented nuthatch <i>Sitta nagaensis</i>	+	+		+	+	
78		Chestnut-bellied nuthatch <i>Sitta cinnamoventris</i>		+		+		
79		White-tailed nuthatch <i>Sitta himalayensis</i>		+	+			
80		Beautiful nuthatch <i>Sitta formosa</i>				+		
81	CINCLIDAE	Brown dipper <i>Cinclus pallasii</i>	+					
82	TURDIDAE	Plain-backed thrush <i>Zoothera mollissima</i>		+	+			
83		Long-tailed thrush <i>Zoothera dixonii</i>				+		
84		Scaly thrush <i>Zoothera dauma</i>				+		
85		Chestnut thrush <i>Turdus rubrocanus</i>			+			+
86		Plumbeous water-redstart <i>Rhyacornis fuliginosa</i>	+			+		
87		White-capped water-redstart <i>Chaimarornis leucocephalus</i>	+			+	+	
88		Chestnut-bellied rock-thrush <i>Monticola reiventris</i>				+	+	
89	MUSCICAPIDAE	White-tailed rubythroat <i>Luscinia pectoralis</i>			+			

90		Daurian redstart <i>Phoenicurus aureus</i>	+	+				
91		Blue-fronted redstart <i>Phoenicurus frontalis</i>		+	+			
92		Pied bushchat <i>Saxicola caprata</i>	+					
93		Grey bushchat <i>Saxicola ferreus</i>				+	+	
94		White-browed bush-robin <i>Tarsiger indicus</i>			+	+		
95		Himalayan blue-tail <i>Tarsiger rufilatus</i>		+	+	+	+	
96		Blue whistling-thrush <i>Myophonus caruleus</i>	+	+				
97		Pale blue flycatcher <i>Cyornis unicolor</i>		+				
98		Snowy-browed flycatcher <i>Ficedula hyperythra</i>			+			
99		Little forktail <i>Enicurus scouleri</i>				+	+	
100		Slaty-backed forktail <i>Enicurus schistaceus</i>				+		
101		Spotted forktail <i>Enicurus maculatus</i>				+		
102		Blue whistling thrush <i>Myophonus caruleus</i>				+		
103		Small niltava <i>Niltava macgrigoriae</i>				+	+	
104		Rufous-gorgeted flycatcher <i>Muscicapa strophata</i>	+	+	+	+	+	+
105		Oriental magpie robin <i>Copsychus saularis</i>				+	+	+
106	PARIDAE	Coal tit <i>Pariparus ater</i>			+			
107		Rufous-vented tit <i>Pariparus rubidiventris</i>			+			
108		Green-backed tit <i>Parus monticolus</i>	+					
109		Yellow-cheeked tit <i>Parus sponotus</i>				+	+	
110		Yellow-browed tit <i>Sylviparus modestus</i>	+	+	+	+	+	
111		Black-throated tit <i>Aegithalos concinnus</i>				+	+	
112	STENOSTRIDAE	Grey-headed canary flycatcher <i>Culicicapa ceylonensis</i>				+	+	+
113	PYCNONOTIDAE	Crested finchbill <i>Spizixos canifrons</i>		+		+	+	
114		Striated bulbul <i>Pycnonotus striatus</i>		+	+	+	+	+
115		Brown-breasted bulbul <i>Pycnonotus xanthorrhous</i>	+	+				
116		Red-whiskered bulbul <i>Pycnonotus jocosus</i>				+	+	+
117		Red-vented bulbul <i>Pycnonotus cafer</i>				+	+	+
118		Ashy bulbul <i>Hemixos flava</i>	+	+				
119		Mountain bulbul <i>Ixos mccllellandii</i>		+	+	+	+	+
120		White-throated bulbul <i>Alophoixus flaveolus</i>				+	+	
121		Himalayan black bulbul <i>Hypsipetes leucocephalus</i>		+	+	+	+	+
122	HIUNDINIDAE	Asian house martin <i>Delichon dasypus</i>				+	+	+

