Hanoi Birdwatching Club
Hanoi National University and Bu Gia Map National Park

The Status and Distribution of Orange-necked Partridge *Arborophila davidi* in Binh Phuoc Province, Vietnam.

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1. Introduction

1.1 Background

Vietnam is a country rich in natural and biological resources that represent a unique physical environment developed over tens of thousands of years. Vietnam has been identified as one of Asia's most biologically valuable countries. The wide range of habitats has given rise to the country's rich and diverse wildlife species, many of which are endemic.

According to preliminary inventory data, Vietnam has 12,000 species of plants, 275 species of mammals, 258 species of reptiles, 82 species of amphibians, 471 species of fresh water fish, 2,470 species of ocean fish, 5500 species of insects, and thousands of species of invertebrates.

The avifauna of Vietnam has 828 species belonging to 19 orders and 81 families[1], 72 of which are listed in *Threatened Birds of the World* in different categories, including 3 critical species, 12 endangered species, 25 vulnerable species, 31 near-threatened species and 1 data deficient species. Moreover, Vietnam has four areas which qualify as Endemic Bird Areas, comprising the Annamese Lowlands, Kontum Plateau, Southern Vietnam Lowlands and Dalat Plateau, with a total of eight nationally endemic bird species.

Orange-necked Partridge *Arborophila davidi* is a restricted-range bird species endemic to the Southern Vietnam Lowlands Endemic Bird Area. The species' known global range is centred on southern Vietnam but also extends into Cambodia. It has been assessed by The World Conservation Union (IUCN) *2002 Red List of Threatened Animals* as Endangered. *The Red Data Book of Vietnam* also lists it under the category Endangered. Orange-necked Partridge qualifies as Endangered because it has a very small population and a very small range, both of which are declining and undergoing severe fragmentation owing to habitat loss. High levels of hunting are an additional pressure.

This report presents the results of a status and distribution survey of Orange-necked Partridge in Binh Phuoc province, Vietnam, conducted by the Hanoi Birdwatching Club, Hanoi National University, Binh Phuoc provincial forest protection department and Bu Gia Map national park.

1.2 Global status and distribution

Orange-necked Partridge was formerly believed to be endemic to southern Vietnam, occurring principally in the provinces of Dong Nai and Lam Dong in low hill ranges north of Ho Chi Minh City (*Threatened Bird of Asia*). The species was first recorded in Bu Kroai, Binh Phuoc province in 1927 when two specimens were collected (one is now preserved in MNHM, Delacour and Jabouille 1931, and the other is placed in the Bristish Museum of Natural History, Delacour *et al*. 1928). The third specimen was collected in

an area about 64 km east of Phu Rieng, Binh Phuoc province at an elevation of 250 m asl in February 1927.

There were no confirmed recorded for the occurrence of this species between its first records and June 1991, when three birds were recorded on a small isolated hill at an elevation of 150-200 m asl, close to Dac Lua forest guard station of Cat Tien National Park, about 37 km south-east of Bu Kroai (Eames *et al*. 1992). Subsequently, McGowan (1992), Robson *et al*. (1993) and Nguyen Cu (*in litt.* 1997) also recorded this species at the same location.

During fieldwork in February–April 1997, 2–5 groups with a total of up to 27 birds were recorded in the Cat Loc sector of Cat Tien National Park (J. C. Eames *in litt.* 1997, Atkins and Tentij 1998b). In April 1997, up to three pairs were recorded near by Elephant mountain in the Nam Cat Tien sector of the national park (Nguyen Tran Vy *in litt.* 1997), and subsequently, Orange-necked Partridge was recorded by many observers in Cat Tien national park (e.g. B. Wright *in litt*. 1999).

In 2000, the Wildlife Conservation Society Cambodia Program and their counterparts conducted a wildlife survey of the Samling Logging Concession in southern Mondulkiri province, Cambodia; an area contiguous with Bu Gia Map National Park in Vietnam. During this survey, a number of globally threatened bird species, including Orange-necked Partridge, were confirmed by photo-trap pictures (Walston *et al* 2001).

During a survey by WWF in January 2002 at Vinh An State Forest Enterprise, Dong Nai province, two birds were recorded in mixed regenerating forest at an elevation of 200 m asl (Le Trong Trai, 2002). This site is located outside of Cat Tien National Park, to the west.

The next record of the species was in 2003, when 12 birds were recorded in Nghia Trung State Forest Enterprise, Bu Dang district, Binh Phuoc province, at elevations from 200 to 500 m asl (Nguyen Tran Vy *et al* 2003). This site is located outside Cat Tien National Park to the north.

Despite the recent discovery of the species at several sites away from Cat Tien national park, as described above, prior to the current survey, large areas of potentially suitable habitat for the species remained unsurveyed, particularly in Binh Phuoc province Vietnam and southern Mondulkiri province Cambodia. As both of these areas are facing actual (in the case of Binh Phuoc) and potential (in the case of southern Mondulkiri) land-use change on a large scale, surveys of these areas to establish the status and distribution of the species were a highly priority.

1.3 Global Population

Before its rediscovery, the global population of this species was estimated at below 1,000 (McGowan *et al*. 1994). Despite intensive searching, only small numbers were initially observed in Cat Tien National Park and the species was presumed scarce at this site

(Eames *et al.* 1992, Nguyen Cu *in litt.* 1997). However, it has more recently been described as occurring "everywhere on hills" in the park and "common" in its Cat Loc sector, with 27 sightings in four days (Atkins and Tentij 1998b).

It potentially occurs widely throughout hill forest in southern Lam Dong, Dong Nai, Binh Duong and Binh Phuoc provinces, and is likely to be commoner than current records suggest owing to its inconspicuous nature (J. C. Eames and Nguyen Cu *in litt.* 1997). The ease with which numbers can be underestimated is illustrated by the fact that, while it was not located in two months of searching at Cat Tien National Park in February–March 1997 (when birds were silent), seven were later encountered in three weeks when the site was resurveyed with the aid of recordings of its voice (Atkins and Tentij 1998b). This suggests that improvements in fieldwork technique will lead to a more optimistic evaluation of the status of this species. As such it is now considered a "fairly common to common resident" of the area (Robson 2000). Nevertheless, its populations, however numerically strong, must be considered in significant decline.

In Cambodia, Orange-necked Partridge is probably restricted to a small area of suitable habitat in southern Mondulkiri, within which it may be rare and localised (Peter Davidson *et al* 2002, World Birdwatch December 2002).

The new discovery of the species in Vinh An and Nghia Trung State Forest Enterprises of Dong Nai and Binh Phuoc provinces, as well as in southern Mondulkiri, Cambodia, increased its known distribution. However, it does not mean that the population of the species is increasing. More likely, the population of the species is currently declining, at least in Vietnam, where suitable habitat is being converted to other land uses.

