PHOU CHOMVOY PROVINCIAL PROTECTED AREA: A BIODIVERSITY BASELINE ASSESSMENT

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Chanthavy Vongkhamheng[1]

[1]Senior Conservation Biologist (PhD), Lao Wildlife Conservation Association (Lao WCA)

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[1] The training agenda and the data collection forms are available from the author on request.

1. Introduction

One of the two pilot Payments for Environmental Services (PES) schemes that are being developed within the project 'Effective Implementation of PES in Lao PDR' will focus on wildlife conservation in the Annamite Ranges. The Phou Chomvoy Provincial Protected Area (PCV-PPA) located within the central Annamite mountain range located in Bolikhamxay Province is the targeted area. The PCV-PPA harbors key wildlife species that are endemic to the Annamite mountain range and are of global conservation significance (Duckworth, 1998). These species include Saola (*Pseudoryx ngetinhensis*), Large-antlered Muntjac (*Megamuntiacus vuquangensis*), Annamite-striped Rabbit (*Nesolagus Timmins*), Douc Langur (*Pygathrix nemaeus*), White-cheeked Crested Gibbon (*Hylobates leucogenys*) (Bolikhamxay Provincial Forest Resources Management Office, unpublished; Robichaud & Stuart, 1999; Swanepoel & McWilliam, 2012). Given its geographic location along Lao-Vietnam border, major threats to wildlife are similar to those found in other forested areas in the border region, in particular unsustainable hunting of wildlife by local and Vietnamese poachers using snare lines (Bolikhamxay Provincial Forest Resources Management Office, unpublished; Robichaud & Stuart, 1999). High hunting pressure is mainly associated with high demand for wildlife on international and domestic markets (Duckworth, Salter, & Khounboline, 1999).

This report presents the results of a baseline survey undertaken within the PCV-PPA using a grid-based approach. The survey was conducted between 3rd to 18th September 2015 by a team of Lao WCA field wildlife biologists, government staff, and local villagers. The primary purpose of this survey was to collect baseline data on both the wildlife presence and the type and extent of threats to wildlife in the area. The data collected will be used to assist in the design of a PES scheme that aims to secure viable populations of key Annamite wildlife species within PCV-PPA. The PES scheme will involve anti-poaching patrols through the PCV-PPA and the instigation of Conservation Agreements with the eight villages bordering the area.

2.   Objectives

The objectives of this survey were
- to assess the abundance and distribution and relative abundance of wildlife species, especially ungulates (e.g., Sambar, Southern Serow, Large-antlered Muntjac, Wild Pig), large birds (e.g., Great Hornbill), and primates (e.g., Macaques, White-cheeked Gibbon, Douc Langur); and
- to assess the types and level of threats to wildlife, i.e., snares, hunting camps and other wildlife damaging human activities.

3.   Methodology

Phou Chomvoy Provincial Protected Area

The PCV-PPA was declared by the Provincial Governor on 15 August 2007 (Agreement No. 330/Government). It covers approximately 22,305 hectares (~223 km^2) and falls under two district administrations: Khamkeut (11 villages) and Xaychamphone (2 villages). The PCV-PPA shares a border with Vietnam to the north of approximately 37 km.

The PCV-PPA is mountainous and located entirely above an altitude of 500 meters above sea level. Several ridges in the area exceed 1,200 meters in elevation. The highest mountain top is Phou Chomvoy with an altitude of 1,821 meters. The vegetation in the area is dominated by wet evergreen and mixed deciduous forests.

Previous wildlife surveys in the PCV-PPA include a ibbon survey conducted by staff of the Provincial Office for Natural Resources and Environment (PONRE) with technical support from WCS in 2012 (Swanepoel & McWilliam, 2012), and a Saola survey conducted by Bolikhamxay Provincial Government staff using camera trapping (Bolikhamxay Provincial Forest Resources Management Office, unpublished).

