

A WILDLIFE SURVEY OF SOUTHERN MONDULKIRI PROVINCE, CAMBODIA

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THE WILDLIFE CONSERVATION
SOCIETY
CAMBODIA PROGRAM

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Executive Summary

- The Wildlife Conservation Society (WCS) Cambodia Program, in cooperation with members of the Ministry of Agriculture, Forestry and Fisheries (MAFF) and the Ministry of Environment (MoE), undertook the first formal wildlife survey of southern Mondulakiri province.
- Field surveys of habitats, mammals and birds were conducted during three periods between March and May 2000.
- Survey teams concentrated on gathering direct evidence for the presence of species, using camera-trapping, direct observation, and, for birds, vocalisations. Sign surveys were also undertaken.
- The Samling logging concession was selected as the survey area, focussing mainly on Keo Seimar district and adjacent areas.
- Objectives of the survey included establishing the wildlife conservation priorities within the survey area, identifying threats, and producing recommendations for the mitigation of these threats.

Results

Habitats

- A diverse and complex mosaic of habitats dominates the survey area. A limited strip of near-evergreen forest along the border with Vietnam grades northwestward into larger swathes of semi-evergreen forest containing varying concentrations of deciduous elements resulting in a mosaic effect. The forest then ultimately tends toward deciduous dipterocarp forest as the topography flattens below the Sen Monorom Plateau.
- Fire, of both natural and anthropogenic causes, has clearly played an important role in determining the current composition and appearance of the majority of the non-evergreen habitats of the survey area.
- Only one concession area (Coupe 2a) has been legally and systematically logged. However, most evergreen/semi-evergreen and deciduous forests have already experienced selective logging in recent years.
- Snoul Wildlife Sanctuary, entirely enveloped by the logging concession, appears to have been heavily logged at some time and is currently in a mature stage of regrowth, though still maintains a large tract of evergreen and semi-evergreen forest.

Birds

- A total of 212 species of birds were recorded during the survey, of which 11 were previously unrecorded from the field in Cambodia.

- 25 Key Species were confirmed for the area, including significant populations of several Globally Threatened and Near-threatened species. The most significant of these are Siamese Fireback *Lophura diardi*, Germain's Peacock Pheasant *Polyplectron germaini*, Green Peafowl *Pavo muticus*, Grey-headed Fish Eagle *Ichthyophaga ichthyaetus* and Lesser Adjutant *Leptoptilos javanicus*.
- The Green Peafowl population in the area is potentially one of the largest single remaining populations of this rapidly declining Globally Threatened species anywhere in the world.
- The discovery of a healthy population of the Globally Threatened regional endemic Germain's Peacock Pheasant is also of global significance, and certainly the most important known population of the species in Cambodia.
- The lowland semi-evergreen forest mosaic in the survey area supports a high species diversity, representative of some of the most species-rich evergreen forest mosaics in southern Indochina.
- Regional endemics/near-endemics are particularly well represented in these habitats, where most time was spent, including Siamese Fireback, Red-vented Barbet *Megalaima lagrandieri*, Bar-bellied Pitta *Pitta elliotii*, Blue-rumped Pitta *Pitta soror*, Grey-faced Tit Babbler *Macronous kelleyi* and Black-browed Fulvetta *Alcippe grotei*, whilst regionally threatened species present include Great Hornbill, Wreathed Hornbill and Woolly-necked Stork.
- A lower species diversity was found in the deciduous dipterocarp habitats, where less time was spent, but more extensive surveys in these areas could reasonably be expected to reveal a suite of endemic/near-endemic, regionally and globally threatened deciduous dipterocarp specialists.
- The seasonal pools and meadows studding both evergreen and deciduous dipterocarp forest mosaics were found to support several Key Species including regionally and Globally Threatened species such as Grey-headed Fish Eagle, Lesser Adjutant and Woolly-necked Stork. These areas are potentially of high importance to other Globally Threatened large waterbirds, including Giant and White-shouldered Ibises (both Critical) and, as such, merit more systematic investigation.

Mammals

- A total of 41 mammal species were identified either by direct observation, specimen(s) or by photo-trap picture.
- 20 Key Species were confirmed for the survey area, the most significant of which are Douc Langur *Pygathrix nemaeus*, Yellow-cheeked Gibbon *Hylobates [Nomascus] gabriellae*, Tiger *Panthera tigris*, Asian Elephant *Elephas maximus*, Gaur *Bos gaurus*, and Banteng *Bos javanicus*.

- The survey area, and contiguous habitats to the north (see Timmins and Ou Ratanak in prep.), are of global importance for wild cattle and possibly maintains the most important population of Banteng on mainland Asia.
- Seven primate species were observed, with the Yellow-cheeked Gibbon populations representing potentially the most important for the species.
- A number of poorly-known species were recorded, including Northern Smooth-tailed Treeshrew *Dendrogale murina*, Acuminate Horseshoe Bat *Rhinolophus acuminatus*, Hog Badger *Arctonyx collaris*, and Large-spotted Civet *Viverra zibetha*.
- Signs of Asian Elephant were found only in a few locations, with indications of seasonally-present (wet season at least) populations in the area. However, there is evidence to suggest that the area might be an important migratory corridor for the species between Vietnam and the Phnom Prich Wildlife Sanctuary, and thus could seasonally support a regionally important population.
- No evidence for the continued presence of Kouprey *Bos sauveli* or Wild Water Buffalo *Bubalus arnee* was found. No evidence of Khting Vor *Pseudonovibos spiralis* was found.
- It is unlikely that domestic or feral cattle or elephant exists in the survey area beyond the immediate confines of villages, thus the genetic threat to existing wild populations is low.
- Camera-traps provided photographs of 17 species including the following Key Species: Stump-tailed Macaque *Macaca arctoides*, Douc Langur, Sun Bear *Ursus malayanus*, Hog Badger, Large-spotted Civet, Leopard Cat *Prionailurus bengalensis*, Tiger, Asian Elephant, Sambar *Cervus unicolor*, Banteng and Gaur.

Threats

- Hunting is the single greatest threat to most of the Key Species of large mammals, and several of the Key Species of birds. Although the area has a low human population density, hunting is actively pursued by many locals and members of the army and police, which has caused the decline of many Key Species. Around the time of the survey, two Tigers, two Banteng, and one Gaur were either shot or killed using mines and at least four locally caught Green Peafowl were observed in trade.
- The increased access to the area offered by the construction of new logging roads and smaller logging tracks is undoubtedly encouraging and facilitating hunting.
- Resin-tapping and non-timber forest product (NTFP) collection is causing habitat disturbance over a wide area, potentially also negatively impacting populations of Key Species such as Lesser Adjutant, Grey-headed Fish Eagle and other large waterbirds.

- The status of the area as a logging concession has both negative and positive implications for wildlife conservation. Whilst natural habitats have and will be degraded to varying degrees, controls on illegal logging and encroachment by farmers and settlements has prevented further destruction.

Conservation Recommendations

Short-term

- The immediate and absolute ban on hunting of all Focal Key Species (see below) in the concession. This action is essential for longer-term strategies to be successful. Focal Key Species are those Key Species of elevated conservation significance which can be readily identified by non-specialists and which do not form an important part of local subsistence hunting. Focal Key Species are categorised as:
 - Tigers and other large cats;
 - Wild cattle;
 - Primates;
 - Green Peafowl and Germain's Peacock Pheasant;
 - Hornbills.
- The inclusion of hunting as an activity to be monitored by the existing concession patrols, with incidents of hunting of the Focal Key Species to be subject to similar methods of enforcement as illegal logging. Particular emphasis should be placed on the regular patrolling of all mineral licks and water holes.
- An absolute ban on hunting, purchasing or transportation of all wildlife by concession employees.
- Implementation of actions to minimise access to logging areas to non-employees and the closing of non-essential roads after logging activities.
- The most important areas for wildlife in the concession: the four mineral licks located in Coupe 5 and the O'Por and O'Reang rivers, to be treated as exclusion areas by a double ring buffer of a no-entry zone for an inner ring of 250 m, and a no-roading zone for an outer ring of 750 m.
- The inclusion of all of the above recommendations in the Samling Forest Management Plan.

Short-term Research Recommendations

- A detailed assessment of the hunting trends in the area, working with local communities, concession staff and local authorities, and focussing on who is hunting what species, where, at what levels and for what purpose or market.

- Further broad-based surveys for those areas not visited under the present work, especially to the west and north. The contiguity of habitat with Phnom Prich Wildlife Sanctuary should be assessed and geographical features important for wildlife should be mapped, including permanent water sources and mineral licks.
- More detailed research to more accurately assess the status of, and threats to, the Focal Key Species identified above, and to develop appropriate conservation and monitoring strategies.

Medium-term

- The initiation of a hunting control program throughout the Mondulkiri section of the Samling concession based on the results of the hunting study (see above). This would take into account local subsistence use of wildlife and would be implemented using the existing Samling monitoring and protection staff in cooperation with MAFF and local authorities.
- The initiation of a community awareness programme focussing on the involvement of local people in the designation of all mineral licks as 'no access' areas, with an exclusion zone of 250 metre radius to be clearly demarcated. These areas are currently only visited for purposes of hunting, thus exclusion will not prevent any on-going legal activities in the area.
- Initiation of a long-term monitoring program for the Focal Key Species and its inclusion in Samling's Forest Management Plan. It is likely that indirect sampling methods will be required for some groups, thus preliminary work would be essential in designing a suitable sampling regime.
- Development of the **Short-term** activities into a more rigorous framework for wildlife conservation that can also be incorporated into Samling's Forest Management Plan for both national concessions. This process should seek to learn from similar activities in other parts of Asia, especially from the experiences of WCS and Samling in Sarawak, Malaysia.
- The establishment of a research station within Samling's km 148 camp, to provide a base for conservation and research activities in the area.
- Training and equipping of Samling patrol staff to be able to carry out wildlife enforcement activities and record and collate wildlife information.
- The development of an integrated landscape level conservation strategy for the Samling concession and adjacent areas, including Phnom Prich and Snoul Wildlife Sanctuaries.



Above: The Black-browed Fulvetta *Alcippe grotei* is a regional endemic that is locally common in the lowland evergreen forests of Coupes 2a and 3.

Above centre: Blue-winged Pitta *Pitta moluccensis*.

Right: Female Banded Kingfisher *Lacedo pulchella*.

Right and below right: This Green Peafowl chick *Pavo muticus* was found in Phum O'Por. It was intended for sale, the asking price being c. 15\$ per bird. The survey team found four sets of tail feathers being transported out of Keo Seimar district on motorbikes, and at least one live adult being transported to Phnom Penh by a senior member of the Provincial authorities



Left: Juvenile Oriental Pied Hornbill *Anthracoceros albirostris* taken from the nest for sale as a pet.



Banteng *Bos javanicus* were taken at two mineral licks



A Gaur *Bos gaurus* photo-trapped along a concession road in logged forest.



Ten pictures of Sun Bear *Urus malayanus* were obtained from just Coupe 2a.

Wild Pig *Sus scrofa* were abundant in the survey area.



Four pictures of Tiger *Panthera tigris* of at least two animals were taken in Coupe 2a. This is the first time that the species has been photographed in the wild in Cambodia.



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Abbreviations

ARL	At Risk Lao PDR
c.	approximately
cf.	compare
CITES	Convention on International Trade in Endangered Species
dbh	diameter at breast height
DAFF	Department of Agriculture, Forestry and Fisheries (MAFF)
DD	Data Deficient
DFW	Department of Forestry and Wildlife (MAFF)
DNCP	Department of Nature Conservation and Protection (MoE)
FFI	Fauna & Flora International
GPS	Global Positioning System
GT	Globally Threatened
GT-CR	Globally Threatened - Critically Endangered
GT-EN	Globally Threatened - Endangered
GT-VU	Globally Threatened - Vulnerable
GNT	Globally Near-threatened
IRIC	International Resource Information Center
IUCN	World Conservation Union
Lao PDR	Lao Peoples' Democratic Republic
LKL	Little Known in Laos
MAFF	Ministry of Agriculture, Forestry and Fisheries
masl	metres above sea level
MoE	Ministry of Environment
NP	National Park
NBCA	National Biodiversity Conservation Area
NTFP	Non-timber forest product
PAO	Protected Area Office (DNCP/MoE)
PFO	Provincial Forestry Office (DAFF/MAFF)
UNTAC	United Nations Transitional Authority in Cambodia
UTM	Universal Transverse Mercator
WCS	Wildlife Conservation Society
WPO	Wildlife Protection Office, Department of Forestry and Wildlife
WS	Wildlife Sanctuary
WWF	World Wide Fund for Nature

Commonly used Khmer names

Bung	pond or lake
O	stream
Phnom	large hill/mountain
Phum	village
Stung	river
Tonle	river (generally, though not always, larger than a Stung)
Trapeang	pond/pool
Viel	seasonal meadow/grassland

Conventions

Key Species are defined here as any species falling into one or more of the following global or regional threat categories (see following section for definitions of the various conventions used):

- Any species considered to be Globally Threatened, Globally Near-Threatened or Data Deficient, following IUCN (1996). For definitions of these conventions see below.
- Any species considered At Risk in Lao PDR, Potentially At Risk in Lao PDR and Little Known in Lao PDR, following Duckworth *et al.* (1999).
- All bird species considered to be Critical, Endangered, Vulnerable or Near-threatened in a national context in Thailand, following Round (1997), as updated by Round (2000).

Some species falling into only one of the latter two categories may prove to be common and/or under no elevated threat in Cambodia, and thus not warrant Key Species status in a national context. However, until a more complete picture emerges of species' distributions and statuses across Cambodia, these species are retained in the Key Species category. For birds, these are included under the 'Additional Regionally Sensitive Species' section 22.3. Comments are made under the *Remarks* subsection to indicate the appropriateness of the Key Species designation for the more common and/or widespread species.

Each Key Species account also notes if the species is included in either Appendices I, II or III of CITES (CITES 2000).

Definitions of Conventions used in Key Species Accounts

The global threat categories relate to the threat to the survival of the species across its entire world range, following criteria defined formally (often quantitatively) in the *1996 IUCN Red List of Threatened Animals* (IUCN 1996). In this publication, the categories for birds are taken from Collar *et al.*'s (1994) *Birds to Watch 2: The Threatened Birds of the World*, which applied the same criteria to derive threat categories. These categories and criteria are currently being re-evaluated for all species by BirdLife International, to be published later this year. In instances where it is known that a bird species' threat status will be re-classified in this work (BirdLife International *in litt.* 2000), the new categorisation is given first, with the 1994 categorisation given after it in brackets. It should be noted that some of these re-classifications have yet to be finalised, but are given here to reflect the most up-to-date thinking on each species' global threat status.

Global Threat Categories

GT - Critical

The species faces an extremely high risk of extinction in the wild in the immediate future.

GT - Endangered

The species is facing a very high risk of extinction in the wild in the near future.

GT - Vulnerable

The species is facing a high risk of extinction in the wild in the medium-term future.

Data Deficient

A species for which there is inadequate information to make a direct, or indirect, assessment of its risk of global extinction in the wild. This category does not imply that the species is certainly Globally Threatened, and further data could show that the species is presently secure globally.

Globally Near-threatened

The species is close to qualifying for Globally Threatened – Vulnerable. Near-threatened is one of three sub-categories of the Lower Risk (LR) category. Lower Risk is defined as “a taxon which, when evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable”. Near-threatened is defined as “taxa which do not qualify for Conservation Dependent (the highest sub-category of Lower Risk), but which are close to qualifying for Vulnerable”.

Least concern

A species which does not qualify for Near-threatened – this applies to all species not in one of the above categories, but this is only mentioned for those species that were formerly considered Near-threatened.

For a fully comprehensive discussion of the criteria by which each category is defined see IUCN (1996).

Thai Threat Status (Birds only)

Thai Threat Status follows Round (1997) as updated by Round (2000). These analyses apply the IUCN global threat criteria to Thailand's bird fauna in a purely national context. In many instances the global threat level is insufficient to describe the threat to the species in Thailand alone, and it has been necessary to upgrade the national threat level (e.g. from Vulnerable to Endangered). However, a species that is considered globally (near-) threatened, cannot be downgraded (e.g. from Endangered to Vulnerable) for the national assessment. Status codes are as for global threat status:

Cr	= Critical in Thailand
En	= Endangered in Thailand
Vu	= Vulnerable in Thailand
Nt	= Near-threatened in Thailand
Ex	= Extinct in Thailand
En*	= Endangered in Thailand as a breeding bird
Ex*	= Extinct in Thailand as a breeding bird

Lao Threat Status

These categories relate specifically to the threat to survival of the species in Lao PDR, following Duckworth *et al.* (1999).

At Risk in Lao (ARL)

This category is roughly equivalent at a national level to the Globally Threatened categories of IUCN (1996).

Potentially At Risk in Lao (PARL)

This category includes species (a) suspected to be At Risk in Lao PDR but where information about threats or species status is insufficient to make a firm categorisation and (b) species on or close to the borderline of At Risk in Lao PDR.

Little Known in Lao PDR (LKL)

This category is for species whose conservation status is difficult to assess, either because they are difficult to detect or identify, or where fieldwork within their preferred range and habitats has been restricted, or where threats or species status are not clear for other reasons.

The Lao risk categories ARL, PARL, and LKL are intended to be very approximately equivalent to the global threat categories Globally Threatened, Globally Near-threatened, and Data Deficient, applied at a national level.

CITES Trade Categories

These categories reflect the level of threat posed by international trade. Unlike global and national threat categories, CITES categories have a regulatory effect in trade between countries that are parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Cambodia is one of these countries, having signed an agreement to be part of this Convention.

I = **Appendix I:**

Species threatened with extinction that are or may be affected by trade. Trade in specimens between parties is only authorised in exceptional circumstances (such as import and export of specimens for scientific purposes).

II = **Appendix II:**

Species which although not necessarily now threatened with extinction may become so unless trade in specimens is subject to strict regulation in order to avoid over-utilisation. Species may also be listed in Appendix II because of their similarity to more threatened species, as an aid to enforcement. Commercial trade in wild specimens listed on Appendix II is permitted between members of the convention, but is controlled and monitored through a licensing system.

III = **Appendix III:**

Species for which trade in wild specimens is permitted, but for which in certain CITES signatory countries requires appropriate regulation and documentation.

Further Conventions

South-East Asia (*sensu* Robson 2000) refers to the geopolitical area of Myanmar, Thailand, Peninsular Malaysia, Singapore, Cambodia, Laos and Vietnam.

Indochina (also *sensu* Robson 2000) refers to Cambodia, Laos and Vietnam collectively.

'Large mammals' is used as a broad term of convenience to refer to those mammals which are generally identifiable in the field (following Dorst and Dandelot 1970 in Duckworth and Hedges 1998a).

PART I. Introduction

1.1 Background

Early expeditions to Cambodia established the presence of large populations of mammal and bird species (Osgood 1932, Delacour and Jabouille 1940, Wharton 1957, Thomas 1964, Pfeffer 1969) which are now considered to be of global significance to conservation (IUCN 1996). However, for 30 years following the last of these surveys, regional and civil conflict, foreign occupation and international isolation prevented any efforts to systematically assess the extent or size of these populations. During these decades many of the same bird and mammal species underwent severe and rapid declines regionally, consequently raising the potential importance of any populations remaining within Cambodia. However, wildlife markets, anecdotal reports and speculation have often been the only major sources of information for published literature (e.g. Eudey 1987, Santiapillai and Jackson 1990, Nowell and Jackson 1996) and the status of these populations remained a subject for speculation up until the mid-1990s.

For large mammals, evidence of a rapid and widespread decline of populations in Indochina has recently been collated and documented (Duckworth and Hedges 1998a and Duckworth *et al.* 1999 and references therein). Although intense regional conflict and isolationist governments have prevented surveys over the last 30 years, the existence of these wildlife declines had been proposed (MacKinnon and MacKinnon 1986) as had the contrary notion that wildlife would be protected by these same manifestations of war and politics (Santiapillai and Jackson 1990). Little evidence, however, was available to support either theory. Since approximately 1984 in Vietnam and 1988 in Lao PDR, limited access has been granted to foreign biologists and environmentalists to help identify national conservation priorities, resulting in the gazettement of protected area systems and the establishment of relevant government agencies. In Cambodia, however, civil conflict and general lawlessness have played a more significant role in determining the efficacy of field surveys, even now after fighting has officially ceased. The level of poverty, proliferation of guns and the existence of many thousands of uncharted landmines combined to prevent both national and international surveys being undertaken. Abatements in conflict became windows of opportunity for a few surveys (Olivier and Woodford 1994, Mundkur *et al.* 1995) though these were the exceptions between the mid- to late 1960's and 1998.

With the cessation of conflict, surveys are now required to assess the current status of the historically significant wildlife populations, and to locate other species and sites of conservation significance. Some species of conservation significance have probably never been common and widespread, such as Kouprey *Bos sauveli*, Wild Water Buffalo *Bubalus arnee*, Khting Vor *Pseudonovibos spiralis*, Douc Langur *Pygathrix nemaeus* and Giant Ibis *Pseudibis gigantea*, whilst other species are known to have undergone severe regional declines thus raising the relative importance of remaining populations within Cambodia. Examples of these are Tiger *Panthera tigris*, Banteng *Bos javanicus*, Asian Elephant *Elephas maximus*, Eld's Deer *Cervus eldi*, Sarus Crane *Grus antigone*, Green Peafowl *Pavo muticus*, White-shouldered Ibis *Pseudibis davisoni*,

Lesser Adjutant *Leptoptilos javanicus* and all vultures. Regular surveys of these species will help form an understanding of trends and provide a basis for prioritising the wildlife conservation efforts within Cambodia.

A further result of the conflict has been the dearth of trained Cambodian biologists and conservationists. Only in recent years have opportunities arisen for Cambodians to study on conservation-related courses, both within Phnom Penh and abroad. The establishment of Cambodia programs for international conservation NGOs such as WCS and WWF is now helping to further train individuals within the government in a variety of conservation-related disciplines. The current survey is part of WCS's efforts in building capacity of government staff from the Ministry of Environment (MoE) and the Ministry of Agriculture, Forestry and Fisheries (MAFF) to ensure that recent efforts in prioritising and conserving Cambodia's wildlife have a long-term future.

1.1.1 Previous surveys

Little information is available on the wildlife of the extreme southern part of Mondulakiri Province. Two brief searches for Kouprey (Dioli 1994, Sun Hean 1995a), one for bears (Zborovskiy 1999) and a hunter interview survey (Weiler 1998) form the majority of what little is known of the area. No field surveys lasting more than a few days have been undertaken, either historically or in recent times, despite the presence of a wildlife sanctuary (Snoul) along its border with Kratie Province. Its geographical location, situated along the south-eastern fringe of the forested Mekong plains of northern Cambodia and the western fringe of the southern extent of the Annamite mountains, combined with the wide variety of deciduous and evergreen habitats that occur, suggest that it potentially supports a diverse fauna, especially for a lowland region. However, a 1997 survey of the adjacent Dak Lak province in Vietnam provided evidence for a major decline in large mammal populations on at least the Vietnamese side (Le Xuan Canh *et al.* 1997). No signs of big cats were found and evidence of Asian Elephant, Banteng and Gaur *Bos gaurus* was limited. For the avifauna, the ranges of several Globally Threatened species (*sensu* Collar *et al.* 1994 and BirdLife International in prep. a and b) overlapping the area partially or completely, imply that it could be important for several. Indeed, a recent survey of Dak Lak province highlighted this area of Mondulakiri to be of potential importance for Green Peafowl (Brickle *et al.* 1998).

No specific ornithological work had previously been conducted in the areas covered during this survey. However, some brief observations were made in degraded deciduous forest patches between 650 and 750 masl, just outside Sen Monorom town, in January 1997 (Duckworth and Hedges 1998b), covering similar habitats immediately north-east of the area of the Sen Monorom Plateau covered during this survey. Duckworth and Hedges (1998b) also visited Phum Dak Dam to the east (within Phnom Nam Lyr WS) over three days in January 1997, making observations in a mosaic of open grassland, regenerating bushland and little-degraded evergreen/semi-evergreen forest between 900 and 950 masl. However, their survey (primarily a search for Kouprey and other threatened large mammals) had to be prematurely cancelled due to deteriorating security in the region. During the same time period a nationwide interview of hunters was undertaken to determine the possible relative concentrations of large mammals remaining

in Cambodia. The results suggested that the present survey area, more specifically Keo Seimar district, was one of the three highest priority sites for Tigers in the country (Heng Kim Chhay *et al.* 1998) and also important for Banteng, Gaur and Asian Elephant (Hunter Weiler *pers comm.* 2000). These results are discussed in Duckworth and Hedges (1998a).

In May and June 1998, an extensive mammal and bird survey was conducted along the Tonle San and Tonle Srepok rivers and adjacent small wetlands within wide tracts of extensive deciduous dipterocarp forest, in Ratanakiri and Stung Treng provinces (Timmins and Men Soriyun 1998). Although the region lies well to the north of the areas of southern Mondulakiri covered during this survey, some similar habitats were covered, and the two areas are linked by an extensive lowland deciduous-dominated habitat mosaic, which reaches its southern limit in southern Mondulakiri. Timmins and Men Soriyun (1998) found the mosaic of small wetlands within deciduous dipterocarp forest in Ratanakiri and Stung Treng to be of very high global importance for Globally Threatened large waterbirds (most significantly Giant Ibis, White-shouldered Ibis and Sarus Crane). In addition, the area probably supports the single most important remaining population of three vulture species, White-rumped, Red-headed and Long-billed, which are all Globally Near-threatened, but in the process of being up-graded to Globally Threatened, except for Red-headed Vulture (BirdLife International in prep. a and b), in Indochina and Thailand.

Another survey in central-northern Mondulakiri, which ran concurrently with the present survey, centred on the Phnom Prich Wildlife Sanctuary (Timmins and Ou Ratanak in prep.). The survey focussed predominantly on large mammals and made some important findings worthy of note. Important populations of wild cattle were found, direct observations of Banteng and Gaur were achieved, and the possible tracks of Wild Water Buffalo *Bubalus arnee* were located. The survey also produced the first confirmed record of Jungle Cat *Felis chaus* in Cambodia (Poole and Duckworth in prep.). Although concentrating on large mammals, the survey also made a number of key ornithological findings. In addition parts of the area were found to support Globally Threatened large waterbirds (chiefly Lesser Adjutant and Woolly-necked Stork *Ciconia episcopus*, but also one Giant Ibis and one Sarus Crane, the latter in an area well to the north-east of Sen Monorom). Furthermore, the survey recorded several Green Peafowl, which is reported by local people to be locally numerous, particularly along the Sen Monorom-Khonyek road (Timmins and Ou Ratanak in prep.).

1.2 Survey aim and objectives

The overall aim of the survey was to identify and assess the wildlife conservation priorities within the Samling logging concession (see Figure 1.) and adjacent areas. To this end mammals and birds were chosen as suitable focal taxa, with two teams of specialists working together and sharing the following objectives:

- Develop skills and knowledge of the national participants in survey and identification techniques, both specific to their focal taxa and to broader aspects of field-based surveys;

- Conduct baseline surveys of the bird and mammal communities in all representative habitats within the survey area;
- Gather more detailed information on Key Species (for definitions see *Conventions*);
- Establish priorities for wildlife conservation within the survey area;
- Assess the current and future threats to these wildlife priorities and recommend methods of mitigating and preventing these threats.

Additional objectives specific to the mammal and bird surveys are detailed in their respective sections.

1.2.1 Participants (alphabetically)

Name...	...in text	Office	Primary survey focus
Chuon Sereyath	CS	PFO Mondulkiri	Mammals
Pete Davidson	PD	WCS Cambodia	Birds
Kong Kim Sreng	KKS	PAO and WCS Cambodia	Mammals
Men Soriyun	MS	WPO and WCS Cambodia	Mammals
Nor Mat	NM	Snoul WS	Survey participant
Pech Bunnat	PB	PAO and WCS Cambodia	Birds
Prim Sovanna	PS	WPO and WCS Cambodia	Mammals
Tan Setha	TS	DFW and WCS Cambodia	Birds
Joe Walston	JW	WCS Cambodia	Mammals

1.3 Survey area

The survey was carried out almost entirely within the Mondulkiri section of the Samling logging concession, with a brief visit to the adjacent Snoul WS and the Sen Monorom plateau (Figure 2.). The Samling concession is vast and complex in shape; over 457,000 hectares straddling three provinces: Kampong Cham, Kratie and Mondulkiri, and tapering westwards, to a tail only 4 km wide at some points. Although reasons for the demarcation of the concession boundaries is not clear, access to the Mekong River via the tapering tail appears to be a crucial factor. The concession is subdivided into four compartments of 15 coupes (Figure 3.) with coupe boundaries being retained as useful units for this report. The major highway, known as the M-1, running through the concession horizontally bisecting Snoul WS, connects Chhlong and Sen Monorom, the provincial capital. The concession is defined to the south by the border with Vietnam and Snoul WS (which is entirely enveloped by the concession and Vietnam), and to the north-east by Phnom Prich WS. It is of note that Snoul WS and Phnom Prich WS lie only 30 km from each other.