1.4 Ecology and habitat use

The type specimen was collected at c.250 m in densely wooded country with rolling hills (Delacour *et al.* 1928, Delacour and Jabouille 1931). More recently the species has been observed within Cat Tien National Park at 200 m in "non-thorny bamboo forest", sometimes very dense, reaching a height of c.6–10 m (Eames *et al*. 1992) and with a light understorey including various gingers Zingiberaceae (Robson *et al*. 1993). In the Cat Loc sector of Cat Tien National Park it seems to thrive in a variety of secondary habitats including tall scrub (c.4 m high), bamboo, acacia, logged evergreen and semi-evergreen forest plantation, and thus appears to tolerate considerable habitat disturbance (J. C. Eames and Nguyen Cu *in litt.* 1997, Atkins and Tentij 1998b). It perhaps favours slopes covered with bamboo and a thick layer of leaf-litter; much of Cat Tien National Park is composed of level lowlands but the Cat Loc area is hillier, although rising to only 400 m, and the species occurs on even the steepest slopes (Atkins and Tentij 1998b).

In 2002, the record of the species at Vinh An State Forest Enterprise, Dong Nai province was in regenerating, closed canopy forest of mixed bamboo and timber trees, at an elevation of 200 m asl (Le Trong Trai, 2002). The survey in 2003 at Nghia Trung State Forest Enterprise, Binh Phuoc province, concluded that Orange-necked Partridge occurs

more often in evergreen or mixed forest than in *Bambusa procera* forest, and also that it occurs on slopes (Nguyen Tran Vy *et al* 2003).

The Mondulkiri record came from a bamboo-dominated slope in degraded semi-evergreen forest at about 150 m asl, in a similar area to the species's preferred habitat in Vietnam (Peter Davidson *et al* 2002, World Birdwatch December 2002).

1.5 Conservation of Orange-necked Partridge

Currently, a number of planned and ongoing forest protection and conservation projects in the Southern Vietnamese Lowlands present a great opportunity for conservation of Orange-necked Partridge.

The species was mostly occurs in Cat Tien National Park, a site considered irreplaceable to the long-term conservation of East Asian galliforms (McGowan *et al*. 1999). The park originally covered 383 km^2 but, with extensions to include the Tay Cat Tien and Cat Loc sectors, now covers 738 km^2 (Atkins and Tentij 1998b, G. Polet *in litt*. 2000). As a result, protection of the Cat Loc sector is much improved, with 30 forest guards now stationed there, an increase from seven in 1998 (G. Polet *in litt*. 1999). In 1998, 110 park guards were stationed in the Nam Cat Tien sector of the park (which excludes the Cat Loc and Tay Cat Tien sectors); not only has the number of guards increased in the last few years, but the level of protection is much higher, a circumstance leading to a marked decline in poaching incidents (G. Polet *in litt*. 2000). The road from Dak Lua to Talai, the only one to cut through part of the Orange-necked Partridge's range in the national park, was closed to public traffic in 1998 (G. Polet *in litt*. 1999). WWF and Care have implemented an Integrated Conservation and Development Project (ICDP) at Cat Tien National Park (A. W. Tordoff *in litt*. 2000).

Presently, Cat Tien national park have carried out an annual monitoring programme focusing on Galliformes, which included Orange-necked Partridge, however, the data collected did not follow the standard systems (Tran Dinh Thuc verbally 2005).

In Cambodia, Orange-necked Partridge stands to benefit from a unique conservation project, an international forestry company that manages the forest areas at Mondulkiri province has been working for some recent years with WCS and the Cambodian Government to promote biodiversity conservation, primarily by controlling illegal hunting within the concession. In August 2002, the Cambodian Government formally adopted this pioneering initiative (called the Seima Protected Forest), and now Orange-necked Partridge has a better chance of long-term survival (Peter Davidson *et al* 2002, World Birdwatch December 2002).

Despite many conservation efforts at Cat Tien national park, Vietnam and in the Seima Protected Forest in Cambodia, potentially, a very significant part of the species' range still remains unprotected. In Vietnam in particular, forests in the Southern Vietnamese Lowlands Endemic Bird Area are being converted to other land-uses, such as cashew

plantations, new roads and infrastructures construction as the result of uncontrolled human migration from the north of the country.

2. Aim and objectives

The aim of the field survey was to assess the current status and collect necessary data to build a strong foundation for the future conservation of the Orange-necked Partridge.

The specific objectives of the survey were to:

+ To investigate the current status and distribution of Orange-necked Partridge in Binh Phuoc province.
+ To assess the habitat status and threats to Orange-necked Partridge .
+ To produce recommendations for the conservation of the species
+ To distribute the results to conservation organisations with on-going and planned activities in the area (FFI, BirdLife, IEBR, WWF, WCS Cambodia, FPD, Cat Tien National Park, Bu Gia Map National park, World Bank, Royal Netherlands Government, etc) in order to improve conservation management and alleviate threats to the species.
+ To raise awareness of the importance of Orange-necked Partridge among local people, forest protection officials and decision makers.
+ To build the capacity of local team members in bird survey techniques.
+ To use the results to develop a proposal for follow-on conservation activities.

3. Methods

3.1 Survey methods

Surveying was carried out between 25 April and 27 May 2005. The survey used Orange-necked Partridge calls as the primary tool for investigating the distribution and habitat use of the species. The calls of Orange-necked Partridge are loud and easy to recognize at distances up to about 800 m (Nguyen Tran Vy verbally 2005, authors' own data).

The most up-to-date and accurate available land-cover maps were used to identify potentially suitable remaining habitat for Orange-necked Partridge in the province.

GPS units were used to overlay coordinates of specific reference points for various features (tracks, woodland blocks, habitat patches, elevation, etc.).

In some areas, interviews were conducted to get information from local people.

Identified survey areas were divided into sectors, with each sector consisting of one or more sub-catchments. A grid was overlaid on a GIS map of the sub-catchments with the defined points being between 1- 1.5 km apart. At each of these points, tape of the

Orange-necked Partridge's calls was played for a fixed time period. The data collection started 45 minutes before sunrise and continued until 2 ¼ hours after sunrise. Data collection was repeated 3 times at each counting point. Whether the bird called or not, relevant data about the counting point was recorded on data sheets (attached), including time, observer, distance to the bird, bearing, slope, phase of the moon, distance to water, distance to human settlement, etc.

Simple habitat variables were recorded at each counting point. These were:

+ Forest type: The presence of each of three forest types (evergreen forest, mixed forest and bamboo forest) at each counting point was assessed on a 3 point scale (absent, present, dominant).

+ Undergrowth type: The presence of grass and scrub in the understorey at each counting point was assessed on a 3 point scale (absent, present, dominant).