Methods

The survey method used for this baseline study was based on a species occupancy model assessment (MacKenzie et al., 2002; MacKenzie et al., 2005). This method has been considered as the most appropriate approach for wildlife monitoring when species densities are low as is the case in Lao PDR (Hansel et al., 2013). It also has the advantage that its

application requires little technical skills and therefore can be considered for long-term wildlife monitoring plans.

Occupancy-based methods allow the estimation of the probability of detection (given their presence) with replicated visits to geographic sampling units. Occupancy models provide a relative abundance estimate, namely "the probability that a sampling unit is occupied by a species. When using occupancy as a state variable it is typically interpreted as the proportion of area occupied or, when home range size is large relative to the size of the sample unit, the proportion of area 'used' (MacKenzie et al., 2005; Royle & Dorazio, 2008)" (Hansel et al., 2013). When surveys are repeated, the results provide trends in species occupancy over time and therefore can be used to assess the impact of a development project or success of a management strategy. The method is now recognized as a viable and statistically sound alternative for biodiversity monitoring programs in areas of low wildlife density (Hansel et al., 2013). It was also deemed to be most applicable in the PCV-PPA case given limited funding and the requirement of collecting reliable data not only on wildlife but also on threats. This is despite the models poor capacity to deal with limited sampling sizes.

The PCV-PPA area of 22,305 hectares (~223 km^2) was divided into grid cells (each of a size of 13 km^2) assuming that this grid cell size covers the maximum home range of the largest ungulate such as the Gaur (Figure 1). Each grid cell comprised four sub-girds cells (each of the size of 3.25 km^2). These sub-cells were treated as the sampling unit. This resulted in a total of approximately 65 sampling units. Within each sub-grid cell, nine equally spaced (600 meters apart, Figure 1) 'sampling destinations' (points along the route to be sampled) were created using ArcGIS 10.2. Sampling routes between destinations were developed flexibly based on logistical convenience. However, survey teams had to pass through at least five sampling destinations and mandatorily through the sub-gird cell centres (Figure 2). Each 'spatial replicate' was a walk effort of 300 meters that was recorded using GPS.

1:100,000 topographic maps were used to traverse each grid cell and navigate the rugged terrain (Figure 1). Survey teams walked along the geometrically rigid sampling route (indicated in Figure 2 as green lines connecting black dots), thoroughly searching to locate