123	CETTIIDAE	Black-faced warbler <i>Abroscopus schisticeps</i>		+	+	+	+	+
124		Chestnut-headed tesia <i>Tesia castaneocoronata</i>				+		
125		Mountain tailorbird <i>Phyllergates cucullatus</i>			+			
126	AEGITHALIDAE	Black-throated tit <i>Aegithalosconcinus</i>			+			
127		Tit <i>Ithaginis spp</i>			+			
128	PHYLLOSCOPIDAE	Ashy-throated warbler <i>Phylloscopus maculipennis</i>		+	+	+	+	
129		Oriental white-eye <i>Zosterops palpebrosus</i>				+	+	+
130	TIMALIIDAE	Brown parrotbill <i>Cholornis unicolor</i>			+			
131		Brown-winged parrotbill <i>Suthora brunneus</i>	+					
132		Goldern-breasted fulvetta <i>Lioparuschrysotis</i>			+			
133		White-browed fulvetta <i>Fulvetta vinipectus</i>		+	+	+	+	+
134		Streak-throated fulvetta <i>Fulvetta manipurensis</i>	+	+	+	+	+	
135		Black-chinned yuhina <i>Yuhina nigrimenta</i>				+	+	+
136		Stripe-throated yuhina <i>Yuhina gularis</i>		+	+	+	+	
137		Rufous-vented yuhina <i>Yuhina occipitalis</i>		+	+	+	+	
138		Whiskered yuhina <i>Yuhina flavicollis</i>		+	+			
139		White-naped yuhina <i>Yuhina bakeri</i>				+		+
140		White-collared yuhina <i>Yuhina diademata</i>						+
141		Whiskered yuhina <i>Yuhina flavicollis</i>				+	+	
142		Grey-cheeked fulvetta <i>Alcippe fratercula</i>				+	+	+
143		Nepal fulvetta <i>Alcippe nipalensis</i>				+		
144		Sickle-billed scimitar-babbler <i>Xiphirhynchus superciliosus</i>			+			
145		Spot-breasted scimitar-babbler <i>Pomatorhinus erythrocnemis</i>				+		
146		Streak-breasted scimitar-babbler <i>Pomatorhinus ruficollis</i>	+			+		+
147		Orange-billed scimitar-babbler <i>Pomatorhinus ochraceiceps</i>				+		
148		Pygmy wren-babbler <i>Pnoepyga pusilla</i>				+		
149		Bar-winged wren-babbler <i>Spelaeornis troglodytoides</i>			+			
150		Golden babbler <i>Stachyridopsis chrysaea</i>		+	+			
151		White-hooded babbler <i>Gampsorhynchus rufulus</i>				+		
152		Streaked wren-babbler <i>Napothera brevicaudata</i>	+					
153		Golden-breasted fulvetta <i>Alicippe cbrsotis</i>				+	+	
154		Rufous-winged fulvetta <i>Pseudominla castaneiceps</i>		+	+	+		+
155		Grey-sided laughingthrush <i>Dryonastes caeruleatus</i>			+	+	+	

156		White-throated laughingthrush <i>Garrulax albogularis</i>		+				
157		White-crested laughingthrush <i>Garrulax leucolophus</i>				+	+	+
158		Chestnut-crowned laughingthrush <i>Garrulax eruthrocephalus</i>				+	+	+
159		Striated laughingthrush <i>Grammatoptila striata</i>		+		+	+	+
160		Blue-winged laughingthrush <i>Trochalopteron squanmatum</i>				+	+	
161		Black-faced laughingthrush <i>Trochalopteron affine</i>		+	+	+	+	
162		Red-tailed laughingthrush <i>Trochalopteron milnei</i>				+	+	
163		Assam laughingthrush <i>Trochalopteron chrysopterum</i>	+	+	+			
164		Scarlet-faced liocichla <i>Liocichla ripponi</i>	+					
165		Bar-throated minla <i>Chrysominla strigula</i>	+	+	+	+	+	+
166		Red-tailed minla <i>Minla ignotincta</i>				+	+	+
167		Silver-eared mesia <i>Mesia argentaurea</i>		+		+	+	+
168		Red-billed leiothrix <i>Leiothrix lutea</i>			+			
169		Long-tailed sibia <i>Malacias gracilis</i>				+	+	
170		Beautiful sibia <i>Malacia pulchellus</i>	+	+	+	+	+	+
171		Rufous-backed sibia <i>Leioptila annectens</i>	+	+	+	+	+	+
172		Streak-throated barwing <i>Actinodura waldeni</i>			+	+	+	+
173		Rusty-fronted barwing <i>Actinodura egertoni</i>				+	+	
174	G INCERTAE SEDIS	Fire-tailed myzornis <i>Myzornis pyrrhura</i>			+	+		+
175		Brown bush-warbler <i>Bradypterus luteoventris</i>		+				
176	CISTICOLIDAE	Hill prinia <i>Prinia atrogularis</i>		+				