+ Canopy cover: A rough estimation of percentage canopy cover at the counting point was made.

+ Distance to water: The distance to water, running or standing, was determined as far as possible from investigating the state of rivers and streams in the surveyed area and estimating distance from them, using maps if necessary. Because the survey was carried out at the end of dry season, all water found was considered to be permanent.

+ Distance to human settlement: The distance to permanent human settlement was determined by investigation, use of maps and discussion with guides and local people.

+ Presence of human activities: The presence of domesticated grazing cattle, agriculture and evidence of burning were recorded. Also, the presence of humans other than the survey team (local villagers, border army soldiers, etc.) at the counting point was recorded.

In some areas, due to topography and the security situation, the survey team had to survey in defined areas, such as close to military bases or along roads (especially near the border between Vietnam and Cambodia).

3.2 Other bird species

All bird species seen or heard during the survey were recorded by site. No quantitative data were collected.

3.3 Identification of sites and access

Potential sites were identified from existing forest cover maps, topographic maps and land use maps. Potential sites were then prioritised on the basic of their likelihood of holding Orange-necked Partridge based on the existing knowledge of habitat use by the

species, such as habitat types, elevation, etc. Each site was visited for between 2 and 5 days. Camp-sites were made where suitable supply of water was available.

3.4 Statistical analysis

Statistical analysis was conducted using Excel Version 2003 and SYSTAT version 10.2.

4. Site descriptions

During the survey, ten sites were visited; their locations are shown in Map 2. The key habitats features are briefly described in Table 1. The exact location, with geographical co-ordinates and the dates surveyed is shown in Appendix 1.

Site	Location	District	Dominant habitat	Water in dry season	Fire	Human presence	Altitude (m. asl).
C1	Bu Gia Map national park	Phuoc Long	Mixed forest	Present	None	low	300-500
C2	Bu Gia Map national park	Phuoc Long	Mixed forest	Present	None	low	300-450
C3	Bu Gia Map national park	Phuoc Long	Evergreen	Restricted	None	high	300-450
C4	Bu Gia Map national park	Phuoc Long	Mixed forest	Restricted	Present	high	350-500
C5	Bu Gia Map national park	Phuoc Long	Mixed forest	Restricted	Present	high	380-500
C6	Ba Gia Mountain	Phuoc Long	Regenerating mixed forest	Very restricted	None	high	200-500
C7	Dac O SFE	Phuoc Long	Mixed forest	Restricted	Present	low	150-320
C8	Bu Dop SFE	Bu Dop (north of former Loc Ninh district)	Mixed forest	Very restricted	Present	high	150-280
C9	Bu Dang SFE	Bu Dang	Evergreen forest	Present	None	high	350-450
C10	Bu Dang SFE	Bu Dang	Mixed forest	Very restricted	Present	high	450-550

Table 1. Key characteristics of survey sites. Detailed location of sites is shown in Appendix 1 and Map 2.

5. Results

5.1 General

A total of 134 independent point counts were conducted at 10 sites within Binh Phuoc province. Orange-necked Partridge was recorded at 15 counts spread across four sites, a total of 27 Orange-necked Partridges were recorded (Appendix 1).

Analysis of data followed three steps. The first step was to insert the relevant data collected in to Excel. The second step was to use the SYSTAT 10.2 to analysis the habitat use. Finally, a map-based analysis was conducted to predict Orange-necked Partridge distribution in Binh Phuoc province.

5.2 Habitat use

In order to assess the effect of different habitat variables on the minimum of number of Orange-necked Partridges present, simple and multiple regression were both used. It was assumed that there are many factors potentially affecting to the presence and number of Orange-necked Partridge, because of that, it was necessary to use an analytical technique that could consider these effects simultaneously. SYSTAT version 10.2 is a software package that allows analysis of the correlation and relationship between two variables or several variables at the same time. This is particularly useful when the dependent variable is likely to be strongly influenced by more than one independent variable.

The simple analysis of correlation between pairs of variables was tested first. The effect of each variable on Orange-necked Partridge presence was tested sequentially, through a series of tests. All variables were tested, as it was felt during the field work that they may all be important factors determining the presence of Orange-necked Partridge.

The results showed that elevation had a significant effect on the presence of Orange-necked Partridge ($r = - 0.203$, $p = 0.019$). Elevation was negatively correlated with presence of Orange-necked Partridge, meaning that Orange-necked Partridge was recorded more common at low elevations than that at high elevations. During the survey, the highest elevation surveyed was 700 m asl and lowest was 150 m asl, simple analysis using Excel revealed that all records of Orange-necked Partridge were below 500 m asl, and all but one were below 420 m asl. Elevations below 150 m asl were not surveyed, as the only areas below this elevation in the province are located in Bu Dop district, where deciduous forest is dominant (this habitat is unlikely to support the species). During the survey, all records of Orange-necked Partridge ranged from 160 to 420 m asl.

When elevation was replaced by distance from human settlement, the test showed no significant relationship between the variables ($r = - 0.109$; $p = 0.209$). The presence of Orange-necked Partridge did not appear to be correlated with distance from human settlement.

The human settlement factor was then replaced by presence of permanent water within 2 km. The result showed a highly significant effect and strong relationship between the presence of Orange-necked Partridge and presence of permanent water within 2 km ($r = -0.242$; $p = 0.009$). All Orange-necked Partridges recorded during the survey were within 2 km of permanent water.

Three forest types variables were compared with presence of Orange-necked Partridge in turn: evergreen forest, mixed forest and bamboo forest. The results showed a strong positive correlation between the bamboo forest variable and presence of Orange-necked Partridge ($r = 0.301$; $p = 0.002$). A strong positive correlation was also observed between the mixed forest variable and presence of Orange-necked Partridge ($r = 0.181$; $p = 0.021$). However, no significant relationship was shown with the evergreen forest variable ($r = -0.185$; $p = 0.197$).

In order to investigate the effect of understorey vegetation (not including bamboo, which was considered part of the canopy vegetation) on the presence of Orange-necked Partridge, the correlation between the scrub and grass variables with presence of the species were tested. The results showed that neither the correlation of the scrub ($r = -0.117$; $p = 1$) nor the grass variables ($r = -0.031$; $p = 1$) with the presence of Orange-necked Partridge was significant.

To analyse the effects of human impacts other than distance from human settlement on presence of Orange-necked Partridge, three other variables were entered: presence of burning, presence of agriculture and presence of cattle. The results, however, did not show a significant relationship between any of these variables and presence of Orange-necked Partridge (burning: $r = 0.189$; $p = 0{,}174$; agriculture: $r = -0.106$; $p = 1$; cattle: $r = -0.070$; $p = 1$). It should be noted that, in the case of agriculture and cattle, very few point counts had these human impacts present (in part because places with human impact were avoided during site selection). This may mean that relationships were overlooked due to lack of data.