animal signs (fresh tracks and fresh dung), direct sightings and threats (snares, people with guns, logging, poaching camps, livestock, rice fields). The teams were allowed to deviate from this sampling route by as much as 100 meters on either side of the line in order to maximize their chances of detecting signs. Intensive searches along animal trails, mineral licks, rivers banks, stream beds, small muddy patches were also made.
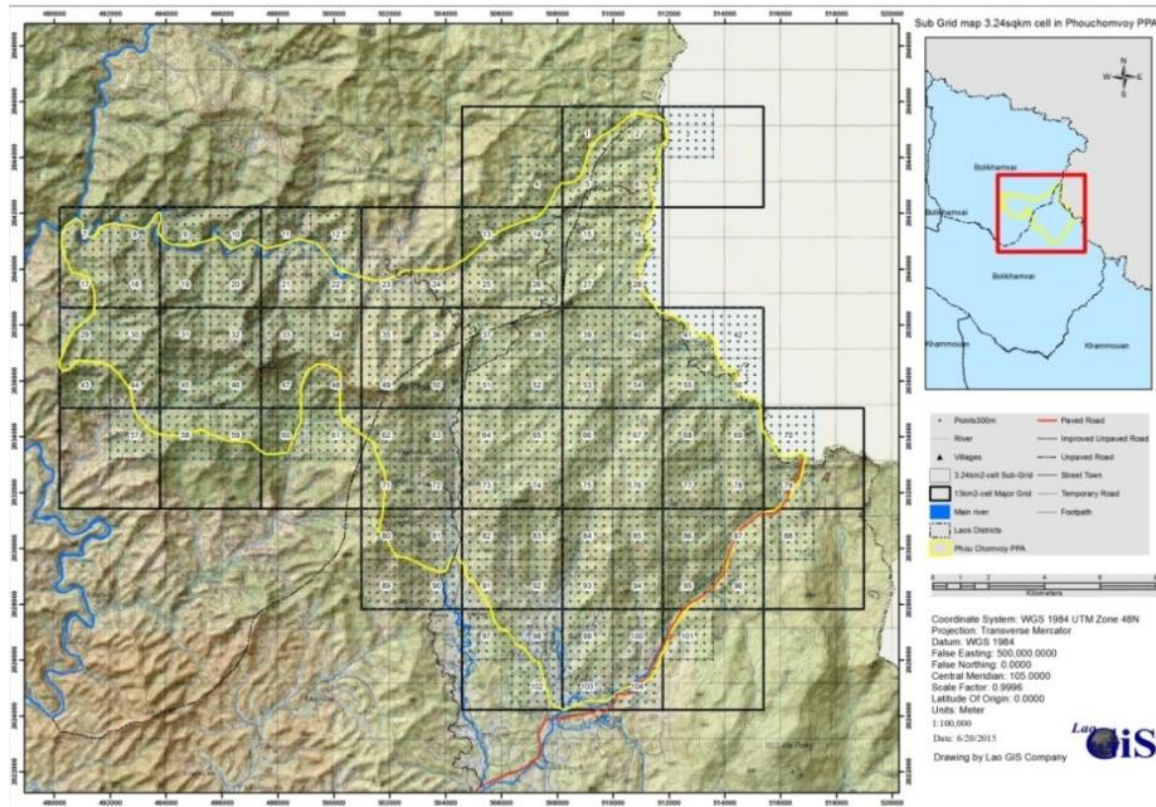

Figure1. Survey grid cells in PCV-PPA

Figure 2. Potential survey route through grid cells

Figure 3. Survey covering the PCV-PPA

The actual sampling is shown in Figure 3. In each grid cell, the data on sightings were recorded for every 300 meter replicate determined with a GPS. The number 1 was recorded when an animal sign was detected and 0 otherwise. Direct observations of animals encountered along the survey route were also recorded. The teams walked 3 km in 1-1.5 days to complete the survey for each grid cell.

4. Team structure and timing

Four field survey teams were assembled. Each team consisted of two well trained staff, assigned as team leader and deputy team leader, two village guides, four porters, and one border military staff. The team leaders were trained on survey techniques and how to distinguish tracks and dung of focal ungulate species based on size and shape following the field guide. The identification of animal signs was assisted by local villagers with experience in wildlife tracking. The survey area was divided into four survey sections: two section on the west and two sections on the east of PCV-PPA.

List of team leaders

Name	Responsibility
Mr Voudvorlaxay Vongkhamheang	Leader
Mr Mane	Deputy-leader
Mr Sisouthone Oupaxayorvanh	Leader
Mr Xang Keosouvanh	Deputy-leader
Mr Vilayvong Seanmany	Leader
Mr Chumnang	Deputy-leader
Mr Aire Vaneluangphanya	Leader
Mr Bounchan	Deputy-leader

Survey timing

Date	Activities
29-30 September, 2015	Introduction of survey techniques to team members
31 August-1 September, 2015	Logistic preparation at province and district offices
2 September, 2015	Travel from Khamkeut district to village
3-18 September	Field survey

