

Lao range to merit designation as a key species. *Special Significance*: Endemic to Cambodia and parts of Lao PDR, Thailand and Vietnam (Corbet and Hill 1992). *Taxonomic issues*: See under *T. mccllellandii*.

[*Tamiops swinhoi* **Swinhoe's Striped Squirrel**]. Range possibly extends into far northern Lao PDR, as the species occurs relatively close by in Yunnan, China, and northern Tonkin, Vietnam (Moore and Tate 1965).

Tamiops maritimus **Eastern Striped Squirrel** (= Chinese Striped Squirrel). North, south (Moore and Tate 1965): no specimens from centre but provisional sight records in e.g.^{M8}. Occurs only east of the Mekong (Moore and Tate 1965). Habitat use unclear; where sympatric with *T. rodolphii*, forms resembling this species occur in degraded evergreen forest, mixed deciduous forest and scrub, with *T. rodolphii* in denser, more evergreen forest (Duckworth *et al.* 1994, Steinmetz 1998b). Elsewhere in Lao PDR, *T. 'maritimus'* occurs in little degraded evergreen forest. *Taxonomic issues*: See under *T. mccllellandii*. Squirrels keying out as this species in Corbet and Hill (1992) occur widely in Lao PDR, but several forms are probably involved as both calls and habitat-use differ across the Lao range.

[*Dremomys pernyi* **Perny's Long-nosed Squirrel**]. This species inhabits southern Yunnan, China, and west Tonkin, Vietnam (Moore and Tate 1965, Dang Huy Huynh 1994) and may thus be found in northern Lao PDR.

Dremomys rufigenis **Red-cheeked Squirrel** (= Red-cheeked Ground Squirrel; Red-cheeked Squirrel^{M2, M4, M5}). North^{M8}, centre^{M8}, south^{M8}. Evergreen and deciduous forests, and dense scrub, from the Mekong plains to higher montane areas. The species is common in many lowland areas, e.g. Xe Pian NBCA; the genus was considered to "occur only in the mountains or hills" by Moore and Tate (1965), but this assessment is not applicable in Lao PDR. (Plates 14, 17)

Menetes berdmorei **Berdmore's Squirrel** (= Indochinese Ground Squirrel^{M2, M5}). North^{M14}, centre^{M8}, south^{M8}. Common in dry dipterocarp forest and present in many other forest types, including deep within little degraded semi-evergreen forest. Mainly lowlands and lower hills.

Conservation Management and Research Proposed for Non-flying squirrels:

- Structured collecting programme of *Tamiops* spp., *Callosciurus finlaysonii* and *C. erythraeus* across Lao PDR; appropriate conservation prioritisation within these genera can only be carried out after their systematics are better documented.
- Pending this, documentation of these genera by (1) assessment whether each morph observed fits visually a

form named from the area and (2) for each that does not, inclusion in the survey report of a precise description of pelage (detailing intra-population variation). Tape-recorded calls may facilitate retrospective identification.

- Year-round protection from hunting for Black Giant Squirrel in NBCAs, and seasonal protection throughout the country.
- Research into status and habitat use of Inornate Squirrel to allow selection of appropriate areas for its conservation and assessment of the need for hunting controls.

Pteromyidae: Flying squirrels (6-8 species in Lao PDR; 43 worldwide)

• *Trogopterus pearsonii* (= *Belomys pearsoni*^{M1, M2}; = *B. pearsonii*^{M4, M6, M7}) **Hairy-footed Flying Squirrel**. *Conservation Significance*: Globally Near-Threatened; Little Known in Lao PDR. *Documented Range and Habitat*: Centre^{M17}. Habitat use in Lao PDR unknown. *Status Information*: See below. Remains of two individuals were found in owl pellets collected in Khammouan Limestone NBCA in early 1998 (Robinson and Webber 1998a). Lekagul and McNeely (1977) and Corbet and Hill (1992) both mapped the species over a diffuse area centred on Chapa (Tonkin, Vietnam) and extending into Lao PDR, but we have traced no published historical records from Lao PDR.

[*Petaurista petaurista* **Red Giant Flying Squirrel** (= Red Flying Squirrel^{M5}); (included in *P. petaurista* Red Giant Flying Squirrel^{M2, M3}, Common Giant Flying Squirrel^{M1})]. Although mapped for north-west Lao PDR by Corbet and Hill (1992), we have traced no primary records. Boonratana's (1997) listing for Nam Phoun NBCA was an editorial error for *P. philippensis* (RB). *Taxonomic issues*: see note under *P. philippensis*.

