CONSERVATION STATUS OF SMALL ASIAN MONGOOSE
HERPESTES JAVANICUS (É. GEOFFROY SAINT-HILAIRE, 1818)
(MAMMALIA: CARNIVORA: HERPESTIDAE) IN LAO PDR

J. W. Duckworth
PO Box 5573, Vientiane, Lao PDR
Email: willduckworthdprk@yahoo.com

R. J. Timmins
The Shack, Button Oak, Kinlet, Worcestershire, DY12 3AL, UK
Email: rjtimmins@gmail.com

T. Tizard
1901 Nueces Drive, College Station, Texas 77840 USA
Email: rjtzard@ocellata.com

ABSTRACT. – Small Asian Mongoose Herpestes javanicus (É. Geoffroy Saint-Hilaire, 1818) is not much recorded through conventional (evergreen-forest-centred) wildlife surveys in South-east Asia, and available literature contains few records from Lao PDR. Collating records from the country reveals a wide distribution in the lowlands of its centre and south, and persistence in areas whence most other wild mammals (other than murids and bats) have been eradicated, including extensive farmland and suburban areas. Records from largely natural habitats are in or adjacent to deciduous biomes: the species is indeed rare in or absent from evergreen forests, hence the paucity of records during conventional survey. It evidently survives through rather evasive behaviour, and while populations may be much below carrying capacity, the paucity of records does not reflect a cause for conservation concern. It remains unclear whether the species inhabits the extensive hill and mountain ranges of Lao PDR.

KEY WORDS. – Distribution, habitat use, hunting pressure, Javan Mongoose, Laos.

INTRODUCTION
The Small Asian Mongoose Herpestes javanicus (É. Geoffroy Saint-Hilaire, 1818) s.l. is a pest species in many areas outside its native Asian range, so has been well studied in such regions (e.g., Nellis, 1989; Simberloff et al., 2000 and references therein). However, it is unlikely that H. javanicus sensu lato (constituted sensu, e.g., Corbet & Hill, 1992), contains only one species (Taylor & Matheson, 1999; Veron et al., 2006), and the introduced populations belong to, and nearly all of the field research concerns, the segregate Small Indian Mongoose H. auropunctatus (Hodgson, 1836). Considerably less information is available for Javan Mongoose H. javanicus sensu stricto, which is believed to be the form across most of South-east Asia (Veron et al., 2006). Within the latter region, a recent review of mammal status in Lao People’s Democratic Republic (Lao PDR; Laos) stated that the species is “apparently rather local: Duckworth (1997) traced few [only 13–14] recent records, and Delacour (1940) no historical ones” (Duckworth et al., 1999: 192). (In fact there are two hitherto not explicitly published specimens, from 1932; see below.) A more recent review of small carnivores from neighbouring Myanmar (Than Zaw et al., 2008) did not record Small Asian Mongoose (both ‘H. auropunctatus’ and H. javanicus sensu stricto may occur there; Veron et al., 2006) at all during extensive camera-trapping at sites spread across the country, although it is a pest around Yangon, and concluded (p. 21), that the “lack of camera-trap records reflects the focus on tall forest habitat...in mainland Southeast Asia it lives mainly in deciduous forests and secondary, semi-open, habitats, with few, if any, records from closed evergreen or semi-evergreen forest (Wells, 1989; Duckworth, 1997; R. J. Timmins verbally, 2006)”. This opens a potential conservation concern, at least in Lao PDR, because species not supported by (semi-)evergreen forest are exposed, throughout their range in the country, to very high hunting levels, and many have been effectively eradicated from large parts of the country. This includes generally robust birds such as crows Corvus Linnaeus, 1758, and mynas Acridotheres Vieillot, 1816 (Fuchs et al.,
2007), which often reach pest proportions in other parts of tropical Asia. And thus, among small cats, the Jungle Cat Felis chaus Schreber, 1777, is probably the rarest species in Lao PDR, because, although it is not the only one which lives outside tall forest, it is regionally unique in that it does not have reservoir populations in such habitat (Duckworth et al., 2005).