5. Results

Survey effort

The survey teams completed surveys across 46 grid cells covering approximately 71% of the total area of the PCV-PPA. This involved 178 km of walking with 338 replicates (one replicate is 300 m). The sampling replicates were dominated by evergreen forest (73% of total replicates, n=342) (Figure 4). Animal signs were encountered in 52 replicates (~15.38%) and threats were recorded in 59 replicates (~17.5%). Due to the low encounter rate of each wildlife species (and threats), we were not able to analyse the data using the PRESENCE program to generate occupancy rates defined as the proportion of an area being occupied by a certain species. However, the records of animal signs and sightings, and threats were mapped using ArcGIS10.2 to present their spatial distribution.
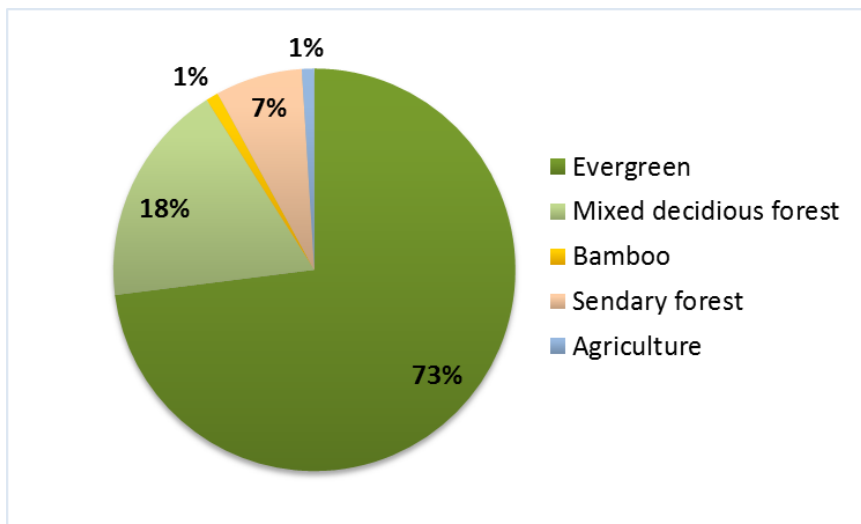

Figure 4. Habitat types dominating the sampling replicates

Wildlife

Across the survey site, over three-quarters (or 74%) of all animal signs (n=54) encountered were Wild Pig, Large-antlered Muntjac (18%), Sambar Deer (2%), and Macaque (2%) (Figure 5).
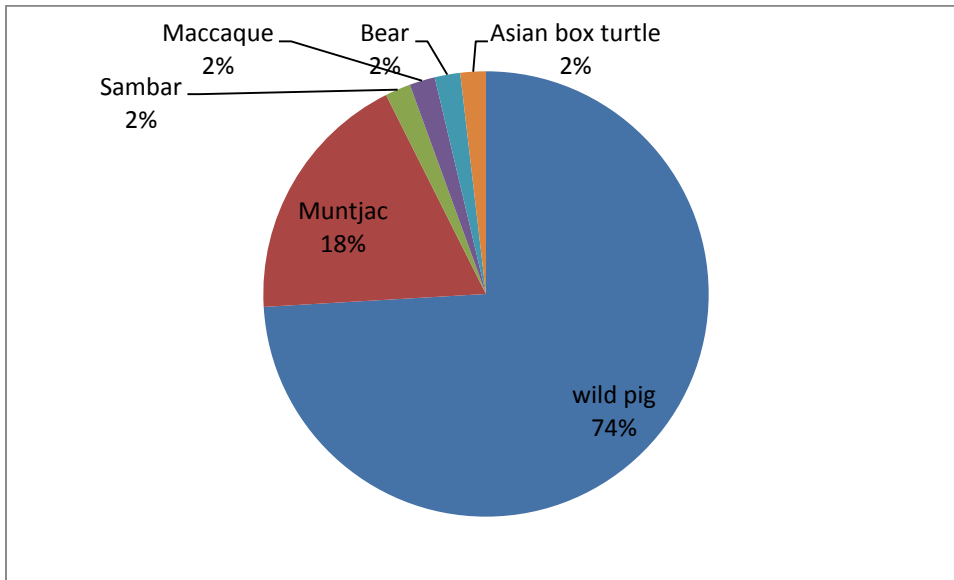