1.3.1 Study areas and survey routes

The surveys concentrated on the eastern portion of the concession, entirely within Mondulkiri province, and principally within Coupes 2, 3, 4 and 5. The Samling logging camp at km 148 was the starting point and base camp for the surveys.

It was intended at the survey's outset to attempt to cover a representative suite of areas and habitats within the Samling concession, and also Snoul WS if time allowed. Both the southern part of the Samling concession and the whole of Snoul WS are traversed by a network of logging tracks, feeding from the main M-1 access road (see Figure 3.). This allows relatively easy access to certain parts of the southern area of the Samling concession, and provided an obvious series of survey routes to rapidly cover different areas within Coupes 2a and 3, and Snoul WS. Many of these tracks are still traversible, and have not been allowed to become overgrown as a result of their frequent use by the numerous resin-tappers working in the area. The resin-tappers have also created a number of foot-trails off the main logging tracks, which were also followed as survey routes where possible.

The old road to Sen Monorom, which branches off the M-1 near km 148 and runs north through Keo Seimar district's central settlement, then northwest along the northern boundary of Coupe 3 to re-join the M-1 at km 182, provided a means of access to Coupes 4 and 5 (although at the time of survey it was not driveable along its whole length). These two sectors of the concession are not so extensively crossed by logging tracks, but because they are relatively flat they are reasonably easily accessible. Security problems in Snoul WS, particularly between between kms 95 and 123 of the M-1, prevented access to the part of Snoul WS north of this road, and necessitated using an armed escort when travelling along this stretch. Concerns were also occasionally voiced about security in other parts of the survey area, most notably the part of Samling's concession to the north of Snoul WS, along the Mondulkiri/Kratie provincial border. Thus, this potentially important area could not be visited. If the security situation improves, this should be made a priority for any further surveys planned in the area, especially for large waterbirds.

Figs. 3. and 4. detail the boundaries of the different logging concession coupes, the survey sectors, specific locations visited during the survey, survey routes followed, and all major rivers and streams mentioned in the text. Appendix I provides further details of all the discrete locations visited during the survey.

PART II. Results

2.1 Habitats

2.1.1 Introduction

No specific botanical or habitat expertise was employed during this survey. It is therefore important to consider that the habitat assessments made in this report have been made subjectively. They are broadly based on the habitat categorisations in Lekagul and Round (1991), which have been used loosely in numerous recent wildlife and habitat survey reports in Lao PDR, Cambodia and parts of Vietnam. Assessments have also been made using the authors' experience of extensive areas of Indochina, incorporating modifications stemming from a more recent analysis (Rundell in prep.) and ongoing discussions on appropriate classifications/descriptions for the habitats of the Greater Annamites and central/southern Indochinese lowlands. For the purposes of this report it is unnecessary to elaborate in detail on the habitat characteristics, especially as these discussions have not yet produced a consensus. For further detail and debate on these issues see Rundell (in prep.) and Timmins and Ou Ratanak (in prep.).

2.1.2 Global and regional importance of the area

Two zones highlighted within a preliminary analysis of notable areas of floristic interest and/or significance (Rundell in prep.) in Indochina lie very close to, or form part of the survey area. These are the Haut Chhlong and Haut Cochinchine Plateaus of the Greater Annamite Bioregion, and Eastern Cambodia along the foothills of the Annamite Range (part of the Central Indochina Dry Forest Bioregion). The western parts of the Haut Chhlong and Haut Cochinchine Plateaus support dense wet evergreen forests on rich soils which receive >3,000 mm annual precipitation and are reported to just extend into the survey area. Whether these characteristics are consistent for the parts of these plateaus that protrude into Cambodia is not clear, and it may be that these edge areas are less wet and dense than is typical for the zones. Rundell (in prep.) affords this area a preliminary classification as a High Priority for conservation (in a High, Moderate, Low ranking system). Eastern Cambodia along the foothills of the Annamite Range supports a mosaic of dry evergreen forest, deciduous dipterocarp woodlands and agricultural areas, which provide good but not unique examples of these forest types, their importance in part stemming from their large scale, covering an extensive landscape. Rundell (in prep.) affords this area a preliminary classification as a Moderate Priority for conservation. Both these areas are little studied, and detailed surveys of the forest structure and floristic diversity are required before their conservation values can be fully assessed Rundell (in prep.).

2.1.3 Summary descriptions of the main habitat types

Evergreen and semi-evergreen forests

Within the survey area, habitats classified here as evergreen and semi-evergreen are very diverse in character. The distinction between the two is somewhat masked by the degree to which these forests have been modified by logging, which in places has resulted in the near-complete removal of the upper canopy, presumably causing a major alteration in forest structure and composition. Thus, retrospective assessments of the original character of the forest become rather difficult. The more obvious, generally relatively mature, (semi-)‘pure’ evergreen forest tracts are typically dense formations on apparently rich soils, with a high frequency of lianas, rattans and palms in an often thick and tangled understorey. Canopy cover varies considerably, but there are some patches of secondary/low-stature evergreen forest (probably logged over 20 years ago) with a near-complete (mid-)canopy, and where selective logging has occurred and a reasonable proportion of tall trees remain, the forest stands have patches of relatively intact, high canopy.

The semi-evergreen forests cover a considerably more extensive area, and exhibit the greatest variation in structure and composition. This is at least in part because the definition of semi-evergreen has yet to be fully clarified, and in current discussions includes forests previously classified as ‘mixed deciduous forests’ in most recent survey reports in Lao PDR, Cambodia and Vietnam. They vary from apparently evergreen-dominated stands (where the majority of the large trees appeared to be evergreen, with only a small deciduous component), often with an understorey that, in patches, could be considered typical of pure evergreen forests, being thick and tangled with a relatively high frequency of lianas, palms and some rattans, to tracts with a more open understorey, but often high sapling density forming a dense lower canopy at c.5-10m height.

These more classical semi-evergreen forests grade into, and also occur patchily within, forest areas heavily dominated by deciduous trees, particularly *Lagerstroemia* species. To what extent this feature is a result of selective logging for commercially more valuable evergreen tree species, is not clear. These forests would formerly have been classified as ‘mixed deciduous forests’ by many recent regional survey report authors. The proportion of *Lagerstroemia* varies, but it is frequently dominant. Canopy cover is also variable. The understorey is often relatively sparse, and frequently burnt. In areas less frequently burnt, patchy bamboo stands (of at least two species, including a spiny form) occur, which are extensive in places, and dominate the vegetation below the *Lagerstroemia* canopy. The review of Rundell (in prep.) groups these within the semi-evergreen classification, but indicates that they should perhaps be given greater significance as a distinctive forest association comprising a variety of forms in their own right, pending careful quantitative community studies to better characterise the nature of gradients between typical semi-evergreen forest and these deciduous associations, especially since the two occur in close proximity (Rundell in prep.). Timmins and Ou Ratanak (in prep.) suggests a preliminary classification for these as ‘Indochinese mixed deciduous forests’.

Deciduous dipterocarp forests

This habitat has frequently been referred to in previous survey reports and literature as dry dipterocarp forest (e.g. Round 1998), following Manivong and Sandevall (1992), although Rundell (in prep.) and J. F. Maxwell (pers. comm. to P. D. Round 1998) consider the term “deciduous dipterocarp” to be more precise, hence it has been adopted here.

Deciduous dipterocarp forest in the survey area is varied in type and quality, with occasional relatively dense patches of trees with some understorey bamboos, grading through to more open almost savannah-like habitat, sometimes with exposed rocks, or more frequently grassland or ‘parkland’, with scattered trees. The habitat diversity was enhanced by the presence of seasonal and permanent pools (Bungs) flowing watercourses, often flanked by stands of evergreen trees or gallery forest. The areas of deciduous dipterocarp forest supporting the highest diversity of birds appeared also to be more diverse in terms of tree species composition, with more tall, wide-girth trees, and occasionally a distinct canopy and middle storey. Ground-storey vegetation was generally rather sparse, generally comprising a few grasses and herbs, but with the onset of the rains became increasingly lush, particularly in the more open patches. The least diverse tracts of deciduous dipterocarp appeared, in patches at least, to be dominated by one tree species of relatively even age and middle-size. These may well have been a fire-climax habitat formed as a result of frequent burning of either a formerly more diverse sub-type of deciduous dipterocarp, or perhaps even of evergreen/semi-evergreen forest (Round 1998, Rabinowitz 1990). Deciduous dipterocarp forest, although partly dependent on at least occasional fires to maintain it, is nonetheless susceptible to damage from too-frequent fires, which are set deliberately by local people every dry-season. Many larger trees in the better quality areas of deciduous dipterocarp had apparently been killed by fire. Some areas, even those several kilometres from the nearest village, also had rice-paddies situated in them. In such areas girdled trees were often found. Many larger *Dipterocarpus* trees were being tapped for resin.

The question as to whether this form of habitat is climactic or of recent origin, anthropogenically altered, has been discussed but not resolved (Wharton 1966, 1968 and Rundell in prep.).

2.1.4 Habitats within the survey area’s sectors

Coupes 2a and 3

Predominantly semi-evergreen forest on lower hills (up to c.600m), becoming gradually steeper further east approaching the western edge of the Sen Monorom Plateau. Although only Coupe 2a has legally been logged in recent times, the whole area appears to have been logged, in some places quite heavily, and with some evidence of local clearance for agriculture. North-westernmost parts of Coupe 3 are more deciduous in character and grade into the dry deciduous dipterocarp areas that dominate Coupes 4 and 5. Numerous old logging tracks traverse the area, maintained by local resin-tappers as motorbike trails at least. Some wanton felling of fruit trees still goes on by locals and Coupe 3 is due to be harvested in the 2000/2001 dry season by Samling.

The habitats of Coupe 2a and 3 appear to continue across the O'Houch river and through to Vietnam for a considerable distance and superficially appears to be in a similar condition. Maps indicate that the Vietnamese land is at least partly within the Buu Gia Map Nature Reserve. Irrespective of its protection status, this contiguous block of evergreen forest is of importance given its undoubted status as the largest of its type in the vicinity of the survey area and its possible significance to a number of species reliant on evergreen forest.

Coupes 4 and 5

This area is predominantly low-lying and/or gently undulating (up to 400masl) mixed deciduous and deciduous dipterocarp forest, centred on the O'Por and O'Reang rivers. In many places bamboo dominates the understorey, whilst in others a more open grassy understorey in mature deciduous dipterocarp woodland appears. Some patches of semi-evergreen forest are scattered throughout, notably between Phou Clair, 450masl, and Andong Kroleung, c. 430 masl, and near the Srer Pleng camp. Some stretches of semi-evergreen gallery forest flank at least the parts of the O'Por river visited.

Certainly some human modification, seems to have been people in the area for quite a long time, numerous trails, old paddies and fallow, semi-overgrown areas within more mature (fairly natural looking) forest tracts.

Snoul Wildlife Sanctuary

Snoul is characterised by predominantly evergreen and semi-evergreen forest, scattered with small forest pools and larger. It has been heavily logged over in most of the areas visited, the only obvious tall stands of trees remaining being around the fringes of the grassy clearings with trapeangs/Bungs (e.g. Bung Boun). Some regeneration of low-stature evergreen forest in some areas has occurred, whilst others are now dominated by bamboo or sprawling secondary growth and creepers, seemingly preventing penetration of young saplings. Old logging roads network the protected area and now extensively utilised by resin-tappers as trails, with many of them being driveable by motorbike.

There is a distinct and abrupt habitat transition on the south-western fringe of the protected area, from predominantly evergreen to deciduous dipterocarp forest with some substantial open grassy and scrubby areas, demarcated by the Stung Chray Meang. There are several open, seasonally flooded, grassland areas along this river, grading into deciduous dipterocarp forest with some cultivation and human habitation to the east of Route 13. Disturbed, secondary deciduous dipterocarp forest appeared to extend westwards from Route 13, but to what extent was not determined.

Sen Monorom Plateau

Above c.500masl the forested hills of Samling concession Coupes 2a and 3 rise onto the Sen Monorom Plateau, which ascends to 760masl at its highest point to the south-west of Sen Monorom, Monduliri's provincial town. It rises further still to the north, reaching over 900masl. The plateau is characterised by large, open grassy areas with few, scattered trees and occasional stands of pine, and is dissected by relatively shallow stream valleys which still support linear tracts of secondary evergreen forest. The plateau evidently has a long history of human modification though it is not

clear what the vegetation structure of the plateau would have been prior to clearance. Wharton (1966) remarks that the Chhlong (Sen Monorom) Plateau has a rich soil not present anywhere else in the northern plains (Wharton's 'northern plains' include the survey area), but that the Chhlong Plateau had already been converted to grassland and abandoned. He attributes this to the slash and burn methods of the Mnong ethnic group who "removed the mantle of heavy forest and formed a savanna grassland" (Wharton 1966).

2.2 Birds

2.2.1 Survey Description

Survey Aim

- To assess the conservation value of the survey area for birds.

Survey Objectives

- To conduct baseline surveys of bird communities in the different habitats within the Samling concession and Snoul WS.
- To collect more detailed information on 'Key Species' (see definition in *Conventions*)
- To exchange skills and knowledge in bird identification and recording techniques with staff members of the DFW and DNCP.
- To assess any major threats to the bird communities and their habitats, particularly Key Species, and where possible provide recommendations for their conservation.

Survey timing and summary itinerary

The survey was conducted to coincide with the mammal survey, in order to maximise ease of access to this relatively remote area, and to minimise logistical difficulties. Table 1 summarises the itinerary, split into two periods, an initial reconnaissance visit in mid-March, followed by a longer period from late April to mid-May. The March period coincided well with the early part of the breeding season for a number of species, and many birds were very vocal. However, by late April the majority of species had bred and were feeding fledged broods. This factor, coupled with the increased heat of the late dry season, followed by/admixed with the onset of the rains, served to reduce song and other territorial vocalisations considerably, and made finding birds more difficult, with the daily period of obvious bird activity restricted to the first few hours of the morning (usually c.0530-0900 hours). Future surveys of the area would be well advised to commence work earlier in the year (i.e. February and March) to coincide with the main period of bird vocalisations (immediately prior to the onset of breeding), and hence maximise species contacts and ease of detectability.

2.2.2 Methods

The primary ornithological objective of the survey was to compile baseline data on the bird species occurring in the various habitats in the area. The methodology was therefore necessarily restricted to broadly qualitative rapid appraisals, rather than more time consuming methods for quantitative data collection, which would have failed to provide a broad overview of bird communities during the time available for conducting the survey.

Standard diurnal birding techniques were used, concentrated during periods of maximum bird activity (dawn - late morning and mid afternoon - dusk), supplemented by some night walks to detect nocturnal species. Diurnal bird

Table 1. Summary of bird survey dates, sectors covered and personnel involved.

Dates (2000)	Survey Sector	Observers
15-17 March	Coupes 2a+3	PD, PB
18 March	Coupe 5	PD, PB
18-19 March	Coupes 2a+3	PD, PB
25-28 April	Coupes 2a+3	PD, TS
28 April - 1 May	Coupe 4	PD, TS
2-5 May	Snoul Wildlife Sanctuary	PD, TS, N
6 May	Coupes 2a+3	PD, TS
7 May	Coupe 5	PD, TS
8-10 May	Coupes 2a+3	PD, TS
10 May	Sen Monorom Plateau	PD, TS
11 May	Coupe 5	PD, TS
12-16 May	Coupes 2a+3	PD, TS

activity noticeably curtailed during the latter survey period (late April-mid May), when many species already had young and daytime temperatures soared, with song in particular becoming noticeably reduced in many species. Birds were detected by sight and by listening for calls. Many of the species were already familiar to the primary author, and the majority of bird songs and calls were immediately or at least quickly recognisable, and for those that weren't, tape playback of vocalisations was used. This greatly facilitated species detection and the (subjective) assessment of relative abundance. In addition mist nets were set up at some localities to catch skulking understorey species which may have otherwise gone undetected. All netted birds were measured, photographed and released.

A daily log of all observations was maintained, which has been archived in the WCS Cambodia Program Office in Phnom Penh. For the more significant observations, primarily of 'Key Species', additional notes on behaviour, habitat and altitude were made. All evidence of breeding was also recorded.

Informal interviews were also conducted with local people, particularly hunters and knowledgeable guides, as well as Provincial Forestry Office and Protected Area staff, to gain additional information concerning some larger Key Species, e.g. pheasants and large waterbirds.

Notes on the broad habitat types encountered, their extent, and the amount and type of human use within them were also taken during the course of general fieldwork.

2.2.3 Results

Key Species Accounts

The following accounts are broken down into three categories, Globally Threatened and Near-threatened species, regionally threatened species, and additional regionally sensitive species, in order to reflect the different levels of threat these species face.

Globally Threatened and Globally Near-threatened Species

Siamese Fireback *Lophura diardi*

espkul It Sdach coleet

<i>Global Range:</i>	Endemic to Indochina and parts of north-west, north-east and south-east Thailand (Robson 2000).
<i>Cambodian Range:</i>	The only recent records are from Virachey National Park in Stung Treng and Ratanakiri provinces in the north-east (WWF camera-trap data). It is also known historically from Siem Reap and Kompong Thom provinces, where it was fairly common north of the Great Lake (Thomas 1964). It is likely to persist across much of northern Cambodia, but is probably absent from the less forested, wetland-dominated central and south-eastern parts of the country, and has never been recorded from the south-west.
<i>Conservation Status:</i>	Globally Near-threatened (categorised as Vulnerable in Collar <i>et al.</i> 1994). Vulnerable in Thailand. Potentially at Risk in Laos.
<i>Coupes 2a and 3:</i>	Three encounters totalling at least nine birds, including one group of at least five, all in logged semi-evergreen forest between 180 and 340 masl,
<i>Snoul W.S.:</i>	At least two birds in logged lowland evergreen forest at c.90 masl near Trapeang Sandan on 5 th May.

Remarks: This relative paucity of records indicates that Siamese Fireback is an uncommon species in the area. However, this may be more a reflection of the species becoming more secretive post-breeding. The characteristic 'wing-whirring' of *Lophura/Gallus* galliformes was heard frequently, particularly during March. Although not specifically attributable to species, at least some of these are likely to have been Siamese Firebacks, suggesting the species may be more numerous than these records suggest.

Germain's Peacock Pheasant *Polyplectron germaini*

manɛTaR)akB'NRbepH-ébtg Moantoprak purprophess baytong

<i>Global Range:</i>	Endemic to southern Indochina, where it is known from southern Central Annam, South Annam and Cochinchina in Vietnam, and north-eastern Cambodia (Poole 1999, Robson 2000).
<i>Cambodian Range:</i>	Only recently discovered to occur in Cambodia, it is now known from eastern and southern Mondulkiri Province (Poole 1999 and this survey), and from Veal Hateng in Virachey National Park, close to the Lao border in northern Ratanakiri province (WWF camtrap data).
<i>Conservation Status:</i>	Globally Threatened – Vulnerable CITES Appendix II
<i>Coupes 2a and 3:</i>	Locally relatively common, with a day-maximum of five, most individuals heard only (with two direct sightings), all in the logged semi-evergreen forest mosaic, between altitudes of 150 and 460masl,
<i>Coupe 4:</i>	One heard in evergreen forest in the south-eastern part of Coupe 4 (12°21.53'N 106°54.40'E) was the only record in this sector. Local people reported that the species occurs less frequently in this area compared with Coupes 2a and 3 to the south
<i>Snoul W.S.:</i>	Heard on three of the four days spent in Snoul, with a day-maximum of five, all in logged evergreen/semi-evergreen forest and second growth between 80 and 130masl,

Remarks: A widespread and locally relatively common species in Snoul Wildlife Sanctuary and Coupes 2a and 3, particularly in areas with a more substantial evergreen component, but becoming scarcer and more patchily distributed with increasing distance north and west from the Vietnamese border. These are the first confirmed sight records of the species in Cambodia, following the recent discovery of a specimen that apparently originated from Cambodia, and vocalisation evidence from Dak Dam in eastern Mondulkiri (Poole 1999, Brickle *et al.* 1998, F. Goes verbally). They also represent a small westward range extension for the species (Robson 2000).

Although it is not possible to make any population estimates based on the survey results, the area evidently supports a healthy population of Germain's Peacock Pheasant. It is evidently tolerant of logged forest, as elsewhere in its restricted range (BirdLife International in prep. a and b), and was recorded in heavily degraded secondary habitats, indicating that the extensive logging that has occurred throughout the survey area may not have affected the population significantly.

Green Peafowl *Pavo muticus*

ek  **ébtg** Kngoak baytong

<i>Global Range:</i>	This species has a large ancestral range, across which it was once common and widespread. However, it now only survives in a few scattered remnant populations in south China, west Thailand, Laos, southern Vietnam, Cambodia, Myanmar, and Java, Indonesia (Grimmett <i>et al.</i> 1998, Robson 2000). It may now be extinct in north-east India and Bangladesh, and is already extinct in Malaysia and peninsula Thailand (McGowan <i>et al.</i> 1998, BirdLife International in prep. a and b).
<i>Cambodian Range:</i>	Historically the species was distributed throughout most of the wooded lowlands and lower hills of Cambodia (Thomas 1964). However, it has now been extirpated from much of central Cambodia, with populations now believed to be confined to the north, east and south-west (McGowan <i>et al.</i> 1998).
<i>Conservation Status:</i>	Globally Threatened – Vulnerable Endangered in Thailand. At Risk in Laos. CITES Appendix II.
<i>Coupes 2a and 3:</i>	One male seen on the Coupe 3/Coupe 5 boundary, crossing a dirt road through deciduous dipterocarp woodland with an understorey comprising a mix of bamboo and grasses at 170masl, c.2km west of Phum Phnom Krang on 18 th March. Local reports suggest the species still occurs, perhaps not uncommonly, along much of the north-western fringe of Coupe 3. Anecdotal information also indicates that it probably still occurs in other parts of this sector (to the south and east), but is probably only patchily distributed here, in very small numbers.
<i>Coupe 4:</i>	A female with at least two, possibly four 1-2 month old chicks (well capable of flight) feeding in bamboo and tall shrubby undergrowth of dry deciduous forest flanking the O'Por river, at c.200masl, on 30 th April. Two separate females, both feeding on seeds of tall grasses, in the clearings around Bung Khlaa, c.260 masl, also on 30 th April. In addition, several peafowl feathers were found around Bung Khlaa, and numerous peafowl feathers were found in grassy clearings in the O'Reang catchment just to the north.
<i>Coupe 5:</i>	One male seen on the Coupe 5/Coupe 3 boundary on 18 th March (see above). I know it was late but... Pair heard calling in early morning on 8 th May near Srer Pleng Camp and later near Srer Pleng mineral-lick (See Appendix I)
<i>Snoul W.S.:</i>	Three females feeding in tall, seeding grasses on the west side of the Boung Boun clearing, abutting tall semi-evergreen forest, at c.120masl, on the evening of 2 nd May.

Remarks: Local reports indicate that peafowl are still widespread and locally common along the O'Por and O'Reang rivers, an area which certainly supports substantial tracts of suitable habitat for the species, and also in parts of Snoul W.S., particularly along the south-western border and in the north-western section of the protected area (the latter was not visited by the survey team).

It is almost certainly declining however, and local people report that it is rarer now than a few years ago in at least some areas, particularly nearer habitation. It is evidently hunted for both subsistence food and trade. The survey team noted four sets of train feathers being transported out of Keo Seimar district on motorbikes, and at least one live adult being transported to Phnom Penh by a senior member of the Provincial authorities. Five spring traps set for ground-foraging animals (capable of holding a muntjac *Muntiacus* sp., and certainly peafowl) were discovered along an old track north-west of Phum Phnom Krang in Coupe 5 in May. Chicks are also caught and sold as *pets*; two chicks seen in captivity in Phum O'Por were intended for sale, the asking price being c.\$15 per bird.

The survey area, and the remainder of the Samling concession to the north and west, appears to support a substantial population of Green Peafowl. A wide-ranging calling count survey (following similar methods used by Brickle *et al.* 1998) during the period late February to early April is a very important survey priority, to provide a clearer picture of the species' status and distribution in southern Mondulkiri. The global significance of this population, given that the current world population is estimated at between 5,000 and 10,000 individuals (BirdLife International in prep. a), is potentially very high, as highlighted by McGowan *et al.* (1998).

Jerdon's Baza *Aviceda jerdoni***ស្បែកក្រហម** *Stoangslapchek thnote kampoy*

<i>Global Range:</i>	From India east to south China and south through the Philippines, much of South-East Asia and Borneo to Sulawesi and Maluku, Indonesia (Robson 2000).
Cambodian Range:	Known from Ream National Park, Sihanoukville province in the south-west, where it was first recorded for Cambodia in March 1998 (Goes et al. 1998b), with one further provisional record from Bou Sra road, north-east of Sen Monorom (F. Goes in litt. 2000).
Conservation Status:	Globally Near-threatened. Near-threatened in Thailand. Not At Risk in Lao PDR. CITES Appendix II
Coups 2a and 3:	One adult seen at 280masl in the logged semi-evergreen forest mosaic in Coupe 2a, c.2km from the Vietnamese border, on 10th May.

Remarks: Only the third record for Cambodia. It is difficult to derive any further significance from this record however, more than it proving that the species occurs in the area. It is presumably a resident, as it is in adjacent areas of South-East Asia (Robson 2000). It is a naturally low-density species across its entire range, and the survey area covered in this report is unlikely to support a substantial population.

Grey-headed Fish Eagle *Ichthyophaga ichthyaetus***ក្រណាត់** *Oaktreykbalprohphess*

<i>Global Range:</i>	From the Indian subcontinent through mainland South-East Asia to the Greater Sundas and Sulawesi, Indonesia, and the Philippines (Robson 2000).
<i>Cambodian Range:</i>	Historically it was fairly common throughout the Mekong-Tonle Sap floodplain, and was also recorded in Koh Kong (Thomas 1964). Recent records derive from the Bung Tonle Sap (particularly Prek Toal in the north-west where it is still relatively numerous), scattered localities in the north-east, and lowland rivers and wetlands in the south-west (Goes et al. 1998a and 1998b, Timmins and Men Soriyun 1998).
<i>Conservation Status:</i>	Globally Near-threatened. Critical in Thailand. At Risk in Laos.
<i>Snoul W.S.:</i>	One adult at Bung Boun on 2 nd May, with two there on 3 rd May, perched on posts and on the ground, although very shy and easily flushed, whereupon they flew into tall trees flanking the western fringe of the clearing.

Remarks: The species is evidently uncommon in the survey area, as there is little suitable habitat, and of the few potentially suitable areas visited (all of which appeared to be more disturbed than Bung Boun), this was the only one found to hold the species. The least disturbed grassy clearings with permanent water, within forest, in parts of both Snoul Wildlife Sanctuary and the Samling concession are the only other places likely to support the species, albeit in very small numbers. Although it is very unlikely that the extreme southern Mondulkiri/eastern Kratie population approaches the importance of the Prek Toal population in terms of numbers, this comprises a small proportion of a highly significant population, in an Indochinese context at least, which is scattered across lowland Cambodia. Populations in Thailand have declined such that it is now probably hanging on at only two sites, with no more than a few pairs at each (Lekagul and Round 1991, Round 1998). A similar decline has probably taken place in Laos, where the species has only been recorded from two areas in very small numbers (Duckworth et al. 1999, Thewlis et al. 1998). In Vietnam the species is now restricted to the remotest areas (J.C. Eames verbally to Timmins 1998).

This raptor is typically restricted to level lowland plains and the lower reaches of lowland rivers. As such it is likely to be threatened by a number of factors including disturbance, direct persecution, declines in food availability (especially fish) and loss and degradation of habitat. Disturbance certainly appears to be a problem for it in Snoul Wildlife Sanctuary.

Red-headed Vulture *Sarcogyps calvus*

ត្រពេង Thmat phleung

<i>Global Range</i>	From India to SW China, and throughout much of South-East Asia (Robson 2000).
<i>Cambodian Range:</i>	Formerly widespread and common, it was described as “by far the commonest vulture in Cambodia” (Thomas 1964). However, it has declined dramatically, and is now confined to the plains of northern and eastern Cambodia.
<i>Conservation Status:</i>	Globally Near-threatened. Critical in Thailand. At Risk in Laos
<i>Coupe 5:</i>	One was seen circling over the O’Por river close to the location of a recent killing of Banteng (See Banteng Species Account) on 7 th May. Although the habitat afforded broad panoramic views of the area, no other vulture was seen in the three days spent in the sect or.