Lao PDR is a landlocked South-east Asian country of 236,800 km² with a human population density relatively low by regional standards, but growing fast. Semi-evergreen or evergreen forest is the climax habitat in most areas, with extensive deciduous forest mainly in the centre and south (Vidal, 1956–1960). Most of the north (‘the northern highlands’) is rugged terrain, as is the eastern boundary formed by the spine of the Annamite mountains. Plains occur beside the River Mekong (which forms much of the country’s western border) and its major affluents. Lao PDR has been estimated to retain about 41.5% forest cover (Department of Forestry, 2005), a relatively high figure for tropical Asian countries. Up to 1950 mammals were collected only patchily, and little reliable information was generated between 1950 and 1988. During 1989–1998, many areas of the country were surveyed for large (= identifiable without invasive survey) mammals (including small carnivores), birds, habitat condition and human use of natural resources, and surveys continue at reduced levels.

This review collates records of Small Asian Mongoose Herpestes javanicus sensu lato from Lao PDR to assess its national conservation status, with particular attention to determining habitat use and reflection of the possible causes why relatively few records are generated during typical wildlife survey.

**SURVEY AREA AND METHODS**

Recent wildlife surveys covered Lao PDR from the far north to the far south (Fig. 1) and focussed on large (>1,000 km²) tracts of little-encroached forest that were declared or potential National Protected Areas (NPAs; see Berkmüller et al., 1995; Robichaud et al., 2001). Each survey area was typically visited only once, for a few weeks to, at most, a few months (see timings and effort levels in Timmins & Duckworth, 1999: Table I). During survey, animals were sought opportunistically, to maximise chances of finding rare species. Only records of direct sightings of live animals or their remains are included. Lao PDR supports many species of small carnivore (Duckworth, 1997) and its national conservation status, with particular attention to determining habitat use and reflection of the possible causes why relatively few records are generated during typical wildlife survey.

Field activity was prioritised towards globally and regionally (near-)threatened species, but many data were generated about other species, such as mongooses, in the process. The surveys were based around extensive diurnal direct field observation, which is probably the most time-efficient technique for understanding the coarse distribution and abundance of mongooses in the context of a general wildlife survey; although we traced no large-sample study, all evidence suggests that H. javanicus sensu stricto is overwhelmingly diurnal (e.g., Lekagul & McNeely, 1977; Suzuki et al., 2006), and ‘H. auropunctatus’ certainly is (Nellis, 1989). Over 300 person-weeks of direct observation were undertaken by the end of 1998 (Timmins & Duckworth, 1999: Table I). During survey, animals were sought opportunistically, to maximise chances of finding rare species. Only records of direct sightings of live animals or their remains are included. Lao PDR supports many species of small carnivore (Duckworth, 1997) and there has been no demonstration that village reports or field signs (tracks, faeces) of mongooses can reliably be identified to species or even, by at least most surveyors, to genus. In particular, although the Lao name chon fon is often associated with mongooses, both JWD and W. G. Robichaud (in litt. 2009) have seen it used for the superficially somewhat similar Stripe-backed Weasel Mustela strigidorsa Gray, 1853.
Table 1. Records of *Herpestes javanicus* from Lao PDR.