THREATS TO MAMMALS AND BIRDS IN THE IMAWBUM MOUNTAINS

During the surveys in the Imawbum Mountains, and by obtaining information from local villagers and hunters, it was clear that the area had recently seen a change in how people use the land and its animals. In 2001 Chinese commercial timber companies started operating in the area. The roads they build and the roads they are still building allowed easy access to markets in China. This was facilitated by the presence of logging camps and road construction camps employing Chinese workers. Local hunters shifted from subsistence hunting to commercial hunting and bushmeat and medicinal plants are now traded in substantial volumes. While specifically targeting a small number of high-value species, such as bears, deer, and certain medicinal plants, a large number of other species are taken as well. Future access to the area may furthermore increase with the construction of several dams in the Maykanp River, to the west of the Imawbum Mountains.

Here a brief overview is given of the threats posed by commercial logging and logging road construction, hydropower dam construction, bushmeat trade, collection of timber and non-timber forest products (NTFP) and the international wildlife trade.

Commercial Logging and Logging Road Construction

Timber has been commercially extracted in the Imawbum Mountains since around 2001, when Chinese logging companies started operating in the area. The size of the logging operations differs considerably between the different parts of the Imawbum Mountains, and depends largely on access and ruggedness of the terrain. Large scale of logging was recorded along Kangfang-Lanse road where timber was extracted on the mountain ridges on the both sides of the road. As a result, once primary forests have been logged and degraded up to the highest mountaintops, with irreparable impacts on ecosystems.

Chinese company roads for logging from Kangfang have opened up the entire area. The Yin Toak Company, operating on 5-year contracts, has developed roads for logging in the upper Mae Hka watershed. This company has started the development of two logging roads towards the habitat of the snub-nosed monkeys to access precious woods in the upper mountain forest and conifer zone. One road goes south of the Maw River via San Buk village, the other one north of the Maw river via Wayaw Buk village. These logging roads go through steep slopes with 30-70° slope inclination, and their construction so far has led to large scale landslides impacting areas used for shifting cultivation, as well as secondary and primary forests. Timber has been logged along the roads, although the main target species are limited to higher elevation in the area that is currently still primary forest; it appears to be only a matter of time until these areas are reached by the logging companies allowing them to extract timber at a commercial scale.

Throughout the Imawbum Mountains hunters were of the opinion that wildlife in logging areas move away due to the noise from road construction, chainsaws, trucks and people. Noise from explosives used in road construction could impact the behaviour of the species, ultimately having an impact on their reproduction and group dynamics.

Apart from logging impacting the forest and changing the landscape the improved access to, and demand by Chinese workers for, wildlife product has led to a drastically increase hunting pressure. This increased access is probably the most important threat to the mammals and birds of the Imawbum Mountains.

Figure 28 (next page) Selection of threats to biodiversity in the Imawbum Mountains as recorded during surveys in 2010-2014: (a). Slide of wood for trading to China (b) Logging trucks are ready to leave for China (c) Dam construction on the Chibwe river by China Power Investment. (d) Collecting tree bark and selling local business man (e) hunter with Gongshang muntjac (f) Local hunter with cross-bow from Mawre village



Hydropower Dam Construction

At present there are three cascade hydropower stations in the May Hka River, with two Chipwi, and one near Pade. In December 2006 the China Power Investment Corporation (CPI) and the Myanmar Ministry of Electrical Power signed a Letter of Intent for the Hydropower Development in Ayeyarwady river basin above Myitkyina, Kachin State. Seven cascade hydropower stations are to be built in the hydropower development scheme of the Ayeyarwady river basin upstream from Myitkyina. Five of these cascade power stations are built on the May Hka river, one power station is built on the Mali Hka river, and one is built 5 km downstream from the confluence of the latter two rivers on the Ayeyarwady river. The total installed capacity of basin cascade development of the Ayeyarwady river above Myitkyina is 16,500 MW.