Figure 5. Wildlife species recorded during the survey

Other species recorded are Bear and Asian Box Turtle. The latter were encountered in the Northern part of PCV-PPA. Presence of other target species like White-cheeked Gibbon, Douc Langur, Southern Serow and Great Hornbill were not recorded during this survey. A spatial distribution of wildlife species recorded during the survey is shown in Figure 6.
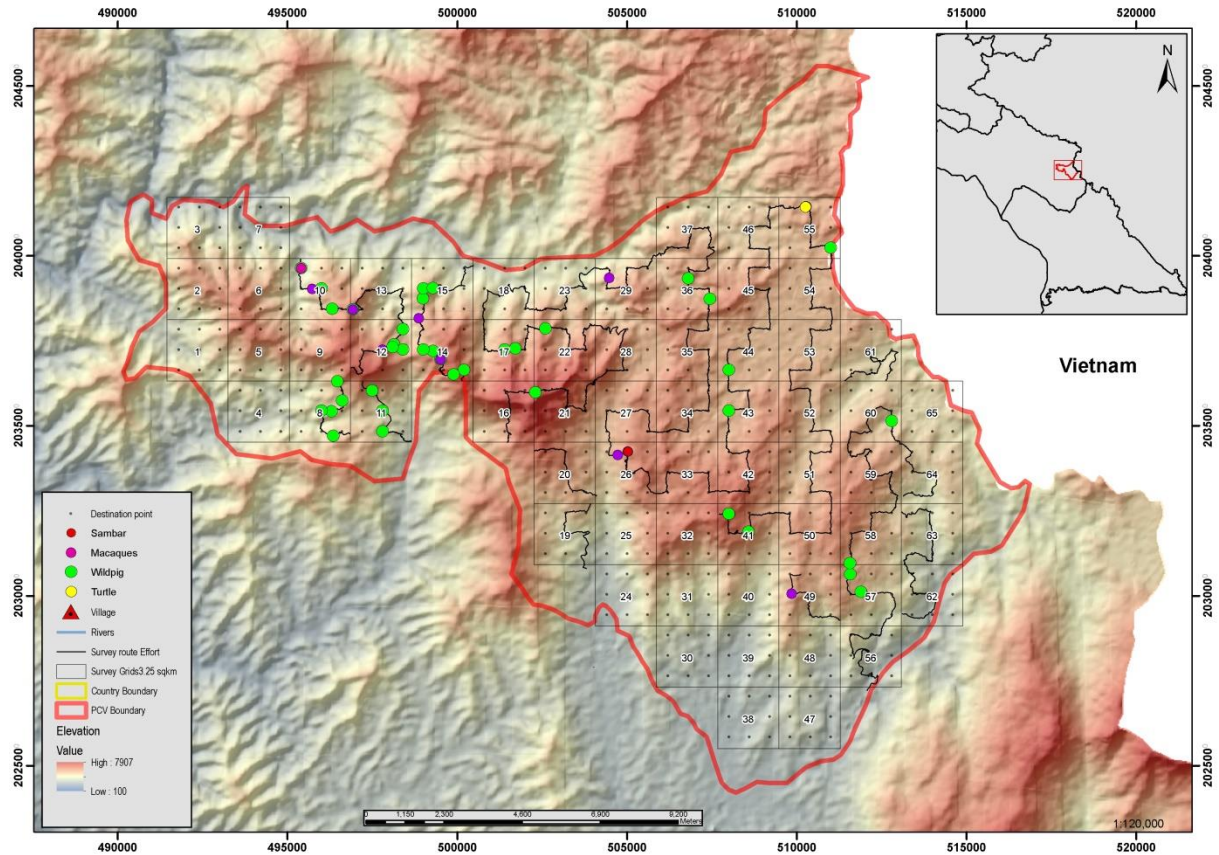
Figure 6. Spatial distribution of wildlife encountered during the survey.