Remarks: This sole record indicates that vultures are scarce or rare in the area. However, they may have been overlooked to a certain extent, particularly in the northern and westernmost of the areas surveyed. These sectors probably form the southern outlier of the north-eastern Cambodia population, which is centred on Stung Treng, Ratanakiri and Mondulkiri provinces (Timmins and Men Soriyun 1998, Timmins and Ou Ratanak in prep.). Further surveys in the northern and western sections of the Samling concession (in Mondulkiri and along the Mondulkiri/Kratie border) may well yield more sightings, and are a very high priority. Given that the north-eastern Cambodian population is of considerable regional importance (Timmins and Men Soriyun 1998), and vultures require huge areas over which to roam (in search of food), the area could, periodically at least, be of elevated importance for itinerant feeding aggregations of vultures. However, no carcasses suitable for feeding vultures were encountered during this survey, and given the patchy distribution and the generally low densities of large ungulates (primarily cattle) in the area, domestic water buffalo and domestic cattle presumably form the bulk of their sustenance. Populations of all vulture species have plummeted in Thailand, Laos and Vietnam (in each of which they are on the verge of extinction), with the only substantial, currently known, population centred on north-eastern Cambodia, extending marginally into adjacent parts of Vietnam and Laos, perhaps mainly as non-breeding birds (Lekagul and Round 1991, Le Xuan Canh *et al.* 1997, Thewlis *et al.* 1998, Round 1998, Timmins and Men Soriyun 1998, Duckworth *et al.* 1999). Larger populations remain in India, although these too are undergoing steep declines (BirdLife International in prep. a and b).

Lesser Adjutant *Leptoptilos javanicus*

ត្រក់ត្រ Trodog toch

<i>Global Range</i>	From the Indian subcontinent east to south China, and south through South-East Asia to the Greater Sundas (Robson 2000).
<i>Cambodian Range:</i>	Historically common around the Bung Tonle Sap, and in “any well-watered place” (Thomas 1964). Recent surveys have shown that the species is still widely distributed in lowland Cambodia, with a substantial breeding population around the Bung Tonle Sap, but it has undoubtedly declined (e.g. Goes <i>et al.</i> 1998a and 1998b, Timmins and Men Soriyun 1998, Parr <i>et al.</i> 1996, Mundkur <i>et al.</i> 1995).
<i>Conservation Status:</i>	Globally Threatened – Vulnerable Critical in Thailand. At Risk in Laos
<i>Coupe 4:</i>	One circling over Bung Khlaa at midday on 29 th April before drifting off low to the north-west.
<i>Snoul W.S.:</i>	Up to six birds feeding at Bung Boun on 2 ^d and 3 ^d May, and odd singles seen flying over the area between Bung Boun and the km123 village along the M1 Samling logging road on 3 ^d and 4 th May.

Remarks: This spread of records suggests that southern Mondulkiri is still of some significance to the regional Lesser Adjutant population, particularly, as seems likely, if it is contiguous with areas to the north, where the species has also been found in regionally significant numbers recently (Timmins and Men Soriyun 1998). It seems unlikely that the population in eastern/north-eastern Cambodia is as large as that around the Bung Tonle Sap. However it still has considerable significance regionally, and possibly even globally. In Laos and Vietnam small populations are restricted to the remotest areas, entirely (Laos) or predominantly (Vietnam) those contiguous with north-eastern Cambodia (Duckworth *et al.* 1999, Thewlis *et al.* 1998).

Blue-rumped Pitta *Pitta soror*

)ak exbvexov Pakkhteiv keiv

<i>Global Range:</i>	Restricted to south-east China, south-east Thailand and much of Indochina (Lambert 1996, Robson 2000).
<i>Cambodian Range:</i>	Prior to this survey the species was known in Cambodia by one historical record only, from Bokor in the south-west (Delacour 1929), and one recent record, from Veal Hateng in Virachey National Park, close to the Lao border in Ratanakiri province (WWF camtrap data).
<i>Conservation Status:</i>	Globally Near-threatened Endangered in Thailand Potentially At Risk in Laos.
<i>Coupes 2a and 3:</i>	One heard, then seen, in logged semi-evergreen forest at c.150masl, along the km159 (south) track, just north of the Prek Chhlong (Coupe 3) on 15 th May.

Remarks: This constitutes the second recent, and only the third ever record for Cambodia (Goes 2000a). It is presumably a resident in Mondulkiri, as elsewhere in its South-East Asian range (Robson 2000). This pitta can be quite unobtrusive, particularly as it does not appear to call with any regularity (Thewlis *et al.* 1998, Lambert *et al.* 1995), and may be commoner in the area than this single record suggests.

Bar-bellied Pitta *Pitta eliottii*

)ak exbvqit eBalle l Og Pakkteiv chnotpossleung

<i>Global Range:</i>	Endemic to extreme east Thailand, Cambodia, and much of Laos and Vietnam (Lambert 1996, Robson 2000).
<i>Cambodian Range:</i>	Known historically from the Siem Reap area in the north-west (Thomas 1964), and more recently has been recorded in Ratanakiri in the north-east (Timmins and Men Soriyun 1998).
<i>Conservation Status:</i>	Globally Near-threatened Endangered in Thailand Potentially At Risk in Laos.
<i>Coupes 2a and 3:</i>	Frequently recorded, particularly along the km159 (south) track, in Coupe 2a and southern Coupe 3, with a day-maximum of at least four, in the semi-evergreen forest mosaic that dominates this sector, from 150-320masl. More frequently heard than seen.
<i>Coupe 5:</i>	One heard in a patch of semi-evergreen forest c.10 km north-west of Phum Phnom Krang on 7 th May.

Remarks: The species is evidently locally common in the area, seemingly preferring the areas of semi-evergreen forest or 'mixed deciduous' forest with a dominant evergreen component in the understorey, and largely absent from the drier deciduous dipterocarp forest types.

Grey-faced Tit Babbler *Macronous kelleyi*

<i>Global Range:</i>	Endemic to central and southern Lao, central and southern Vietnam and north-eastern Cambodia (Robson 2000).
<i>Cambodian Range:</i>	Only known from the north-east of the country (Duckworth and Hedges 1998a, F. Goes verbally 2000).
<i>Conservation Status:</i>	Globally Near-threatened (but soon very likely to be down-listed to least concern). Not At Risk in Laos
<i>Coupes 2a and 3:</i>	Common and widespread in the semi-evergreen forest mosaic, from 150-440 masl, with a day-maximum of at least 20.
<i>Coupe 4:</i>	Several heard in the tract of evergreen forest between 280 and 440 masl, to the west of Phoum Phou Chou on 29 th April and 1 st May.
<i>Coupe 5:</i>	Several in semi-evergreen forest c.10 km north-west of Phum Phnom Krang on 7 th May.
<i>Snoul W.S.:</i>	Common and widespread in all logged evergreen forest areas, with a day-maximum of at least 10.
<i>Sen Monorom Plateau:</i>	One heard in a tract of evergreen forest at c.600 masl near km 186 of the M-1 on 10 th May.

Remarks: This species is common and widespread, including in degraded habitats, wherever there are relatively substantial tracts of evergreen forest. It is under no elevated threat, and these observations lend further support to BirdLife International (in prep. a and b)'s proposed down-listing of the species from near-threatened to least concern.

Regionally Threatened Species

White-bellied Woodpecker *Dryocopus javensis***RtesHF BALS** Trosessthom posssoa

<i>Global Range:</i>	From west India, patchily to China and Korea (and formerly Japan), south to the Philippines, and through South-East Asia to the Philippines and the Greater Sundas (Indonesia) (Robson 2000).
<i>Cambodian Range:</i>	Described as 'rare' historically (Delacour and Jabouille 1931, 1940), it is now known from the Kirirom area (Goes <i>et al.</i> 1998b, Thomas 1964) and one site in Pursat province (J.C. Eames <i>in litt.</i> 2000), both in the south-west, and, prior to this survey, just two sites in the northeast (F. Goes <i>in litt.</i> 2000). Within this patchy distribution it appears to be uncommon.
<i>Conservation Status:</i>	Vulnerable in Thailand Potentially At Risk in Laos.
<i>Coupe 2a and 3:</i>	One pair seen in deciduous dipterocarp forest at 170 masl along the Coupe 3/Coupe 5 boundary, c.3 km south-west of Phum Phnom Krang on 18 th March.
<i>Coupe 4:</i>	One in deciduous dipterocarp forest fringing the Bung Khlaa clearing at 260masl on 30 th April.
<i>Snoul W.S.:</i>	Three together in logged semi-evergreen forest abutting Trapeang Vaeng at 110 masl on 4 th May, and one in logged evergreen forest near Trapeang Tuk at 80 masl on 5 th May.

Remarks: This large woodpecker is probably widespread in the survey area, but at low densities only. It may have been more numerous prior to the area being logged, as it prefers larger, old trees in which to excavate nest-holes, roost and feed (Wells 1999). Perhaps surprisingly, Timmins and Men Soriyun (1998) did not record the species in Ratanakiri.

Great Hornbill *Buceros bicornis***ekgkg FM** Kengkong thom

<i>Global Range:</i>	India to SW China, through South-East Asia to Sumatra, Indonesia (Robson 2000).
<i>Cambodian Range:</i>	Formerly common across the country (e.g. Thomas 1964), it is still relatively widespread in the hills of the south-west that are still forested, but little recent information is available from the rest of the country, although there are also several recent records from other parts of Mondulkiri (Timmins and Ou Ratanak in prep., B. L. Stuart verbally 2000, Duckworth and Hedges 1998b).
<i>Conservation Status:</i>	Near-threatened in Thailand At Risk in Laos. CITES Appendix I
<i>Coupe 2a and 3:</i>	Recorded almost daily, with a day-maximum of at least six birds, in logged stands of semi-evergreen forest, from 150-440masl, in both March and April-May. Invariably encountered in singles or pairs, with one record of a group of four feeding in a fruiting tree along the km159 (south) track, together with a troop of Douc Langurs <i>Pygathrix nemaeus</i> . Most frequently encountered in Coupe 2a, along the series of forested ridges abutting the Vietnamese border.
<i>Snoul W.S.:</i>	Seen and heard daily, with a day-maximum of four birds, in logged evergreen forest between 80 and 110masl, in May.

Remarks: This hornbill remains widespread at low densities across much of the semi-evergreen forest mosaic in Coupes 2a and 3, and Snoul Wildlife Sanctuary, with the extensive tract of forested hills along the Cambodian-Vietnamese border (extending at least 5 km into Vietnam) apparently supporting the highest densities. The species is highly dependent on larger forest trees to provide nest-cavities, and large-fruited figs for food. Its population in the area is therefore likely to have been impacted by the widespread logging activities, as well as by hunting.

Wreathed Hornbill *Aceros undulates***BWJ** Pvoang

<i>Global Range:</i>	From north-eastern India to south-west China, and south through much of South-East Asia to the Greater Sundas (Robson 2000).
<i>Cambodian Range:</i>	Widespread (both historically and recently) in the more extensively forested hills of the Elephant and Cardamom Mountains in the south-west (J.C. Eames <i>in litt.</i> 2000, Akers 2000, Goes <i>et al.</i> 1998b, Thomas 1964), but there is little available information from the rest of the country.
<i>Conservation Status:</i>	Near-threatened in Thailand At Risk in Laos.

CITES Appendix II
Coupes 2a and 3: Uncommon, recorded on less than half of the days spent in this sector, with a day-maximum of three, and maximum group size three.

Remarks: Still relatively widespread, but apparently less numerous in *Coupes 2a and 3* than Great Hornbill, and not recorded at all in Snoul Wildlife Sanctuary (although its occurrence there is certainly likely). As with Great Hornbill, it was most frequently encountered in the semi-evergreen forest mosaic in the hills along the Cambodian-Vietnamese border. It is also highly dependent on larger forest trees to provide nest-cavities, and large-fruited figs for food. Its population in the area is therefore likely to have been impacted by the widespread logging activities, as well as by hunting.

[Pompadour Green Pigeon *Treron pompadora*]

កណ្តកេល ឲ្យ Kamphlok coleung

Global Range: Patchily distributed from India and Sri Lanka, east through continental South-East Asia to the Philippines and Maluku, Indonesia (Robson 2000).
Cambodian Range: There appear to be only two previous records for Cambodia, one from Ta Veng district, Ratanakiri Province in 1996, the other from Kompong Thom province in 1997 (Goes 1999b).
Conservation Status: Vu in Thailand
 At Risk in Laos.
Records: One was photographed in a cage (with Thick-billed Green Pigeons *Treron curvirostra*) in the market in La Pakhe in mid March, though the collection locality for the birds was not ascertained.

Remarks: Although no Pompadour Green Pigeons were recorded during field surveys, this market individual points to the species occurrence in the area. Although not specifically questioned about its provenance, most if not all other caged birds in the market had been caught locally, thus it seems likely the Pompadour Green Pigeon was too. The survey area supports what appears, superficially at least, to be a substantial area of suitable forest habitat for the species. This green pigeon is now scarce, having undergone declines in both neighbouring Thailand and Laos, with records from just one site in the latter country in recent times (Duckworth *et al.* 1999).

Green Imperial Pigeon *Ducula aenea*

ក្របាច់ក្របាច់ Preapprey

Global Range: From the Indian subcontinent east throughout SE Asia and south China, the Philippines and Indonesia to New Guinea (Robson 2000).
Cambodian Range: This pigeon remains widespread and locally common in forested lowlands and foothills throughout the country.
Conservation Status: Vulnerable in Thailand
 At Risk in Lao PDR.
Coupes 2a and 3: Only seen frequently in this sector flying over Samling's km148 logging camp, with a day-maximum of eight, presumably commuting between stands of dry deciduous forest to the north, west and south of the camp. Although *Ducula* pigeons were seen occasionally in the semi-evergreen forest mosaic that characterises this sector, none were specifically identified, and could have been either this species or Mountain Imperial Pigeon *Ducula badia*. Also recorded along the Coupe 3/Coupe 5 boundary (see Coupe 5).
Coupe 4: Small numbers (day-maximum of three) in deciduous dipterocarp forest in the O'Por valley between 180 and 260masl.
Coupe 5: Small numbers (day-maximum of four) in deciduous dipterocarp forest along the Coupe 3/Coupe 5 boundary, c.3km south-west of Phum Phnom Krang, and also in deciduous dipterocarp forest a further 5-10 km to the north-west.
Snoul W.S.: Relatively common, with a day-maximum of nine (largest flock size five), generally around the larger grassy clearings in evergreen/semi-evergreen forest, between 80 and 120masl.

Remarks: This pigeon is evidently widespread, and locally common in the level lowland deciduous dipterocarp, dry deciduous and semi-evergreen forests, becoming noticeably less numerous in the foothills. It has been found commonly in several areas of Cambodia surveyed recently (e.g. Timmins and Ou Ratanak in prep., Goes *et al.* 1998b, Timmins and Men Soriyun 1998), and is evidently considerably less at risk here than in neighbouring Thailand and Lao PDR, where it has undergone substantial declines. It is still locally common in Vietnam (C. R. Robson *in litt.* 1999, Le Xuan Canh *et al.* 1997).

Woolly-necked Stork *Ciconia episcopus***កកកស** Kok kosoar

- Global Range:** Occupies an extensive range spanning two continents, from sub-Saharan Africa to India, throughout SE Asia to Indonesia and the Philippines (Robson 2000).
- Cambodian Range:** Formerly common and widespread (Thomas 1964), it is still relatively widespread in suitable forested/wetland habitats in south-west, central (around parts of the Great Lake and Mekong floodplain) and north-east Cambodia, albeit in relatively small numbers (F. Goes *in litt.* 2000, Timmins and Ou Ratanak in prep., Timmins and Men Soriyun 1998, PD own data).
- Conservation Status:** Critical in Thailand
At Risk in Laos.
In Laos and Vietnam small populations are restricted to the remotest areas, entirely (Laos) or predominantly (Vietnam) those contiguous with north-eastern Cambodia (Duckworth *et al.* 1999, Thewlis *et al.* 1998, J. C. Eames verbally to Timmins 1998).
- Coupe 2a and 3:** One seen by a roadside pool (adjacent to tall semi-evergreen forest at c.320 m) at km170 on several dates during April-May, with two there on one date. One seen flying over semi-evergreen forest by the S2-1 Prek Chhlong bridge on 8th May, and at least two seen occasionally further along the S2-1 (between kms 6 and 10) during April and May. Two flushed from an overgrown section of disused logging track through logged semi-evergreen forest in central Coupe 2a on 13th May. Two flushed from the road (passing through heavily degraded forest with very few large trees remaining and extensive bamboo) at km152 on 14th and 16th May. See also Coupe 5.
- Coupe 4:** Two flushed from a grassy seasonal meadow c. 50 m from stream in the late morning in early May. Surrounding habitat mixed deciduous tending to dry deciduous away from the stream.
- Coupe 5:** Two feeding around a recently filled puddle in a grassy clearing in deciduous dipterocarp forest along the Coupe 5/Coupe 3 boundary c.4 km west of Phum Phnom Krang on 11th May.

Remarks: This species is evidently still widespread in the area, although uncommon. The noticeable bias of records from the period after the rains had started is presumably attributable to an increasing number of suitable feeding sites becoming available, encouraging the birds to wander from the few suitable remnant feeding areas at the end of the dry season. Given the size of the study area, the population is likely to be of some regional significance, particularly (as is likely) if it is contiguous with the regionally significant population in Ratanakiri, Stung Treng and areas of Mondulkiri to the north (Timmins and Men Soriyun 1998). This stork seems to have a lower association with large marshes and lakes than do the other species (e.g. Timmins and Men Soriyun 1998, Mundkur *et al.* 1995), and is more adaptable to forested, hillier terrain.

Golden-crested Myna *Ampeliceps coronatus***សកកកវ្យក, ឧល ឧល** Sarekakeovong k'balleung

- Global Range:** North-east India to south China and through much of continental South-East Asia (Robson 2000).
- Cambodian Range:** Known from a handful of records (recent and historical), from the lower hills of the Elephant and Cardamom Mountains in the south-west (Akers 2000, J.C. Eames *in litt.* 2000), and also parts of Mondulkiri and southern Ratanakiri provinces in the north-east (Timmins and Ou Ratanak in prep., Timmins and Men Soriyun 1998).
- Conservation Status:** Near-threatened in Thailand
Potentially At Risk in Lao PDR
- Coupe 2a and 3:** Relatively common and well distributed throughout the semi-evergreen forest mosaic in this sector, with a day-maximum of at least eight in Coupe 2a. Numerous juveniles seen during late April and May.
- Coupe 4:** Common in dry deciduous and deciduous dipterocarp forest (180-260m) along the O'Por river, with a day-maximum of at least 10.
- Coupe 5:** Not uncommon, with a day-maximum of four, in deciduous dipterocarp and dry deciduous forest along the Coupe 3/Coupe 5 boundary, c.3km south-west of Phum Phnom Krang, and also in deciduous dipterocarp forest a further 5-10 km to the north-west.
- Snoul W.S.:** Common, with a day-maximum of at least 10, particularly around the trapeangs and grassy clearings fringed by evergreen/semi-evergreen forest.

Remarks: This myna appears to thrive in lowland evergreen/deciduous/dipterocarp habitat mosaics, including degraded areas, and often in association with water (e.g. Thewlis *et al.* 1998). It is therefore not surprising that the species is widespread and generally common in the area. In Lao its apparent association with lowland habitats which incorporate dense forest, put it at risk from habitat loss; hunting, and trapping for trade are further potential threats (Thewlis *et al.* 1998). The species has been

affected by habitat loss in Thailand, but remains widespread although nowhere numerous (P. D. Round *in litt.* to Timmins 1998). The species appears also to be widespread and locally common in Vietnam (J. C. Eames verbally to Timmins 1998).

Additional Regionally Sensitive Species

Great Slaty Woodpecker *Mulleripicus pulverulentus*

RtesHF **depH** Trossess thom propess

<i>Global Range:</i>	From northern India east to south-west China and south through South-East Asia to the Greater Sundas (Indonesia) and the western Philippines (Robson 2000).
<i>Cambodian Range:</i>	Relatively widespread where forest with tall trees remains in Cambodia, chiefly in the south-west and north-east (e.g. J.C.Eames <i>in litt.</i> 2000, Goes <i>et al.</i> 1998b, Timmins and Men Soriyun 1998). Thomas (1964) described it as not uncommon in Kompong Thom, Kompong Speu and Siem Reap provinces.
<i>Conservation Status:</i>	Near-threatened in Thailand
<i>Survey area:</i>	Relatively widespread and locally common in Coupes 2a, 3, 4 and Snoul Wildlife Sanctuary, with a day-maximum of at least five birds recorded.

Remarks: In Thailand this large woodpecker is now scarce, although still widespread, predominantly in lowland areas or sub-montane plateaux (in both evergreen and deciduous forests), where it is at risk from habitat loss and hunting (Round 1997, P. D. Round *in litt.* to Timmins 1998). However, it remains common and widespread in Laos, where it occurs in a wide range of habitats, but has not been found especially common in open lowland forests (Duckworth *et al.* 1999, PD own data). In Dak Lak Province, Vietnam, the species is similarly widespread and abundant in lowland deciduous forests (Le Xuan Canh *et al.* 1997). The species is certainly in no immediate danger in Cambodia.

Blossom-headed Parakeet *Psittacula roseate*

eskGat; Sekart

<i>Global Range:</i>	North-east India through Myanmar into south China, continental Thailand and much of Indochina (Robson 2000).
<i>Cambodian Range:</i>	Indicated to have had a relatively widespread distribution, but described as uncommon historically (Thomas 1964), with relatively few recent records.
<i>Conservation Status:</i>	Potentially At Risk in Lao PDR CITES Appendix II
<i>Survey Area:</i>	Only recorded on two occasions, one flock of 10+ in deciduous dipterocarp forest near the O'Por river in Coupe 4 on 30 th April, and a flock of six seen in heavily degraded and disturbed forest adjacent to Samling's km148 logging camp on 6 th May.

Remarks: The scarcest of the three parakeet *Psittacula* species recorded during the survey. It was not considered under elevated threat in Lao PDR by Thewlis *et al.* (1998), but in a later analysis it was re-evaluated to Potentially At Risk in Lao PDR (Duckworth *et al.* 1999). This is because it occupies a narrow altitudinal range (restricted to the lowlands), has undergone a range contraction and has a restricted distribution compared with Grey-headed *P. finschii* and Red-breasted Parakeets *P. alexandri*, and the on-going demand for parakeets as cage-birds (Duckworth *et al.* 1999). Recent surveys in central/northern Mondulkiri and Ratanakiri/Stung Treng provinces have also found the species to be scarcer than Grey-headed *P. finschii* and Red-breasted Parakeets *P. alexandri*, but not as rare as Alexandrine Parakeet *P. eupatria* (Timmins and Men Soriyun 1998, Timmins and Ou Ratanak in prep.). There was some evidence that flocks of birds (chiefly parakeets and green pigeons *Treron* spp.) are trapped at certain mineral licks in the survey area, which they visit in flocks.

Orange-breasted Green Pigeon *Treron bicincta*

kMkRT **Uel Og** Komploktrungleung

<i>Global Range:</i>	Through much of India east to Hainan Island (south China) and south through much of South-East Asia to Java and Bali (Indonesia) (Robson 2000).
<i>Cambodian Range:</i>	There appear to be relatively few records of this species, which is known from parts of south-west and north-east Cambodia, and Angkor Wat in Siem Reap province. Many green pigeon encounters are brief and/or involve birds in flight, hence remain unidentified, which may partly account for the lack of records.
<i>Conservation Status:</i>	Potentially At Risk in Lao PDR

Survey Area: At least five in deciduous dipterocarp forest around Bung Khlaa (260m), near the O'Por river in Coupe 4, and c.20 in secondary evergreen forest fragments at 640masl on the Sen Monorom Plateau in late March.

Remarks: Although these records indicate the species may be local in occurrence in the survey area, many unidentified green pigeons *Treron* sp. were also seen, at least some of which may well have been Orange breasted. It is therefore difficult to draw any firm conclusions about the species status in the survey area. In Laos at least the species appears to be restricted to open forests of the level lowlands with relatively few recent records, and maybe at some risk from habitat loss and hunting (Duckworth *et al.* 1999). It also appears to be associated with the open forests of the level lowlands in Vietnam (J. W. Duckworth *in litt.* to Timmins 1998). In Thailand the species is numerous in only one protected area, with small (probably declining) numbers in deciduous and edge habitats in the north, west, east and peninsula (P.D. Round *in litt.* to Timmins 1998). This appears not to be the case in southern Mondulkiri however, unless it makes some seasonal altitudinal movements (perhaps in response to fruit availability), and it may prove to be common in the area.

Mountain Hawk Eagle *Spizaetus nipalensis*

ShyPM Stoeng phnom

Global Range: Throughout the Indian subcontinent east and north through southern China to Japan, and south through much of continental South-East Asia (Robson 2000).

Cambodian Range: Only known from two provisional field records, both in Bokor National Park in the south-west, and a possible in Phnom Kulen in the north (Goes *et al.* 1998b, Goes 1999d, Akers 2000). Captive individuals in zoos in Sihanoukville in the south-west and Phnom Tamau in Phnom Penh have confirmed the species occurrence in Cambodia (Poole 2000).

Conservation Status: Near-threatened in Thailand

Survey Area: At least one juvenile, and probably a second bird, in logged semi-evergreen forest at 340masl in Coupe 2a on 9th and 10th April, one feeding on a dead Crested Serpent Eagle *Spilornis cheela* on the ground.

Remarks: This is the first confirmed field record for Cambodia, and the first east of the Mekong. It is difficult to derive anything about the species status from these records, more than proving that the species occurs in the area. Its status is rather poorly understood in adjacent regions within its South-East Asian range, although it is thought to be a widespread resident, subject to some local movements (Robson 2000). It is a naturally low-density species across most of its global range, and the survey area covered in this report is unlikely to support a substantial population.

Malayan Night Heron *Gorsachius melanolophus*

Global Range: From parts of India east to southern China and the Philippines, and south through much of South-East Asia into the Greater Sundas and the Sulawesi sub-regions of Indonesia (Robson 2000).

Cambodian Range: Prior to this survey it was only known from an immature bird on sale at the Srei Khlong market south-west of Phnom Penh in December 1998 (Goes 1999a).

Conservation Status: Near-threatened in Thailand

Survey Area: Several heard (always around dusk and/or dawn) at three localities, all in semi-evergreen forest near watercourses between 200 and 370 masl in Coupes 2a and 3, between 26th April and 15th May, and one seen in semi-evergreen forest by the Prek Chhlong camp on 8th May. One heard in gallery forest at c.180 masl, flanking the O'Por River in Coupe 4 on 30th April.

Remarks: These are the first field records of the species in Cambodia. They indicate that it is uncommon to (at best) locally common in the area. However, being a secretive species that only calls around dawn and dusk, it could have gone under-recorded, and may be more widespread. Given the level of territorial calling heard at the sites where the species was recorded, it would appear to be a prospective breeder in the area. Its presence in a market in December, combined with these breeding season records, suggest it may be resident in Cambodia, although its status remains uncertain. It is a resident and/or breeding visitor (during the wet season) in adjacent regions of South-East Asia (Robson 2000).

Black-and-red Broadbill *Cymbirhynchus macrorhynchos*

Global Range: Southern Indochina, south Myanmar and south-central Thailand, through Malaysia to the Greater Sundas, Indonesia (Robson 2000).

Cambodian Range: There are relatively few records of this species, either historically or recently. It was common at Angkor historically, and known from Kratie (Thomas 1964), with recent records from the north-

east (Timmins and Men Soriyun 1998), Bokor in the south-west (Goes *et al.* 1998b), and the Tonle Sap (F. Goes verbally 2000).
Conservation Status: Vulnerable in Thailand
Survey Area: Three in semi-evergreen secondary growth and scattered taller trees fringing the east side of Boeug Boun at 120 masl in Snoul Wildlife Sanctuary on 3rd May.

Remarks: This single record indicates that the species may be uncommon in the area, although a relatively short time only was spent in Snoul Wildlife Sanctuary. In Laos, where it was formerly considered Potentially At Risk (Thewlis *et al.* 1998), it is common in several areas and is evidently tolerant of habitat degradation, as this survey's observation also suggests (Duckworth *et al.* 1999).

White-browed Fantail *Rhipidura aureola*

Global Range: Throughout the Indian subcontinent, east to south-west China and across much of continental South-East Asia.
Cambodian Range: Locally common in parts of Mondulkiri and Ratanakiri in the north-east (Timmins and Ou Ratanak in prep., Timmins and Men Soriyun 1998). Elsewhere known from very few records. Thomas (1964) states it was apparently 'rare' and that the only records were for Stung Treng and Kompong Thom.
Conservation Status: Endangered in Thailand
Survey Area: Two in deciduous dipterocarp forest at c.130 masl, c.10 km north-west Phum Phnom Krang in Coupe 5, on 7th May.