In order to investigate the effects of different variables on the presence of Orange-necked Partridge at the same time, selected variables were entered, using a multiple regression stepwise analysis. The variables entered comprised: evergreen forest (dominant, present, absent), mixed forest (dominant, present, absent), bamboo forest (dominant, present, absent), elevation, presence of permanent water within 2 km, distance to human settlement, and presence of humans at the counting point. At each step of this analysis, the variable with the weakest relationship to the presence of Orange-necked Partridge was eliminated. At the first step, the mixed forest variable was eliminated ($E = -0.671$, $t = -1.040$; $S.E = 0.645$; $p = 0.298$). At the second step, presence of humans at the counting point was eliminated ($E = -1.611$, $t = -1.208$; $S.E = 1.134$; $p = 0.227$). At the third step, distance from human settlement was eliminated ($E = 1.083$, $t = 1.122$; $S.E = 0.886$; $p = 0.222$). The four remaining variables showed a significant relationship with presence of Orange-necked Partridge. When stood in order, the strongest was bamboo forest ($E = 1.195$, $t = 2.883$; $S.E = 0.415$; $p = 0.004$), then presence of permanent water within 2 km ($E = -3.007$, $t = -2.332$; $S.E = 1.290$; $p = 0.020$), then elevation ($E = -0.006$, $t = -1.997$;

S.E = 0.003; p = 0.046) and then evergreen forest (E = -0.990, t = - 1.691; S.E = 0.586; p = 0.091).

The same analysis was then applied with the same variables but using a backward model. Following this approach, variables with a stronger relationship to the presence of Orange-necked Partridge were eliminated first, followed by variables with weaker relationships. The results showed that elevation was eliminated at the first step (E = -0.006, t = - 6.662; S.E = 0.001; p = 0.001), then bamboo forest at step 2 (E = -3.166, t = - 2.398; S.E = 1.320; p = 0.016), then presence of permanent water within 2 km at step 3 (E = -0.990, t = - 1.691; S.E = 0.586; p = 0.091) then evergreen forest at step 4 (E = 1.083, t = 1.222; S.E = 0.886; p = 0.222), then distance to human settlement, mixed forest and presence of humans.

In both models, the results were similar with four variables strongly affecting the presence of Orange-necked Partridge: elevation, presence of permanent water within 2 km, bamboo forest and evergreen forest. The remaining three variables did not show any significant relationship with presence of Orange-necked Partridge under either model.

Overall, the results of this survey show that of the habitat variables measured, elevation, presence of permanent water within 2 km, evergreen forest and bamboo forest have the largest effect on the presence of Orange-necked Partridge in an area.

5.3 Predicted distribution

The analyses presented in Section 5.2 identified four key factors affecting the distribution of Orange-necked Partridge in the surveyed areas. In this section, we attempt to use these results to predict the distribution of Orange-necked Partridge in Binh Phuoc province.

The results show that the strongest factor affecting the presence of Orange-necked Partridge is the presence of bamboo forest. The next is presence of permanent water within 2 km, then elevation (less than 500 m asl), then presence of evergreen forest.

A map of Binh Phuoc province was then prepared using MapInfo Professional Version 8.0. This map shows habitat types, human settlement, elevation and rivers and was used to identified all areas lower than 500 m asl, with presence of bamboo forest and/or evergreen forest, within 2 km of permanent water. This map was based on forest cover, land use and river data, compiled from satellite imagery and existing maps. The accuracy of this map obviously affects the value of the results. The accuracy of the map regarding distribution of permanent water is of particular concern as, when the survey was undertaken (during the dry season), many of the streams depicted in the map were dry.

Nevertheless, the map highlights the importance of certain areas of Binh Phuoc province for Orange-necked Partridge. In particular, areas in the north-east of the province, close to the international border with Cambodia (in Phuoc Long and Bu Dop (formerly Loc Ninh) districts), and areas in the south-east of the province (in Bu Dang and Dong Phu districts) still appear to retain suitable habitat for the species (see Map 4). This predicted

distribution map is based entirely on the data collected in this survey. However, the results correspond well with the results of previous studies on the potential habitat use and distribution of the species in the area.

Based on the predicted distribution map, two proposed extensions to existing protected areas that would increase the conservation coverage of Orange-necked Partridge in Binh Phuoc province were defined; and the potential area of occupancy of the species in Binh Phuoc province was estimated (see Map 5).

Based on the results of the analysis, the total area of suitable habitat for Orange-necked Partridge in Binh Phuoc province is 97,378 ha, comprising 68,501 ha of bamboo forest below 500 m asl within 2 km of permanent water, and 28,877 ha of evergreen forest below 500 m asl within 2 km of permanent water (Map 5).

The first proposed extension is an extension of Bu Gia Map national park to the south-west, including Dac O, Bu Gia Map and Bu Dop State Forest Enterprises. Bu Gia Map national park contains a total of 19,684 ha of potential habitats for Orange-necked Partridge, these comprise 3,186 ha of evergreen forest, 5,064 ha of mixed forest and 11,434 ha of bamboo forest (Tordoff *et al.* 2004). The expansion area to the south-west of Bu Gia Map national park comprises a total of 24,100 ha including 11,161 ha of bamboo forest below 500 m asl within 2 km of permanent water, and 2,564 ha of evergreen forest below 500 m asl within 2 km of permanent water. Following this proposed extension, the total area of suitable habitat for Orange-necked Partridge under protection in the north-east of Binh Phuoc province would increase by 13,725 ha (see Map 5).

The second proposed extension is an extension of Cat Tien national park to the north west, including forest areas in Dong Phu district, plus parts of Bu Dang and Nghia Trung State Forest Enterprises. This expansion comprises a total area of 50,430 ha, including 24,505 ha of bamboo forest below 500 m asl within 2 km of permanent water, and 7,382 ha of evergreen forest below 500 m asl and within 2 km of permanent water. Following this proposed extension, the total area of suitable habitats for Orange-necked Partridge under protection in the south-east of Binh Phuoc province would increase by 31,887 ha (see Map 5).

5.4 Other bird species recorded

A total of 132 bird species were recorded during the survey. A complete list of birds is included in Appendix 3. Some notable species recorded during the survey are shown in details below. The conservation status of the species follows IUCN (2004).

Germain's Peacock Pheasant *Polyplectron germaini* - Vulnerable

Six Germain's Peacock Pheasants were recorded during the survey by hearing their calls. Most of the birds were recorded at the sites within Bu Gia Map national park including one on 27, one on 28 April, one on 4 May and the other was recorded on 6 May (see Appendix 1). Two other individuals were recorded in Dac O and Bu Dop State Forest

Enterprises. All the birds were recorded in mixed forest habitats with the bamboo and scrub dominated understories and at the elevations between 150 and 400 m asl.