<table>
<thead>
<tr>
<th>Location; co-ordinates; altitude¹</th>
<th>Date; time</th>
<th>Habitat¹</th>
<th>Reference²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ban Thalat, Vientiane province; 18°31'N 102°30'E; 180 m</td>
<td>19 Sep.2008; 17h00</td>
<td>Edge of village amid hai fields and secondary scrub; pre-clearance forest-type unclear</td>
<td>A. Johnson*</td>
</tr>
<tr>
<td>Nong Fangdeng, Vientiane province; 18°24'N 102°29'E; 170 m</td>
<td>20 Jul.2009; 10h25</td>
<td>in scrub-strip between swamp and cornfield; pre-clearance forest deciduous</td>
<td>JWD</td>
</tr>
<tr>
<td>PK 105 on route 13, Bolikhamsai province; 18°26'N 103°17'E; 150 m</td>
<td>1 Dec.2007; 13h25</td>
<td>On main road amid rice paddies and tanks; pre-clearance forest-type unclear</td>
<td>A. Johnson*</td>
</tr>
<tr>
<td>PK 155 on route 13, Bolikhamsai province; 18°25'N 103°43'E; 150 m</td>
<td>28 Sep.2008; 15h55</td>
<td>On main road amid rice paddies; pre-clearance forest-type unclear</td>
<td>J. W. K. Parr*</td>
</tr>
<tr>
<td>Ban Thabok substation, adjacent to Phou Khaokhoay NPA; 18°22'N 103°10'E; 160 m</td>
<td>within 1996–2000; afternoon</td>
<td>Road through tree-lined agriculture; pre-clearance forest-type unclear</td>
<td>J. W. K. Parr*</td>
</tr>
<tr>
<td>Ban Kokhe, Muang Sangthong, Vientiane municipality; 18°10'N 102°11'E; 190 m</td>
<td>27 Nov.2005; 16h00</td>
<td>A bund in dry rice paddies close to secondary scrub; degraded semi-evergreen and deciduous forest nearby</td>
<td>RJT &amp; TT*</td>
</tr>
<tr>
<td>Nong My, Muang Pakngum, Vientiane municipality; 18°10'N 103°01'E; 140 m</td>
<td>2 Feb.2009; 08h00</td>
<td>Under pool-side bamboo amid degraded deciduous dipterocarp forest</td>
<td>JWD</td>
</tr>
<tr>
<td>Houay Nhang Nature Reserve; -18°04'N, 102°41'E; 175 m</td>
<td>1992; daytime</td>
<td>Area: degraded fragment of deciduous and semi-evergreen forest amid ricefields</td>
<td>Duckworth, 1997; K. P. Berkmüller*</td>
</tr>
<tr>
<td>Ban Sokkham, Muang Xaisettha, Vientiane town; 17°59'N 102°40'E; 165 m</td>
<td>In or before 2004; daylight, c.4 Jul.2010; 16h30</td>
<td>Interface of a garden with secondary woodland; pre-clearance forest-type unclear; peri-urban</td>
<td>T. E. Hansel*</td>
</tr>
<tr>
<td>Ban Saphangmo, Vientiane town; 17°58'N 102°38'E; 165 m</td>
<td>Oct. or Nov. 2007; 17h30</td>
<td>On a paved road between rice paddies and scrub; pre-clearance forest-type unclear; peri-urban</td>
<td>A. Johnson*</td>
</tr>
<tr>
<td>Ban Don (relocation site³), Nakai plateau; 17°40'N 103°15'E; c.530 m</td>
<td>31 Jan.2007; n/a</td>