Petaurista philippensis **Indian Giant Flying Squirrel** (included in *P. petaurista* Red Giant Flying Squirrel^{M2, M3}, Common Giant Flying Squirrel^{M1}). North^{M13}, centre^{M8}, south^{M8}. Closed forest, evergreen or deciduous, from Mekong plains to almost 1000 m; altitudinally separated from *P. elegans* at least in the Nam Theun basin (Duckworth 1998). *Taxonomic note*: Forms of this species occurring in Lao PDR were known historically as *P. lylei badiatus* and *P. annamensis* (Plate 17). These may not be distinct from each other (Corbet and Hill 1992). All recent Lao field records refer to them. Until recently, they were included within *P. petaurista* by many authors (e.g. Lekagul and McNeely 1977). Other forms currently included in *P. philippensis* might also be found to occur in north Lao PDR. As there is little agreement between workers as to within which species various named forms belong (contrast Corbet and Hill 1992 with Zhang Yongzu 1997), detailed description of any *Petaurista* seen in Lao PDR

not *P. ph. annamensis* (including *badius*) or *P. elegans marica* is essential to allow identification.

Petaurista elegans **Lesser Giant Flying Squirrel** (= Spotted Giant Flying Squirrel^{M3, M4}). North^{M13}, centre^{M13}. Forests above 1000 m. Recent records come from the Annamites (Duckworth 1998, Evans *et al.* in prep. b; Plate 17), Nam Phoun NBCA in the north-west (a skin of a hunted animal, lacking information on origin; Boonratana 1997, RB) and Ban Phonsavan market (Xiangkhouang Province; JWD). Historically, a specimen was taken in Xiangkhouang (Delacour 1940).

• *Hylopetes spadiceus* **Red-cheeked Flying Squirrel** (included in *H. lepidus* Red-cheeked Flying Squirrel^{M2}). *Conservation Significance*: Little Known in Lao PDR. *Documented Range and Habitat*: North (provisionally, Tizard *et al.* 1997), centre^{M17}, south (historically)^{M18}. Habitat in Lao PDR unknown. *Status Information*: See below. The species was recorded from Paleng and Ban Thateng, two adjacent sites on the north-east Bolaven Plateau (Osgood 1932) and it was considered very rare by Delacour (1940). Deuve (1972) recorded it (without details) from the centre and south. A single (provisionally identified) was found dead in Nam Ha NBCA in early 1997 (Tizard *et al.* 1997, as *H. lepidus*). The only recent confirmation in Lao PDR is of a skull near a hunters' cooking site in Khammouan Limestone NBCA in 1998 (Robinson and Webber 1998a). *Taxonomic issues*: see *H. lepidus*, Appendix.

• *Hylopetes alboniger* **Particolored Flying Squirrel**. *Conservation Significance*: Globally Threatened - Endangered; Little Known in Lao PDR. *Documented Range and Habitat*: North (provisionally)^{M16}, south (historically)^{M18}. Habitat in Lao PDR unknown. *Status Information*: See below. One was collected at Pakxe in 1931-1932 (Osgood 1932, Delacour 1940). The species was mapped for most of Lao PDR by Lekagul and McNeely (1977), perhaps by extrapolation. Deuve (1972) stated that the species inhabited trees right in the town centre of Vientiane. Recent records possibly of this species include one in *Fokienia* forest (about 1700 m) in Nam Xam NBCA in early 1998 (Showler *et al.* 1998b; DAS), a skin near Nam Phoun NBCA in 1997 (Boonratana 1997, RB) and one in a Vientiane market in 1991 (Srikosamatara *et al.* 1992). *Taxonomic issues*: Separation of this species from *H. phayrei* is difficult, and indeed animals from the Korat Plateau, Thailand (adjacent to Lao PDR) fit neither species clearly (Lekagul and McNeely 1977, Corbet and Hill 1992). Animals apparently of this species-pair observed recently in several field localities of Lao PDR had pale grey cheeks, paler than the crown and darker than the throat, and are thus unidentifiable from Corbet and Hill (1992: 315). Until pelage characters are more clearly understood in Lao PDR, identifications to species can only be made using skull characters.

• *Hylopetes phayrei* **Phayre's Flying Squirrel**. *Conservation Significance*: Little Known in Lao PDR. *Documented Range and Habitat*: North (provisionally, Boonratana 1997), centre^{M17}, south (provisionally)^{M11}. No confirmed historical specimens. Mapped for north-west Lao PDR by Lekagul and McNeely (1977) and Corbet and Hill (1992), perhaps by extrapolation from extralimital records. Habitat in Lao PDR unclear. *Status Information*: See below. Bourret (1944) reported provisionally a specimen from Savannakhet in 1943, but suffered from the same problem as current workers: a lack of comparative material. Deuve (1972) considered the species montane in Lao PDR but gave no other detail. Remains of four individuals were found in owl pellets in Khammouan Limestone NBCA in 1998 (Robinson and Webber 1998a). Two purchased fresh in the Ban Lak (20) market are held in the NHM, UK, where identification was confirmed (Evans *et al.* in prep. b). There are provisional identifications from Dong Ampham NBCA (two juveniles, apparently from the Xe Kaman lowlands, obtained from a villager and deposited in the Royal Ontario Museum, Canada; Davidson *et al.* 1997, C. M. Francis *in litt.* 1998) and Nam Phoun NBCA in 1997 (a preserved skin; Boonratana 1997, RB).