Siamese Fireback *Lophura diardi* – Near-threatened

At least 8 birds were seen in Bu Gia Map national park between 29 April and 3 May, and 12 other birds were observed in Dac O State Forest Enterprise between 13 and 16 May. Siamese Fireback seems to be common, despite the fact that the species is now under the high pressure from hunting and trapping in these areas.

Great Hornbill *Buceros bicornis* – Near-threatened

Two birds were seen in the early morning of 14 May at Dac O State Forest Enterprise.

Grey-headed Fish Eagle *Ichthyophaga ichthyaetus* – Near-threatened

A single bird was seen near the Camp 9 at Bu Dang State Forest Enterprise on 22 May. The bird was fishing at the relatively large lake inside the forest.

Woolly-necked Stork *Ciconia episcopus* - Least concern

Two birds were seen in the stream near to Camp 2 at the Bu Gia Map national park on 30 April. The birds were feeding in the remaining water pools in the stream.

6. Limitations:

Due to the topography and security factors, the survey team was not always able to undertake the survey following the designated methods. In border areas, the team had to followed the military trails, which were often far from permanent water, and the distance between the point counts was often too short or too long.

The minimum distance of 1 km between point counts was set to avoid incidences of double counting between simultaneous counts. However, avoiding double counting between consecutive counts is perhaps more difficult. Consecutive counts made at the site were always greater than 1 km from previous counts, and usually considerably more, as different areas were approached for each morning and evening counting session. However, it is impossible to be sure that birds did not move several km during the day or night and were double counted as a result.

During the survey, because there were big differences in expertise between the local team members and core team members, data collection was inconsistence, in some cases. For instance, on at least 50% of the completed datasheets, the distance to human settlement factor was not filled in, as some of the team members were not able to estimate this distance. Beside that, there was a significant amount of confusion about how to determine the presence and relative abundance of different habitat: some team members failed to

distinguished between the canopy and understory vegetation, and listed the dominant habitat incorrectly.

Before the survey, the team tried to included parts of Mondulkiri province, Cambodia, within the survey, working in collaboration with local partners there. However, the difficult of getting necessary permissions prevented this idea being realised.

The difficulty of communication between the Hanoi-based team members and the local team members in Binh Phuoc province added more confusions and meant that it took longer to compose the data and complete the final report.

7. Key measures for conservation

7.1 Conservation of Orange-necked Partridge

The survey and analysis of habitat use by Orange-necked Partridge highlighted the importance of bamboo forest, evergreen forest, elevation and the proximity to permanent water. Bamboo forest and evergreen forest, below 500 m asl, and within 2 km of permanent water, appear to support Orange-necked Partridge more frequently than other habitat types.

The expansion of humans, particularly, the in-migration of people from northern Vietnam and the construction of new military roads and bases, within the remaining suitable habitats for Orange-necked Partridge will have a two-fold negative effect:

Firstly, a direct loss of habitat will ensue. The construction of new roads and border army stations as well as human settlements has destroyed large areas of natural forest, and facilitated further forest conversion to agriculture land. Planned new roads will divide the large blocks of natural habitats that remain into small patches of forest, and this forest fragmentation will enable more access from humans.

Secondly, the increase in human presence in the areas will lead to a rise in direct exploitation, and a wider area will be affected by disturbance, which is caused by activities such as wood, bamboo collecting, grazing, fishing and hunting.

The commercial selective logging activities by the State Forest Enterprises in the province can directly affect the species by destroying its habitats and creating disturbance. Beside that, a large indirect detrimental affect also can be caused by the increased ease of access that results from logging activities. Logging requires the opening of access tracks to facilitate the removal of bamboo and lately, these tracks are being used by hunters and local people to travel further into the forest. Forest fires also increase as a result of increased ease of access.

Nevertheless, many Orange-necked Partridge were recorded in selectively logged areas. The value of these areas can remain very high without the need for further protected area designation, if logging is selective and carried out in strict rotation and access outside of

logging periods is strictly prohibited. There are many existing forest enterprise guard stations but more need to be established on all major access routes, patrolling needs to be increased and regulations need to be more effectively enforced.

During the survey, the team tried to conducted on-the-spot awareness raising about the importance of Orange-necked Partridge to local stakeholders, where and whenever it could. Stakeholders included the soldiers in the 783, 785 and 787 border army stations, key persons in Dac O, Bu Dop, Bu Dang State Forest Enterprises, the staff of Bu Gia Map national park, Phuoc Long, Bu Dang and Bu Dop District Forest Protection Departments, Dac O, Bu Gia Map communes, and local people living around the survey areas. For most of these people, it was the first time they had heard about the species, some of them knew the bird very well and a few had even had caught some birds before for food and pet. The photos, books and calls of the species were used for illustration during the talks.

In conclusion, the key factor to consider in the conservation of Orange-necked Partridge is to maintain large, continuous areas of bamboo and evergreen forest, below 500 m asl, within 2 km of permanent water. In particularly, these areas need to be protected from wholesale or piecemeal conversion to other land uses, such as cashew plantations. Human disturbance, such as illegal exploitation and selective logging, also need to be controlled. Ideally, this would be implemented by establishing large protected areas complete with permanent water supplies. More awareness programs should be conducted and widely circulated to local communities.

7.2 Key areas for Orange-necked Partridge in Binh Phuoc province

The survey recorded Orange-necked Partridge at four sites in Binh Phuoc province, of those, only one site is designated as a protected areas (Bu Gia Map national park) with low human population and low human disturbance. The three other recording sites are located in the State Forest Enterprises including Dac O, Bu Dop and Bu Dang.

The predicted distribution map mostly echoes the survey's findings, with the greatest concentration of Orange-necked Partridge predicted in north-east corner of Binh Phuoc province (Phuoc Long and Bu Dop (former Loc Ninh) districts). This corner contains four forest management units of potential significance for the species: Bu Gia Map national park, and Dac O, Bu Gia Map and Bu Dop State Forest Enterprises. While Bu Gia Map national park, Dac O and Bu Dop State Forest Enterprises have confirmed records of the species, Bu Gia Map State Forest Enterprise hasn't been the focus of any surveys so far. This State Forest Enterprise is located near to, and has similar habitats to, Bu Gia Map national park, and currently forms a buffer zone protecting Bu Gia Map national park from the expansion of human settlement, agriculture and disturbance. This area can be considered to have high potential for the conservation of Orange-necked Partridge.

The predicted distribution map have also points out other potential areas for the species, located in south-eastern Binh Phuoc province, including Bu Dang and Dong Phu districts.