The Chipwe Dam, with a capacity of 2,800 MW and a reservoir of 32.14 km² is fed by a watershed of 3,796 km², whereas the planned Wusuk Dam will have a capacity of 1,800 MW and a reservoir of 4.98 km². The latter is linked to a watershed area of 1,203 km². The Chipwe Dam watershed covers parts of the distribution range of the Myanmar snub-nosed monkeys whereas the Wusuk Dam watershed largely overlaps with the monkey's distribution range.

While the size of the reservoirs are small the indirect impacts of the hydropower dams on biodiversity, such as logging, hunting and wildlife trade, are expected to be severe. The construction of access roads for the dams will allow all-year-round and all-weather access to the mountain forests, including the whole distribution area of the snub-nosed monkeys of Kachin, and this will lead to increased logging and unsustainable NTFP extraction in these areas. This will also open cheap opportunities for logging companies to build secondary logging roads. The new dam construction road from Yi Tan via Chaung Mo to Wusuk built in 2009/2010 has already improved access to that area and prompted the Yin Toak company to build secondary logging roads towards the range of the snub-nosed monkeys.

Dam construction leads to an increase in influx of Chinese construction workers as well as shop and restaurant owners, further accelerating demand for bushmeat and wildlife products.

Hunting and Bushmeat Trade

Hunting for subsistence had been ongoing in the Imawbum Mountains from the time the first people moved in. In the past, cross bows and black powder guns were used for shooting small carnivores, primates, deer species and wild pig. Snares were set to catch a wide range of smaller ground-dwelling animals. For subsistence hunting, villagers usually hunt in the forest around their villages as well as on their farms.

The improved access since 2001 due to commercial logging has already introduced profound changes. The hunting pattern has changed from subsistence hunting to hunting for wildlife and bushmeat trade. Hunting techniques have shifted to Chinese shotguns with bullets and iron traps, both available in Kangfang. Prior to the road construction there was no market for trading bush meat and wildlife parts. However, with the construction of a motor road from China via Kangfang into the Imawbum Mountains in 2001, trading in bush meat and other wildlife parts started as the road allowed easy access to markets in China. Furthermore, there was (and still is) a strong demand Chinese road construction camps and logging camps. Prices have gone up, especially for items such as bear gall bladder and bear paws.

The meet the demand from the bush meat and medicinal trade hunters no longer just hunt in the vicinity of their villages. Instead they move further and further away, and hunting trips not only increase in duration but also in magnitude (with more and more iron traps set by individual hunters). Within the Imawbum Mountains the main target species is the Asiatic

black bear and the sun bear, and iron traps are the hunting method of choice. All parts of bears, meat, paws, teeth, claws and skins are highly valued and is traded across the border into China. According to hunters bears have decreased in abundance and while the number of bears caught in iron traps on an annual basis is relatively small (albeit still probably too high for the bear populations to be able to cope), the number of other animals that get caught in iron traps is large. In addition to iron traps other hunting methods (guns, rope snares, cross bow) keep being employed as well.

The species that most frequently get caught in the iron traps and rope snares are Assamese macaque, stump-tailed macaque and Gongshang muntjac. Other species such as red muntjac, tufted deer, Chinese and red serow and Eurasian wild pig also get trapped frequently. The meat of the muntjacs, pigs and serows is sold to the Chinese logging and road construction camps, and is traded into China as well. Muntjak antlers and serow and goral horns are valuable items as well and again can be traded to China. Primate meat, be it of macaques, langurs or the snub-nosed monkey has limited value. Instead the smoked skeletons and skulls are the most valuable parts. Trade in smoked primate skeleton started around 2005 to 2008 in the Imawbum Mountains, and it is sold by the weight to Chinese traders so that ultimately it will be used for 'traditional' Asian medicine.

Masked palm civet and red panda do occasionally get caught in iron traps. Neither the meat nor the bones have commercial value. Takin gets caught in the iron traps frequently, but again neither its meat nor its bones can be sold commercially.

Timber and NTFP Extraction

In addition to commercial logging, small scale timber extraction by local villagers has expanded since access to China has increased. The trade largely comprises slides of wood that are used for furniture once traded to China, and collection is year-round.

Each year from April to June villagers collect a medicinal roots called *daban daing*. From June to September, i.e. during the rainy season, tree bark is collected in large quantities, then left to dry and it is traded by the truckload to China the following February and March. As of 2014 at least fifty people from Myitkyina, Saw Law, Wasuk, Pade, San Buk and Wayawbuk are active in the collection of tree bark, getting paid by the day, and a single local businessman acts as a middleman between them and a Chinese company.