<td>Area: mix of semi-evergreen and deciduous forest, with much agriculture</td>
<td>Dersu, 2008⁴</td>
</tr>
<tr>
<td>Nong Bian, Nakai plateau; 17°46'N 103°53'E</td>
<td>3 Feb.2007; 15h30</td>
<td>Coarse tussock-grass of grazed seasonally dry marsh, amid secondary semi-evergreen and deciduous forest</td>
<td>Dersu, 2008; RJT</td>
</tr>
<tr>
<td>Route 13 near Nong Hoy, Khammouan province; 17°41'N 104°37'E; 160 m</td>
<td>25 Apr.1995; 11h00</td>
<td>On a newly resurfaced main road amid ricefields, scrub and relic deciduous forest</td>
<td>Duckworth, 1997; JWD*</td>
</tr>
<tr>
<td>[Dong Phouxoy PFA, Khammouan province; ~ 17°15'N 105°15'E; lowland]</td>
<td>5 Apr.2005</td>
<td>[Non-forest patch amid deciduous forest, far from village]</td>
<td>Poulsen et al., 2005</td>
</tr>
<tr>
<td>Muang Vilabouli market, Savannakhet province; 16°58'N 105°57'E; n/a</td>
<td>5 Dec.2008; n/a</td>
<td>Not known; procured in town market, evidently sourced locally</td>
<td>K. P. Aplin⁴</td>
</tr>
<tr>
<td>Ban Phongsavang, Phou Xang He NPA; 16°49'N 105°51'E; 200 m</td>
<td>27 Mar.1993; c.07h00</td>
<td>Scrub amid degraded mixed deciduous forest</td>
<td>Duckworth, 1997; RJT</td>
</tr>
<tr>
<td>Near Keng Samat, Dong Phou Viang NPA; 16°18'N 105°59'E; 150 m</td>
<td>6 Nov.2007; 15h35</td>
<td>Thick pek bamboo *Vietnamosasa (=Arundinaria pusilla) understorey of deciduous dipterocarp forest</td>
<td>Duckworth, 1997; JWD*</td>
</tr>
<tr>
<td>[West of Keng Sung near Xe Bang-Nounan, Xe Bang-Nounan NPA; 15°57’N 105°35’E; 250 m]</td>
<td>[30 May1994; daylight]</td>
<td>[Degraded lowland forest, mostly deciduous]</td>
<td>Duckworth, 1997; RJT</td>
</tr>
<tr>
<td>Ban Nongpop, Dong Hua Sao NPA; 14°55'N 106°03'E; 200 m</td>
<td>4 Jul.1993; c.07h30</td>
<td>Degraded mixed deciduous forest</td>
<td>Duckworth, 1997; RJT</td>
</tr>
<tr>
<td>Ban Houayton, Dong Hua Sao NPA; 14°55'N 106°11'E; 280 m</td>
<td>8 Jul.1993; afternoon</td>
<td>In scrub by a rice field, surrounded by degraded semi-evergreen and mixed deciduous forest</td>
<td>Duckworth, 1997; RJT</td>
</tr>
<tr>
<td>Ban Thongpa, Muang Pathoumphon, Champassak province; 14°51’N 106°03’E; 140 m</td>
<td>16 Dec.2007; 15h40</td>
<td>Bamboo, ruderals and cultivation, c.300 m from houses; amid degraded mixed deciduous-semi-evergreen forest</td>
<td>Duckworth, 1997; JWD</td>
</tr>
<tr>
<td>Xe Xou lowlands, Dong Ampham NPA; ~ 14°45’N, 107°15’E; 145–250 m</td>
<td>16 Jan.1997</td>
<td>Grass in a degraded mosaic of semi-evergreen and deciduous forest</td>
<td>Davidson et al., 1997; D. Davenport</td>
</tr>
</tbody>
</table>
Table 1. Cont’d.