Remarks: This single record suggests the species, a deciduous dipterocarp specialist, is uncommon in the area. This seems somewhat surprising however, given that the quality of much of the deciduous dipterocarp forest encountered during the survey appeared to be good (i.e. relatively undisturbed and not heavily logged), and it is a locally common in deciduous dipterocarp forest elsewhere (e.g. Timmins and Men Soriyun 1998). It is not considered under any elevated threat in Laos, where it is locally common, but also seemingly absent from some substantial areas of deciduous dipterocarp forest (Duckworth *et al.* 1999). In Thailand the much reduced area and quality of lowland deciduous dipterocarp forest is presumably the reason for its treatment as Endangered there.

Hill Myna *Gracula religiosa*

sarkakvvg Sarekakeovong

Global Range: From India east through southern China to the Philippines, and south throughout South-East Asia to the Greater and western Lesser Sundas, Indonesia (Robson 2000).
Cambodian Range: Formerly widespread and common (Thomas 1964). Recent records show that it is still widespread, but is now only locally common
Conservation Status: Near-threatened in Thailand
Survey Area: Widespread and generally common in most habitats in all sectors, including heavily degraded areas, with regular day-maxima of at least ten.

Remarks: Despite its Near-threatened status in Thailand, this popular cage-bird (frequently seen in cages in houses and markets throughout the country) evidently remains common and widespread, both in the survey area and indeed across many parts of Cambodia. The situation is similar in Laos (Duckworth *et al.* 1999), where it also remains common and widespread, although it has evidently undergone local declines. It is under no immediate threat in Cambodia, although its status should perhaps be monitored at regular intervals to document any declines.

Pin-tailed Parrotfinch *Erythrura prasina*

cabc^ogjk,al exov Chap chongkrong k'balkheiv

Global Range: Distributed patchily through Thailand and Indochina south to the Greater Sundas in Indonesia (Robson 2000).
Cambodian Range: Not previously recorded in Cambodia
Conservation Status: Near-threatened in Thailand
Survey Area: One record, a flock of three birds (including one male) flying along a logging track within semi-evergreen forest at c.380 masl in Coupe 2a on 16th May.

Remarks: This is the first record of the species for Cambodia. Although resident in South-East Asia, within this range it is semi-nomadic and prone to irruptive movements in response to food availability, primarily seeding bamboo, one of its

primary food sources (Robson 2000). A substantial proportion of the bamboos in Coupe 2a were seeding during the survey, and presumably these birds' presence in the area is at least partly attributable to this. Thus it may only occur in the area periodically.

Other Records of Significance

The following records constitute interesting/significant additions to the current knowledge of these species' statuses and/or distributions in Cambodia.

Germain's Peacock Pheasant *Polyplectron germaini*

See the *Remarks* section of the Germain's Peacock Pheasant key species account.

Blue-eared Kingfisher *Alcedo meninting*

Two along the Prek Chhlong in Coupe 3, near the end of the km 174 track on 26th April, and at least one along the O'Por river in Coupe 4 on each date between 29th April and 1st May, and in another location along the O'Por river in Coupe 5 on 10th May. These appear to be the first records for north-east Cambodia. The only other records are from Bokor National Park and the Cardamom Mountain foothills, both in the south-west (J.C. Eames *in litt.* 2000, F. Goes *in litt.* 2000).

Black-backed Kingfisher *Ceyx erithacus*

(Oriental Dwarf Kingfisher *Ceyx erithacus* following Inskipp *et al.* 1996, Lekagul and Round 1991).

One along the Prek Prey, a 2-5 m wide stream flanked by logged semi-evergreen forest at c. 80 masl in Snoul Wildlife Sanctuary, on 4th May, and one in secondary semi-evergreen forest at 180 m, away from any running water, on 5th May. Its status in Cambodia remains unclear, the only previous report coming from the Stung Chinnit in Kompong Thom Province in either April or August 1997 (Goes 1999a). It is likely to be either a resident or passage migrant, based on its status in neighbouring regions of South-East Asia (Robson 2000).

Hodgson's Hawk Cuckoo *Hierococcyx fugax*

One heard in logged semi-evergreen forest at c.260 masl in Coupe 2a on 19th March constitutes the first record for Cambodia (Goes 2000c). This species occurs not only as a resident, but also a winter visitor and passage migrant in adjacent regions of South-East Asia (Robson 2000). It is therefore difficult to speculate as to the status of this bird in the survey area based on this one record.

Violet Cuckoo *Chrysococcyx xanthorhynchus*

Three on 17th March and two on 19th March, when very vocal and easily detected, but just one further observation during April and May (on 26th April), all in the semi-evergreen habitat mosaic, between 200 and 380 masl in Coupes 2a and 3. Also one on 29th April in gallery forest flanking the O'Por river (within a predominantly dry deciduous/deciduous dipterocarp forest mosaic) in Coupe 4. These are the first recent records of the species for Cambodia (Goes 2000). It is presumably a resident (subject to some movements) as in adjacent regions within its South-East Asian range (Robson 2000).

[Pompadour Green Pigeon *Treron pompadora*]

See the *Remarks* section of the Pompadour Green Pigeon key species account.

Jerdon's Baza *Aviceda jerdoni*

See the *Remarks* section of the Jerdon's Baza key species account.

Rufous-bellied Eagle *Hieraaetus kienerii*

At least four birds (three adults/near adults and one juvenile) in the semi-evergreen forest mosaic, between 180 and 390masl, in Coupes 2a and 3, first recorded on 19th March, then noted on four dates between late April and mid May. The juvenile was seen on 8th and 10th May. In addition an adult was seen over Pou Chou village, at 480masl on the western edge of the Sen Monorom plateau on 28th April. These are the first records east of the Mekong river in Cambodia, and only the second time the species has been recorded in the wild in the country, following its discovery in a Kampot Zoo in December 1999 (Goes 1999c, 2000b, Akers 2000). It is presumably a resident as in adjacent regions within its South-East Asian range (Robson 2000).

Mountain Hawk Eagle *Spizaetus nipalensis*

See the *Remarks* section of the Mountain Hawk Eagle key species account.

Malayan Night Heron *Gorsachius melanolophus*

See the Remarks section of the Malayan Night Heron key species account.

Blue-rumped Pitta *Pitta soror*

See the Remarks section of the Blue-rumped Pitta key species account.

Blue-and-white Flycatcher *Cyanoptila cyanomelana*

One male in heavily degraded, trackside second growth at c.260masl in Coupe 2a on 16th March. This constitutes the first record for Cambodia (Goes 2000c). It is presumably a passage migrant in Cambodia, as in adjacent regions within its South-East Asian range (Robson 2000).

Blue-throated Flycatcher *Cyornis rubeculoides*

A locally common species in semi-evergreen forest on hill slopes between c.250 and 430masl, including in some patches where the understorey is dominated by bamboo, in Coupes 2a and 3. This is the first time the species has been recorded in Cambodia. All records were of the race *C. R. klossi*, a resident endemic subspecies to southern Indochina (Robson 2000).

Yellow-bellied Warbler *Abroscopus superciliosus*

A locally common species in bamboo within the semi-evergreen forest mosaic between 150 and 320 masl in Coupes 2a and 3. This is the first time the species has been recorded in Cambodia. It is presumably a resident as elsewhere in its South-East Asian range (Robson 2000).

[Black-throated Laughingthrush *Garrulax chinensis*]

Two provisional records, one singing in secondary growth and bamboo adjacent to the Samling Keo Seimar logging camp at 150masl on 15th March, and a brief sighting of one bird which was probably this species in similar habitat at c.170masl by the M-1 road at km150 on 8th May. There appears to be only one other record for Cambodia, near Banlung in Ratanakiri province in April 1996 (Goes 1999b). It is a resident elsewhere in its South-East Asian range (Robson 2000).

Purple-naped Sunbird *Hypogramma hypogrammicum*

Locally common in logged/secondary lowland semi-evergreen forest between 150 and 250masl in Coupes 2a and 3. This is the first time the species has been recorded in Cambodia (Goes 2000c). It is presumably a resident as it is elsewhere in its South-East Asian range (Robson 2000).

Streaked Spiderhunter *Arachnothera magna*

A widespread and locally abundant species in the semi-evergreen forest mosaic of Coupes 2a and 3, recorded down to c.170masl. This is the first time the species has been recorded in Cambodia. It is presumably a resident, as elsewhere in its South-East Asian range (Robson 2000).

Pin-tailed Parrotfinch *Erythrura prasina*

See the Remarks section of the Pin-tailed Parrotfinch key species account.

2.3 Mammals

2.3.1 Survey Description

Survey Aim

- To assess the conservation significance of the survey area for mammals.

Survey Objectives

- To conduct baseline surveys of the mammal communities within the Samling concession.
- To collect detailed information on Key Species especially Tiger and wild cattle.
- To develop the field skills of national counterparts in camera-trapping, data recording and species identification.
- To assess any major threats to the mammal communities and their habitats, particularly Key Species, and where possible provide recommendations for their conservation.

Survey timing and summary itinerary

The survey was conducted in the latter stages of the dry season and witnessed the stuttered onset of the wet season. The advantages to the timing were that grass, often a visually obstructive feature of the habitats in the area (Wharton 1966), was low and that large mammals were more likely to be concentrated near permanent water bodies, making their presence more easy to establish. However, the lack of water was also a limiting factor to the movements of the survey team, especially in the more northern coupes. The onset of the rains, though sometimes making access difficult, was conducive to the track-based surveys as the intensity and frequency of the rain meant that substrate was often moist and receptive to tracks being laid, though did not remove all signs before they could be recorded.

Survey activity was generally at its highest during the first few hours of daylight until late morning and the late afternoon. Additionally, surveys at night were carried out, mainly by car along the main M1 road and the logging tracks of Coupe 2a. Spot-lighting by foot was limited to one surveyor's (JW) incidental work whilst netting for bats.

2.3.2 Methods

As the work aimed to provide experience and training to national staff members as well as gathering baseline data, surveys were broad in nature. General coverage of the representative habitats and areas of reported presence of wildlife populations within the survey area were granted high priority. In order to maximise coverage and reduce logistical demands, survey personnel divided into two teams wherever possible. Two main survey methods were used: Camera-trapping (using CamTrakker units) and foot surveys. Due to the high level of human activity in the area, mainly from resin collectors, the risk of theft was sufficiently high to limit the use of camera-traps. Furthermore, as baseline data was not available for many

Table 2. Summary of mammal survey dates, sectors covered and personnel involved.

Dates (2000)	Survey Sector	Observers
15-18 March	Coupes 2a and 3	JW, MS
18-19 March	Coupes 4	JW, MS
3-8 April	Coupe 2a	JW, KKS, MS, CS, PS
25-26 April	Coupes 2a	JW, KKS, MS, CS, PS
27 April	Coupe 3	JW, PS
27 April	Coupe 2a	KKS, MS, CS,
28-29 April	Coupe 4 (East)	JW, KKS, MS, CS
30 April – 5 May	Coupe 4 (West)	JW, KKS, MS, CS
7-11 May	Coupe 5	JW, KKS, MS, CS
13-14 May	Coupe 5	KKS, CS, PS
13-14 May	Coupe 2a	JW, MS
15-16 May	Coupe 2a and 3	JW, KKS, MS, PS
25-27 May	Coupe 5	KKS, PS

species, cameras were primarily used to confirm the presence or probable absence of some species whose tracks and signs are often ambiguous, such as cats and cattle. To this end, formal transects were not constructed and instead cameras were placed in positions at which they were considered most likely to capture target species. This often meant clustering cameras around mineral licks and paths with tracks of the target species or their prey, after which they were left for a period of approximately four weeks before retrieval (see Appendix II for details).

Foot surveys concentrated on covering as wide an area as possible and on acquiring direct observations. Tracks and signs of mammals were also recorded and, when large cat tracks were encountered, casts were taken. Although interviews with local people and the examination of tracks were also undertaken, their value as an identification tool was limited to only a few species and were generally used as first level indicators of where foot surveys may be most productive for direct sightings. However, tracks were recorded and considered useful in making broad assessments of the relative abundance of some groups of animals such as 'big cats' and 'wild cattle'.

Prior to the work, interviews with Samling staff with experience of working in the concession were held to identify the survey starting points. 1970's 1:50,000 topographic maps of the concession were examined and used on the survey. Additionally Coupe maps and timber-related habitat maps were made available by Samling and were also used to establish the location of surveys.

2.3.3 Results

Key Species Accounts

Sunda Pangolin *Manis javanica*

BRGU Pongrool

<i>Global Range:</i>	Southern Myanmar east across Indochina, south to Borneo and Java.
<i>Cambodian Range:</i>	Widespread and recently recorded from Bokor and Kirirom National Parks (Net Neath <i>et al.</i> 2000, Kong Kim Sreng <i>et al.</i> 2000). The only pangolin species recorded for the country.
<i>Conservation Status:</i>	Globally Near-threatened. CITES Appendix II. At Risk in Lao PDR.
<i>Coupe 5:</i>	A set of clear tracks seen along old logging road (0707410 1361642). Attributed to this species on the basis of there likely being only one pangolin species in the area. If future work should establish <i>M. pentadactyla</i> as present, then this record should be reclassified as <i>Manis</i> sp..

Remarks: Specimens of this species were examined in the Sen Monorom market, reportedly caught from Keo Seimar district. Hunting pressure was identified as the main reason for the local decline. A variety of methods are used to catch this species, including snaring, felling of trees with holes thought to contain animals, hunting with dogs, and incidental collection of animals encountered. A pangolin weighing between 1g and 5kg fetches 100,000 Riel/kg, whereas an individual weighing more than 5kg fetches 80,000 Riel/kg. These prices are higher than in the South-west of the country (Kong Kim Sreng, own data, 2000).

Northern Smooth-tailed Treeshrew *Dendrogale murina*

knkk,al qit Kon thuk k'baal chnowt

<i>Global Range:</i>	Patchy distribution from eastern Thailand, Cambodia, central and southern Lao PDR and Vietnam.
<i>Cambodian Range:</i>	First collected by Mouhot and recorded by Gray (1860b) as <i>Tupaia frenata</i> , though with no specific locality other than 'Cambodia'.
<i>Conservation Status:</i>	CITES Appendix II Little Known in Lao PDR
<i>Coupe 2a</i>	Many direct observations at c.220masl and c.360masl in disturbed semi-evergreen forest in both young and mature bamboo, wild ginger, herbaceous understorey, and fallen trunks and boughs. Usually seen between 0.5 and 2.5 m above the ground. Most often seen individually, but occasionally in pairs
<i>Coupe 4:</i>	Four separate sightings of at least three animals in dense, low bamboo in deciduous/semi-evergreen mosaic at c.320masl in May. At least three individuals heard calling at same locality in late morning.
<i>Coupe 5:</i>	Three individuals in three separate mature tall, stands of bamboo stands along permanent stream in mixed-deciduous forest at c.180masl in late April. The surrounding habitat away from stream tended towards dry deciduous forest with open seasonal meadows and grasslands.

Remarks: Locally very common with a day-maximum of at least 10 individuals; in excess of 20 separate sightings over survey period in the forests bordering Vietnam in Coupe 2a. Although more common in forest with stronger evergreen elements, the species was observed in open mixed deciduous forest with little understorey, being apparently entirely restricted to mature clumps of bamboo.

Twice seen in close proximity to *Tupaia belangeri*. There does not appear to be any lower altitude limit for this species which was recorded between 180 and 360 masl. The observation that the species was 'quite shy and inconspicuous and difficult to see' (Lekagul and McNeely 1977) was not supported by the survey. The species was noticeably less wary of human presence than *T. belangeri* and extended periods of observations at less than 10 m distance were frequently possible. When disturbed, animals would flee through vegetation, never being observed on the ground. At Site 1 calls heard daily. The call was a series of four to nine short, sharp, high-pitched notes. The pitch rose gradually for the first few notes, steadying for approximately the last third of the call. Could possibly be confused with calls of *Tamiops* sp., though higher and more varied pitch. One surveyor (PS) has previously observed the species regularly within Snoul WS and has observed it feeding on ants and butterflies. External characteristics consistent with the descriptions given in Van Peenan *et al.* (1969) and Lekagul and McNeely (1977).

Lorises (*Nycticebus*)**rj |** Rornhee

Recent studies (Alterman and Freed 1997 and Groves 1998) have highlighted confusion over the systematics of loris species in the region. It appears likely that at least three species occur in Lao PDR (Alterman and Freed 1997), thus doubt must remain as to the correct name for any Cambodian forms. For the purposes of this report it seems judicious to retain the existing names for the two most obvious forms, whilst keeping all records provisional until the taxonomic status of Indochinese lorises has been clarified sufficiently.

Nycticebus coucang is here assigned to any large Loris with a distinctive dorsal stripe along approximately half the length of the back, with *N. pygmaeus* being assigned to smaller individuals, lacking any distinct stripe or which ends on the upper back or shoulders area. Pelage coloration is not considered here to be a diagnostic feature.

[Slow Loris *Nycticebus coucang*]**rj Rbeph** Rornhee propes

<i>Global Range:</i>	Bangladesh, east across Myanmar, southern China, Thailand, Indochina and south to Sumatra and Borneo.
<i>Cambodian Range:</i>	Probably widespread.
<i>Conservation Status:</i>	CITES Appendix II. [Little Known in Lao PDR]
<i>Coupe 2a and 3:</i>	Three complete skins drying in Phum Phou Chou village.
<i>Coupe 5:</i>	One captive animal was photographed in mid-March being transported by motorbike along the Coupe 3/Coupe 5 boundary, close to the village of Phum Phnom Krang. The animal had been taken nearby using a catapult and had an injury to its left eye. The captors reported that they were taking it to a nearby market (presumably La Pakhe).

Remarks: Hunters and locals report two lorises, one large and one small, though with no differences in habitat preference. The larger form is reported to be more common and can fetch 7,000 - 10,000 Riel for a single individual. The trade is driven by a belief in the medicinal properties of the skin and bones. Since very little spot-lighting was attempted, it is not surprising that no direct observations were made of this nocturnal species in the wild. Many skins (>15) of the two forms were seen on sale in Sen Monorom at a number of shops.

[Pygmy Loris *Nycticebus pygmaeus*]**rj lPq** Rornhee pleung

<i>Global Range:</i>	Southern China, Vietnam, Lao PDR and Cambodia, though only east of the Mekong (Corbet and Hill, 1992)
<i>Cambodian Range:</i>	Unknown
<i>Conservation Status:</i>	Globally Threatened - Vulnerable. Little Known in Lao PDR. CITES Appendix II
<i>Coupe 2a and 3:</i>	One complete skin drying in Phum Phou Chou village.

Remarks: See **Slow Loris** species account.

Pig-tailed Macaque *Macaca nemestrina***sWktas** Svar traos

<i>Global Range:</i>	From Myanmar, Thailand and Indochina, south through Malay peninsular to Borneo and Sumatra.
<i>Cambodia:</i>	Probably widespread in evergreen forests, but only recently recorded west of the Mekong (Net Neath <i>et al.</i> 2000, Kong Kim Sreng <i>et al.</i> 2000).
<i>Conservation Status:</i>	Globally Threatened - Vulnerable CITES Appendix II Potentially At Risk in Lao PDR
<i>Coupe 2a and 3:</i>	A group of c.20, including juveniles, in semi-evergreen forest by the main road (M-1) at km 168 on 17 th March. At least three individuals walking across the main road (M-1) through semi-

evergreen forest at km 173 on 4th April. One large male observed in tall tree on 26th April near the same site. At least 10, again in semi-evergreen forest flanking the M1, at km 170, on 28th April, in lower storey bamboo by a small pond. At least two in bamboo and secondary growth behind the Samling km 148 camp on 6th May.

Coupe 4: Five individuals including two juveniles were seen on 2^d May in tall trees in evergreen forest (0711065 - 1367872).

Remarks: Observations during the survey support the assertion that this species is generally restricted to evergreen forests and may well be limited to the more southerly Coupes (2a, 3 and 4). Although individuals observed probably represented only a fraction of the total troop size present, numbers were clearly lower than those observed in other parts of the region, especially when compared to the 50-100 in a single group observed in near-adjacent forest in Vietnam (Le Xuan Canh *et al.* 1997).

Long-tailed Macaque *Macaca fascicularis*

SVKpm Svar k'daam

<i>Global Range</i>	From southern South-East Asia, throughout Philippines and Sumatra, Java and Borneo.
<i>Cambodian Range:</i>	Widespread
<i>Conservation Status:</i>	Globally Near-threatened CITES Appendix II Potentially At Risk in Lao PDR
<i>Coupe 2a and 3:</i>	One captive male at Keo Seimar village reportedly came from adjacent forests. A troop of at least six individuals observed over a small pool next to the main road (M-1) at km 152.
<i>Coupe 5:</i>	Seven adults and one juvenile, as part of a larger troop, seen along small river in degraded bamboo forest on 7 th May. One adult male seen along a stream on 10 th May in similar habitat. On the 9 th May, one troop of at least five individuals was seen sleeping in a tall tree in a small patch of semi-evergreen forest in a predominantly mixed deciduous area.
<i>Snoul W.S.:</i>	One group of 5-6 in logged evergreen/semi-evergreen forest adjacent to Trapeang Tuk on 5 th May.

Remarks: This species was always observed in close proximity to waterbodies.

Stump-tailed Macaque *Macaca arctoides*

SVGGt; Svar ongkoot

<i>Global Range</i>	From north-east India, across southern China to northern Malay peninsular.
<i>Cambodian Range:</i>	The species has previously been recorded from west of the Mekong (Pfeffer 1969) though these appear to represent the first confirmed easterly records.
<i>Conservation Status:</i>	Globally Threatened - Vulnerable CITES Appendix II Potentially At Risk in Lao PDR.
<i>Coupe 2a</i>	Five individuals belonging to a larger troop were seen along abandoned logging road on 26 th April and fled along the ground on being disturbed. A troop of 10-15 in semi-evergreen forest at c. 340 masl, along the S-2-1 on 16 th May. This species was photographed by camera-traps on 11 separate occasions (See Appendix II).
<i>Coupe 3:</i>	Two observations of probably one troop numbering at least nine individuals seen in the mid-storey of semi-evergreen forest. Although unlikely, this troop may also be the same one observed in Coupe 2a.
<i>Coupe 4:</i>	Two adults disturbed in semi-evergreen forest at in early May. Both animals left the tree before fleeing along the ground.

Remarks: Hunters report the species being less shy than both *M. nemestrina* and *M. fascicularis* and more easy to hunt, being more boreal and can thus be snared. Sometimes this species is used as bait in Tiger traps. The animals observed were noticeably darker than *M. nemestrina*.

Douc Langur *Pygathrix nemaeus***ស្រក្បាតស្រវង្គស** Svar krovath

<i>Global Range:</i>	Endemic to Indochina
<i>Cambodian Range:</i>	The species has been recorded only east of the Mekong (Pfeffer 1969, Timmins and Men Soriyun 1998) as is the case of Douc Langurs throughout their range.
<i>Conservation Status:</i>	Globally Threatened - Endangered CITES Appendix I At Risk in Lao PDR
<i>Coupe 2a:</i>	Eleven separate sightings of at least four troops between the 4 th April and 16 th May, in various locations between the km 148 camp and the turn-off for S-2-1. Minimum troop size for each observation was: 4, 7, 7 (including juvenile), 9, 6, 7, 9, 2, 2, 4 and 9. Earlier in March two separate troops of four (including juvenile) and 10+ were also observed. One camera-trap photograph was taken of an individual in the early morning during April (see Appendix II)
<i>Coupe 3:</i>	At least eight individuals on 27 th April, one with juvenile feeding in the upper canopy at the base of a hill (0726891 1350943) in semi-evergreen forest.
<i>Coupe 4:</i>	On 2 nd May seven individuals were seen feeding with Black Giant Squirrel in semi-evergreen forest (0711065 1367872) with one juvenile among the group. Later the same day six individuals were seen on a ridge-top c. 5 km from the first site. Five individuals were also seen on 3 rd May at in denser evergreen gallery forest on the O'Reang river. Later at least nine individuals seen on feeding on a hill-top near 1 km from the O'Reang river in semi-evergreen forest (0675725 1339845).
<i>Coupe 5:</i>	At least five adults and one juvenile were seen resting in canopy along the O'Por river, (0707866 1363242) at 09:20 on 8 th May. When one adult became alerted to the human presence, the troop was woken and fled with little sound.
<i>Snoul W.S.:</i>	At least eight in logged semi-evergreen forest flanking the main road (between kms 95 and 110) on 14 th March.

Remarks: Insufficient information is available to confidently establish the existing number of distinct forms of Douc Langurs and their respective taxonomic and geographic limits. Whilst some authors consider there to be a single species containing two (Corbet and Hill 1992, Eudey 1987) or three (Nadler 1997) subspecies, others suggest that the three sub-specific forms may warrant full species recognition (C. Roos in Feiler and Nadler 1997). However, a number of observation of animals that fit none of the described forms (Wirth *et al.* 1991, Lippold 1995, Le Xuan Canh *et al.* 1997, Timmins and Duckworth 1999, Timmins and Ou Ratanak in prep. and the present work) suggest that designating full species at this time may be premature. Indeed, a picture of a dying animal from Virachey National Park taken by Tim Redford clearly details an animal with features of all three described forms. It is therefore important that the features of any Douc Langurs observed in the wild are described in order to assist any future studies on this matter. Most Douc Langurs observed suggesting a closer affinity to the Black-shanked Douc Langur *P. n. nigripes* form.

The Douc Langurs observed during the survey all displayed almost entirely black or dark-grey shanks with a lighter grey forehead and cap. There was some variability in the colour of the back between a near-black and mid-grey colouration. The face lacked the striking blue portions of the mouth and cheeks of *P. n. nigripes* but, when proximity and light were favourable, showed a slight blue hue. Facial hair was short. Arms appeared dark-grey to black with black hands and a pale grey/murky white chest and belly. The camera-trap photograph of the backside of a single individual details the thighs to be black posteriorly, abruptly bordering the white groin and anal area surrounding pale-orange callosities. The grey back and upper arm clearly contrasts with the black upper thighs.

This species seem to be widespread in the survey area, predominantly in the more evergreen Coupes, and appeared to be more abundant than the other primate species. A troop was even observed along the M1 within Snoul Wildlife Sanctuary, close to human habitation. Like the Black Giant Squirrel, with which they were observed twice, the species has a habit of sitting motionless as a method of avoiding detection, even when in the open. When one individual decides to change tactic and flee, the rest of the troop follows immediately, and with far less noise than macaques.

As is the case throughout the species' range, Douc Langurs are a target for hunters above other primate species as their meat is considered a delicacy. The apparent anomaly that they are both hunted heavily and persist near human habitation is likely only to be a result of the influx of people to the area being a very recent phenomenon.

Yellow-cheeked Gibbon *Hylobates Gabriellae*

etacfal el Oŋ Toach t'poal luong

<i>Global Range</i>	Endemic to central and southern Vietnam, southern Laos and Cambodia.
<i>Cambodian Range:</i>	Restricted to forest east of the Mekong river.
<i>Conservation Status:</i>	Globally Threatened – Data Deficient (though listed Vulnerable by the 2000 IUCN Red Data Book) CITES Appendix I Little known in Lao PDR
The following records are for direct observations only:	
<i>Coupe 2a and 3:</i>	One adult couple seen briefly in evergreen forest in Coupe 3 near the M1 on 27 th April. One male observed in trees defining the edge of the logging camp on 6 th May. One male in semi-evergreen forest in Coupe 3 along the km 159 track (south fork) on 16 th May, singing.
<i>Coupe 4:</i>	One adult couple with dark juvenile were observed 1 st May in semi-evergreen/mixed deciduous forest in the early afternoon. When disturbed the adults fled, leaving the juvenile behind, before the female returned for it c. 2 minutes later.
<i>Coupe 5:</i>	Seven individuals in two groups were seen calling aggressively to each other from either bank of the O'Por river (0707866 1363242) on 3 rd May. One group contained one male, one female and two dark juveniles, while the second group contained one male and two females. All animals were preoccupied with the opposing group and were observed for 100 minutes.

Remarks: Singing was heard regularly from the main logging camp and throughout the survey area, including Snoul WS, though never in many numbers. Only in Coupe 5 were more than three separate groups vocalising at one time and numbers in the other Coupes appeared depressed. However, given the limited distribution of this species and its severe decline in Vietnam, the populations of Monduliri province are likely to be of high significance to this species. In Laos, significant populations of this species were recorded in Dong Amphan and Phou Kathong proposed NBCAs (Davidson *et al.* 1997) and Dong Hua Xao and Xe Pian NBCAs (Duckworth *et al.* 1994), though the long-term future of conservation in these areas is uncertain (Davidson *et al.* 1997, Duckworth *et al.* 1994). Recordings of gibbon song were not made as sound equipment was faulty, though recordings should be attempted on any future survey as vocalisation characteristics are considered useful diagnostic features.