Medicinal plants (bark, roots and whole plants), ornamental plants (orchids), and wild mushrooms are collected and are sold to the Chinese logging and road construction camps.

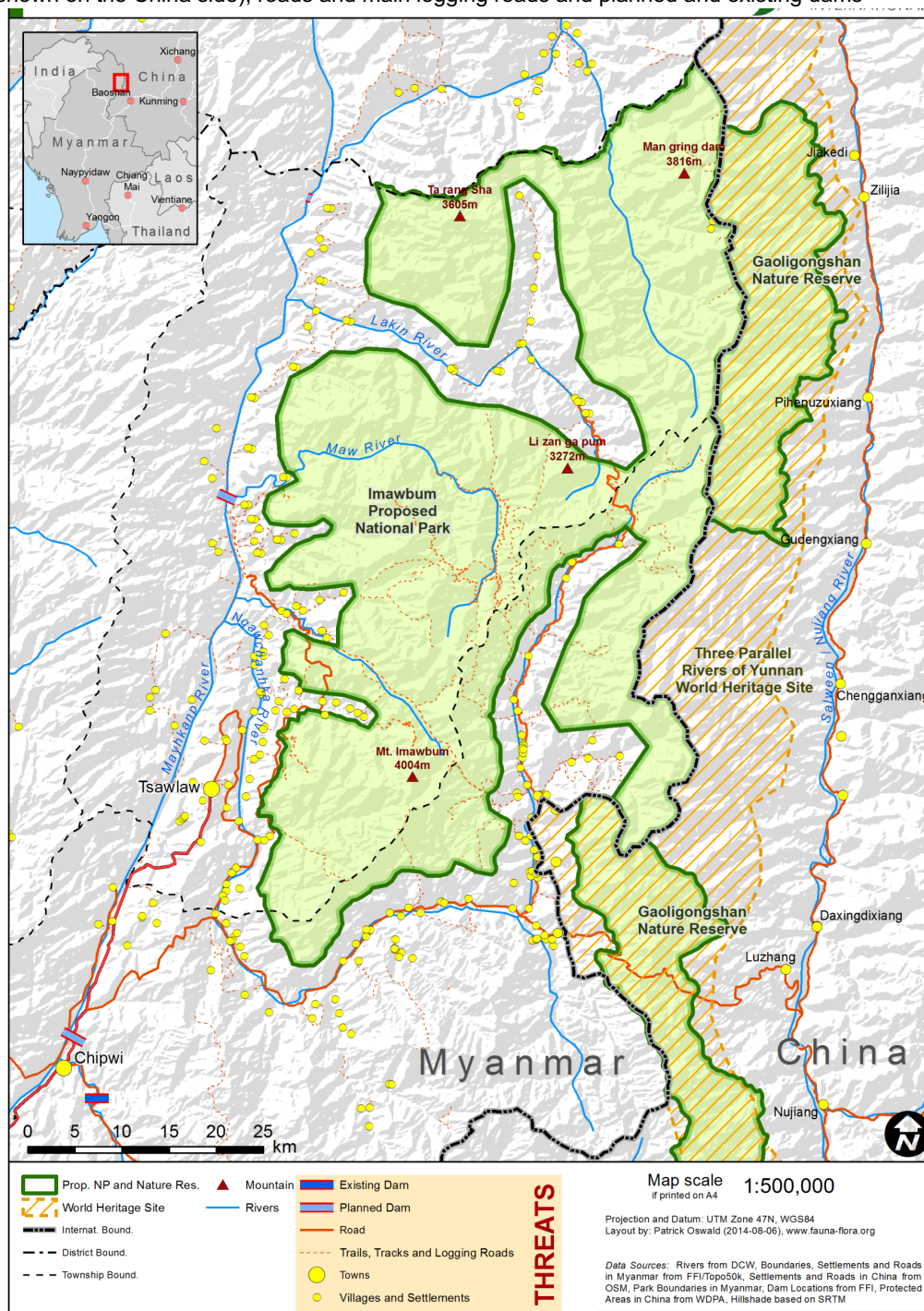
Most NTFP collectors carry shotguns with them on their collection trips. Thus an increase in the demand for NTFP and the commercialization and internationalization of this trade leads to an increase in hunting and as such has a direct impact on the mammals and birds in the Imawbum Mountains.