In Bu Dang district, the potential areas are concentrated in Nghia Trung and Bu Dang State Forest Enterprises. Nghia Trung State Forest Enterprise has a confirmed record from 2003 (Nguyen Tran Vy *et al* 2003), while the occurrence of Orange-necked Partridge at Bu Dang State Forest Enterprise was confirmed during this survey. Dong Phu district was also shown to have potential for the presence of the species. Particularly, forest areas in the south and eastern Dong Phu district, adjoining Cat Tien national park (from where many surveys have confirmed the species).

7.3 Follow-up activities

The follow-up activities will be divided in to two phases including survey and conservation:

- Additional surveys will be focused on unsurveyed areas with potential to support the species, such as Mondulkiri province, Cambodia, forest areas in Dong Phu district, and Bu Gia Map State Forest Enterprise.

- Conservation actions will focus on different awareness-raising programs, such as talks, circulation of the survey report to local stakeholders via the media (radio, TV, etc), strengthening the capacity of local team members and staff of national parks and nature reserves in order to establish long-term monitoring systems for the species, and formulating recommendations for land-use planning that promote the conservation of the species.

8. Recommendations for conservation of Orange-necked Partridge

1. Further and more detailed surveys of Orange-necked Partridge should be conducted in the future, focused on the identified high potential areas without confirmed field records to date, such as: Bu Gia Map State Forest Enterprise and forest areas in southern and eastern Dong Phu district. Within the areas which already have confirmed records, such as Bu Gia Map national park, Bu Dop, Dac O and Bu Dang State Forest Enterprises, further surveys should also carried out to estimate the population in these areas; these surveys should tried at the different time of year, to investigate seasonal patterns in the distribution of the species. Surveys should also be conducted in Mondulkiri province, Cambodia, in order to assess the world's distribution and estimated population of the species.

2. Further human in-migration into Binh Phuoc province from other parts of Vietnam should be strictly controlled. Currently, human settlements are spreading at an alarming rate, in particular at Bu Dop, Bu Dang (village No.8), Dac O and Bu Gia Map State Forest Enterprises. The spread of human settlement will almost certainly lead to agricultural expansion and this will result in direct habitat destruction and, likely, greater fragmentation and increased levels of exploitation of forest resources.

3. Information on important forest areas for Orange-necked Partridge in Binh Phuoc province should be integrated into provincial land-use and development plans,

particularly those relating to agriculture development, forestry and infrastructure, in order to assist the province to pursue environmentally sustainable development.

4. The development of new military infrastructure should be carefully planned. A new military road and several border army stations are now under construction. This road runs along the border between Vietnam and Cambodia. This new road has already destroyed a large patch of forest, and threatens to isolate the population of the species in Vietnam from that in Cambodia.

5. The conservation coverage of natural forest areas in Binh Phuoc province should be increased, either through expansion of existing protected areas (Bu Gia Map and/or Cat Tien National Parks), establishing new protected areas, or designating key habitat within state forest enterprises as conservation areas for Orange-necked Partridge and other threatened species. Orange-necked Partridge was confirmed at four sites during the survey, only one of which is within a protected area. This means that most of the sub-populations recorded are unprotected. Bu Gia Map national park could be expanded to the south-west to cover parts of Bu Gia Map, Dac O and Bu Dop State Forest Enterprises. In addition, areas within Nghia Trung and Bu Dang State Forest Enterprises important for the species could be combined to established a "species habitat protection area", focused on both Orange-necked Partridge and Germain's Peacock Pheasant *Polyplectron germaini*.

6. Sustainable forest management should be strengthened at Bu Gia Map, Dac O, Bu Dop, Nghia Trung and Bu Dang State Forest Enterprises. Logging should be carefully selective and carried out in strict rotations. After logging, access and human settlement should be controlled.

7. The awareness of local communities about the importance and conservation of the species should be raised. More raising awareness activities should be conducted in the areas. These activities included give a talks to key people in buffer zones, talking with schools (with pictures, photos, leaflets..) and particularly talking with the people in border army stations and people from State Forest Enterprises who live within areas. These people may help to protect the habitat and species from hunters and disturbance from local people.

8. The results of the survey should be widely disseminated to inform other conservation projects in the Southern Vietnam Lowlands Endemic Bird Area, in both Cambodia and Vietnam.

9. Forest protection regulations and forest rangers' capacity to enforce them should both be strengthened at key areas for Orange-necked Partridge. Currently, the forest rangers are short of training and lack equipment. Forest protection regulations are not strictly enforced, and hunters and illegal loggers are met frequently inside the forest in both Bu Gia Map national park and State Forest Enterprises.

10. Cooperation between the forest rangers and Border Army Stations should be strengthened. Border Army Stations play an important role to protect the habitats and species as it located within an areas. The good cooperation will help to prevent the hunters and illegal loggers access the areas.