Sun Bear *Ursus malayanus*

XOX pŋt Klah k'mom toich

<i>Global Range</i>	Borneo, Sumatra, Malaysia, Indochina, Thailand and tapering westwards across northern Myanmar into extreme eastern India (Assam).
<i>Cambodian Range:</i>	Probably widespread. Recently photographed in Bokor and Virachey National Parks.
<i>Conservation Status:</i>	Globally Threatened - Data Deficient CITES Appendix I At Risk in Lao PDR
<i>Coupe 2a:</i>	Ten separate camera-trap pictures obtained in Coupe 2a, though some of these are likely to represent the same animal. Bear tracks on the main road in late April. Scat containing bees on a branch of an old logging road was examined in semi-evergreen forest on 6 th April (0725800 1350690). On the same day, bear scratches on one tree approximately 2 km east of the previous location. Fresh tracks on the S-2-1 on 8 th May, and fresh scat on S-2-1 on 16 th May.
<i>Coupe 3:</i>	Two trees torn open. Three others with scratch marks, one of them fresh. Fresh tracks crossing the M-1 around km 153 on 17 th March.
<i>Coupe 4:</i>	Old scratch marks on three trees in semi-evergreen forest along ridge-top near O'Reang river.
<i>Coupe 5:</i>	Fresh scratch marks in mixed deciduous forest on ridge top near O'Por river on 10 th May.

Remarks: Bear gall bladders were openly on sale in Sen Monorom market. Adult bears can reportedly fetch \$300 with the gall bladder alone fetching \$100, prices lower than those quoted in Zborovskiy (1999). Hunters report that the species has declined in recent times, though still appear to be in healthy numbers in some areas.

Hog Badger *Arctonyx collaris*

RCkeBan rŋRCkRBŋ Chrouk pown, Chrouk prool

<i>Global Range</i>	Most of central and eastern China, west to Sikkim (eastern India) and south to Sumatra.
<i>Cambodian Range:</i>	Recorded by Wharton (1957) and recently photographed by camera-trap in Bokor National Park (Kong Kim Sreng <i>et al.</i> 2000). Probably restricted to evergreen forests of hills across the country.

<i>Conservation Status:</i>	Little Known in Lao PDR
<i>Coupe 2a:</i>	Three camera-trap photographs in April taken of at least two animals given the timing and proximity of cameras.
<i>Coupe 5:</i>	Tracks in mixed deciduous forest on old logging road were reportedly from this species according to local hunters. A hole in side of hill, clearly still utilised, was also considered by the same hunter to belong to this species.

Remarks: Locals report this species as common throughout the area. The animal is not a target species for hunters as the meat is considered unpalatable, though they are often collected if found, as the fat is used for treating muscle sprains. There is little commercial demand for Hog Badger and animals are rarely sold.

Otter *Lutra/Lutrogale/Aonyx*

eP Pae

<i>Cambodian Range:</i>	See Poole (in prep.)
<i>Conservation Status:</i>	At Risk in Lao PDR
<i>Coupe 4:</i>	A local hunter reported seeing otter frequently near a waterfall (0712146 1364876) in the previous year, though a cursory examination of the area revealed no evidence.
<i>Coupe 5:</i>	The chattering alarm call of otter was heard along the O'Por river near O'Por camp on 9 th May though the substrate of the banks was not suitable to support tracks.

Remarks: Possibly four species occur in the general region. Otters are still reported as living along stretches of the O'Por and possibly the O'Reang rivers. No efforts were made to identify otter reports to specific level.

Large-spotted Civet *Viverra megaspila*

SBacFM Sompoch thom

<i>Global Range:</i>	Myanmar, Thailand, Indochina, southern China and Malay peninsular.
<i>Cambodian Range:</i>	Unknown
<i>Conservation Status:</i>	Potentially At Risk in Lao PDR
<i>Coupe 2a:</i>	One adult photo-trapped picture taken at night. One adult male road-kill was collected from km 150 of the M1 on 26 th April. The skin was removed, dried and deposited at the WCS Cambodia office. Photographs and DNA were deposited with the Paris Museum of Natural History (MNHN).

Remarks: The present survey represents the first confirmed field record of this species for the country. This species is rarely recorded throughout its range and this photograph and skin are important in understanding more about its range and habitat preference. Local hunters appear to recognise one form of large civet that includes both Large-spotted Civet and Large Indian Civet *V. zibetha*.

Binturong *Arctictis binturong*

SBacP **Phn** **Q** **S** **ERbg** Sompoch phnom, Chmooce praeng

<i>Global Range:</i>	Java, Sumatra, Borneo, Malay peninsular, Indochina, Thailand, northern Myanmar and extreme east India.
<i>Cambodian Range:</i>	Recorded from local markets and three local zoos. Recently recorded from Bokor NP (Net Neath 2000) and Phnom Samkos WS (Daltry and Momberg 2000). The recent identification of Binturong in the central Cardamom Mountains by tracks alone (Daltry and Momberg 2000) is unsupported.
<i>Conservation Status:</i>	At Risk in Lao PDR
<i>Coupe 4:</i>	Hair and skin in abandoned hunters camp in gallery forest.

Remarks: Hunters report this species as being very rare in the survey area and only found in the evergreen areas close to Vietnam. Sometimes confused in interviews with Black Giant Squirrel *Ratufa bicolor*. Only two hunters proffered a sufficiently accurate description of the species. It appears that this species is present but rare in the region, especially east of the Mekong (Nettelbeck, 1997, Le Xuan Canh *et al.* 1997).

Leopard Cat *Prionailurus bengalensis***ឡាវ** Chmarr daow

<i>Global Range:</i>	Indian sub-continent across mainland South-East Asia and north through most of central and eastern China to Korean peninsular and Taiwan. Also some islands of the Philippines and Borneo, Sumatra and Java.
<i>Cambodian Range:</i>	Widespread, recorded from the south-west, north-west and east of the country.
<i>Conservation Status:</i>	CITES Appendix II At Risk in Lao PDR
<i>Coupe 2a:</i>	Three camera-trap photographs taken at night in April.

Remarks: Tracks of small cat possibly referring to this species were encountered in all Coupes, though infrequently. This species is relatively common and resilient to habitat disturbance throughout most of its range and is of little conservation concern.

Large cat**[Leopard** *Panthera pardus* **ខាខ័រ** Klah rokun,**Clouded Leopard** *Pardofelis nebulosa* **ខាប័បក** Klah porpork, or**Tiger** *Panthera tigris* **ខាវអ្នកខ័ប** Klah thom, Klah dombong]

<i>Global Range:</i>	Leopard Widespread, covering much of Africa across southern Asia to Indochina and south to Java, though not Sumatra. Clouded Leopard Nepal through southern China, Indochina and south through Malaysia to Sumatra and Borneo Tiger See species account below for Tiger
<i>Cambodian Range:</i>	Leopard Probably widespread. Recorded from the northwest by Wharton (1966) and recently photographed in Virachey National Park (WWF unpublished data). Clouded Leopard Unclear. Skins seen in local market in the south-west (Colin Poole pers comm. 2000) and recently photographed in Virachey National Park (WWF unpublished data). Tiger See species account below for Tiger
<i>Conservation Status:</i>	Globally Threatened – Vulnerable (Clouded Leopard) CITES Appendix I (Leopard, Clouded Leopard and Tiger) At Risk in Lao PDR (Leopard, Clouded Leopard and Tiger)
<i>Coupe 2a and 3:</i>	Large cat tracks (95 – 100 mm in length) seen along resin collector's path in Coupe 3 near km 175. On 27 th April fresh scats of large cat seen on main road at km 166/167 and km 67, the latter containing muntjac hair and bamboo leaves. One large scat containing pig hairs along the km 159 track (south fork) on 15 th May.
<i>Coupe 4:</i>	Tracks (94 mm) of a single individual along path on 30 th April.
<i>Coupe 5:</i>	A single print (85 mm) on muddy bank in mixed deciduous forest on 13 th May. Identified as Leopard by hunter due to the shape of the print.
<i>Snoul W.S.:</i>	One very old, decomposing large cat scat, containing pig hairs, was seen near Bung Boun on 3 ^d May. Local reports suggested that a Tiger was present in the area.

Remarks: All large felid tracks under 100 mm in total length were categorised under 'large cat' due to the on-going lack of field-tested methods for accurately distinguishing species from their tracks. Prints over 100 mm were assigned to Tiger.

An adult Leopard near Phum Pouchar reportedly attacked one villager earlier in the year. The animal was surprised by the victim whilst it was apparently stalking domestic cattle. The species is widely reported from the area and is considered by locals not to have declined in numbers over recent years.

Tiger *Panthera tigris***ខាវអ្នកខ័ប** Klah thom, Klah dombong

<i>Global Range:</i>	Formally widespread, though now confined to isolated pockets from India westwards through South-East Asia and north through China to the Korean peninsular and south to Sumatra.
<i>Cambodian Range:</i>	Until recently, widespread, though status now unclear.
<i>Conservation Status :</i>	Globally Threatened - Endangered At Risk in Lao PDR

	CITES Appendix I
<i>Coupe 2a:</i>	Four photo-trap pictures of at least two individuals on 12 th April, 1 st May, 2 nd May and 8 th May. Individuals were distinguished on the basis of stripe pattern. One individual seen observed beside a logging track (0728046 1354503) on 7 th April at 0945 in semi-evergreen forest. Tracks of this animal were seen along the same path, apparently following Gaur tracks. A strong odour was present just before the animal was sighted, sitting on forest edge c. 20 metres away from the observers. Fresh scat along old logging track contained two pig feet and bone. Further tracks (110 -117 mm), seen in a number of areas close to the where the pictures of Tiger were taken.
<i>Snoul W.S.:</i>	In early May, staff of Snoul Wildlife Sanctuary reported that a tigress with cubs had been seen 'recently' within the protected area, somewhere to the south-west of Bung Boun. Sufficient time was not available to follow these reports up, but the information provided came from sources which had earlier proven to be reliable, and the discovery of large cat scat (see above) suggests that the report may be accurate.

Remarks: Whilst setting the camera traps and during subsequent foot surveys, hunters armed with assault rifles were encountered setting Tiger traps along paths where Tiger tracks were visible. The survey team dismantled two traps and instructed the hunters to remove their traps from the area, which they did. Camera traps subsequently photographed a total of eight people in Coupe 2a carrying either automatic weapons or heavy duty trapping equipment. Samling staff and local authorities confirmed that hunting for Tiger in the area has been underway for approximately two years, with the recent increase being attributed to the development of easy access to the forest and the suitable substrate for tracks that the new roads provide.

On 17th May a single male Tiger was killed using a land mine placed under a carcass of a macaque in Coupe 2a. The carcass was sold to trader in Snoul district and then sent on to Phnom Penh. The hunter is well known, as are all details of the killing. The Tiger was sold by weight and fetched \$3,270. Recent reports from the same area indicate that a second Tiger was killed near the site of the first killing, a few months later (Hunter Weiler *pers comm* 2000).

The use of mines to kill Tigers is widespread in Cambodia and has been known to have been used in both Kirirom and Bokor National Parks. Though the explosion causes damage to the pelt, this is reportedly only limited to the underside of the head and rarely spoils the overall value of the skin, and even in the event of damage, the bones, penis and other parts are reward enough for the hunter.

Asian Elephant *Elephas maximus*

Damrei

<i>Global Range:</i>	Isolated populations throughout the Indian subcontinent, South-East Asia, Sumatra and Borneo.
<i>Cambodian Range:</i>	Formally widespread though status now unclear.
<i>Conservation Status:</i>	Globally Threatened - Endangered CITES Appendix I At Risk in Lao PDR
<i>Coupe 2a and 3:</i>	One adult photographed by camera-trap on 11 th April in Coupe 2a at night, though examination of the area on the 13 th April revealed no track marks. Tracks and dung were seen on logging road (Yeakong) on a ridge-top in evergreen forest 2 km south-west of km 175. At least three individuals were identified by tracks on 27 th April on a ridge-top in bamboo clumps in semi-evergreen forest near km 160. On the same day an elephant was heard calling at 09:45 in mixed deciduous forest 7 km north of the previous site in Coupe 3. One walked along part of the S-2-1 on 15 th /16 th May, evidenced by fresh tracks on 16 th . Tracks, dung and severely damaged vegetation (c. one week old) along the Prek Chhlong on 8 th May; also older signs (dung and damaged vegetation) at the end of the southernmost logging track in Coupe 2a.
<i>Coupe 4:</i>	Fresh evidence of c. 10 animals passing c. 1km east of the O'Por river camp (see Appendix I) on 1 st May, and similar evidence from just north of the O'Por river on 30 th April. Local resin-tappers nearby, reported seeing a substantial group of elephants in the same area the previous day. The chief of Phum Ro Ka Th'mey reported seeing an elephant 34 km from village whilst walking back to the village. He also said that a small group of about four elephants usually come to that area during the wet season. The only domestic Elephant of Phum Pou Kong was killed by poachers for its ivory.
<i>Coupe 5:</i>	No sign of elephant was found during the survey, though many locals claimed that small herds, formally large herds, visit the area in the wet season.

Remarks: Elephants were clearly once common in the survey area and played an important role in the lives of local communities. Their use in hunting expeditions, in timber activities, for transport and their value for trade with Vietnam, have all diminished to such an extent that the knowledge of domestication has been all but lost. Only a few individual elephants remain in ownership and their value has now dropped. Locals can no longer keep bull elephants as they are invariably poached for their ivory, and their commercial use has now diminished due to the introduction of industrial vehicles.

The hunting of elephant now occurs widely in the area and local hunters report that one kg of ivory is sold to traders for \$400, though this figure has not been verified. In early 1999 a young calf was reported to have been found wandering alone near Phum Pouchou and was finally captured by residents near km 182. The elephant was kept for about a year before being traded to the Phnom Tamau Zoo in exchange for a vehicle.

Assessing the population of elephant in the area is impossible without more intensive surveys in both the dry and wet season. However, it is clear that, although the species still exists in small numbers, the overall population has been reduced dramatically over the last few decades.

Sambar *Cervus unicolor*

ក្របីស Prus

<i>Global Range</i>	Indian subcontinent across southern China and South-East Asia south to Sumatra and Borneo and also the Philippines.
<i>Cambodian Range:</i>	Formally probably widespread, status now unclear.
<i>Conservation Status:</i>	Potentially At risk in Lao PDR
<i>Coupe 2a</i>	Four photographs were taken by camera-traps on 14 th , 15 th April and 19 th April. Tracks were often seen along the M-1 road, along the ridge-tops and less frequently everywhere else.
<i>Coupe 3:</i>	Occasional tracks encountered infrequently.
<i>Coupe 4:</i>	Tracks frequently encountered, especially around the edges of grassy glades near water. Fresh tracks of at least four individuals seen along old trail in bamboo forest c. 700 m from the O'Por river. Fresh tracks of up to five animals along the O'Por river near the Camp 1. The antlers of a large buck were found in mixed deciduous forest on 4 th May (0711335 1369016) near O'Reang camp.
<i>Coupe 5:</i>	Two photographs of up to six individuals were taken on 24 th May at a mineral lick. The lick was scattered with many tracks and 4 individuals were observed nearby in bamboo forest and later on a ridge-top.
<i>Snoul W.S.:</i>	A large stag and a doe were watched for two hours, feeding in and around Bung Boun, during the early afternoon of 3 ^d May. Also numerous tracks around the trapeangs in the south-west of the protected area.

Remarks: Sambar appear to be at least still relatively common in some areas and tracks were encountered at varying frequencies throughout the survey area. Reports by hunters suggest that Sambar are more inclined to enter the bamboo forest during the wet season whilst restricting themselves to the evergreen forest in the dry season. The Srer Pleng area appears to maintain a strong population, though whether this is due to the presence of mineral licks which attract animals for short periods from a wider area, is not clear.

The level of hunting this species is intense as the demand for its meat is high. Local members of the army and police often hunt every night to sell to restaurants in Phnom Penh, Vietnam and even locally. A single kg of meat sells for c. 8,000 Riel with the antlers being valued at 35,000 Riel per kg. At the current rate of persecution, this species is likely to decline sharply over the next few years.

[**Large-antlered Muntjac** *Megamuntiacus vuquangensis*]

ក្របីស Chlous yeak

<i>Global Range</i>	Endemic to Laos, Vietnam and probably Cambodia, though east of the Mekong.
<i>Cambodian Range:</i>	See below
<i>Conservation Status:</i>	Discovered too late for inclusion in current Red Data Book (IUCN 1996), though Timmins <i>et al</i> (1998) recommended the species to be listed as Globally Threatened – Vulnerable. CITES Appendix I Potentially At risk in Lao PDR

Remarks: Whilst Red Muntjac *Muntiacus muntjak* were encountered and photographed occasionally, no field evidence was found for the presence of Large-antlered Muntjac. However, four frontlets clearly representing this species were examined in a private house in Sen Monorom, and were reported to come from Mondulkiri province. Whilst it is likely that the species does exist in Cambodia and that it possibly exists in the survey area, its presence remains provisional for both.

Gaur *Bos gaurus*

ខ្សែ Khting

<i>Global Range:</i>	Limited to disjunct populations from the Indian subcontinent, through southern China and South-East Asia to the Malay peninsular.
<i>Cambodian Range:</i>	Probably widespread but status unclear
<i>Conservation Status:</i>	Globally Threatened - Vulnerable At Risk in Lao PDR CITES Appendix I
Coupe 2a and 3:	All local hunters report that Gaur is the only species of wild cattle they have ever observed in Coupes 2a and 3. Eight camera-trap photographs, representing at least four animals, were taken in semi-evergreen forest on various nights. Tracks and dung, probably of this species, were encountered relatively frequently though not in large numbers and most often of individuals only.
Coupe 4:	On 29 th April the head of Phum Ro Ka Th'mey reported one Gaur calf having recently been caught near the O'Por river, though information on the circumstances of the capture and fate of the animal was not forthcoming. A fragment of cattle bone found in the village was reportedly from a shot adult Gaur.
Coupe 5:	A total of five (possibly 6) camera-trap photographs from two mineral licks were taken in May. The high concentration of cattle tracks made counting an impossibility at either lick.

Remarks: Many reports from locals indicate that before 1997, the species was very common in the area, but that the building of the M-1 road facilitated an intensive period of hunting within Coupes 2a and 3 and Snoul WS (where the protected area's deputy director recently filed a report on two hunters who had shot two from a herd of c.15 Gaur in mid April of this year). Gaur were frequently seen crossing the road, even during the day, encouraging people to carry automatic weapons with them on the back of the vehicles in order to shoot any passing animals encountered. Large numbers were reportedly shot and there has been a noticeable decline in sightings and remaining animals are said to be entirely nocturnal.

Banteng *Bos javanicus*

តេនសាង Tonsaong

<i>Global Range:</i>	From Myanmar eastwards through Thailand and Indochina and south to Malay peninsular, Java and Borneo.
<i>Cambodian Range:</i>	Formally probably widespread but current status unclear
<i>Conservation Status:</i>	Globally Threatened - Endangered At Risk in Lao PDR CITES Appendix I
Coupe 5:	Nine (possibly 10) camera-trap photographs were taken at two mineral licks in May. The heads of two freshly killed Banteng (see photographs) were observed outside a hunters house in Keo Seimar village on 5 th May. The animals had apparently been shot at the Srer Pleng mineral lick.

Remarks: Cattle tracks were encountered throughout the survey area and probably represented both Banteng and Gaur in varying proportions. Although there are certain features of some Banteng tracks that differ from those of some Gaur, these are certainly not consistent for most tracks and there is considerable confusion - and therefore doubt - over assigning tracks to species (Simon Hedges *pers comm.* 2000). For the purposes of this survey no cattle tracks were assigned to species.

The species has clearly undergone a dramatic decline in recent years. Locals report that up until 1998, Banteng could be regularly seen coming down to the grassy plains of Srer Pleng in numbers up to 70-80 in the morning. This does not appear to be uncommon in the survey area and it is highly likely that they still persist in significant numbers throughout, though the overall population is unquestionably in decline. The heads of two animals were seen in Keo Seimar village.

Hunting appears to be the only major threat to this species in the area.

Black Giant Squirrel *Ratufa bicolor***ក្បក់ក្បក់** Komprok thom

<i>Global Range</i>	North-east India and Nepal westwards through southern China and South-East Asia, south through Malaysia to Sumatra, Java and Bali.
<i>Cambodian Range:</i>	Probably widespread.
<i>Conservation Status:</i>	Potentially At Risk in Lao PDR CITES Appendix II
<i>Coupe 2a and 3:</i>	Individuals observed regularly though relatively infrequently throughout the coupes. The distinctive call of this species was also heard infrequently.
<i>Coupe 4:</i>	Three separate individuals seen in period of two hours in semi-evergreen forest (0711065 1367872), one feeding with Douc Langurs and another in semi-evergreen forest at c. 450 masl c. four km west of Phum Pouchou.
<i>Coupe 5:</i>	Only observed twice in gallery forest along O'Por river.
<i>Snoul W.S.:</i>	One near Trapeang Vaeng, and one near Trapeang Tuk, both in logged evergreen/semi-evergreen forest, on 4 th and 5 th May respectively.

Remarks: Animals appear to represent the subspecies *R. b. smithii*. This form has a distinct grizzled appearance over the back and flanks.

Other records

These are species for which no direct evidence was found, but which have been reported from the survey area.

[Silvered Langur *Semnopithecus cristatus*]**ស្បែក** Svar pream

<i>Global Range</i>	Disjunct populations from extreme eastern India and Myanmar through southern Indochina and southern Thailand (though not the Isthmus of Kra), western Malay peninsular, Sumatra and Borneo.
<i>Cambodian Range:</i>	The species appears to have a disjunct distribution across the entire country.
<i>Conservation Status:</i>	Globally Near Threatened CITES Appendix II At Risk in Lao PDR

Remarks: This species was not observed during the survey. Confusion surrounds the identification of this species through village and hunter interviews. The name 'Svar' is used to describe macaques as well as Silvered and Douc Langurs and often the description of a long-tailed 'Svar' can refer to both *Macaca fascicularis* and *S. cristatus* (the long tail of the Douc Langur is apparently not a feature that is used in describing the species). A further impediment to confident reporting comes from the similar association of both species to watercourses. In two instances reports of 'Svar Pream' have turned out to refer to *M. fascicularis*, even when the latter has been supposedly separated as a different form in interviews.

While it is possible that the species was present but overlooked in the survey area, the frequency of observations of all other primates, some of which are likely to be under higher hunting pressure, suggest that in fact the species does not inhabit the area.

[Asiatic Jackal *Canis aureus*]**ឡាក់** Chkai chor chork

<i>Global Range</i>	Widespread from eastern Africa, through south-east Europe, the Indian subcontinent, Sri Lanka and through Myanmar, Thailand and Indochina.
<i>Cambodian Range:</i>	Probably widespread. Previously recorded by Desai and Lic Vuthy (1996) from Monduliri. Has been observed by MS in Stung Treng province and recently observed by JW in Kompong Thom province, both located west of the Mekong.
<i>Conservation Status:</i>	Little Known in Lao PDR
<i>Coupe 5:</i>	Small canid tracks were observed and photographed on a number of occasions during the survey, though the presence of domestic dogs in the area, prevents confirming the identification of this species with confidence.

Remarks: No direct evidence of this species was found during the survey. However, convincing reports of two forms of 'wild dog' probably referring to this species and Dhole *Cuon alpinus* were given in Phum Ro Ka Thmey in Coupe 4. Locals report it still to be present, though in reduced numbers, in the drier forests to the east and north of the village. Records of Asiatic Jackal from Mondulkiri and from adjacent areas in Ratanakiri and Vietnam are detailed in Duckworth *et al.* (1998).

[Dhole *Cuon alpinus*]

EqāRB Chkai prey

<i>Global Range:</i>	India, east across southern China, Myanmar, Thailand, Indochina, Malaysia, Sumatra and Java.
<i>Cambodian Range:</i>	Unclear, though recently photographed in Virachey National Park (WWF unpublished data)
<i>Conservation Status:</i>	Globally Threatened - Vulnerable CITES Appendix II At Risk in Lao PDR
<i>Coupe 4:</i>	One Sambar carcass near O'Por river in mixed deciduous forest was reported to have been killed by a pack of Dhole often seen in the area by resin collectors.

Remarks: No direct evidence of this species was found during the survey. However, a number of detailed reports make the presence of this species highly likely, especially along the O'Por river where a variety of sources report seeing groups of up to seven individuals. Local resin collectors report that Dhole is more commonly encountered than Asiatic Jackal in the area.

[Asiatic Black Bear *Ursus thibetanus*]

xoXpM Klah k'mom thom

<i>Global Range:</i>	Afghanistan and Pakistan, across the Himalayas through Myanmar, Thailand, Indochina and southern China and northwards to eastern Russia and Japan.
<i>Cambodian Range:</i>	No field record for this species has been traced though it is reported from many areas including Bokor National Park. Specimens held in zoos in Kampot and near Phnom Penh are reportedly from Cambodia.
<i>Conservation Status:</i>	Globally Threatened - Vulnerable CITES Appendix I At Risk in Lao PDR

Remarks: No firm evidence was found for the presence of this species in the area, and though occasional reports of this species were gathered, accounts were equivocal. Records of scratch marks and tracks are provisionally assigned to *U. malayanus*, on the basis of its presence having been confirmed for the area and the confusion over there being another species present.

A recent survey for bears in Mondulkiri discusses the presence of both *U. thibetanus* and *U. malayanus* from the area (Zborovskiy 1999). However, it appears from the data that only one of the seven signs recorded for bear was assigned to a species, and the criteria for how this scratch mark was assigned is not explained. The basis for the presence of *U. thibetanus* was apparently local reports.

[Asian Golden Cat *Catopuma temminckii*]

xoel Oymas Klah loeung meas

<i>Global Range:</i>	Nepal through Myanmar, southern China, Thailand, Indochina, Malay peninsular and Sumatra.
<i>Cambodian Range:</i>	Prior to this year, only recorded from a local market in the south-west (Colin Poole pers comm. 2000). Recently photographed in Virachey (WWF unpublished data) and Bokor National Parks (Net Neath <i>et al.</i> 2000).
<i>Conservation Status:</i>	Globally Near-threatened CITES Appendix I Little Known in Lao PDR
<i>Coupe 5:</i>	One hunter reported seeing an individual eating a muntjac carcass in near the Srer Pleng camp location in 1999.

Remarks: Hunters report this species to be relatively rare in the area, though descriptions were specific enough for presence to be considered provisional.

Species of significance not encountered on the survey

No evidence was found for the continued presence of Kouprey *Bos sauveli* or Wild Water Buffalo *Bubalus arnee* in the survey area, though reports indicate that at least Kouprey was still found throughout the northern coupes up until the 1960's. Whilst both species could have contributed to some of the track and dung sign of wild cattle encountered on the survey, no evidence was suggestive of this. However, occasional reports continue to surface of resin collectors seeing Kouprey, and though undoubtedly many of these are in error, the possibility of Kouprey persisting in low numbers cannot be discounted.

The survey did not bring any clarity to the continued cryptic status of Khting Vor *Pseudonovibos spiralis*. Although this species may have at least historically existed, gathering and discerning credible information on its current or recent status is almost impossible given its concurrent standing in the folklore and legends of hunters and rural communities. At least some hunters did proffer information consistent with other reports gathered in other parts of the country by the survey team, though much of the consistency lies in the vagueness. There seems little value in recounting hunter accounts here, except to note that those hunters that reported to know Khting Vor, consider that it no longer persists in the area.

If Hog Deer *Axis porcinus* or Eld's Deer *Cervus eldii* occur in the survey area, they undoubtedly do so in small and isolated numbers. As with wild cattle, it is possible that track and dung sign could easily be confused with other species, though recognition of Eld's Deer amongst hunters was high and by all accounts all sizeable populations have been eradicated. Survey team confidence in the ability of hunters to distinguish Hog Deer was low, so statements on the status of this species are entirely speculative. The lack of evidence for some Key Species is likely to be purely attributable to the level of survey effort. Further camera-trapping, night-spotting and foot surveys would be likely to confirm the presence of these species, but there is little value in speculating about these possibilities.

PART III. DISCUSSION

3.1 International and regional significance of the area

The Samling concession and Snoul WS cover an area which can be considered an excellent example of a southern Indochinese lowland habitat mosaic, incorporating extensive areas of deciduous dipterocarp and evergreen or semi-evergreen forest, lowland streams and rivers, and grassy clearings, some with seasonal and permanent pools. It should be remembered that the survey area is also adjacent to the forests of Phnom Prich WS to the north and that for some species and habitats this area is likely to be of similar significance and should be considered as a single, large contiguous block of natural habitat of various types. For a more complete understanding of this area, the findings and discussions within Timmins and Ou Ratanak (in prep.) should also be considered in conjunction with this report.