<table>
<thead>
<tr>
<th>Location; co-ordinates; altitude¹</th>
<th>Date; time</th>
<th>Habitat¹</th>
<th>Reference²</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Ban Kele-2, Xe Pian NPA; 14°46’N 106°05’E; 150 m]</td>
<td>[16 Jan.2008; 16h10]</td>
<td>[In tall Sesbania of a drying pool amid severely degraded deciduous forest, c.500 m from village houses]</td>
<td>JWD</td>
</tr>
<tr>
<td>Near Bung-Gnai Kiatngong, Xe Pian NPA; 14°45’N 106°12’E; 150 m</td>
<td>3 Jan.1993; mid-day</td>
<td>Paddies bordering mixed deciduous forest</td>
<td>Duckworth, 1997; RJT</td>
</tr>
<tr>
<td>Houay Kua, Xe Pian NPA, 14°36’N 106°13’E, 140 m</td>
<td>within 1–7 Feb.1997; daylight</td>
<td>Area: little-encroached semi-evergreen forest</td>
<td>R. Steinmetz in litt., 2008</td>
</tr>
<tr>
<td>4 km north-east of Ban Sompoy, Xe Kong Plains, Xe Pian NPA; ca. 14°38’N 106°29’E; 80 m</td>
<td>within 19–25 Apr.1991</td>
<td>Riverine vegetation by the Xe Kong; amid deciduous dipterocarp forest</td>
<td>Cox et al., 1991</td>
</tr>
<tr>
<td>Xe Khampho, Xe Kong Plains, Xe Pian NPA; 14°32’N 106°20’E; 80 m</td>
<td>1 Mar.1993; 17h00</td>
<td>On a sandbar across the river; flanked by mixed deciduous forest amid deciduous dipterocarp forest</td>
<td>Duckworth, 1997; T. D. Evans</td>
</tr>
<tr>
<td>Nong Puler, Xe Kong Plains, Xe Pian NPA; 14°31’N 106°19’E; 80 m</td>
<td>1 and 12 Mar.1993; daytime</td>
<td>Beside pool amid deciduous dipterocarp forest</td>
<td>Duckworth, 1997; RJT</td>
</tr>
<tr>
<td>Ban Sompoy, Xe Kong Plains, Xe Pian NPA; 14°34’N 106°28’E, 90 m</td>
<td>21 Sep.1996; n/a</td>
<td>Drowned during heavy floods; in a water-filled boat on the river Xe Kong, amid deciduous dipterocarp forest</td>
<td>TT*</td>
</tr>
<tr>
<td>Houay Kaliang, Xe Pian NPA; ~ 14°10’N, 106°04’E; within 90–120 m</td>
<td>within 9–13 May1991</td>
<td>Area: pool-studded deciduous dipterocarp forest</td>
<td>Cox et al., 1991</td>
</tr>
<tr>
<td>South-west of Ban Khiam, Dong Khanthung; ca. 14°13’N 105°18’E; 100 m</td>
<td>3 May1996; daylight</td>
<td>Ran across a road through scrub amid mostly deciduous dipterocarp forest</td>
<td>Duckworth, 1997; RJT</td>
</tr>
<tr>
<td>Houay Asam, near Ban Khem, Dong Khanthung, Champasak province; 14°31’N 105°18’E, 100 m</td>
<td>12 Feb.1998; daylight</td>
<td>Area: mostly deciduous forest with small areas of evergreen and cultivation</td>
<td>Round, 1998</td>
</tr>
<tr>
<td>Ban Khem and the border nongs, Dong Khanthung; ca. 14°10’N 105°18’E; 100 m</td>
<td>27–31 Mar.1997</td>
<td>Area: pool-studded deciduous dipterocarp forest</td>
<td>Wolstencroft, 1998</td>
</tr>
<tr>
<td>Khongphapheng falls; 13°57’N 105°59’E; 70 m</td>
<td>7 Feb.1993; daytime</td>
<td>Mekong riverside scrub; adjacent forest largely deciduous</td>
<td>Duckworth, 1997; RJT*</td>
</tr>
</tbody>
</table>