[*Petinomys setosus* **Temminck's Flying Squirrel** (= White-bellied Flying Squirrel^{M2, M4})]. Not recorded for Lao PDR, but may be found to occur in north as in adjacent north Thailand it has been found in deciduous forests at 1300-1700 m (Muul and Thonglongya 1971); similar habitat occurs in parts of northern Lao PDR.

Status Information on Small flying squirrels: Small flying squirrels occur widely in markets, but these lack information on capture site. They have been seen regularly on field surveys only in deciduous parts of Xe Pian NBCA and in degraded evergreen forest of Phou Xang He NBCA (Duckworth *et al.* 1994). Scattered records from many other areas (Table 12), including evergreen forest at 1200 m (Duckworth 1998), presumably involve several taxa. Low sighting rates are as likely to reflect difficulties of detection (eyeshine is weak) as low numbers. Local declines have obviously occurred (no species is now observed regularly at large in the centre of Vientiane town), but whether declines have been widespread, or whether any species is associated with a preferentially threatened habitat, is unclear. All members of the genera *Trogopterus* and *Hylopetes* are categorised as Little Known in Lao PDR as there are few certain records of any species, some are listed as of global conservation concern by IUCN (1996) and species which are truly at risk can only be identified once there is a basic understanding of the status, habitat use and distribution of each.

Conservation Management and Research Proposed for Flying squirrels:

- Clarification of the status of all species in *Trogopterus*, *Hylopetes* and *Petinomys* by a structured collecting programme, and of *Petaurista petaurista* (field observations will suffice), so that taxa in need of action can be identified, and areas and actions prioritised. For small flying squirrels, only field trapping, acquisition of freshly captured animals from hunters in the field, and collection of remains left by predators (as used successfully by Robinson and Webber 1998a) will allow understanding of distribution and habitat use.
- Conservation of adequate areas of habitat through the NBCA system.
- Monitoring of trade levels.

Muridae (mice, rats, voles and bamboo rats): see separate chapter

Hystricidae: Porcupines (2 species in Lao PDR; 11 worldwide)

• *Hystrix brachyura* **East Asian Porcupine** (separated as *H. hodgsoni* Crestless Himalayan Porcupine^{M2}, Hodgson's Porcupine^{M1}). *Conservation Significance*: Globally Threatened - Vulnerable. Not At Risk in Lao PDR (see below). *Documented Range and Habitat*: North^{M9}, centre^{M13}, south^{M8}. All forest-types, scrub and agricultural areas from plains to at least 1600 m. *Status Information*: Field records from many recent survey areas (Table 12). Porcupines are both frequent crop pests and food in rural Lao PDR (Tables 1, 2), and their meat is sold in urban markets (Annex 1) and exported to Thailand (Srikosamatara *et al.* 1992). Quills, stomachs and other parts are used in traditional medicine, but there is no evidence that this threatens the species (Martin 1992, Baird 1995b). *Taxonomic issues*: Lekagul and McNeely (1977) divided this species into *H. hodgsoni* Crestless Himalayan Porcupine and *H. brachyura* Malayan Porcupine. The latter is primarily Sundaic, with an isolated population in west Yunnan (China), but there is no evidence of it in Lao PDR. This arrangement was not followed by Corbet and Hill (1992), nor by IUCN (1996). The latter categorised *H. brachyura* in the wide sense as Globally Threatened, thus including populations in Lao PDR, although these were not listed (J. Baillie *in litt.* 1998).

Atherurus macrourus **Asiatic Brush-tailed Porcupine** (= Bush-tailed Porcupine^{M2}; = Brush-tailed Porcupine^{M1}). North^{M15}, centre^{M8}, south^{M8}. Wide range of forest and degraded habitats from plains to at least mid altitudes. (Plate 17)

Conservation Management and Research Proposed for Porcupines:

- Monitoring of trade levels.
- Clarification of the global status of *H. brachyura*; if its status in Lao PDR reflects that range-wide, it does not merit the IUCN (1996) category of Globally Threatened. Conversely, if the species is genuinely threatened elsewhere, the Lao population is internationally significant and should be monitored, although currently the species is not At Risk in Lao PDR or even potentially so.