3.1.1 Significance for Birds

The survey area supports important populations of a number of regionally and Globally Threatened species. Most important among these is probably the Green Peafowl population, which is potentially one of the largest single populations of this rapidly declining species remaining anywhere in the world (as suggested by McGowan *et al.* 1998). Whilst this has yet to be confirmed, the very possibility makes an extensive Green Peafowl survey of the highest priority. The healthy population of Germain's Peacock Pheasant is also likely to be of global significance, and certainly the most important known population of the species in Cambodia.

Overall, the diversity of the bird community is high, and certainly comparable with many other areas of lowland southern Indochina in terms of the variety of Key Species it supports. The large swathe of lowland forested habitats within the survey area is contiguous with even more substantial tracts of similar habitat in central-northern Monduliri and Ratanakiri provinces to the north (Timmins and Ou Ratanak in prep., Timmins and Men Soriyun 1998), extending into Dak Lak province, Vietnam (Le Xuan Canh *et al.* 1997). Based on current knowledge, these areas support the most important (perhaps the only) remaining viable populations of Giant and White-shouldered Ibises and three vulture species (Red-headed, White-rumped and Long-billed) in South-East Asia, and perhaps also Woolly-necked Stork (Timmins and Ou Ratanak in prep., Timmins and Men Soriyun 1998, Le Xuan Canh *et al.* 1997). It is also an important area for Lesser Adjutant, although the population around the Tonle Sap is larger and of greater international significance (Goes *et al.* 1998a, Parr *et al.* 1996, Mundkur *et al.* 1995).

The Evergreen/Semi-evergreen forest mosaic

The evergreen and semi-evergreen bird fauna in the survey area (chiefly restricted to Coupes 2a, 3 and Snoul WS, but found patchily elsewhere) is diverse and certainly representative of species-rich bird communities of

lowland evergreen/semi-evergreen forest elsewhere in Indochina. It unsurprisingly lacks some species typical of the wetter evergreen forests found further north along the Annamite mountain chain, e.g. Ratchet-tailed Treepie *Tennurus tenuis*, although this species has now been recorded just to the north-east of the survey area (Timmins and Ou Ratanak in prep.), and could therefore occur locally within the Samling concession. Furthermore, despite adjoining the mid-altitude Sen Monorom/Phnom Nam Lyr Plateau (which rises to at least 950 m), very few representatives of hill or lower montane bird communities were found in the higher hills (up to 500 m) of the Samling concession itself. One of the few exceptions to this is Streaked Spiderhunter. More time spent at higher elevations (500-650 m) would probably reveal a few more. However, the area remains dominated by a typically lowland/foothill bird community.

A number of regional endemics/near-endemics (some of which are considered Globally Threatened/Near-threatened) are represented, most of which are common or at least locally common in the survey area, and all of which are either exclusively evergreen/semi-evergreen forest species, or at least occur at their highest densities in evergreen and semi-evergreen formations. These include Germain's Peacock Pheasant, Siamese Fireback (which also frequents deciduous forest habitats elsewhere), Red-vented Barbet *Megalaima lagrandieri*, Bar-bellied and Blue-rumped Pittas, Grey-faced Tit Babbler and Black-browed Fulvetta *Alcippe grotei*. Amongst the suite of more widespread species that appear to be restricted to these evergreen/semi-evergreen forest tracts (within the survey area) are Scaly-breasted Partridge *Arborophila chloropus*, Black-and-buff Woodpecker *Meiglyptes jugularis*, Red-headed Trogon *Harpactes erythrocephalus*, Jerdon's Baza, Rufous-bellied Eagle, Black-and-red Broadbill, Blue-throated Flycatcher, Puff-throated Bulbul *Alophoixus pallidus*, Buff-breasted Babbler *Pellorneum tickelli*, Scaly-crowned Babbler *Malacopteron cinereum* and Purple-throated Sunbird *Nectarinia sperata*. At least some of these species also occur in forests with a dominant deciduous character, and some in heavily human-modified habitats, elsewhere in the region (Robson 2000), and it may be that the presence of certain habitat features (e.g. proximity to permanent water), rather than forest type *per se* may be more important for some species, e.g. Black-and-red Broadbill (Round 1998).

The evergreen/semi-evergreen forest mosaic of Snoul Wildlife Sanctuary and Coupes 2a and 3 of the Samling logging concession is a very large (possibly totalling over 1,000 km²), contiguous swathe of these forest types, and as such is of considerable regional importance to the avifauna it supports, in particular wide-ranging species like hornbills and raptors. When viewed from the 'S-3' logging road in Coupe 2a, these unbroken (but logged) forested hills extend south and east across the O'Houch river (which forms the Cambodian-Vietnamese border along much of its length) into Vietnam, certainly covering the first three ridges (c. 5 km) visible in Vietnam, where no evidence of human settlement could be discerned from the Cambodian side. This indicates the tract of evergreen forest is even more extensive, and efforts should be made to investigate the area on the Vietnamese side of the border if at all possible.

Other typically evergreen forest species which might be expected to occur, but were not found during this survey, include Bar-backed Partridge *Arborophila brunneopectus*, which has also been recorded recently just to the

north-east of the survey area (Timmins and Ou Ratanak in prep.), Coral-billed Ground Cuckoo *Carpococcyx renauldi*, Javan Frogmouth *Batrachostomus javensis*, Yellow-vented Green Pigeon *Treron seimundi*, Indochinese Green Magpie *Cissa hypoleuca* and Ratchet-tailed Treepie *Temnurus temnurus* (see above). In addition, it is also conceivable that Orange-necked Partridge *Arborophila davidi*, currently known only from a small area centred on Cat Tien National Park and Cat Loc Nature Reserve in central Cochinchina, Vietnam, could also occur in the area. This Endangered partridge occurs in a range of hills in Vietnam that extend north-west into the southern part of Keo Seimar district within the Samling concession, and future observers in the area should be aware of this. White-winged Duck *Cairina scutulata* could possibly occur too, along the least disturbed stretches of permanent watercourses, although no local people questioned recognised descriptions or illustrations of the species.

The semi-evergreen/deciduous dipterocarp forest mosaic

The semi-evergreen/deciduous dipterocarp forest mosaic (chiefly confined to Coupes 4 and 5 of the areas visited) was considerably less diverse than the evergreen forest mosaic in the survey area. When compared with the species diversity of areas of similar habitat elsewhere in the plains of Cambodia, adjacent Dak Lak province in Vietnam and southern Laos, it is also more depauperate (e.g. Le Xuan Canh *et al.* 1997, Round 1998, Timmins and Men Soriyun 1998). This is at least partly attributable to considerably less time being spent in these habitats than in evergreen forest. Also, few tracts of deciduous forest were found with numerous large mature trees and a distinctly layered canopy and middle-storey, to offer more foraging niches than lower stature formations. Instead, there were substantial tracts of dry deciduous forest with bamboo-dominated understoreys that were particularly poor in terms of species' density and diversity. However, it was somewhat surprising to find low densities and low diversities of birds in the mosaic of apparently mature, relatively undisturbed deciduous dipterocarp forest with a more shrub, herb and grass-dominated understorey.

Species characteristic of the lowland deciduous dipterocarp forests of southern Indochina that were found in significant numbers included Chinese Francolin *Francolinus pintadeanus*, Black-headed Woodpecker *Picus erythropygius*, Lineated Barbet *Megalaima lineata*, Indian Roller *Coracias benghalensis*, Green Bee-eater *Merops orientalis*, Crested Treeswift *Hemiprocne coronata*, Green Imperial Pigeon *Ducula aenea*, Golden-fronted Leafbird *Chloropsis aurifrons*, Red-billed Blue Magpie *Urocissa erythrorhyncha*, Rufous Treepie *Dendrocitta vagabunda*, Black-hooded Oriole *Oriolus xanthornus*, Large Cuckooshrike *Coracina macei*, Common Woodshrike *Tephrodornis pondicerianus*, Black-collared Starling *Sturnus nigricollis*, Sooty-headed Bulbul *Pycnonotus aurigaster* and Purple Sunbird *Nectarinia aspasia*. Species also characteristic of the habitat that were seemingly uncommon or rare in the survey area, but are found more commonly in the same habitat in other areas, e.g. central-northern Monduliri and southern Ratanakiri and extreme south-western Laos (Timmins and Ou Ratanak in prep., Timmins and Men Soriyun 1998, Round 1998) include Blossom-headed Parakeet, Small Minivet *Pericrocotus cinnamomeus*, White-browed Fantail and Brown Prinia *Prinia polychroa*.

A suite of species of regional/global conservation concern which are only found in these habitats in lowland Indochina that were not recorded during this survey, but could reasonably be expected to occur, include Yellow-crowned *Dendrocopos mahrattensis* and Rufous-bellied Woodpeckers *Dendrocopos hyperythrus*, Alexandrine Parakeet *Psittacula eupatria*, Yellow-footed Green Pigeon *Tieron phoenicoptera*, Rufous-winged Buzzard *Butastur liventer* and White-rumped Falcon *Polihierax insignis*. These were all found, some commonly, by the two surveys further to the north (Timmins and Ou Ratanak in prep., Timmins and Men Soriyun 1998). More extensive searching of the more northern and western parts of the Samling concession in Mondulkiri and eastern Kratie provinces would probably reveal at least some of these species.

Grassy clearings and seasonal meadows

The diversity of both the dry deciduous/deciduous dipterocarp mosaic in Coupes 4 and 5 and the evergreen forests of Snoul Wildlife Sanctuary is further augmented by the presence of large grassy/herbaceous clearings with seasonal or permanent pools, which attract waterbirds such as Lesser Whistling-duck *Dendrocygna javanica*, Bronze-winged Jacana *Metopidius indicus* and Red-wattled Lapwing *Vanellus indicus*. This phenomenon has been noted elsewhere (e.g. Round 1998, Timmins and Men Soriyun 1998), where these habitats are of great importance. Within the current survey area they form important feeding areas for species such as Lesser Adjutant and Grey-headed Fish Eagle, and potentially (based on findings elsewhere) Giant and White-shouldered Ibises and Sarus Crane. With this in mind, a comprehensive inventory of all of these clearings and *Bungs* should be a high priority given the apparent suitability of some of those visited during this survey to these species.

Sen Monorom Plateau

Much of this mid-altitude plateau has been heavily degraded, with just a few patches of evergreen forest remaining. It is probably of no great importance to many species, although it does support a distinctly different avifauna from the lowland areas, comprising a number of higher altitude species characteristic of montane habitats in the higher parts of the Annamite mountains (Duckworth and Hedges 1998b). However, it is of potential importance for Pale-capped Pigeon *Columba punicea*, classified as Vulnerable (BirdLife International in prep. a and b), for which there is a provisional record from this area (F. Goes *in litt.* 2000). Future surveys should aim to search the plateau more comprehensively for this species.

3.1.2 Significance for Mammals

When discussing the areas significance for mammals it should be noted that the focus centred mainly on large mammals of high conservation significance and that measures of overall diversity or species numbers means very little in this context. Unlike birds, field surveys for mammals rarely record a very high percentage of the total number of species present in an area, but that since a disproportionately large percentage of large mammals are Globally Threatened, surveys focussing on these groups are often more crucial to identifying the conservation significance of an area. Large mammals generally are also less habitat sensitive than birds, thus a division of the significance of the mammal community of each habitat type is not

necessary and is better discussed under species or species groups where relevant.

Whilst further surveys of similar nature to the present work are required to fully understand the significance of the area for mammals, populations of some regional endemic/near-endemic species were located which highlight the Samling concession as an area of high importance for large mammal conservation in Asia. For primates the area probably maintains the largest and most important population of Yellow-cheeked Gibbon in the world. Similarly, though the taxonomic position of the resident Douc Langur is not clear (see *Species Accounts*), the survey area and adjacent forests to the north probably maintain a population and associated habitat, second only in size to that of the Nam Theun basin and surrounding area in Laos PDR (Timmins and Duckworth 1999). The limited range of both the southerly form of Douc Langur and the Yellow-cheeked Gibbon, combined with their rapid demise in Vietnam and Laos, suggests that the survey area and adjacent forests are critical to the survival of the species. Unlike the results of similar surveys in the species' range (Timmins and Men Soriyun 1998, Le Xuan Canh *et al.* 1997, Desai and Lik Vuthy 1997) Douc Langur and Yellow-cheeked Gibbon were observed or heard both over a wide area, and frequently enough to suggest that populations are at least viable in the long-term if hunting were controlled. Furthermore, the presence of a total of eight primate species in the area, five of which are Globally Threatened or Near-Threatened and one of which undoubtedly should be (Yellow-cheeked Gibbon is currently considered Data Deficient) underlines the areas importance for primates on both a regional and international basis.

The photograph and specimen of Large-spotted Civet represent the first field record of this species for Cambodia and throughout its range this species is rarely recorded. There seems no reason to suggest that Large Indian Civet *Viverra zibetha* and Small Indian Civet *Viverricula indica* do not occur, and the lack of evidence of these terrestrial carnivores is likely only to be a reflection of the limited nocturnal survey effort and the relatively short number of camera trap hours accumulated. The other small carnivore records of note are Hog Badger and Binturong, neither of which are commonly recorded throughout their range, with Binturong being especially rare east of the Mekong river (Will Duckworth pers. comm.). This species is known to inhabit little-disturbed areas of evergreen forest and thus it is likely that the population within the Samling concession is small and not of high significance.

The presence of Tigers in the survey area is of the highest conservation significance as populations throughout Indochina have either been reduced or entirely extirpated (Duckworth and Hedges 1998a). Most evidence of Tiger came from the semi-evergreen forest of Coupes 2a and 3, though this does not indicate an absence of Tiger from the other areas but reflects the overall survey effort. Clearly a lot more survey effort over a much wider area using more formal survey methods is needed before a qualified judgement can be made as to the importance of the area for Tiger conservation. However, it is clear that hunting may have already, and certainly currently is, changing the status of Tiger for the worse.

Heng Kim Chhay *et al.* (1998) highlighted the Keo Seimar district as a possibly important area for Tigers based on interviews with hunters, thus

indicating that more than two years ago, Tiger hunting was being undertaken. Whether or not the Tigers photographed were the Tigers poached is immaterial. More significantly the survey has shown that:

- The intensity of hunting is extremely high
- The methods of hunting are increasingly sophisticated though indiscriminate (i.e. mines, booby traps and snares set for Tigers are responsible for the deaths of individuals of many other species)
- Awareness of the international trade value of Tigers and their parts probably covers all of even the most remote rural areas of the country. Local people who are unaware of the international value of Tigers would be unlikely to attain a \$3,000 payment for a carcass.
- The communication and transportation network for wildlife trade is almost totally unrestricted and stretches to the remotest of areas.

The idea that current Tiger hunting practises are in any way a traditional method of income for local communities is a fallacy. Hunting for Tiger is clearly a highly commercial venture and plays little role in sustaining livelihoods of local communities, rather it is individuals that profit greatly from killing a Tiger, as do the subsequent middlemen and those involved in the national and international of their parts. Often it is the same people profiting from Tigers hunted from a wide area, with little or no benefit being garnered by the local community. Traditionally, local people only killed Tigers opportunistically or in the rare instances when they threatened livestock or the community themselves, as hunting Tigers was considered unnecessarily dangerous when more common species provided the required meat and subsidiary products. Now professional hunters move between provinces and even cross international borders targetting remaining populations.

The ability of this network of local, national and international profiteers to harvest Tigers from large areas is threatening to effectively extirpate the species from Cambodia before the next decade. The topographically uniform nature of much of the country is highly conducive to hunting and offers none of the protection of other natural sanctuaries of the region such as the Annamite Mountains. Only extensive and intensive protection measures with limited human access and local support is likely to be effective in conserving viable populations.

The photo-trap pictures of Tiger represent the first photographs of the species in the wild in Cambodia.

Although there is no direct evidence, interviews suggest strongly that Leopards are still widespread within the survey area, and given the extent of suitable habitat and the relative abundance of prey, this is entirely plausible. The recent sighting of Jungle Cat just north of the survey area (Timmins and Ou Ratanak in prep.) also suggests its possible presence within the Samling concession, a fact that would significantly increase the importance of the area, given the paucity of records of this species from the region. Overall, assessing the importance of the area for felids is constrained both by the lack of available data and the rate at which the some species, notably Tiger,

are being extirpated. However, some conditions which are essential for the long-term conservation of Tiger and other large cats, exist in the survey area:

- Extensive areas of various habitat types
- Unrestricted access to some permanent and seasonal watercourses
- A wide range and sufficient numbers of prey

These features are more important to Tiger conservation than, say, specific habitat types or quality, or even human presence; more important is the extent of available habitat and the level of hunting of the species and its prey base. A number of protected areas on the Indian subcontinent maintain high densities of Tigers and their prey in degraded forest areas with intensive human presence, purely on the basis of limited hunting and sufficient prey base (Karanth and Nichols 1998).

What can be drawn from the survey is that the area provides excellent conditions for sustaining high densities of suitable prey base for Tiger (see below). If hunting can be controlled, there is no reason to think that the present ungulate communities will not return to levels at which Tigers can survive, if they are not already at sufficient levels. The question as to whether there are sufficient Tiger numbers remaining in the area to recover is still not answerable and will require further, more extensive, camera-trap surveys and surveys to do so. As important will be further surveys of the ungulate community, especially the wild cattle.

As with the large cats, the significance of the survey for wild cattle is difficult to assess accurately. The present survey has confirmed the following:

- Both Banteng and Gaur inhabit the survey area;
- Wild cattle sign are distributed at varying densities across most of the survey area;
- No evidence was found to indicate that domestic or feral cattle inhabit areas beyond the immediate confines of villages;
- Both Banteng and Gaur are hunted regularly and the population is reportedly declining;
- No evidence was found for the presence of Wild Water Buffalo, Khting Vor or Kouprey within the survey area.

It is not possible to make an estimate of the population size Banteng and Gaur at this stage, though indeed any figure would have little value. However, merely from the numbers of animals photographed, the area is likely to be of extremely high regional significance to both species, according to the criteria of Duckworth *et al.* (1999). The conditions surveyed in the area appear to be close to optimal. In Coupe 5, extensive grassy, seasonally burnt grasslands run along the base of c. 10 km of low-lying hills (c. 200 masl) cloaked in semi-evergreen forest. Beyond these hills, and

flanking the grasslands, lie a rich and complex mosaic of habitats including forests of semi-evergreen/deciduous dipterocarp to pure-stand Lagerstroemia to more varied mixed deciduous to small pockets of semi-evergreen. Along the hills, four major mineral licks were located, which are regularly used by all the ungulate species so far recorded in the area. To the north of the hills lies the permanent O'Por river and beyond that the forest becomes more evergreen in nature, though consistently maintaining some deciduous elements. If "the greatest ungulate biomass...is reached in areas where grasslands and forests form a mosaic and the interdigitation of many different vegetation types supports a rich ungulate community" (Eisenberg and Seidensticker 1976; Karanth and Sunquist 1992), then the Srer Pleng area of Coupe 5 and adjacent areas can be considered optimal for ungulates and therefore for Tiger. The extent to which this habitat extends is not known, but it is likely to be uninterrupted for large distances, at least northwards towards the Phnom Prich WS.

Other positive features of the area include the low number of human settlements in the area which allow for easy monitoring of what little domestic cattle there are (it seems unlikely that feral cattle exist in the area and certainly local reports support this), and of community hunting patterns. The reported absence of Wild Water Buffalo, Khting Vor and Kouprey is not surprising, though the presence of the latter species should not be entirely ruled out given its known habit of mixing with Banteng herds. Since Banteng still persists in probably significant numbers throughout the survey area and other parts of Mondulkiri (Timmins and Ou Ratanak in prep.) there is still the possibility that Kouprey individuals still persist. Given the extreme doubt that must accompany claims to be able to distinguish Kouprey tracks or dung from other cattle, camera-trapping appears the only pragmatic approach to confirming this.

3.2 Threats

3.2.1 Commercial Logging

Evidence of commercial logging was found in all evergreen/semi-evergreen forest areas visited, and in some of the deciduous formations too. Much of the logging appears to have been selective, with chiefly trees of high value being the targeted, though in places some near-clearfelling has occurred (e.g. in close proximity to the km 148 camp). Much of the forest, although superficially appearing relatively intact, is in fact quite heavily degraded with relatively few mature large trees, a very broken canopy, with encroachment by secondary growth and bamboo prevalent in many areas.

Parts of Snoul WS have perhaps been the most seriously affected. The whole area was apparently extensively logged by the Vietnamese during the early 1980s, though there is considerable evidence which points to the Cambodian Army and Police having also been involved in logging in Snoul WS after the Vietnamese withdrawal. The Samling company has, under the concession agreement, selectively logged Coupe 2a, though logging had been suspended for almost a year and, at the time of survey, a substantial fleet of bulldozers and other machinery lay dormant at the km 148 camp. Agreements with the DFW have apparently progressed to the extent that

Samling will selectively log Coupe 3 during the 2000/2001 dry season, though much of this area appears to have already been logged to some extent, with the exception of areas around km 174.

The threats from logging within the survey area do not just come from the legal practices of the concessionaires. Unquestionably, the fact that clear-cutting is not widespread throughout the survey area is due to the presence of a concessionaire which monitors and protects its forests. The quasi-illegal industrial logging by the Cambodian armed forces and the police (and to a far lesser extent local communities) throughout Cambodia has, until recently, been entirely unregulated. Even National Parks (e.g. Bokor) and Wildlife Sanctuaries (e.g. Snoul) have been targeted (Global Witness 2000), as no protection facilities or legal infrastructure were in place to prevent it. With no regulatory authority or experience in commercial logging, these groups have clear-cut large areas of forest, resulting in the collapse of local ecosystems. Whilst the halting of all commercial logging would undoubtedly be a positive act for wildlife, it would only be so if suitable controls were in place to sustainably manage the former concessions. The reality in some areas of Cambodia is that lawful selective logging by concessionaires with adequate controls on access and hunting (see Recommendations) is a far better scenario for wildlife conservation than the removal of that concession without the legal and financial means by which the area can be protected from other illegal logging and hunting interests.

Whilst logging undoubtedly has had a negative effect on much of the faunal and floral communities of the concession (not least the tree species themselves), the precise causes for this are complex and warrant attention. For purposes of wildlife conservation it is important to understand firstly to which priority species logging is detrimental and whether this is due to direct loss, fragmentation or alteration of habitat, or whether it is the effects of the process itself. Logging has probably had its most profound effect on birds species needing large trees to nest, feed and roost in, chiefly large hornbills, large woodpeckers, and probably also larger raptors. Many species are not primary forest specialists, and do not require large trees *per se*. In particular, Key Species such as Green Peafowl, Germain's Peacock Pheasant, Siamese Fireback, Blue-rumped and Bar-bellied Pittas are tolerant of logged and secondary/degraded forest. As logging often results, at least temporarily, in a decrease in fruit availability (e.g. *Ficus*) and an increase in herbaceous vegetation and browse (Heydon 1994), mammal species such as mousedeer, Binturong and other frugivores are likely to be more severely affected than browse or graze specialists (e.g. Sambar and Banteng) or generalists (e.g. muntjacs and pigs) which may in fact benefit from the alterations (Heydon 1994).

The logging of Coupe 2a appears to have been undertaken selectively by Samling and it is important to note that one year after logging, the area continued to support populations of Tiger, Gaur, Asian Elephant, primates, hornbills and large woodpeckers. Nagarhole National Park in southern India maintains an intact assemblage of seven large ungulates and three large carnivores, all within an area that has been heavily and repeatedly logged over 100 years and indeed, for almost 80 of these years, the colonial authorities undertook a campaign of replacing natural forests with teak monocultures (Karanth *et al.* 1999 in Seidensticker *et al.* 1999a). However, for every Nagarhole there are innumerable instances of commercial logging

having a disastrous impact on wildlife, as well as on local communities and the wider environment. The need for the middleground to be explored is essential in Cambodia where the majority of all remaining forest is currently under logging concession.

Regardless of the ecological impact of logging on species, the effects are unlikely to be as severe as the subsequent increased hunting pressure and deforestation that almost invariably accompanies commercial logging (e.g. Robinson *et al.* 1999 and Robinson and Bennett 2000).

3.2.2 Access

Almost invariably, commercial logging of new sites requires new roads to be built, both to access the timber and to transport it from the area. In the case of Samling Mondulkiri the concessionaire is responsible for the construction of a major new artery linking the provincial capital Sen Monorom to Chhlong on the Mekong river. This is the first time that Sen Monorom and the Mekong have been connected by a drivable road; previously an international route through Vietnam had to be taken. Whilst the importance of this road is significant to trade and commerce, the selection of the route is unfortunate, as it passes straight through the centre of Snoul WS, opening access to illegal loggers and hunters. The effect of this road has been deleterious to the habitats adjacent to the road and continues to pose a major long-term threat to much of the bisected forests and its wildlife communities. Human settlements have already sprung up along much of its length, even within Snoul WS itself, and the clear-cutting of adjacent forest for agriculture can be seen for many kilometres. With the establishment of these settlements comes an increase in hunting by the new residents, initially probably small-scale but undoubtedly increasing as areas of wildlife populations are located and techniques refined. This process has already been witnessed within Snoul WS over the last three years (Nor Mat *pers comm.* 2000) where disturbance is a considerable problem to some of the most important bird species in the area. Regular dry season use of the network of old logging tracks and forest trails by resin-tappers and people collecting other non-timber forest products (NTFPs) causes considerable disturbance. This is only really a problem for a select suite of birds, but these are some of the most important Key Species found in the area, including Lesser Adjutant and Grey-headed Fish Eagle. At Bung Boun, the only site where both these species were encountered, they were particularly shy and sensitive to disturbance. It is likely this would also be the case for any other large waterbirds occurring in the area that utilise forest clearings with seasonal/permanent waterbodies, such as Giant *Pseudibis gigantea* or White-shouldered Ibises *Pseudibis davisoni*, should they occur. Because the available feeding habitat (permanent and seasonal pools within the forest mosaic) for these species is limited, most especially in the dry season, this is a serious problem.

The negative effects of the presence of the M-1 road and logging tracks will continue to cause losses in wildlife and their habitat. Not only do hunters now have massively increased access to the area but they also have the ability to transport a larger mass of wildlife from the area, thus allowing them to hunt more intensively. Additionally, access has encouraged other people to take up opportunistic or professional hunting, especially amongst those who have recently moved into the area. Overall the construction of

the M-1 road and the failure to destroy or block access to the logging tracks in Coupe 2a, greatly facilitates the single biggest threat to the integrity of the whole areas wildlife communities: hunting.

3.2.3 Hunting

The main threat to the large mammal and some bird populations in the survey area is hunting. Whilst other anthropogenic activities such as selective logging, shifting agriculture, burning and NTFP collection have their own complex effects on natural systems, hunting supersedes all these in posing the most intense and immediate threat. There are a number of factors that have brought about this state; increased access to the area, the subsequent spread of wildlife trade networks from the local to international level, increased access of the local populace to weapons (though this trend now appears to be reversing), the lessening of security threats and the increase in financial rewards for wildlife products. However, to understand the significance of recent changes, it is important to summarise the trends since the last surveys were undertaken over 40 years ago. Whilst much of the discussion below refers to large mammals (as historical accounts have tended to do so), the same observations are likely to hold for some bird species such as Green Peafowl and hornbills.

Before the 1970's, most of Cambodia's rural population, which made up 85% of the total, was culturally and geographically isolated, with small numbers of people being distributed widely across the country at low density. Vast swathes of the country were considered difficult to access, and then only seasonally, and trade between Phnom Penh and the provinces was generally limited to agricultural products. Rural populations were almost entirely dependent on natural resources and agriculture for their subsistence, with hunting and fishing invariably being an integral part of this subsistence. Given the very low human population density and the fact that demand was generally limited to these populations, many quarry species were probably not seriously threatened by this level of predation.

During the period of Khmer Rouge rule the demographics of the country changed dramatically with urban populations being shifted to the countryside and rural populations shifted between provinces to contribute to the conversion of Cambodia to an entirely agrarian economy. This had a number of probable effects on wildlife populations. The first was that many rural villages and communities were abandoned with people being translocated to areas deemed more suitable for agriculture, leaving even larger areas entirely unpopulated. Secondly, whilst the total number of weapons in the country may well have increased, only members of the Khmer Rouge militia were allowed guns, and the rationing of bullets was severe. Whilst it is impossible to accurately assess the effects of Khmer Rouge rule even on large mammals, it is unlikely that their rule had more than localised negative effects on populations. Overall, large mammals and possibly fared better during this period than in subsequent years as many areas became depopulated by humans, allowing wildlife to recover to natural levels.

However, as the availability of meat and other products became increasingly scarce and the need to supplement rice with animal protein increased, soldiers, or hunters hired by soldiers, hunted wildlife, both with traps and

with guns. As a result, some areas witnessed an intensification of hunting and even caused local extirpations of some species. Interviews with the ex-Khmer Rouge of Kompong Speu Province suggest that the loss of the Hog Deer and Eld's Deer from the area was entirely due to their being hunted by the militia who took advantage of the species' preference for open habitats and wetlands, making them easy to shoot.