Records are listed north to south, then west to east, with some modification to keep those from each conservation management unit together. Lao-language elements in these place names: Ban = village of; Bung = swamp; Houay = stream; Nam = river; Keng = rapids; Muang = district of; Nong = pool or marsh; PK = point kilometrique; Xe = river.

¹ Square-bracketed records are provisional identifications. NPA = National Protected Area; PFA = Production Forest Area. Where the exact location is not available, the co-ordinates are preceded by the symbol ~, and the habitat is preceded by “Area:”. Some altitudes have been corrected from Duckworth (1997). All records are single sightings which noted only single animals except ‘P.K. 155’ (duo); ‘Houay Kaliang’ (seen on 1–3 occasions); and ‘Ban Khem and the border nongs’ (apparently seen several times). Because many animals were flushed and fled immediately, opportunity to assess true group size was usually low.

² An asterisk (*) indicates a record outside formal wildlife survey.

³ Reportedly dug from burrow, then killed by dog, about 2 km east of village.

⁴ Specimen now held at Australian National Wildlife Collection, Canberra.

RESULTS AND DISCUSSION

All recent field records of *H. javanicus* traced from Lao PDR are listed in Table 1. Most surveys (Fig. 1; references to reports in Timmins & Duckworth, 2008: Table 1) did not record this mongoose. Many records (12) came as incidental sightings outside formal wildlife survey. Little information from Lao PDR dates from before 1990. Only two extant historical specimens were traced: T. D. Carter collected singles on 31 January and 3 February 1932, under the broad locality of the Bolaven plateau, now held in the American Museum of Natural History (AMNH 87389 and 87390; all information D. P. Lunde in litt., 2008). AMNH 87389 is labelled as 2,500 feet (= 800 m) (D. P. Lunde in litt., 2008). This is the generally used altitude for Thateng (15°26’N 106°23’E), where the expedition was based when on the Bolaven during which local people “poured in” through the gates bringing specimens (Legendre, 1932: 495); therefore the actual collection altitude cannot be known. Anon. (1962a, 1962b) listed a specimen from the Vientiane plain about 25 km along the road from Vientiane to Louangphabang (~18°09’N 102°30’E; ~170 m); this has probably perished. Deuve (1972) listed *H. javanicus* sensu stricto for all provinces bordering the Mekong and *H. auropunctatus* for four Mekong-side provinces in the north and centre; while it is indeed plausible that Small Asian Mongoose inhabited all the listed provinces, nothing can be done with these records, or with the assertion that both...
The records in little-encroached habitats were from open deciduous forests, but more records came from outside forest, in fairly- to severely degraded habitat at point of sighting: some sites were entirely anthropogenic. Only one record was certainly within evergreen or semi-evergreen forest, despite very heavy survey effort of such habitats in recent decades; in the Houay Kua area of Xe Pian NPA and the Dong Khanthung proposed NPA. This is best shown by the variety of bird species of such habitats of Houay Kua and the Dong Khanthung proposed NPA. Were surveys spent significant time in other areas surveyed during 1990s. By contrast, in all forest habitats not holding the species, only relatively few records were expected even were it common in Lao PDR. This might have been overlooked by chance. However, K. Aplin (in litt. 2008; see Aplin et al., 2006) “spent several months, in all, wandering around upland fields and forest edge habitats in Louangphabang, Louang-Namtha and Xaignabouli provinces, without seeing a single mongoose” and “also received large collections of heads taken from snared mammals in such habitats of Houaphanh province, again with no mongooses”.

Similarly, A. Johnson (verbally, 2008) has, in the course of administering conservation projects within forest, travelled by car many hundreds of miles through degraded habitat and spent many hours without seeing a mongoose. In adjacent Vietnam, Roberton (2007) traced several records from the general area of the northern highlands, but their density is noticeably lower than in the predominantly lowland regions of the country (his Fig. 3.11w); moreover, as the highest altitude Vietnam record traced was 400 m (p. 76), there is no evidence for occurrence in the northern highlands of Vietnam (rather than lowland parts of this area) yet, either.

A lowland distribution in Lao PDR would reflect the general rarity of deciduous forest in the country above 500 m (Timmins et al., 1998), although this does occur locally in the north-west (Vidal, 1956–1960), in areas so far barely surveyed for wildlife. North of Vientiane most land is rugged and lies above 300 m, even much of the course of the Mekong. Human activity has, however, provided vast areas of scrub and ruderals across Lao PDR’s northern highlands, as it has in other highland areas such as the Bolaven plateau and Annamite spine, which would appear to be superficially suitable. Forests of the northern highlands are relatively well surveyed, but non-forest habitats there are not. Survey effort in the latter (detailed in Duckworth et al., 2002; Fuchs et al., 2007) has been just about low enough that H. javanicus might simply have been overlooked by chance. However, K. Aplin (in litt. 2008; see Aplin et al., 2006) “spent several months, in all, wandering around upland fields and forest edge habitats in Louangphabang, Louang-Namtha and Xaignabouli provinces, without seeing a single mongoose” and “also received large collections of heads taken from snared mammals in such habitats of Houaphanh province, again with no mongooses”.

Similarly, A. Johnson (verbally, 2008) has, in the course of administering conservation projects within forest, travelled by car many hundreds of miles through degraded habitat and spent many hours without seeing a mongoose. In adjacent Vietnam, Roberton (2007) traced several records from the general area of the northern highlands, but their density is noticeably lower than in the predominantly lowland regions of the country (his Fig. 3.11w); moreover, as the highest altitude Vietnam record traced was 400 m (p. 76), there is no evidence for occurrence in the northern highlands of Vietnam (rather than lowland parts of this area) yet, either.