Leporidae: Hares and rabbits (2-3 species in Lao PDR; 54 worldwide)

Lepus peguensis **Siamese Hare** (= Burmese Hare^{M4, M5}); (sometimes included in *L. nigricollis* Indian Hare). North^{M9}, centre^{M8}, south^{M8}. Naturally in dry dipterocarp forest and dry-season river channel vegetation; also in secondary grasslands and other disturbed areas.

[*Lepus comus* **Yunnan Hare**]. Not recorded from Lao PDR but mapped range in Corbet and Hill (1992) comes very close to the Yunnan (China) - Lao PDR border and the species may yet be found to occur in the far north, from whence there appear to be no specimens of any hare.

• *Nesolagus* sp. **Annamite Striped Rabbit**. *Conservation Significance*: Discovered too late for assessment by IUCN (1996); Little Known in Lao PDR. Endemic to the Annamite mountains of Lao PDR and Vietnam (SurrIDGE *et al.* 1999). *Documented Range and Habitat*: North (provisionally, Tizard 1996), centre (RJTim). Reported by villagers to inhabit climatically wet evergreen forest. *Status Information*: Several specimens found in the Ban Lak (20) market in 1996 are under formal description. Villagers report the species from Nam Theun Extension PNBCA (Tobias 1997) and the southern parts of Nakai-Nam Theun NBCA (RJTim), but there are as yet no field records. Rabbits are used in traditional medicine (Baird 1995b), but there is no evidence that this species is used. The species is currently listed as Little Known in Lao PDR as any threats to it are unclear.

Conservation Management and Research Proposed for Hares and rabbits:

- Field surveys and study to determine the range of *Nesolagus* in Lao PDR, habitat use, and threats (if any) to the species.
- Formal taxonomic analysis of the Annamite form to determine the degree of divergence from *N. netscheri* Sumatran Rabbit (Globally Threatened - Critical; IUCN 1996). This is currently ongoing by RJTim (morphological aspects) and A. SurrIDGE and D. Bell (University of East Anglia, U.K.; genetics).

Appendix: Species Omitted from the Foregoing List

Tupaia glis **Common Treeshrew** (included in *T. glis* Common Treeshrew^{M2, M3}, *T. glis* Malay Treeshrew^{M1}). Various recent reports (e.g. Davidson 1998) following Corbet and Hill's (1992) taxonomy listed *T. glis* for Lao PDR; this was an accidental error for *T. belangeri*.

Hylobates hoolock **Hoolock Gibbon**. Suggestions that Hoolock Gibbon occurs in Lao PDR (e.g. Gressitt 1970, and "Laos?" under the species's range in IUCN 1996) seem to stem from Deuve and Deuve (1963a). Although they knew of no Lao specimen, they felt that the species might inhabit Lao PDR, as it occurred in nearby parts of Myanmar. This caution was later abandoned and the species was stated to be present in Lao PDR, although only in the north (Deuve 1972: 12). It is most unlikely that Hoolock Gibbon occurs in Lao PDR as it would have to cross two major rivers, the Salween and the Mekong (see Geissmann 1995).

Rhinoceros unicornis **Indian Rhinoceros** (= Great Indian One-horned Rhinoceros^{M1}, = Great Indian Rhinoceros^{M7}). Deuve and Deuve (1962b) suggested that this rhinoceros may occur or may have occurred in Lao PDR. Rookmaaker (1980) considered the special Lao name for a large one-horned rhinoceros documented by the Deuves to be "the soundest reason yet presented to accept the presence of *R. unicornis* in Laos". However, it means little as in Lao PDR size variants of quarry species often have special names. Rookmaaker (1980) concluded that there is no evidence that this species ever inhabited Lao PDR.

Cervus duvaucelii **Barasingha** (= Swamp Deer^{M5}); (separated as *C. schomburgki*^{M6}, Schomburgk's Deer^{M2, M4}). A set of antlers apparently of this species was seen in a Phongsali medicine shop in 1991. Although Schroering (1995) stated that the shop owner had reported that they came from an animal killed nearby in 1990, when WGR revisited him in 1996 he disclaimed all knowledge of their origin. Although *C. d. schomburgki* is often considered to have been restricted to the Chao Phraya basin of Thailand prior to its extinction (e.g. Lekagul and McNeely 1977), there are unresolved historical indications of a wider distribution (G. Schroering verbally 1997).

Callosciurus pygerythrus **Irrawaddy Squirrel** (= Hoary-bellied Himalayan Squirrel^{M1}). Deuve (1972) listed *C. p. pygerythrus* for Lao PDR as well as '*C. p. imitator*' (= *C. inornatus*). However, except around Mandalay, Myanmar, *C. pygerythrus* occurs only west of the Irrawaddy / Sittang Rivers (Moore and Tate 1965). Deuve's (1972) mistake is clearly a mis-citation of Gray's (1867) type description of *C. inornatus*.