After the overthrow of the Khmer Rouge, the incumbent Vietnamese took advantage of the 'liberated' portions of rural Cambodia, notably the eastern provinces of Mondulakiri, Kratie and, to a lesser extent, Ratanakiri. Local reports from minorities who fought the Vietnamese suggest that the Vietnamese army and Vietnamese civilians working on timber extraction, hunted local game both for subsistence and to supply a more advanced wildlife trade in Vietnam. This relatively well-equipped army used the logging routes to transport ivory, tiger skins, ungulate trophies and other wildlife products across the border. The intensity of the extraction was often quoted as being a major reason for the decline in large mammals. Indeed Cambodian hunters from Lang Bao village suggested that in the 1960's they would encounter large mammals regularly enough to require them to hunt on elephant back for safety, but that after the withdrawal of the Vietnamese, they never again encountered some species such as Kouprey and Wild Water Buffalo. The Vietnamese occupation lasted for almost nine years, during which time some important changes took place with respect to hunting. This period also witnessed a huge influx of weapons into Cambodia as Vietnam began re-arming the populace in its efforts to eradicate the remnants of the Khmer Rouge which were still powerful in many areas. Soon, most Cambodian men had a rifle, and with Vietnamese and Chinese markets that appeared to have an unlimited demand, the obvious occupation for many was hunting. By 1985, the first industrial scale animal markets appeared in Phnom Penh, Sen Monorom and other locations, as did more sophisticated networks of hunters, traders and middlemen. This network is still fully operational today.

Following the Vietnamese withdrawal, the United Nations Transitional Authority in Cambodia (UNTAC) made efforts to reduce the number of weapons in Cambodia, understandably focussing on militia units. The effect that this had on hunting was probably negligible as weapons were still sufficiently common throughout most areas of the country. When UNTAC left in 1994 there were still considerable numbers of weapons available and for the next four years hunting probably continued at a very high rate. After the current government came to power in the elections of 1998 it embarked on a gun confiscation program which targetted the number of weapons in the hands of civilians. Whilst the program is still continuing it is clear that the effects are already being felt in many rural areas where illegal hunting was formerly widespread. Opportunistic hunters especially have reported that they no longer hunt because they cannot, and whilst many traditional hunters have been allowed to retain their guns, the ability of a significant number of people to hunt has been curtailed. For the more committed hunter, there are still few impediments and though land mines, bullets and guns may be harder to acquire, the reward for wildlife is more than adequate to meet the costs of purchasing the equipment and of any fines incurred if caught.

The status of hunting at the current time in Samling is widespread though targeted. Whilst quantifying the level of the various methods of hunting would be a valuable exercise in helping to understand more about wildlife trends and the value and effects of hunting, some basic observations can be made at this stage. Unlike Bokor and Kirirom National Parks where trapping and snaring are the preferred technique, the dominant method of hunting for mammals in the Samling concession is with rifles, though this may reflect the relative availability of very large mammals between the two regions. Hunting is for three main purposes: local consumption; internal Cambodian markets, especially to serve restaurants; and the international wildlife trade (as discussed above). The division between these practises is not clear and it is probably increasingly less common that people hunt solely for either of the first two purposes anymore. Most villagers report that, whilst the majority of bushmeat is kept, trophies from these animals are sold and species of trade value are invariably sought after. Irrespective of the reasons or the final destination of the quarry, hunting for large mammals is of highest conservation concern in the survey area. Around the time of the survey, at least two Banteng, one Gaur and two Tigers were either shot or mined by hunters within the Samling concession, and this is likely to be only a fraction of the overall harvest. Although the gun is the preferred hunting tool, mines and homemade explosives are also favoured. Mines are usually set for Tigers (though clearly are indiscriminate in killing most terrestrial large mammals) and are placed beneath the carcass of an animal, most often a macaque or a muntjac (see Species Account for Tiger).

Hunters' camps were found in many areas and hides for hunting were located at three of the four mineral licks. With a readily available resource, major cash incentives, little awareness of the legality of the activity, and no enforcement, it is hardly surprising that hunting is prevalent. However, the gun confiscation scheme mentioned earlier does appear to be having an effect in dissuading hunters from shooting some animal groups. Most hunters when questioned about what they would shoot if the opportunity arose, indicated that it was no longer worth shooting Black Giant Squirrel or some primates (though opinion differed on the latter group) as it was no longer worth the actual and associated costs of hunting.

Much of the hunting for birds (for which the evidence was widespread throughout the survey area) is probably merely for subsistence, through opportunistic shooting and snaring, though there was evidence certain species/groups are specifically targeted.

Of all the species found to occur in the area, the population of Green Peafowl is almost certainly the most important that is at risk from hunting. It is specifically targeted by for both subsistence and trade. Five spring traps set for ground-foraging animals (capable of holding a muntjac *Muntiacus* sp., and certainly peafowl) were discovered along an old track north-west of Phum Phnom Krang in Coupe 5 in May. Its meat is favoured for food (local consumption), as are the eggs. Perhaps of greater concern, however, is trade in the species. Live adults were noted being taken for trade (one bird was seen being transported to Phnom Penh), and several full sets of train (elongated uppertail-covert) feathers were observed being transported to markets. Chicks/fledglings are also captured for trade. Two c. 2 month-old fledglings were seen in captivity in Phum O'Por, which were intended for sale at c. \$15 per bird. Other ground-foraging species potentially at risk from

snaring include Germain's Peacock Pheasant, Siamese Fireback, Scaly-breasted Partridge *Arborophila chloropus*, Red Junglefowl *Gallus gallus* and perhaps also pitta species. These birds are chiefly evergreen forest species, and little evidence of snaring was found in the evergreen/semi-evergreen forests of Coupes 2a and 3. Some of these species were widespread and common or at least locally common, indicating that they are not under any elevated threat from hunting.

Other large, conspicuous birds (chiefly hornbills, storks and raptors) are at risk from opportunist hunting. Although gunshots were heard quite frequently, there did not appear to be an excessive incidence of this type of hunting, and relatively few piles of feathers discarded from plucked birds shot in the field were found. However, Lesser Adjutant and Grey-headed Fish Eagle at Bung Boun were evidently extremely wary, taking flight at the first hint of human presence, even at a distance of 4500m, indicating that such large, grassy or pool-studded clearings are frequently targeted by hunters. Woolly-necked Storks (in more forested habitats) however seemed much less concerned by human presence, often allowing fairly close approach and only flying a short distance when disturbed.

Flocks of parakeets and green pigeons are targeted where they come down to some saltlicks (e.g. along the O'Por river). They are caught by "flip-" or "clap-netting" as the birds come down to consume pellets of mineral-rich soil. Component parts of such traps were noted at at least two locations, and there was some evidence of them being traded in local markets (e.g. La Pakhe). Young hornbills are taken from their nestholes before fledging, e.g. one juvenile Oriental Pied Hornbill *Anthracoceros albirostris* was noted being taken to a local market on the back of a motorcycle having been captured in Coupe 5. Given the healthy populations of various myna species, these may also be targeted, being particularly popular in the cagebird trade.

3.2.4 Wildlife trade

The trade in wildlife and their parts is now well established in Mondulhiri. Indications for this include widespread knowledge of the commercial value of wildlife, the speed at which products are transported from remote areas, the high prices that are often obtained by the primary hunter/collector, and the diversity of trade routes that products leave Mondulhiri on. A major development of the industry came with the establishment of a direct trade link to China through Vietnam during the latter's occupation of Cambodia. Vietnam and China, though often in conflict with each other in recent decades, have always maintained strong trade links and have shared a similar appetite for wild animals and their parts. Although Cambodia has probably always traded wildlife products to some extent (e.g. ivory), the occupation by Vietnam greatly increased the scope and scale of this trade. Many species, previously considered unimportant to Cambodians, were suddenly given a trading value. Tockay geckos *Gekko gekko* is just one example of a species that was not widely traded before the Vietnamese occupation. Other species, previously caught for use but not traded, became major sources of income for rural Cambodians, most notably pangolins, snakes, turtles, tortoises and also ungulates for trophies.

Whilst Vietnam was, for a long while, the major recipient for wildlife, the network has recently developed in size and complexity and now directly

feeds the Thai market as well as a small but visible internal trade in Phnom Penh. Whilst no data were collected on the scale and exact content of trade items, three points are clear from interviews with hunters and Sen Monorom traders: that China is by far the biggest customer, that demand outstrips supply and that the supply/demand is widening with the obvious result that prices are rising for many species. The rate of increase of the financial reward for a species does not necessarily indicate a negative correlation with the availability of that species in any one province or country. In Cambodia's case, the increasing price paid for pangolins may more accurately reflect the declining populations of Vietnam and Laos, formerly more productive suppliers than Cambodia. However, the overall trend seems to be a decreasing supply feeding an increasing demand with hunters from Coupe 4 reporting that wild pig is the only species that has not declined in recent years.

Efforts to stem the loss of wildlife through trade is not keeping pace with the trade. Cambodia currently lacks the technical and physical capacity, and legislation, to monitor wildlife trade, let alone tackle the problems, and much that prevents activities at the site level from being effective is the fact that members of the army, police and local and provincial government are involved in the trade. Criticism of this involvement should be tempered by the fact that Cambodia does not currently have suitable wildlife laws that would allow effective implementation to be lawful.

3.2.5 Shifting cultivation

Shifting cultivation is practised by numerous small villages and temporary settlements in the Samling concession, especially along the Coupe 3/Coupe 4 and Coupe 3/Coupe 5 boundary. It is difficult to gauge their true effects on the natural vegetation, but in terms of their bird conservation value it has not been dramatic, although evergreen forest has been cleared in some areas to provide and suitable for short-term cultivation for local communities. In addition, some of the larger grassy clearings and Bunges have been modified for cultivation, reducing the available suitable habitat for, in particular, large waterbirds. Conversely, areas that were cultivated as rice paddies some years ago and since abandoned may now be of some conservation value to large waterbirds, perhaps also Green Peafowl.

3.2.6 Resin-tapping

The practice of collecting resin is widespread, particularly from the taller, older dipterocarp trees, in both evergreen and deciduous forests, to such an extent that it appears to form one of the mainstays of the local economy. Once collected (in large plastic containers), the resin is then exported to Vietnam where it is refined into a glue product and reportedly used in boat building.

Although resin-tapping could not be seen to be having any tangible direct effect on wildlife populations in the area, it is certainly a conservation concern. It is unclear precisely what the long-term effects of the activity are, but as large trees are repeatedly burnt at their base and further excavated to produce more resin, presumably at least a proportion of them will die (which may also have positive effects for some bird species such as woodpeckers), or become prone to disease, weaken at the base making them

more likely to fall in a storm. It is also highly likely that the fruit production of tapped trees will be reduced thereby limiting food availability for a number of species groups. Most of the trees that are tapped are large, and in an area which has already seen extensive logging, this only serves to heighten the concern. It is a subject area which requires further investigation before any firm conclusions can be drawn.

3.3 Survey Methods

The present work represents an essential first stage in identifying the wildlife conservation priorities of the area with the intention that it should act as a precursor for future, more focussed surveys, on these priorities. Although efforts were made to acquire data on abundance levels, habitat preferences and distributional limits, these were necessarily superficial given the scope of the work, with stress being given to gathering direct rather than indirect (remote) evidence. The following section discusses the methods used and their value in future large mammal surveys in Cambodia.

The two primary survey methods, direct observation and camera trapping, were supported by local interviews, and the recording of track, sign and vocalisations. Interviews of local hunters were only of limited value in ascertaining species presence and were more useful in learning more about general trends in large mammal populations over recent time and of local hunting preferences. Vocalisations were only useful for gauging the relative abundance between areas of Yellow-cheeked Gibbon and Black Giant Squirrel; no cervids were calling during the survey period. Tracks and signs were used to confirm the presence of certain groups of species (wild cattle, bear) though not specific species (except for Asian Elephant and adult Tiger) but were useful in locating areas in which foot surveys and camera trapping would be most profitable for acquiring direct observations and photographs. Thus, most of the data and all confirmed records for mammals were derived from either direct observation (including specimens) and/or camera-trap photographs.

Camera traps were used specifically to confirm the presence of some Key Species whose sign can otherwise be equivocal. Formal transect methods, and the data that comes from random sampling, were forsaken for targeted trapping, with cameras being located in positions considered most likely to photograph the focal species. The result was that for Banteng, Gaur and Sambar camera traps were the sole source of absolute confirmation, though tracks and signs had suggested their presence. The importance of using cameras for surveying Tigers (and many other species) is underlined by the present work. In two of the four instances a picture was taken of a Tiger, the area was examined for tracks shortly afterwards and no track prints were visible, probably due to the dry leaf litter and lack of living ground vegetation. Remarkably no tracks were found in the immediate vicinity of the camera which photographed the elephant. Cameras also supported local claims that whilst Banteng and Gaur both populate the mixed deciduous forests of much of the concession, Banteng is probably absent from the more evergreen forests of Coupes 2a and 3 bordering Vietnam.

The differing role cameras can play in field surveys is important to consider, especially in the context of Cambodia where baseline data are generally absent and the likelihood of direct observation is low. In these instances, cameras can provide the required data with considerably more success and less effort than foot-based surveys, especially where a number of species provide similar tracks and signs. In Cambodia it will be important to use presence-confirming trapping methods as a first stage survey technique in most areas for a number of species. No large mammal species in Cambodia produce signs which can be uncontroversially assigned to that species, except Asian Elephant and adult Tiger. Whilst claims have been made to be able to clearly distinguish species within some groups such as the large cats and wild cattle, none of these methods have been shown to be consistent and until suitable studies indicate otherwise such claims should be considered with caution.

Even in groups which are locally monospecific throughout much of the region, such as the pigs *Sus* sp. and muntjacs *Muntiacus* sp., the difficulties of identification are compounded by the possible presence of other similar species. In Cambodia, all wild pigs are assumed to belong to *Sus scrofa*. However, Heude's Pig *Sus bucculentus* is known from Indochina (Groves *et al.* 1997) and since no work has established the systematic status of wild pigs in Cambodia, it seems prudent to assign wild pig as *Sus* sp. especially as no phenotypic key exists enabling field identification. [Note: It is recommended that any skulls of wild pigs (preferably with locality data) be collected whenever possible for future review. This may possibly allow current and prior records to be confidently assigned a species name.] Within deer, the situation is similarly challenging for the field biologist. Recent discoveries of new muntjac species from Laos (see Timmins *et al.* 1998), Vietnam (Giao *et al.* 1998), potentially Thailand (Rob Steinmetz *pers comm.* 2000) and Myanmar (Rabinowitz 1999) also suggest caution when assigning small deer tracks to species. This problem is further complicated by the probable presence, at least in the north-east of the country, of Large-antlered Muntjac, and the confirmed presence of Hog Deer, neither of which are known to be identifiable by their sign.

The problem of track identification is most acute in wild cattle, as Cambodia is globally unique in possibly having five sympatric extant bovid species. If surveys cannot gather species specific data, then their value becomes greatly reduced, though it may be plausible to argue that all wild cattle species are of high conservation priority and that they share broadly the same requirements, are subject to similar types of threat and thus conservation measures for any species would benefit all other species present. This argument though fails to consider the danger of overlooking some areas which may have a lower absolute density of wild cattle but which still maintain populations of Kouprey, Khting Vor or Wild Water Buffalo. Kouprey and Khting Vor may well both be globally extinct, and if they aren't are likely to exist only in Cambodia in relict groups or even individuals which do not represent a viable long-term population. However, the question of what should be done to test this hypothesis, and if it is worth expending effort on testing it at all, remains debatable. Unless exceptional evidence is presented, surveys for Kouprey, or Khting Vor for that matter, are no longer justifiable given the likelihood of success and the questionable use of resources which could most effectively be used for other purposes. Instead, surveys focussing on all wild cattle have as much of a chance of

'discovering' Kouprey and Khting Vor, especially as Kouprey was known to coexist closely with Banteng (Wharton, 1957). Moreover, surveys would undoubtedly contribute to the conservation of at least Banteng and Gaur, both species of international concern in their own right, and for which Cambodia is likely to be globally critical for their conservation. Therefore surveys which concentrate on all wild cattle and which use methods which can distinguish species (such as direct observation or camera-trapping) would be a priority for large mammal conservation in Cambodia.

For two cervids, Cambodia is also of global significance. Both Eld's Deer *Cervus eldii* and Hog Deer *Axis porcinus* have undergone dramatic declines in recent decades throughout their range and, for both Indochinese forms, Cambodia might provide its last refugia. A closer study of both species would likely elevate the Indochinese forms to specific level with *A. p. annamiticus* having already attained a CITES Appendix 'I' listing. This taxa is not known from any protected area in its range and is probably extinct in both Vietnam and Laos. Similarly, the Indochinese Eld's Deer *C. e. siamensis* is only known from a small area of south-west Laos, just west of the Mekong river and only numbers approximately 12 individuals (Round 1998) with the Thai and Vietnamese populations having already been extirpated. The tendency of both these species to graze in open marshy lowlands, avoiding dense forest, has made them a favoured quarry species for hunters and is probably the major factor in their apparently more severe decline than, say, Sambar *Cervus unicolor* which generally inhabits denser forested areas. It is of the highest priority that any remaining populations of these species be located in Cambodia and immediate conservation activities initiated, as any remnant group is almost certainly under acute threat. The tracks of both species have certain features which are said to be distinctive though, as with cats and cattle, no studies have quantified the consistency of the uniqueness of these features against other sympatric species across all age ranges, sex and substrate type.

Given the low likelihood of direct observation of many of the terrestrial Key Species and the equivocal nature of other methods of detection, the use of camera-traps is highly recommended. For more detailed information on camera-trap applications and methodology, see (Karanth 1999a and 1996b).

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APPENDIX I. Gazatteeer

Name in Text	Map Name	Name (Khmer)	Coupe	Location type	Survey activity	masl	UTM	Date
Bung Boun	Trapeang Run	វត្តបាទី	Shoul	Large pool in large grassy clearing	Birds	120	068489 E 133911 N	2 to 3 May
Bung Khlaa			4	Small pool in grassy clearing	Birds	240	071550 E 136430 N	29 April to 1 May
Keo Seimar	Ph. Sré Preah	ភ្នំស្រី	N/a	Town	Interview	130	0705001E 1347054N	6/May
Km 159 tracks			2a3	Logging track x-roads junction with M-1	Birds	270	No UTM taken	March and May
LaPakhe			N/a	Market	Interview	150	0708002E 1342600N	3-Apr to 28-May
O'Por camp			4	Camp by river	Birds	200	071406 E 136489 N	29 April to 1 May
Okbal Sva			2a3	stream	Mammals	340	0725600E 1352155N	6/Apr
O'Pong Maon			2a4	Stream	Mammals	280	0724800E 1352600N	6/Apr
O'Por			4	Waterfall	Mammals	180	0711147E 1364702N	1/May
O'Por camp			5	Salt lick	Mammals	190	0709257E 1359561N	13 to 14-May
O'Por river	Prék Por	ប្រេកប៊ុន	5	River	Mammals	160	0707533E 1362751N	9/May
O'Rang camp			2a3	Camp by O'Rang river	Mammals	340	0724486E 1349689N	4 to 7-Apr
O'Reang river	O'Rang	ទ្រាង	3	River	Mammals	390	0735810E 1367202N	26/Apr
O'Reang village	O'Rang districk	វត្តទ្រាង	2a3	Village	Interveiw	265	0707209E 1371081N	26/Apr
Phum O'Por	recently settled		4	Village	Birds	180	071269 E 136480 N	30/Apr
Phum Phnom Krang	Phum Phnom Krang	ភ្នំក្រាង	4	Village	Birds	210	No UTM taken	18 March, 11 May
Phum Phou Chou	Phum Pu Kle Kraom	ភ្នំប្រាក់ក្រាម	5	Village	Birds	480	072210 E 136238 N	28, 29 April. 1 May
Phum Phou Clair	Phum Pu Yuk	ភ្នំប្រាក់	5	Village	Birds	460	072520 E 136336 N	28+29 April. 1 May
Phum Pou Chou			4	Village	Interview	130	0702755E 1350301N	13/May
Phum Pou Kong			2a3	Village			No UTM taken	
Phum Pouchar	Ph. Pu Char	ភ្នំប៊ុន	N/a	Village	Interview	130	0702333E 1350621N	9/May
Phum Ro Ka Thmey			4	Village	Interview	360	0713408E 1373077N	29/Apr

Name in Text	Map Name	Name (Khmer)	Coupe	Location type	Survey activity	masl	UTM	Date
Phum Srer Pleng			5	Village	Camera trapping	400	0722100E 1362380 N	27/May
Prek Chhlong camp			2a3	Camp in semi - evergreen forest	Birds	200	071970 E 134730 N	8-10 May
Ro Ka Thmey camp			4	Village	Interview	130	0704904E 1347811N	5/May
Saltlick (No name known)			4	Mineral lick	Birds	160	071020 E 136424 N	30/Apr
Saltlick 1			5	Mineral lick	Camera trapping	190	0710912E 1359800N	7/May
Saltlick 2			5	Mineral lick	Camera trapping	240	0785500E 1358810N	7 to 9-May
Sen Monorom	Senmonorom	ស៊ីម៉ាណូរ៉ូម	N/a	Town	Interview	700		26/Apr
site 1			2a	Base of mountain	Mammals	340	0726891E 1350943N	6/May
site 2			2a	Yeakong road	Mammals	480	0728046E 1354503N	7/May
site 3			5	O'Por river	Mammals	200	0707866E 1363242N	10/May
Sl, camp(148)			2a	Logging camp (Survey base camp)	Mammals	150	0709100E 1342297N	March, April, May
Snoul Headquarter			Snoul	Wildlife Sanctuary headquarter	Interview	90	0664893E 1336269N	30/Apr
Srer Pleng camp			5	River	Mammals	160	0707533E 1362751N	10 to 11-May
Trapeang Chhrap-soa			Snoul	Small pool in evergreen forest	Birds	80	067429 E 133388 N	5/May
Trapeang Sandan	Not marked		Snoul	Small pool in evergreen forest	Birds	90	067213 E 133456 N	4 to 5 May
Trapeang Sunluk			Snoul	Small pool in evergreen forest	Birds	85	067144 E 133557 N	4/May
Trapeang T'oich	Not labelled		Snoul	Large pool in grassy clearing	Birds	120	068587 E 133942 N	2 to 3 May
Trapeang Tuk			Snoul	Small pool in evergreen forest	Birds	70	067540 E 133205 N	5/May
Trapeang Vaeng	Trapeang Bungkray	វត្តបាញ់ប្រាក់ក្រយ	Snoul	Large pool in large grassy clearing	Birds	90	063920 E 134071 N	3 to 4 May
Yeakong road			2a	Old road on ridge in evergreen forest	Camera & track survey	320	0728046E 1354503N	7 to 8-Apr

APPENDIX II. Camera-trap Data

Coupe	Position ID	Camera ID	Location Description	UTM Easting	UTM Northing	Date set	No. trap nights	No. Trap days	Stump-tailed macaque - SIGG	Douc Langur - SARKVat	Malay Sunbear - XIX	Yellow-throated Marten - SABaFEl	Hog Badger - KCKBn	Large-spotted Civet - SABaCFM	Common Palm Civet - SABaCtAt	Leopard Cat - CPaCa	Tiger - XIX	Asian Elephant El	Wild pig KCKaB	Sambar aB5	Red Muntjac OB	Gaur - Xb	Banteng - ElNg	Total animal traffic
2a	SL1.1	A12	Old logging road in semi-evergreen forest	0724580	1349806	05/04/00	21	22		1										1				2
2a	SL1.2	A42	Old logging road in semi-evergreen forest	0725350	1350012	05/04/00	40	41	1						1									4
2a	SL1.4	A9	Old logging road in semi-evergreen forest	0725943	1350763	05/04/00	38	39									2						4	6
2a	SL1.6	A5	Trail down hill in evergreen forest	0726993	1351052	06/04/00	40	41											2					2
2a	SL1.7	A36	Ridgetop in semi-evergreen forest	0727449	1351965	06/04/00	40	41											10					10
2a	SL1.8	A12	Trail in semi-evergreen forest	0727490	1352946	06/04/00	39	40					1											1
2a	SL1.9	A17	Old logging road in semi-evergreen forest	0725968	1352772	07/04/00	38	39			2		1	1							3			7
2a	SL1.10	A3	Old logging road in semi-evergreen forest	0725039	1352696	07/04/00	38	39				1				1	1			2	2	2		9
2a	SL1.11	A25	Old logging road in semi-evergreen forest	0724576	1349780	08/04/00	37	38	1		2		1					1	1					6
2a	SL1.12	A19	Old logging road in semi-evergreen forest	0728044	1354635	08/04/00	37	38	6															6
2a	SL1.13	A41	Old logging road in semi-evergreen forest	0729066	1355027	08/04/00	37	38	3		5						1		12					21
2a	SL1.14	A6	YeaKong trail in semi-evergreen forest	0729240	1356103	08/04/00	37	38														1		1
3	SL2.1	A15	Ridgetop in evergreen forest	0724605	1354315	27/04/00	19	20											3					3
3	SL2.2	A2	Old logging road in semi-evergreen forest	0725014	1354140	27/04/00	19	20														1		1
5	SL3.1	A18	Minerall lick at edge of forest in bamboo	0709257	1359561	13/05/00	13	14															1	1
5	SL3.2	A36	Minerall lick at edge of forest in bamboo	0709261	1359556	13/05/00	13	14															1	1
5	SL3.3	A8	Minerall lick at edge of forest in bamboo	0709265	1359552	13/05/00	13	14												2			3	5
5	SL3.4	A22	Minerall lick at edge of forest in bamboo	0707924	1358828	13/05/00	13	14														5	1	6
5	SL3.5	A28	Minerall lick at edge of forest in bamboo	0707924	1358828	13/05/00	13	14											1				1	2
5	SL3.6	A14	Minerall lick at edge of forest in bamboo	0707924	1358828	13/05/00	13	14														2	2	4
							558	578	11	1	9	1	3	1	1	1	4	1	29	5	7	15	9	98

APPENDIX III. Bird species recorded during the survey

Taxonomy, nomenclature and species sequence follows Robson (2000).

KEY:

Status:

R	Resident.
R (N)	Resident, but subject to wide-ranging nomadic movements
P	Passage migrant.
W	Winter visitor.
BV	Breeding visitor.
AM	Altitudinal migrant.
?	Status unknown.

In instances where a ? precedes a status the assessment is uncertain, but is either likely, or at least possibly, that indicated.

Habitat Association (Assn.) in the survey area:

EF/SEF	Evergreen and semi-evergreen forest.
DDF	Dry deciduous/Deciduous dipterocarp forest.
W	Wetlands
St	Rivers and streams
Gr	Short grassland
Ba	Bamboo
O	Open/degraded forest

Abundance Codes in the different survey areas:

C	common and widespread (recorded almost daily, often in large numbers).
LC	locally common (common in certain areas only).
U	uncommon (uncommon or scarce - only given for species that are generally conspicuous/ vocal, but were evidently uncommon during the survey.
P	present, but abundance not assessed.
M	market record only.
[]	provisionally recorded (i.e. identification probable but not confirmed).
()	occurrence in area not confirmed.

The status codes given above have been derived subjectively but intuitively, based primarily on frequency of encounter (the total number of records), taking into account factors such as species detectability (including frequency and volume of individual species vocalisations), species-specific behavioural traits (e.g. shyness, flocking tendency etc.) and the carrying capacity of a species in a given habitat. The limited period of survey dictated that rigorous scientific methodologies for assessing density/abundance could not be effectively employed.