Threats

Of the key major threats encountered across the survey site (n=59), 49% were snares, followed by poacher camps, logging, and people with guns, 17%, 14%, and 8%, respectively (Figure 7). Survey teams also found trees marked with a number indicating that they were proposed for logging.
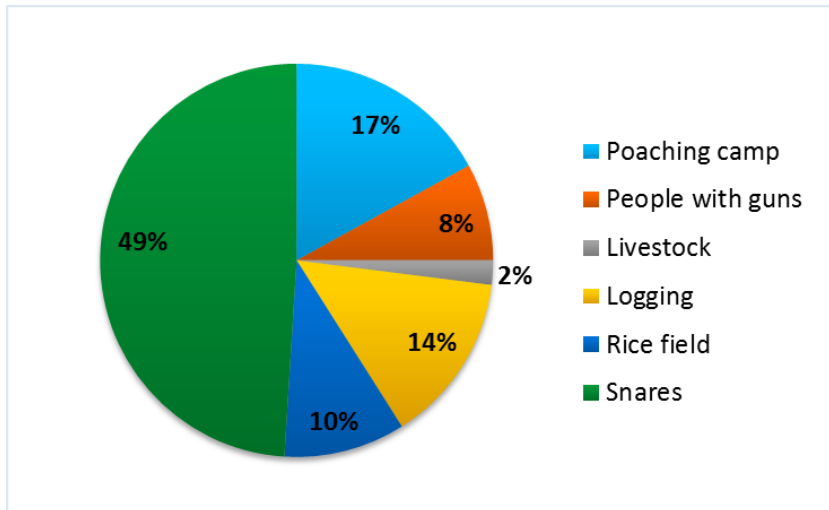
Figure 7. Threats recorded during the survey

The spatial distribution of threats encountered during the survey is shown in Figure 8.
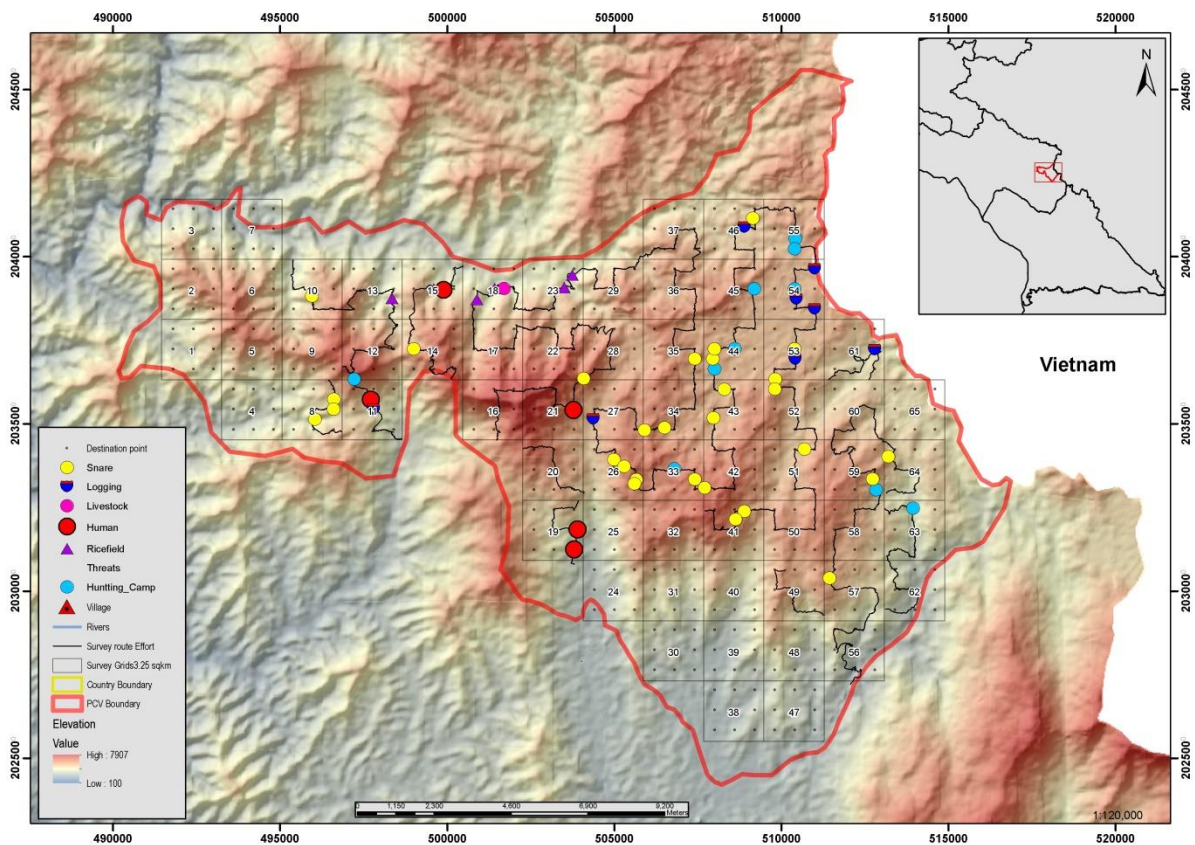