Abundance and resilience to human pressure. – At no site was H. javanicus commonly seen, but because most surveys focussed on little-degraded (semi-)evergreen forest, i.e. habitat not holding the species, only relatively few records would be expected even were it common in Lao PDR. This is exemplified by the Nakai plateau: this had 24 person-weeks of direct-observation survey in 1994–1996, placing it among the then most intensively surveyed sites in Lao PDR, but H. javanicus was not recorded (Timmins & Duckworth, 1999; Evans et al., 2000). A survey in 2007 involved several person-weeks specifically attending to habitats other than (semi-)evergreen forest and its rivers; it recorded nine large mammal species not previously known from the plateau, of which four, including this mongoose, are typical in Lao PDR of deciduous biotopes (Dersu, 2008). Therefore, H. javanicus may also have been overlooked in some or even many of the other areas surveyed during 1990s. By contrast, in all the 1990s survey areas where surveys spent significant time (at least several person-weeks) in deciduous biotopes, there were multiple records of H. javanicus: Xe Pian NPA, Dong Ha Sao NPA and the Dong Khanhng proposed NPA.
well behind that of forest species (Duckworth, 2007; Fuchs et al., 2007). Although it is difficult to quantify the overall survey effort, *H. javanicus* records seem surprisingly few in such habitats. Sighting rates are genuinely low at least in Vientiane: none was recorded during about 170 mornings (each of 2–6 hours’ duration) of direct-observation bird survey at multiple sites in and around Vientiane during 2003–2005 (locations in Duckworth, 2007), while T. E. Hansel (in litt., 2010) has lived in the same garden in outer Vientiane for years, keeping chickens (which might be assumed to attract mongooses), but has observed the species there only twice.

The extent to which the overall low sighting rate reflects a small population is debatable. Many individuals were remarkably shy (but some were not, e.g., that at PK 105 crossed route 13 only 15 m in front of a vehicle), and no doubt such behaviour allows *H. javanicus* to persist in the face of hunting heavy enough to have exterminated many other mammal and bird species widely in Lao PDR. Several records [Dong Phouxoy PFA; Dong Phou Viang NPA 2007; and Muang (= District) Pathoumphon 2007–2008] came during short-duration or village-centred activities when hardly any other mammals were seen other than squirrels (most of which have survived noticeably well in Lao PDR by comparison with larger mammals; Timmins & Duckworth, 2008), and sign-searches revealed massively depleted large mammal communities. This mongoose is about the only mammal species (other than bats and murids) that may be seen from main roads in Lao PDR. Various sightings were close to villages. In sum, this mongoose evidently shows high resilience to hunting, and while today’s densities are probably substantially below what the habitat matrix would support if persecution ceased, there is no reason to conclude or even suspect that the animal is actually rare, still less under threat, in Lao PDR.

It is presently not clear whether *H. javanicus* inhabits the northern highlands. Several non-forest bird species regularly common in south and central Lao PDR in the 1990s [e.g., Red-wattled Lapwing *Vanellus indicus* (Boddart, 1783), with habitat use and distribution in south and central Lao PDR similar to *H. javanicus*] are now very rare in the north, despite historical abundance there; this presumably reflects hunting (Fuchs et al., 2007). The collection record is too poor to assess the possibility of a comparable range contraction with *H. javanicus*.