Species notes:

1. Large owl sp. - two individuals seen briefly and poorly, one by day, one at night
2. Fish Owl *Ketupa* sp. - one heard very distantly
3. unidentified green pigeon *Treron* sp. (excludes birds identified to species).
4. Imperial Pigeon *Ducula* sp. - excludes all those specifically identified in lowland habitats were Green Imperial Pigeon *D. aenea*.
5. Sparrowhawk *Accipiter* sp. (excludes birds identified to species).
6. Pond Heron *Ardeola* sp. - many were in non-breeding plumage, hence have remained unidentified. However, all those identified were Chinese Pond-Heron *A. bacchus* and virtually all Adeolas had moved away from the area by late April, indicating they are likely to have been Chinese Pond Heron, chiefly a winter (dry season) visitor to the area only.
7. House Martin sp. *Delichon* sp. - probably Asian House Martin

Family English and Scientific species names	Status	Habitat Assn.	Coupees 2+3	Coupees 4+5	Snoul W.S.	Senmonorom Plateau
Francolins, Partridges and Pheasants (Phasianidae)						
Chinese Francolin <i>Francolinus pintadeanus</i>	R	DDF		C	P	C
Scaly-breasted Partridge <i>Arborophila chloropus</i>	R	EF/SEF	C	P	P	
Red Junglefowl <i>Gallus gallus</i>	R		C	C	C	
Siamese Fireback <i>Lophura diardi</i>	R		P		P	
Germain's Peacock Pheasant <i>Polyplectron germaini</i>	R		LC	P	LC	
Green Peafowl <i>Pavo muticus</i>	R		P	P	P	
Whistling -ducks (Dendrocygnidae)						
Lesser Whistling -duck <i>Dendrocygna javanica</i>	?R				P	
Woodpeckers (Picidae)						
Grey-capped Woodpecker <i>Dendrocopos canicapillus</i>	R		P	P		
Rufous Woodpecker <i>Celeus brachyurus</i>	R		P	P	P	
White-bellied Woodpecker <i>Dryocopus javensis</i>	R			P	P	
Lesser Yellownape <i>Picus chlorolophus</i>	R		P		P	
Greater Yellownape <i>Picus flavinucha</i>	R		C	C	C	
Laced Woodpecker <i>Picus vittatus</i>	R		P	P	P	
Black-headed Woodpecker <i>Picus erythrogygius</i>	R	DDF		LC		
Grey-headed Woodpecker <i>Picus canus</i>	R		P	P	P	
Common Flameback <i>Dinopium javanense</i>	R		C	C	C	
Greater Flameback <i>Chrysocolaptes lucidus</i>	R		LC	P	P	
Bay Woodpecker <i>Blythipicus pyrrhotis</i>	R		LC	P		
Black-and-buff Woodpecker <i>Meiglyptes jugularis</i>	R		C		P	
Heart-spotted Woodpecker <i>Hemicircus canente</i>	R		P	P	P	
Great Slaty Woodpecker <i>Mulleripicus pulverulentus</i>	R		C	C	C	
Barbets (Megalaimidae)						
Red-vented Barbet <i>Megalaima lagrandieri</i>	R	EF/SEF	LC	P	P	P
Lineated Barbet <i>Megalaima lineata</i>	R	DDF		C	P	
Green-eared Barbet <i>Megalaima faiostricta</i>	R		C	C	C	
Black-browed Barbet <i>Megalaima oorti</i>	R	>600m				P
Blue-eared Barbet <i>Megalaima australis</i>	R		C	C	C	
Coppersmith Barbet <i>Megalaima haemacephala</i>	R		U	LC	P	P
Hornbills (Bucerotidae)						
Oriental Pied Hornbill <i>Anthracceros albirostris</i>	R		C	C	C	
Great Hornbill <i>Buceros bicornis</i>	R	EF/SEF	U		U	
Wreathed Hornbill <i>Aceros undulatus</i>	R	EF/SEF	U			
Hoopoes (Upupidae)						
Common Hoopoe <i>Upupa epops</i>	?			P	P	
Trogon (Trogonidae)						
Orange-breasted Trogon <i>Harpactes oreskios</i>	R	EF/SEF	C	P	C	
Red-headed Trogon <i>Harpactes erythrocephalus</i>	R	EF/SEF	C		C	
Rollers (Coraciidae)						
Indian Roller <i>Coracias benghalensis</i>	?R		C	C	C	P
Dollarbird <i>Eurystomus orientalis</i>	?R		C	C	C	P
Kingfishers (Alcedinidae, Halcyonidae)						
Common Kingfisher <i>Alcedo atthis</i>	?R	St	P			
Blue-eared Kingfisher <i>Alcedo meninting</i>	R	St	P	P		
Black-backed Kingfisher <i>Ceyx erithacus</i>	?	EF/SEF	P		P	
Banded Kingfisher <i>Lacedo pulchella</i>	R	EF/SEF	C	U	C	
Stork-billed Kingfisher <i>Halcyon capensis</i>	R		P	P	P	

Family English and Scientific species names	Status	Habitat Assn.	Coupes 2+3	Coupes 4+5	Snoul W.S.	Senmonorom Plateau
White-throated Kingfisher <i>Halcyon smyensis</i>	R		C	P	C	P
Bee-eaters (Meropidae)						
Blue-bearded Bee-eater <i>Nyctomys athertoni</i>	R	EF/SEF	P			
Green Bee-eater <i>Merops orientalis</i>	R	DDF/O		C	C	C
Chestnut-headed Bee-eater <i>Merops leschenaulti</i>	?R		P	LC		
Cuckoos (Cuculidae)						
Hodgson's Hawk Cuckoo <i>Hierococcyx fugax</i>	?P	EF/SEF	P			
Indian Cuckoo <i>Cuculus micropterus</i>	?		P			
Banded Bay Cuckoo <i>Cacomantis sonneratii</i>	R		C		P	
Plaintive Cuckoo <i>Cacomantis merulinus</i>	R				P	
Violet Cuckoo <i>Chrysococcyx xanthorhynchus</i>	R		P			
Drongo Cuckoo <i>Sumiculus lugubris</i>	R		C	C	P	
Asian Koel <i>Eudynamis scolopacea</i>	R		P	P		
Green-billed Malkoha <i>Phaenicophaeus tristis</i>	R		C	P	C	
Coucals (Centropodidae)						
Greater Coucal <i>Centropus sinensis</i>	R		C	C	C	P
Lesser Coucal <i>Centropus bengalensis</i>	R		P	P		
Parrots and Parakeets (Psittacidae)						
Vernal Hanging Parrot <i>Loriculus vernalis</i>	R		C	C	C	P
Grey-headed Parakeet <i>Psittacula finschii</i>	R	DDF		LC		
Blossom-headed Parakeet <i>Psittacula roseata</i>	R	DDF	P	LC		
Red-breasted Parakeet <i>Psittacula alexandri</i>	R		C	C	C	
Swifts and Treeswifts (Apodidae, Hemiprocnidae)						
White-throated Needletail <i>Hirundapus caudacutus</i>	?P			P		
Silver-backed Needletail <i>Hirundapus cochinchinensis</i>	?R		C	P		
Brown-backed Needletail <i>Hirundapus giganteus</i>	?R		P		P	
Fork-tailed Swift <i>Apus pacificus</i>	?		C	C	C	
Crested Treeswift <i>Hemiprocne coronata</i>	R	DDF	LC	C	LC	P
Owls (Tytonidae, Strigidae)						
Oriental Bay Owl <i>Phodilus badius</i>	R	EF/SEF	P			
Mountain Scops Owl <i>Otus spilocephalus</i>	R	EF/SEF	P			
Collared Scops Owl <i>Otus bakkamoena</i>	R		P	P		
Large owl sp. ¹			P	P		
Fish Owl Ketupa sp. ²	R			P		
Collared Owlet <i>Glaucidium brodiei</i>	R	EF/SEF	P			
Asian Barred Owlet <i>Glaucidium cuculoides</i>	R		C	C	C	
Brown Hawk Owl <i>Ninox scutulata</i>	R		C			
Nightjars (Eurostropodidae, Caprimulgidae)						
Great Eared Nightjar <i>Eurostropodus macrotis</i>	R		P	P	P	
Large-tailed Nightjar <i>Caprimulgus macrurus</i>	R		LC			
Pigeons and Doves (Columbidae)						
Spotted Dove <i>Streptopelia chinensis</i>	R		C	C	C	C
Emerald Dove <i>Chalcophaps indica</i>	R		C	P	P	
Pink-necked Green Pigeon <i>Treron vernans</i>	R	DDF		LC		
Orange-breasted Green Pigeon <i>Treron bicincta</i>	R			P		LC
(Pompadour Green Pigeon <i>Treron pompadora</i>)	?		M			
Thick-billed Green Pigeon <i>Treron curvirostra</i>	R		LC	LC		
Pin-tailed Green Pigeon <i>Treron apicauda</i>	R	EF/SEF				P
Unidentified Green Pigeon <i>Treron sp.</i> ³			C	C	LC	LC
Green Imperial Pigeon <i>Ducula aenea</i>	R		LC	C	C	

Family English and Scientific species names	Status	Habitat Assn.	Coupes 2+3	Coupes 4+5	Snoul W.S.	Senmonorom Plateau
Mountain Imperial Pigeon <i>Ducula bada</i>	R					P
Imperial Pigeon <i>Ducula sp.</i> ⁴			P	P	P	
Rails and Crakes (Rallidae)						
White-breasted Waterhen <i>Amaurornis phoenicurus</i>	R		P		P	
Ruddy-breasted Crake <i>Porzana fusca</i>	?R	W		P		
Jacanas (Jacanidae)						
Bronze-winged Jacana <i>Metopidius indicus</i>	R	W			LC	
Plovers and Lapwings (Charadriidae)						
Red-wattled Lapwing <i>Vanellus indicus</i>	R	OGr		LC	LC	
Hawks, Eagles and Vultures (Accipitridae)						
Jerdon's Baza <i>Aviceda jerdoni</i>	?R	EF/SEF	P			
Black Baza <i>Aviceda leuphotes</i>	?		P	P		
Oriental Honey-buzzard <i>Pernis ptilorhynchus</i>	?		P		P	P
Black-shouldered Kite <i>Elanus caeruleus</i>	?					P
Grey-headed Fish Eagle <i>Ichthyophaga ichthyaetus</i>	R	W			U	
Red-headed Vulture <i>Sarcogyps calvus</i>	R (N)	DDF/O		U		
Crested Serpent Eagle <i>Spilornis cheela</i>	R		C	C	C	
Crested Goshawk <i>Accipiter trivirgatus</i>	R		P	P	P	
Shikra <i>Accipiter badius</i>	R		C	P	P	P
Japanese Sparrowhawk <i>Accipiter gularis</i>	P				P	
Sparrowhawk sp. <i>Accipiter sp.</i> ⁵			P	P	P	
Grey-faced Buzzard <i>Butastur indicus</i>	P					P
Rufous-bellied Eagle <i>Hieraetus kienerii</i>	R		P	P		
Mountain Hawk Eagle <i>Spizaetus nipalensis</i>	R		P			
Falcons (Falconidae)						
Collared Falconet <i>Microhierax caerulescens</i>	R		P	P		
Hérons, Egrets and Bitterns (Ardeidae)						
Little Egret <i>Egretta garzetta</i>	?P		P			
Chinese Pond Heron <i>Ardeola bacchus</i>	WP		C	P	P	
Pond Heron sp. <i>Ardeola sp.</i> ⁶			P		P	
Little Heron <i>Butorides striatus</i>	R	St	P			
Malayan Night Heron <i>Gorsachius melanolophus</i>	?	St	P	P		
Storks (Ciconiidae)						
Woolly-necked Stork <i>Ciconia episcopus</i>	R	FW	P	P		
Lesser Adjutant <i>Leptoptilos javanicus</i>	R	FW		P	P	
Pittas (Pittidae)						
Blue-rumped Pitta <i>Pitta soror</i>	R	EF/SEF	P			
Bar-bellied Pitta <i>Pitta Elliotii</i>	R	EF/SEF	LC	P	P	
Hooded Pitta <i>Pitta sordida</i>	BV		LC			
Blue-winged Pitta <i>Pitta moluccensis</i>	BV		LC	LC	P	
Broadbills (Eurymidae)						
Black-and-red Broadbill <i>Cymbirhynchus macrorhynchus</i>	R				P	
Silver-breasted Broadbill <i>Serilophus lunatus</i>	R	EF/SEF		P		
Banded Broadbill <i>Eurymus javanicus</i>	R	EF/SEF	LC	P	C	
Dusky Broadbill <i>Corydon sumatranus</i>	R		C		P	
Fairy Bluebirds and Leafbirds (Irenidae)						
Asian Fairy Bluebird <i>Irena puella</i>	R		C	LC	C	C
Blue-winged Leafbird <i>Chloropsis cochinchinensis</i>	R		C	P	C	C
Golden-fronted Leafbird <i>Chloropsis aurifrons</i>	R	DDF	P	C		
Shrikes (Laniidae)						

Family English and Scientific species names	Status	Habitat Assn.	Coupes 2+3	Coupes 4+5	Snoul W.S.	Senmonorom Plateau
Brown Shrike <i>Lanius cristatus</i>	W		P			
Magpies, Treepies and Crows (Corvidae: Corvinae)						
Red-billed Blue Magpie <i>Urocissa erythrorhyncha</i>	R	DDF	P	LC		
Rufous Treepie <i>Dendrocitta vagabunda</i>	R	DDF		P		
Racket-tailed Treepie <i>Crypsirina temia</i>	R		P		P	
Large-billed Crow <i>Corvus macrorhynchos</i>	R		P			P
Woodswallows (Corvidae: Artamini)						
Ashy Woodswallow <i>Artamus fuscus</i>	R	DDF/O		P		C
Orioles, Cuckooshrikes, Minivets and Flycatcher-shrikes (Corvidae: Oriolini)						
Black-naped Oriole <i>Oriolus chinensis</i>	?W		C	C	P	
Black-hooded Oriole <i>Oriolus xanthornus</i>	R	DDF	C	C	C	
Large Cuckooshrike <i>Coracina macei</i>	R	DDF		C	LC	C
Black-winged Cuckooshrike <i>Coracina melaschistos</i>	R		C	C	P	P
Small Minivet <i>Pericrocotus cinnamomeus</i>	R	DDF		P		
Scarlet Minivet <i>Pericrocotus flammeus</i>	R		C	P	C	C
Bar-winged Flycatcher-shrike <i>Hemipus picatus</i>	R		C		LC	P
Fantails, Drongos, Monarchs and Paradise-flycatchers (Corvidae: Dicruinae)						
White-browed Fantail <i>Rhipidura aureola</i>	R	DDF		P		
Ashy Drongo <i>Dicurus leucophaeus</i>	?R		C	C	LC	C
Bronzed Drongo <i>Dicurus aeneus</i>	R		LC	P	LC	
Spangled Drongo <i>Dicurus hottentottus</i>	?R		P	LC		
Greater Racket-tailed Drongo <i>Dicurus paradiseus</i>	R		C	LC	C	
Black-naped Monarch <i>Hypothymis azurea</i>	R		C	C	C	
Asian Paradise-flycatcher <i>Terpsiphone paradisi</i>	R	EF/SEF	P	P		
loras (Corvidae: Aegithininae)						
Common lora <i>Aegithina tiphia</i>	R	DDF		C	P	P
Great lora <i>Aegithina lafresnayeii</i>	R		LC		P	
Woodshrikes (Corvidae: Aegithininae)						
Large Woodshrike <i>Tephrodornis gularis</i>	R		LC			
Common Woodshrike <i>Tephrodornis pondicerianus</i>	R			C		
Thrushes (Muscicapidae: Turdinae)						
White-throated Rock Thrush <i>Monticola gularis</i>	W			P		
Blue Rock Thrush <i>Monticola solitarius</i>	W		P			
Blue Whistling Thrush <i>Myophonus caeruleus</i>	R		P			
Eyebrowed Thrush <i>Turdus obscurus</i>	P/W		P			
Flycatchers, Robins and Chats (Muscicapidae: Muscicapinae)						
Darksided Flycatcher <i>Muscicapa sibirica</i>	P		P			
Asian Brown Flycatcher <i>Muscicapa dauurica</i>	WP			P		
Red-throated Flycatcher <i>Ficedula parva</i>	W		P			
Blue-and-white Flycatcher <i>Cyanoptila cyanomelana</i>	P		P			
Blue-throated Flycatcher <i>Cyornis rubeculoides</i>	R	EF/SEF	LC			
Tickell's Blue Flycatcher <i>Cyornis tickelliae</i>	R			LC	LC	
Grey-headed Canary Flycatcher <i>Culicicapa ceylonensis</i>	?AM		P			
Oriental Magpie Robin <i>Copsychus saularis</i>	R		LC	LC	P	P
White-rumped Shama <i>Copsychus malabaricus</i>	R		C	LC	C	
Common Stonechat <i>Saxicola torquata</i>	W		P			
Starlings and Mynas (Sturnidae)						
Chestnut-tailed Starling <i>Sturnus malabaricus</i>	?R					LC
Black-collared Starling <i>Sturnus nigricollis</i>	R		P	LC	LC	

Family English and Scientific species names	Status	Habitat Assn.	Coupes 2+3	Coupes 4+5	Snoul W.S.	Senmonorom Plateau
Vinous-breasted Starling <i>Sturnus burmannicus</i>	R		LC	P		P
Common Myna <i>Acridotheres tristis</i>	R					LC
Golden-crested Myna <i>Ampeliceps coronatus</i>	R		C	LC		
Hill Myna <i>Gracula religiosa</i>	R		C	C	C	P
Nuthatches (Sittidae)						
Chestnut-bellied Nuthatch <i>Sitta castanea</i>	R	DDF		P		
Velvet-fronted Nuthatch <i>Sitta frontalis</i>	R		C	C	P	
Swallows and Martins (Hirundinidae)						
Barn Swallow <i>Hirundo rustica</i>	W		LC	P		P
Red-rumped Swallow <i>Hirundo daurica</i>	W		LC			
House Martin sp. <i>Delichon sp.</i> ⁷	W		P			
Bulbuls (Pycnonotidae)						
Black-headed Bulbul <i>Pycnonotus atriceps</i>	R		LC	P	P	P
Black-crested Bulbul <i>Pycnonotus melanicterus</i>	R		C	P	C	P
Red-whiskered Bulbul <i>Pycnonotus jocosus</i>	R		U			C
Sooty-headed Bulbul <i>Pycnonotus aurigaster</i>	R	DDF/O		C		C
Stripe-throated Bulbul <i>Pycnonotus finlaysoni</i>	R		C	P	C	
Streak-eared Bulbul <i>Pycnonotus blanfordi</i>	R		LC		LC	
Puff-throated Bulbul <i>Alophopus pallidus</i>	R	EF/SEF	C	P	C	
Grey-eyed Bulbul <i>Iole propinqua</i>	R	EF/SEF	C	P	C	P
Black Bulbul <i>Hypsipetes leucocephalus</i>	R					C
Cisticolas and Prinias (Cisticolidae)						
Zitting Cisticola <i>Cisticola juncidis</i>	R	Gr			LC	P
Brown Prinia <i>Prinia polychroa</i>	R	DDF		P		
Rufescent Prinia <i>Prinia rufescens</i>	R		LC	C	P	P
Grey-breasted Prinia <i>Prinia hodgsonii</i>	R			P		
Plain Prinia <i>Prinia inornata</i>	R			LC		P
White-eyes (Zosteropidae)						
Oriental White-eye <i>Zosterops palpebrosus</i>	?					P
Warblers and Tailorbirds (Sylviidae: Acrocephalinae)						
Thick-billed Warbler <i>Acrocephalus aedon</i>	W		P			
Common Tailorbird <i>Orthotomus sutorius</i>	R			P		
Dark-necked Tailorbird <i>Orthotomus atrogularis</i>	R		C	P	C	
Yellow-browed Warbler <i>Phylloscopus inornatus</i>	W		C	C	P	
Arctic Warbler <i>Phylloscopus borealis</i>	P		P			
Pale-legged Leaf Warbler <i>Phylloscopus tenellipes</i>	W		P			
Yellow-bellied Warbler <i>Abroscopus superciliosus</i>	R	Ba	LC			
Laughingthrushes (Sylviidae: Garrulacinae)						
White-crested Laughingthrush <i>Garrulax leucolophus</i>	R		C	C	C	P
Lesser Necklaced Laughingthrush <i>Garrulax monileger</i>	R		P	LC	P	
[Black-throated Laughingthrush <i>Garrulax chinensis</i>]	[R]		[P]			
Babblers (Sylviidae: Sylviinae: Timaliini)						
Buff-breasted Babbler <i>Pellorneum tickelli</i>	R	EF/SEF	P		P	
Puff-throated Babbler <i>Pellorneum ruficeps</i>	R		C	C	C	
Scaly-crowned Babbler <i>Malacopteron cinereum</i>	R	EF/SEF	LC	LC	C	
Large Scimitar Babbler <i>Pomatorhinus hypoleucos</i>	R		P		P	
White-browed Scimitar Babbler <i>Pomatorhinus schisticeps</i>	R	>550m				P
Striped Tit Babbler <i>Macronous gularis</i>	R		C	C	C	C
Grey-faced Tit Babbler <i>Macronous kelleyi</i>	R	EF/SEF	C	LC	C	P
Black-browed Fulvetta <i>Alcippe grotei</i>	R	EF/SEF	LC		LC	

Family English and Scientific species names	Status	Habitat Assn.	Coupes 2+3	Coupes 4+5	Snoul W.S.	Senmonorom Plateau
White-bellied Yuhina <i>Yuhina zantholeuca</i>	R		LC	LC	P	
Larks (Alaudidae)						
Indochinese Bushlark <i>Mirafra marionae</i>	R	DDF/O			P	
Flowerpeckers, Sunbirds and Spiderhunters (Nectariniidae)						
Thick-billed Flowerpecker <i>Dicaeum agile</i>	R		LC		P	
Yellow-vented Flowerpecker <i>Dicaeum chrysorheum</i>	R		P			
Plain Flowerpecker <i>Dicaeum concolor</i>	R		C	C	C	
Scarlet-backed Flowerpecker <i>Dicaeum cruentatum</i>	R				LC	
Flowerpecker <i>Dicaeum</i> sp			P	P	P	P
Ruby-cheeked Sunbird <i>Anthreptes singalensis</i>	R		P	P	P	
Purple-naped Sunbird <i>Hypogramma hypogrammicum</i>	R	EF/SEF	LC			
Purple-throated Sunbird <i>Nectarinia sperata</i>	R	EF/SEF		P	P	
Olive-backed Sunbird <i>Nectarinia jugularis</i>	R		P			
Purple Sunbird <i>Nectarinia asiatica</i>	R	DDF		LC		
Crimson Sunbird <i>Aethopyga siparaja</i>	R		P		P	
Little Spiderhunter <i>Arachnothera longirostra</i>	R		C	P	P	
Streaked Spiderhunter <i>Arachnothera magna</i>	R	EF/SEF	LC			P
Sparrows (Passeridae: Passerinae)						
Eurasian Tree Sparrow <i>Passer montanus</i>	R		P			P
Wagtails and Pipits (Passeridae: Motacillinae)						
Forest Wagtail <i>Dendronanthus indicus</i>	W		P			
Yellow Wagtail <i>Motacilla flava</i>	W		P	P	P	P
Paddyfield Pipit <i>Anthus rufulus</i>	R	Gr/O		P	LC	C
Parrotfinches and Munias (Passeridae: Estrildinae)						
Pin-tailed Parrotfinch <i>Erythrura prasina</i>	?R (N)	Ba	P			
White-rumped Munia <i>Lonchura striata</i>	R		LC	P		

APPENDIX VI. Mammal species recorded during the survey

Key:
 O = Observation
 I = Interview
 T = Track or sign
 R = Remains/body parts
 Sp = Specimen
 P = Photo-trapped
 [] = Provisional

Scientific name	English name	Khmer name	English transliteration	Coupe 2a/3	Coupe 4	Coupe 5	Sen Monorom	Snoul WS
<i>Manis javanica</i>	Sunda Pangolin	BRgU	Pongrool	[I]	[I]	T	R	
<i>Tupaia belangeri</i>	Northern Treeshrew	knik	Kon thuk	O	O	O		
<i>Dendrogale murina</i>	Northern Smooth-tailed Treeshrew	knik, al qit	Kon thuk k'baal chnowt	O	O	O		
<i>Cynopterus sphinx</i>	Greater Short-nosed Fruit Bat	Rbecov	Prao chiew			Sp		
<i>Megaerops niphanae</i>	Northern Tail-less Fruit Bat	Rbecov	Prao chi ew			Sp		
<i>Macroglossus sobrinus</i>	Greater Long-tongued Fruit Bat	Rbecov	Prao chiew			Sp		
<i>Megaderma spasma</i>	Lesser False Vampire Bat	Rbecov	Prao chiew			Sp		
<i>Rhinolophus acuminatus</i>	Acuminate Horseshoe Bat	Rbecov	Prao chiew			Sp		
<i>Tylonycteris pachypus</i>	Lesser Club-footed Bat	Rbecov	Prao chiew			Sp		
<i>Tylonycteris robustula</i>	Greater Club-footed Bat	Rbecov	Prao chiew			Sp		
[<i>Nycticebus coucang</i>]	Slow Loris	rj RbepH	Romhee propes	[Sp]		[Sp]	[Sp]	
[<i>Nycticebus pygmaeus</i>]	Pygmy Loris	rj RPlg	Romhee pleung	[Sp]			[Sp]	
<i>Macaca nemestrina</i>	Pig-tailed Macaque	SHTAS	Svar traos	O	O			
<i>Macaca fascicularis</i>	Long-tailed Macaque	sikm	Svar k'daam	O		O		O
<i>Macaca arctoides</i>	Stump-tailed Macaque	sHGgt	Svar ongkoot	O	O			
[<i>Semnopithecus cristatus</i>]	Silvered Langur	SIBam	Svar pream		[I]			
<i>Pygathrix nemaeus</i>	Douc Langur	SIRKvat	Svar krovath sor	O	O	O		O
<i>Hylobates gabriellae</i>	Yellow-cheeked Gibbon	etacfael Og	Toach tpoal luong	O	O	O		
[<i>Canis aureus</i>]	Asiatic Jackal	Eqack	Chkai chor chork		[I]			
[<i>Cuon alpinus</i>]	Dhole	EqapB	Chkai prey		[I]			
[<i>Ursus thibetanus</i>]	Asiatic Black Bear	xaxm	Klah kmom thom	[T, I]	[T, I]	[T, I]	[R]	
<i>Ursus malayanus</i>	Sun Bear	xaxm	Klah kmom toich	P	[T, I]	[T, I]	[R]	
<i>Martes flavigula</i>	Yellow-throated Marten	SBackel Og	Sompoch kor leung	P	O			
<i>Arctonyx collaris</i>	Hog Badger	RCKeBan/RCKRBU	Chrouk pown/prool	P		[T]		

Scientific name	English name	Khmer name	English transliteration	Coupe 2a/3	Coupe 4	Coupe 5	Sen Monorom	Snoul WS
<i>Lutra/Lutrogale/Aonyx</i>	Otter sp.	ep	Pae		[I]	[I]		
<i>Viverra megaspila</i>	Large spotted Civet	sBacFM	Sompoich thom	P, Sp				
<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	sBacKCb/sBacetat	Sampoich kraob	O, Sp	[I]	[I]		
<i>Arctictis binturong</i>	Binturong	Opserlog	Chmooce praeng		R	[I]		
<i>Prionailurus bengalensis</i>	Leopard Cat	opav	Chmarr daow	P	[T]	[I]		
[<i>Catopuma temminckii</i>]	Asian Golden Cat	xæi Ogmias	Klah læung meas			[I]		
[<i>Pardofelis nebulosa</i>]	Clouded Leopard	xæBBk	Klah porpok		[T]	[T]	[R]	
[<i>Panthera pardus</i>]	Leopard	xæxñ	Klah rokun	[I]	[T, I]	[T, I]	[R]	
<i>Panthera tigris</i>	Tiger	xæFkædbg	Klah thom/dombong	P, O, T	[T]	[T, I]	[R]	
<i>Elephas maximus</i>	Asian Elephant	dhil	Damrei	P, T	I	[I]	R	
<i>Sus scrofa</i>	Wild Pig	RCKæRB	Chroukprey	O	O	O	R	
<i>Tragulus javanicus</i>	Lesser Mousedeer	kñeij gtt-pgñtt	Kadan gneng toich	O				
<i>Cervus unicorn</i>	Sambar	æbS	Prus	P, [T]	R, [T]	P, [T]	R	O
<i>Muntiac muntjak</i>	Red Muntjac	Ois	Chlous	O	O	R	R	
[<i>Megamuntiacus vuquangensis</i>]	Large antlered Muntjac	Ois ykS/Ois EsjFM	Chlous yeak/Chlous sneng thom				R	
<i>Bos/Bubalus</i>	Wild cattle	BBkæKaTs	Kou sar thus	T	T	T		
<i>Bos gaurus</i>	Gaur	xæj	Khting	P, [T]	[R, T]	P, [T]	R	
<i>Bos javanicus</i>	Banteng	Tensag	Tonsaong	[T]	[T]	P, Sp	R	
[<i>Naemohedus sumatrensis</i>]	Southern Serow	ækh	Kess				R	
<i>Ratufa bicolor</i>	Black Giant Squirrel	kñBkFM	Kom prok thom	O	O	O		
<i>Callosciurus finlaysonii</i>	Variable Squirrel	kñBkBIN	Kom prok pour	O				
<i>Tamiasp. sp.</i>	Cambodian/Eastern Striped Squirrel	kñj	Kang hech	O	O	O		
<i>Menetes berdmorei</i>	Berdmore's Squirrel	kñjñ	Kang hen	O	O			
<i>Hystrix brachyura</i>	East Asian Porcupine	Rbma	Pro ma	O	R	R	R	
[<i>Atherurus macrourus</i>]	Asian Brush-tailed Porcupine	Rbmaej	Pro maogn		[I]			