Petaurista alborufus **Red-and-white Giant Flying Squirrel** (Red-and-white Flying Squirrel^{M4, M5}). This species is mapped in Lekagul and McNeely (1977) for most of northern Lao PDR. However, this population, *P. "a." barroni*, is better regarded as a form of *P. petaurista* (Corbet and Hill 1992). Furthermore, we have traced no primary sources concerning the occurrence of *barroni*, whatever species it is associated with, in Lao PDR.

Hylopetes lepidus **Grey-cheeked Flying Squirrel** (included in *H. lepidus* Red-cheeked Flying Squirrel^{M2}). This species was listed for Nam Ha NBCA by Tizard *et al.* (1997), but as accepted by Hill (1960) and Corbet and Hill (1992), *lepidus* is a Sundaic form which would be most unexpected in Lao PDR. However, Lekagul and McNeely (1977) considered *H. lepidus* to include *H. spadiceus*, which does occur in Lao PDR, and the identification in Nam Ha NBCA was made on this basis (RJTiz). Wilson and Reeder (1993) recorded *H. lepidus* from southern Vietnam, based on a mention in Sokolov *et al.* (1986). This may stem from a specimen listed (without details) from Phu Quoc island and held in the MNHN, Paris, by Cao Van Sung (1984).

Aeromys tephromelas **Black Flying Squirrel** (= Large Black Flying Squirrel^{M2}). This species was listed for Nam Ha NBCA by Tizard *et al.* (1997), but it is known only from the Malay Peninsula, Sumatra and Borneo (Corbet and Hill 1992). Lekagul and McNeely (1977), mentioning specimens perhaps of this squirrel in shops in Chiangmai (north-west Thailand), speculated about the existence of a northern population as yet undocumented. If there is one, the species may indeed occur in Lao PDR. As, at least locally, melanistic individuals of the genus *Petaurista* can look uniformly very dark (e.g. Duckworth 1997d), a specimen would be necessary to confirm this species's presence in Lao PDR.

ORDER INSECTIVORA

M. F. Robinson

INTRODUCTION

This list includes all species of the mammalian order Insectivora with Lao records known to the author. Species are listed as confirmed in Lao PDR only where a documented record has been traced; portrayal of parts of Lao PDR in the range maps of general works (e.g. Lekagul and McNeely 1977, Corbet and Hill 1992) is not sufficient, as most maps extrapolate to some degree. Additionally, several species known from neighbouring countries which may potentially occur in Lao PDR are placed in square brackets. The taxonomy and species limits of this order are unsettled and it is likely that further species will be named, including both reassessments of existing material and new discoveries. World species totals for families are taken from Corbet and Hill (1992).

Sequence, species limits and scientific names follow *Mammals of the Indomalayan Region* (Corbet and Hill 1992), with minor exceptions, including some presented by Hutterer (1993). Synonymies are presented except when extensive, where reference is made to an existing compilation. No English names are given as there is no stability of usage, in or outside the region, for these species. Little is known about the distribution and habitat of species of Insectivora in Lao PDR, so detail is presented of recent records supplemented (explicitly) with information from neighbouring countries.

No species are listed in CITES Appendix I or II (WCMC 1998) and only a single species, *Hylomys sinensis*, is of international conservation significance in IUCN (1996). No other key species of special conservation significance are designated as there is insufficient information to assess national conservation status. There is no reason to believe that any species is threatened in Lao PDR other than indirectly through habitat change.

Often species can only be identified by critical comparison of specimens with those held in museum collections. Thus, information presented here is restricted to identifications verified with voucher specimens, except where indicated.

ANNOTATED LIST OF SPECIES

Erinaceidae: Gymnures (1 species in Lao PDR; 1 potentially; about 19 species worldwide)

Subfamily Galericinae

***Hylomys suillus* Müller, 1841** (= *H. peguensis* Blyth, 1859; = *H. parvus* Robinson and Kloss, 1916). North (Osgood 1932), centre (provisionally, Deuve 1972) and south (sight