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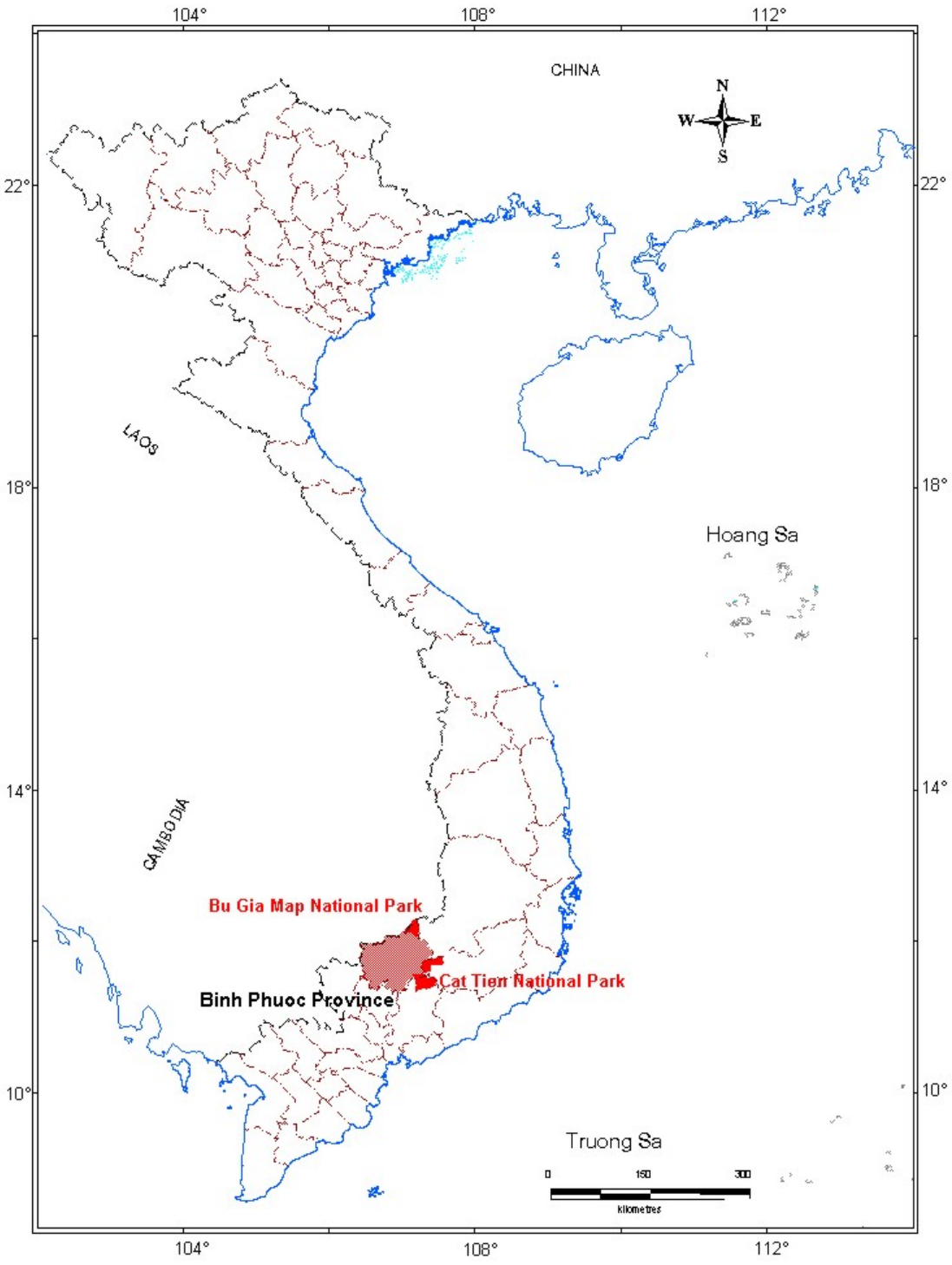
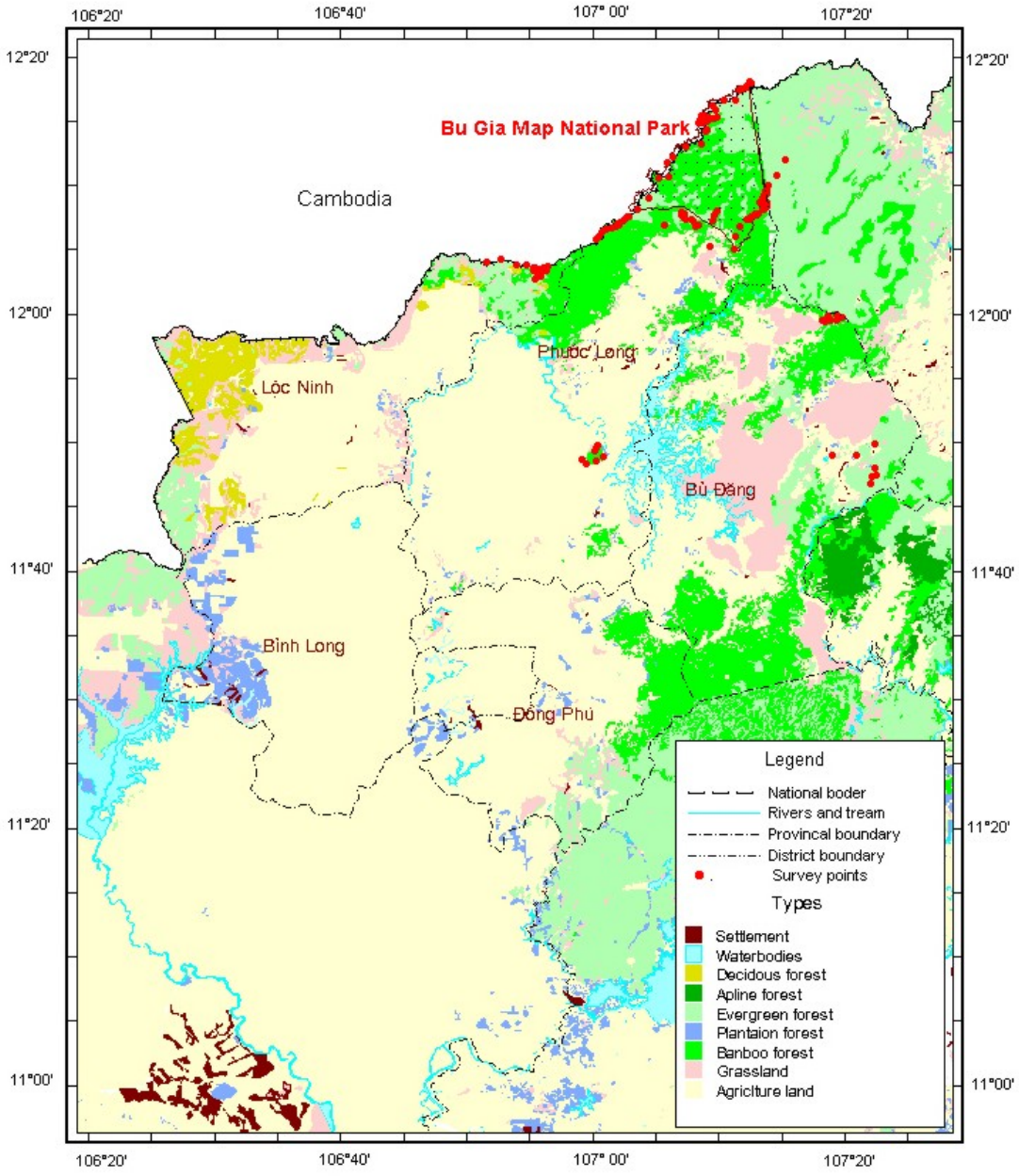
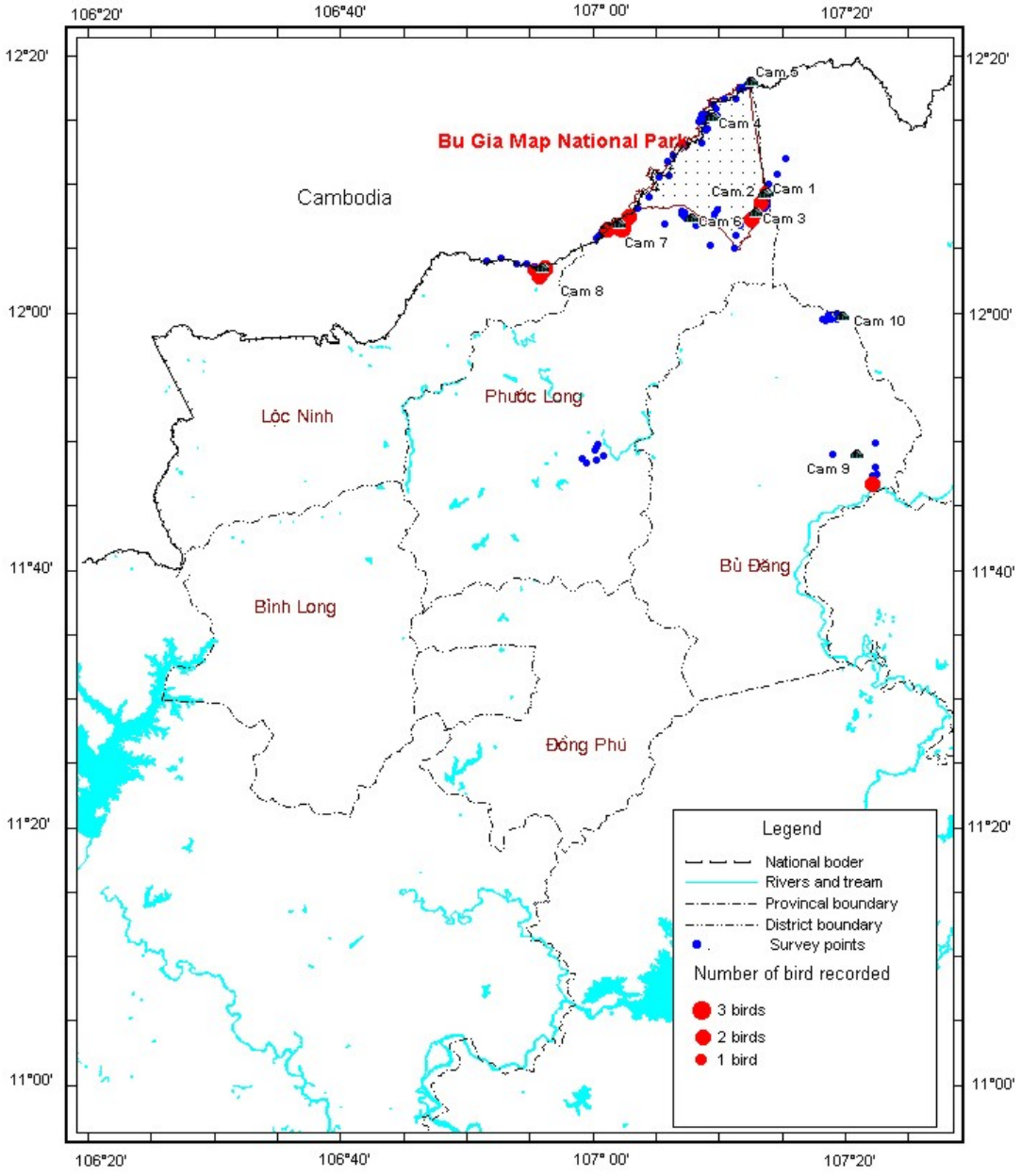
Map 1: Location of Binh Phuoc Province in Vietnam