National conservation status. – Even if this mongoose is restricted to lowlands and plains, Lao PDR contains substantial areas of suitable habitat (Fig. 1); if it uses degraded highland and evergreen areas, it could inhabit the entire country. Extensive conversion and degradation of dense forest in Lao PDR since the 19th century (e.g., Department of Forestry, 2005) has certainly increased the proportion of the country suitable for the mongoose. The heavy hunting levels may be the chief threat to the species in the country. It is rare in commercial trade in Lao PDR, and was not, for example, recorded during the intensive surveys of Srikosamatara et al. (1992) in and around Vientiane, when wildlife trade was undertaken widely and openly. It is mentioned in Noreen & Claridge’s (2001) comprehensive study of trade only as an exotic ‘pet’ in Vientiane. Additional such records, which are overall rather few, include one in a businessman’s hotel in Pakxan (18°23′N 103°39′E) in December 1994 and two young in a cage in the back of a parked pick-up in central Vientiane on 28 April 2009. Such small levels of domestic trade could not pose any threat to Lao populations. The extent to which international trade may be, or may become, a problem is unclear. The related civets are highly traded in neighbouring Vietnam and China (e.g., Bell et al., 2004), and there are indications of such trade in Small Asian Mongooses: a confiscation of 130 was taken to Soc Son centre, Hanoi province, on 3 March 2009 (U. Streicher in litt., 2009); in 2001–2002 there was a seizure in Ninh Binh province (northern Vietnam) of c.250 reportedly en route for China and trapped in Binh Dinh province (southern Vietnam); and a nature reserve in Hoa Binh province reported releasing over 100 in 2005 that had been seized in trade (S. Roberton in litt., 2010). In southern China itself, M. W. N. Lau (in litt., 2010) and colleagues have found the species in wildlife markets in Guangzhou, but not very often and usually in relatively small numbers (from several to dozens, but occasionally over 100). These seem to be wild-caught because many have leg injuries, but whether they were caught in South China or imported is unknown.

The species is probably killed in Lao PDR, presently, primarily as by-catch in trapping, or directly shot during general leisure-time hunting and, no doubt, to protect chickens from being killed. Economic changes in Lao PDR in the last 20 years (see ICEM, 2003) have, by stimulating entrepreneurial activity, greatly reduced the amount of leisure-time hunting by urban people, leading to major rapid population rises in urban birds such as mynas *Acridotheres*, doves *Streptopelia* Bonaparte, 1855, bulbuls *Pycnonotus* Boie, 1826 and others in Vientiane, from the severely depleted populations of the early 1990s (Fuchs et al., 2007). It is likely that mongooses are also benefiting from these changes. Continued, indeed enhanced, trade investigation would help clarify the perhaps emerging risks from this factor.

CONCLUSIONS

The relative rarity of *H. javanicus* records during the intensive wildlife surveys in Lao PDR of 1992–1996 (Duckworth, 1997) has continued and reflects a survey focus on little-encroached (semi-)evergreen forest, at the expense of the deciduous forests and anthropogenic landscapes which form the main Lao habitats of this species. Low sighting rates in the anthropogenic habitats reflect a mix of evasive behaviour and, presumably, reduced densities, reflecting the intense persecution of wildlife in Lao PDR. The low densities even in the most remote deciduous dipterocarp forest are probably not driven by hunting, given that it is equally scarce in such habitats in Cambodia, where relevant forms of hunting pressure are certainly minimal (RJT, pers. obs.): they may reflect lower prey density than in agricultural
areas, or perhaps an association with surface water, although no data exist to test these speculations. Sighting locations indicate that *H. jaouanicus* is resilient to human pressures, and it is likely to be benefiting from recent habitat trends of forest conversion and degradation. It is not nationally at any risk of extinction. It remains unclear whether it occurs in the highlands of Lao PDR.

ACKNOWLEDGMENTS

We thank Dirk Van Gansbergh, Richard Thewlis, Ulrike Streicher, Rob Steinmetz, Dave Showler, Chris Shepherd, Philip Round, Bill Robichaud, Scott Robertson, Michael Poulsen, Jean-Paul Pédrono, John Parr, Mike Meredith, Michael W. N. Lau, Arlyne Johnson, Troy Hansel, Frank Haegeman, Charles Francis, Tom Evans, Nick Dymond, Dave Davenport, Mark Bezuijen and Ken Aplin for their information (in many cases, confirmation that they had never observed this mongoose in Lao PDR). Géraldine Veron confirmed that she had traced no other specimens from Lao PDR, and Judy Chupasko checked the original collection details of a Vietnamese specimen elsewhere reported as from northern Lao PDR. The original surveys were funded through many sources and undertaken through various agencies, as identified in the survey reports.

LITERATURE CITED


Duckworth et al.: *Herpestes javanicus* in Lao PDR