record, Duckworth *et al.* 1994). Occurs throughout most of Indochina (Corbet and Hill 1992, Hutterer 1993) with specific records from Phongsali and Xiangkhouang (Osgood 1932), and Dong Hua Sao NBCA at 1200 m on the Bolaven Plateau amid degraded scrub land (Duckworth *et al.* 1994; TDE). Deuve (1972) stated that the subspecies *H. s. microtinus* is found in north Lao PDR from Vientiane to the Chinese border and *H. s. siamensis* in central and south Lao PDR. He detailed no specific localities, although Deuve and Deuve (1963b) listed "Vientiane" for the species. Bergmans (1995) mentioned village reports of sightings from Sekong Province, perhaps attributable to this species. From specimens in NHM, Osgood (1932), Allen (1938) and Dao Van Tien (1985), it seems that three taxa (whether best regarded as species or subspecies is unclear) inhabit Indochina: (1) *H. s. siamensis*, which extends from eastern Thailand to Xiangkhouang in Lao PDR; (2) one as yet un-named known from Dak To, in the Vietnamese Annamites; and (3) *H. s. microtinus*, from Phongsali in Lao PDR and several localities in Tonkin, Vietnam (C. P. Groves *in litt.* 1999).

[• ***Hylomys sinensis* (Trouessart, 1909)** (= *Neotetracus sinensis*)]. **Conservation Significance:** Globally Near-Threatened (IUCN 1996). **Context:** Not recorded from Lao PDR; however, as it is found from north Vietnam (Osgood 1932) west to Sichuan it seems very likely to inhabit adjacent parts of Lao PDR (C. P. Groves *in litt.* 1999).

Talpidae: Moles (2 species in Lao PDR; 1 potentially; about 31 species worldwide)

Subfamily: Talpinae

***Talpa micrura* Hodgson, 1841** (= *T. cryptura* Blyth, 1843; = *T. klossi* Thomas, 1929; = *T. parvidens* Miller, 1940). North, centre (provisionally, Corbet and Hill 1992) and south (Osgood 1932). Recorded throughout Lao PDR by Corbet and Hill (1992) and Deuve (1972), but no specific localities or habitat information are given. A single specimen was collected at Ban Thateng (Osgood 1932). Also recorded from areas of northern Vietnam (Osgood 1932) and Thailand (Allen and Coolidge 1940). In Thailand it occurs in forests, particularly in mountainous areas (Lekagul and McNeely 1977), at altitudes of 1000-2000 m (Corbet and Hill 1992).

[***Talpa longirostris* Milne-Edwards, 1870**]. No Lao records, but found in neighbouring areas of northern Vietnam at altitudes of 1800-2900 m (Corbet and Hill 1992) and so may be found in adjacent parts of Lao PDR.

***Talpa leucura* Blyth, 1850**. North (Osgood 1932). Single specimen recorded from Xiangkhouang by Osgood (1932), listed as *Parascaptor leucurus*. Also, recorded in north Lao

PDR by Corbet and Hill (1992), presumably on the basis of Osgood's record. Delacour (1940) stated that the species seemed fairly well distributed; the basis for this is unclear, as it is for Deuve and Deuve's (1963b) statement that the species was common in all Lao provinces.

Soricidae: Shrews (5 species in Lao PDR; 7 potentially; about 272 species worldwide)

Subfamily: Soricinae

[***Soriculus leucops* Hodgson in Horsfield, 1855** (= *S. minor* Dobson, 1890; = *S. baileyi* Thomas, 1914; = *S. gruberi* Weigel, 1969)]. Not recorded from Lao PDR, but found in northern Vietnam at altitudes of 3000 m (Osgood 1932), and thus potentially occurs in adjacent parts of Lao PDR.

[***Soriculus macrurus* Blandford, 1888** (= *S. irene* Thomas, 1911)]. No Lao records, but found in northern Vietnam, close to the Lao border (Corbet and Hill 1992), and thus potentially occurs in adjacent parts of Lao PDR.

[***Soriculus parca* (Allen, 1923)** (= *Chodsigoa smithii parca* Allen, 1923; = *C. lowei* Osgood, 1932; = *C. s. furva* Anthony, 1941)]. Not known from Lao PDR, but found in northern Vietnam, near the Lao border (Osgood 1932, Deuve 1972) and Thailand (Allen and Coolidge 1940). Lekagul and McNeely (1977) recorded *S. salenskii* Kastschenko, 1907 in Thailand, and their generalised distribution map included northern Lao PDR, but Lao PDR was not mentioned in the text. At the time *salenskii* was taken to include the form *smithii*, of which *parca* was considered a subspecies. However, *S. parca*, *S. smithii* and *S. salenskii* are all now considered to be separate species; *S. salenskii* is currently only recognised from an incomplete holotype from north Sichuan, China (Corbet and Hill 1992).

[***Anourosorex squamipes* Milne-Edwards, 1872** (= *A. assamensis* Anderson, 1875)]. No specific records for Lao PDR, although Corbet and Hill (1992) stated that it probably occurs. Also, Lekagul and McNeely (1977) showed a generalised distribution map which includes areas of north Lao PDR; however, this is not mentioned in the text. Known from neighbouring northern Vietnam (Osgood 1932), north Thailand (Allen and Coolidge 1940), Myanmar (Corbet and Hill 1992) and China (Osgood 1932). In Yunnan, China, it has been collected between 2438 and 3048 m (Allen 1923).