CITES and Regulation of International Wildlife Trade

From the surveys it became clear that a significant number of species trapped in the Imawbum Mountains were traded to China. The most common route for this was via the town of Kangfang. Both Myanmar and China are Party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). A large number of species that are traded internationally are included on the appendices of CITES, thus regulating or precluding their trade, as to ensure that trade does pose a significant threat to the survival of these species. Species included on Appendix I are those for which no international commercial trade is permitted. Species that are included on Appendix II are those for which the international trade is regulated, meaning that specific permission needs to be obtained from

the country CITES Management Authority prior to the export. Recognising that international trade poses a significant threat to the survival of all Asian species of pangolin, in 2000, it was agreed to implement a “zero quota” for all specimens of wild pangolin from Asia. As such international trade in pangolins, and their parts, is no longer permitted.

Figure 29. The Imawbum Mountains proposed national park showing some of the pressures to the biodiversity in the area, i.e. villages (all shown on the Myanmar side of the park but only the larger ones are shown on the China side), roads and main logging roads and planned and existing dams



Twenty species of mammals recorded in the Imawbum Mountains are included on Appendix I (12 species) or Appendix II (8 species); with the exception of the spotted linsang, based on observations in the villages and based on information received locally, these species were all observed to have entered the trade. Undoubtedly some of these species have limited monetary value and are traded just locally but a substantial proportion of them are traded across the border into China. Species that are especially prevalent in trade between Myanmar and China include Chinese pangolin, Bengal slow loris, Myanmar snub-nosed monkey, clouded leopard, Asiatic golden cat, Asiatic black bear, sun bear, takin, Chinese serow, red serow, and Chinese goral.

Table 9. Species recorded in the Imawbum Mountains that are included on Appendix I or II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Species on Appendix I cannot be traded internationally and international trade in species on Appendix II is strictly regulated.

No	Species	CITES Appendix	Comments	Traded
1	Chinese pangolin <i>Manis pentadactyla</i>	II	zero quota	Yes
2	Bengal slow loris <i>Nycticebus bengalensis</i>	I		Yes
3	Myanmar snub-nosed monkey <i>Rhinopithecus strykeri</i>	I		Yes
4	Shortridge's langur <i>Trachypithecus shortridgei</i>	I		Yes
5	Assamese macaque <i>Macaca assamensis</i>	II		Yes
6	Stump-tailed macaque <i>Macaca arctoides</i>	II		Yes
7	Rhesus macaque <i>Macaca mulatta</i>	II		Yes
8	Northern pig-tailed macaque <i>Macaca leonina</i>	II		Yes
9	Dhole <i>Cuon alpinus</i>	II		Yes
10	Red panda <i>Ailurus fulgens</i>	I		Yes
11	Spotted linsang <i>Prionodon pardicolor</i>	I		
12	Clouded leopard <i>Neofelis nebulosa</i>	I		Yes
13	Leopard cat <i>Prionailurus bengalensis</i>	II		Yes
14	Marbled cat <i>Pardofelis marmorata</i>	I		Yes
15	Asian golden cat <i>Catopuma temminckii</i>	I		Yes
16	Asiatic black bear <i>Ursus thibetanus</i>	I		Yes
17	Sun bear <i>Helarctos malayanus</i>	I		Yes
18	Takin <i>Budorcas taxicolor</i>	II		Yes
19	Red Serow <i>Capricornis rubidus</i>	I		Yes
20	Chinese Goral <i>Naemorhedus griseus</i>	I		Yes

RECOMMENDATIONS

With respect to assessing the conservation status of the mammals and birds in the Imawbum Mountains a number of recommendations can be made, aiming at furthering our understanding of the biodiversity in the area and the threats it faces, to obtain better insights in the impediments to the conservation of imperilled wildlife and how to mitigate these, as well as initiating a more in-depth investigation on natural resource use in the Imawbum Mountains and how this is linked and tied to actors from outside the area. Collaboration with partners and institutions in China is hereby key.