Figure 8. Spatial distribution of threats encountered during the survey

6.   Discussion and recommendations

This survey, using a grid-based walking approach, was conducted during the rainy season by four survey teams. Each team consisted of WCA staff, provincial and district government staff, border military and local villagers. Due to the extremely rugged and mountainous terrain, especially in areas of high elevation in the West (around the Phou Chomvoy) where heavy rain was encountered, some grid cells were not surveyed (Figure 3).

The results show that 59 threats were recorded. Wildlife sightings and signs encounters numbered 52. Only one species, the Wild Pig, was found to be abundant and widely distributed across the PCV-PPA (Figure 6). However, it is evident that most wildlife encounters were recorded in forest areas that are far from the Lao-Vietnamese border, on the western side of PCV-PPA (Figure 6). Snares were found across the PCV-PPA with a higher concentration in the eastern part of the PCV-PPA (Figure 8). Therefore, the low wildlife encounter rate detected in this survey is most probably related to the high pressure on species resulting from unsustainable hunting by both outsiders and local villagers.

The widespread use of metal snares across the PCV-PPA coincides which findings from previous wildlife surveys in this area (Bolikhamxay Provincial Forest Resources Management Office, unpublished; Swanepoel & McWilliam, 2012). Other wildlife threats include logging, livestock grazing, and a relatively high number of poacher camps. Logging was found only in areas adjunct to the Lao-Vietnamese border.

The evidence of threats (combined with low encounter rate of wildlife) suggests that most wildlife species, especially terrestrial mammals and birds, are at high risk of extinction under current threat levels. Anti-poaching patrols to remove snares and control other illegal activities such as logging are urgently required and strongly recommended. Anti-poaching patrols should give special attention to the eastern part of the PCV-PPA.

One species of conservation concern that was not recorded in this survey is the endangered White-cheeked Gibbon. The Gibbon was previously recorded to be present (through calls) in the far western and in north-eastern parts of the PCV-PPA (Swanepoel & McWilliam, 2012). There is the possibility that the Gibbon and other species were not sighted during this survey was probably due to its timing. Surveying occurred during the rainy season,

and rain can affect the ability of Gibbons to call. It is, therefore, suggested that a further survey be conducted in the dry season so that full coverage is achieved.

In conclusion, this survey generated a better understanding of the current status of wildlife and wildlife threats in the PCV-PPA. It shows that wildlife population abundance is relatively low whereas the level of threat is high. Under the current threat level, it is likely that some wildlife species in the PCV-PPA will go extinct within the next few years. Management action on the ground is urgently needed to reduce current and emerging threat levels, and thus secure the remaining populations of species of high conservation significance in their natural habitats. This is especially the case for species endemic to the Annamite mountain range.

7.   Photos

Photo 1. Asian box turtle

Photo 2. Snare set to catch large ground mammals

Photo 3. Poacher camp

Photo 4. Logging road

Photo 5. Evidence of logging

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