[***Chimarrogale himalayica* (Gray, 1842)** (= *Crossopus himalayica* Gray, 1842; = *C. leander* Thomas, 1902; = *C. varennei* Thomas, 1927). North (Osgood 1932). Single specimen caught in Phongsali (Osgood 1932). Deuve (1972) recorded it in Lao PDR, apparently (Deuve and Deuve 1963b)

extrapolating from Ellerman and Morrison-Scott (1951). Also occurs in northern Vietnam (Osgood 1932), north Myanmar and south China (Corbet and Hill 1992). Referred to by Osgood (1932) as a water shrew and reported to occur in mountain streams by Corbet and Hill (1992). *Taxonomic issues*: Deuve (1972) recorded *C. platycephala* Temminck, 1842, which included *C. himalayica* as a synonym; however, Hutterer (1993) retained both as separate species. *C. platycephala* is larger with a relatively longer tail and broader skull and is known only from Japan (Osgood 1932, Corbet and Hill 1992).

Subfamily: Crocidurinae

[***Suncus murinus* (Linnaeus, 1766)** (See Corbet and Hill 1992 for synonyms)]. Described as widespread across Indochina by Lekagul and McNeely (1977) and Corbet and Hill (1992), although neither specifically mentioned Lao PDR. Deuve (1972) recorded *S. m. murinus* in Lao PDR, but gave no specific records or localities. Found around houses and buildings (Deuve 1972) and in grassland, scrub and forest (Lekagul and McNeely 1977, Corbet and Hill 1992).

[***Suncus etruscus* (Savi, 1822)** (See Corbet and Hill 1992 for synonyms). Centre (Smith *et al.* 1998). Widespread in the Indomalayan region (Corbet and Hill 1992), but with few records, probably due to its small size of 1.8 g (Innes 1994). On mainland South-east Asia it is known from only three localities east of Bangkok; Loei Province, north-east Thailand (Jenkins and Smith 1995), Cuc Phuong National Park, Vietnam (Feiler and Nadler 1997b) and Khammouan Limestone NBCA (Smith *et al.* 1998). In Khammouan Limestone NBCA, Robinson and Webber (1998a) recovered cranial remains from two sites. At Ban Mauang they were found in owl pellets collected from a cave entrance. The area comprised limestone karst with heavily degraded, mixed deciduous forest, scrub and bamboo at its base. The low-lying areas away from the karst had been cleared for the cultivation of paddy rice. At a cave near Ban Vieng a ramus was found in the prey remains of the carnivorous bat *Megaderma lyra*. The area comprised dense, relatively undisturbed semi-evergreen forest, with small areas of grassland, maintained for grazing.

[***Crocidura fuliginosa* Blyth, 1856** (See Corbet and Hill 1992 for synonyms). North (Osgood 1932) centre and south (Corbet and Hill 1992). Widespread in Indochina (Corbet and Hill 1992). Lekagul and McNeely (1977) and Corbet and Hill (1992) showed the species as widespread in Lao PDR on their generalised distribution maps, although made no reference to it in the text. There are few specific records from Lao PDR. A specimen was recorded from Muong Chao Noi, near Phongsali (Osgood 1932), Deuve (1972) recorded it in the north and Delacour (1940) referred to it as the common shrew

of north-east Laos. In Malaysia it appears to inhabit a range of habitats from agricultural areas, grassland and both montane and lowland forest (Medway 1969). In Tonkin (Vietnam) it occurs up to 2700 m (Lekagul and McNeely 1977). *Taxonomic issues*: Lekagul and McNeely (1977) listed both *C. dracula* and *C. fuliginosa* as present in Thailand, showing generalised distribution maps which include areas of Lao PDR. Deuve (1972) also listed *C. dracula* as present in northern Lao PDR. However, *C. dracula* is a synonym of *C. fuliginosa* (Jenkins 1982, Corbet and Hill 1992).

***Crocidura hilliana* Jenkins and Smith, 1995.** Centre (Smith *et al.* 1998). Recorded from two localities in Khammouan Limestone NBCA where Robinson and Webber (1998a) found cranial remains in owl pellets and among the prey of the carnivorous bat *Megaderma lyra*. The habitat comprised limestone karst with heavily degraded, mixed deciduous forest, scrub, bamboo and paddy rice at Ban Mauang and relatively undisturbed, semi-evergreen forest, with small areas of grassland, maintained for grazing near Ban Vieng. *Special significance*: endemic to a small area; north-east (Jenkins and Smith 1995) and central Thailand (Motokawa and Harada 1998), and Khammouan Limestone NBCA (Smith *et al.* 1998). However, this limited range probably reflects lack of knowledge as a result of limited survey work.