Surveys targeting additional taxa and expanding geographic coverage

While an impressive number of mammal and bird species were recorded in the four years that the surveys were conducted, it is evident that the true number of species residing in the area must be considerably larger. No systematic surveying of the smaller mammals was done and the documentation of birds in the area was largely based on visual observations only. Bringing in expert mammalogists (for instance ones that specialize on rodents and bats) and expert ornithologists (ones that can identify birds not just visually but also aurally) that are familiar with the avifauna of adjacent regions (China, India, other parts of Southeast Asia) may aid in this.

Northern Myanmar is rich in biodiversity other than mammals and birds and expanding the faunal surveys as to include additional taxa (e.g. invertebrates, fish, amphibians, reptiles) and initiating botanical studies will bring greater knowledge of this. Collaboration with expert from both within Myanmar and internationally is paramount in achieving this.

Future surveys should target areas additional to the ones surveyed now, thus covering a wider geographic area as well as a wider altitudinal range. The current surveys were concentrated in an forest area of ~30 km², within a wider area, including villages of ~125 km², all centred on the Maw River valley. Myanmar snub-nosed monkeys are known to occur to the area north of Tapankhar, towards the Gaoligongshan Nature Reserve across the border into China, and future surveys targeting that area may reveal the presence of additional groups. Myanmar snub-nosed monkeys are also known to occur across the border from the southern part of the Imawbum Mountains, and Chinese researchers suspect these groups to range into Myanmar as well (Chi et al. 2014). A concerted effort should be made with the Chinese parties involved in Myanmar snub-nosed monkey research and conservation, to clarify the ranging patterns of the groups living closest to the international borders.

The highest part of the Imawbum Mountains is in the southern part of the proposed national park. Here Mt Imawbum rises to 4,004 m asl. The lowest part of the proposed national park that are still forested is probably in along the Ngawchanhka River in the west, in addition to other western sections, where forest descends to below the 1,000 m asl level. Both high and low areas are priority for future surveys.

The camera trapping efforts have been thus far focussed mainly on the Maw River valley, at high elevations, i.e. typically above 2,600 m asl, where Myanmar snub-nosed monkeys were known or suspected to range. If set at different altitudes –either higher but especially at lower elevations- and targeting different habitats, undoubtedly the number of species that will be recorded photographically will increase.

Natural resource use within the Imawbum Mountains

From the present surveys it is clear that the people of the Imawbum Mountains have an intricate knowledge of the plant and animals of their area, and have relied upon them for subsistence for centuries. It is also clear that current practises may no longer be sustainable,

especially not for those species that have high commercial value and that are traded internationally. Obtaining a better insight what practises are used and have been used in the past to exploit the areas natural resources and to what extent these are still practised today is crucial in ensuring that any future developments and any future landuse changes does not disproportionally impact the people of the Imawbum Mountains negatively.

Assessing levels of international wildlife trade

Since 2001 international wildlife trade, with both plants, animals and their parts being traded commercially to China, has had a dramatic impact on the biodiversity of the Imawbum Mountains. With access to the area increasing year by year, and many more new roads and projects planned in the foreseeable future, wildlife trade will almost certainly increase. While part of this trade may be legal, a large part of it is not. Legally protected species, including totally protected species and seasonally protected species that are taken at times when this is not allowed, are some of the main target species of the hunters in the area. These include Asiatic black bear and sun bear, and different species of serow and goral. In order to obtain these high value species, large numbers of iron traps are set throughout the area, thereby affecting a large number of other species in the area.

Myanmar and China have committed to the conservation of their biodiversity by becoming Party to several major international conventions (e.g. CITES, CBD); with respect to wildlife trade both countries participate in the ASEAN-Wildlife Enforcement Network and have been long-time members of CITES. It is clear that the harvest, hunting and trade of animals and plants in the Imawbum Mountains is largely to supply the demand for wildlife from China. Villagers, hunters, and local middleman openly agree that the flow of wildlife is in one direction: from Myanmar to China. In order to gain insight in the magnitude of wildlife trade from the Imawbum Mountains to China monitoring of the major trading post – the border town of Kangfeng – is imperative. Regulating wildlife trade and ensuring that trade between two countries does not violate the rules and intentions of CITES is a responsibility shared by both the importing and the exporting country, and as such an increased collaboration between the Myanmar and Chinese authorities in Kachin and Yunnan is recommended. Irrespective of this, monitoring of the flow of wildlife across the border should commence as soon as possible.

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