[***Crocidura attenuata* Milne-Edwards, 1872** (= *C. rubricosa* Anderson, 1877; = *C. kingiana* Anderson, 1877; =? *C. fuliginosa trichura* Dobson in Thomas, 1889; =? *C. aequicauda* Robinson and Kloss, 1918; = *C. grisea* Howell, 1926; = *C. tanakae* Kuroda, 1938)]. Widespread in Indochina (Corbet and Hill 1992), but although Lekagul and McNeely (1977) and Corbet and Hill (1992) showed it to be present on their generalised distribution maps, they gave no specific records for Lao PDR in the text. Known to occur in Vietnam from near sea level up to 1700 m (Heaney and Timm 1983) and has been collected in agricultural areas in Thailand (Lekagul and McNeely 1977).

***Crocidura pullata vorax* Allen, 1923** (= *C. rapax* Allen, 1923). Centre and south (Smith *et al.* 1998). In Xe Pian NBCA, a single specimen was caught in semi-evergreen forest near Ban Taong (Robinson 1997). In Khammouan Limestone NBCA, the species was recorded among the prey remains of the carnivorous bat *Megaderma lyra*, in an area comprising dense, relatively undisturbed, semi-evergreen forest surrounded by karst formations reaching heights of 200-300 m and in an area of dense, relatively undisturbed, semi-evergreen forest, within the small areas of grassland maintained for grazing (Robinson and Webber 1998a). It is poorly recorded in Indochina. The nearest records to Lao PDR are from north (Allen and Coolidge 1940), west (Robinson *et al.* 1995) and north-east Thailand (Smith *et al.* in prep.), and Yunnan, China, up to 3650 m (Allen 1923). *Taxonomic*

issues: The taxonomy is uncertain. Originally listed as *C. vorax* by Allen (1923), subsequently as a subspecies of *C. russula* (Lekagul and McNeely 1977), and as *C. gueldenstaedtii* (Corbet and Hill 1992), it has more recently been grouped provisionally with *C. pullata* (Hutterer 1993).

[***Crocidura horsfieldi* Tomes, 1856** (= *C. retusa* Peters, 1870; =? *C. indochinensis* Robinson and Kloss, 1922; = *C. watasei* Kuroda, 1924; = *C. tadae* Tokuda and Kano, 1936)]. No specific records in Lao PDR. However, Hutterer (1993) recorded its distribution as north Thailand to Vietnam, while Corbet and Hill (1992) and Lekagul and McNeely (1977) showed the species in Lao PDR on their generalised distribution maps, but made no reference to Lao PDR in the text. It was also listed by Deuve (1972), but again with no specific records or localities. Known to occur in neighbouring northern Vietnam (Robinson and Kloss 1922, Osgood 1932, Heaney and Timm 1983), north-east Myanmar (Anthony 1941) and south China (Corbet and Hill 1992). In Thailand, it is classed as “an intermediate montane form, found from 1220 to 2120 m in areas of fairly heavy cover” (Lekagul and McNeely 1977).

Miscellaneous records: Deuve (1972) recorded *Soriculus caudatus* (Horsfield, 1851) from north Lao PDR. However, both Corbet and Hill (1992) and Hutterer (1993) recorded it from northern Myanmar and south-west China, several hundred kilometers north of Lao PDR. As Deuve (1972) provided no specific information for this record, it may have been erroneous.

CONSERVATION MANAGEMENT AND RESEARCH PROPOSED FOR INSECTIVORA

In Lao PDR, as with much of Indochina, there is very little information on species of the Insectivora. Most information available is either non-specific (Deuve 1972, Lekagul and McNeely 1977, Corbet and Hill 1992, Hutterer 1993) or in the form of historical records (Allen 1923, Osgood 1932) which were often based on individual specimens with little or no ecological data. Even where ecological information is presented, such as by Lekagul and McNeely (1977), this is very general, and indeed questionable due to the (at least occasional) misidentification of species (see Heaney and Timm 1983). Insectivores, particularly shrews, are difficult to survey because they are not easily caught in conventional cage traps, being light-footed and not attracted to bait. However, a recent study, collecting owl pellets and the prey remains of a carnivorous bat, has identified three species previously unrecorded in Lao PDR (Robinson and Webber 1998a, Smith *et al.* 1998), providing both ecological and taxonomic information. Due to the limited data available for this group it is not possible to make any meaningful conservation recommendations or to identify any species of conservation significance. Before these can be done, a systematic programme of research is needed to survey insectivores and determine their ecological and conservation requirements in Lao PDR.