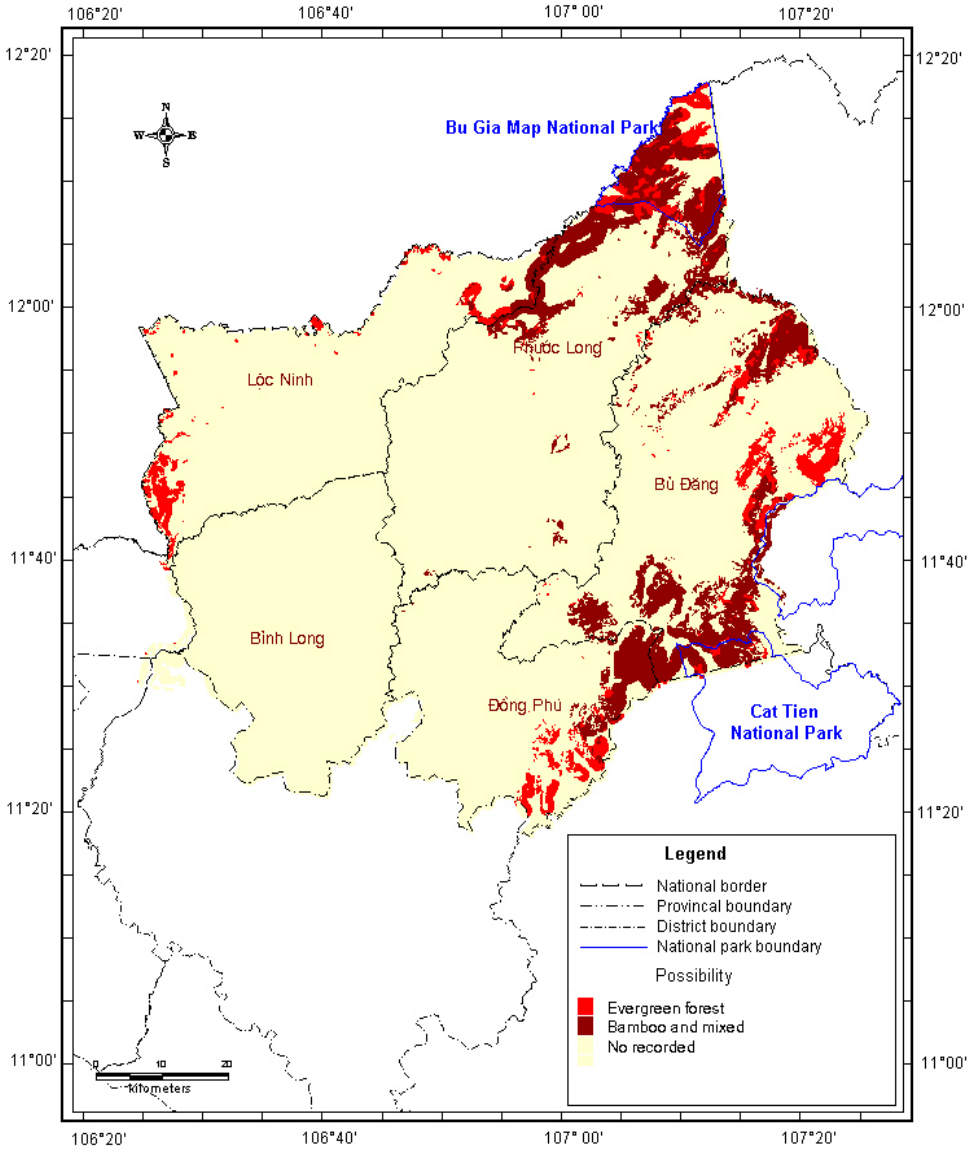
Map 2: Forest cover and surveyed points in Binh Phuoc province



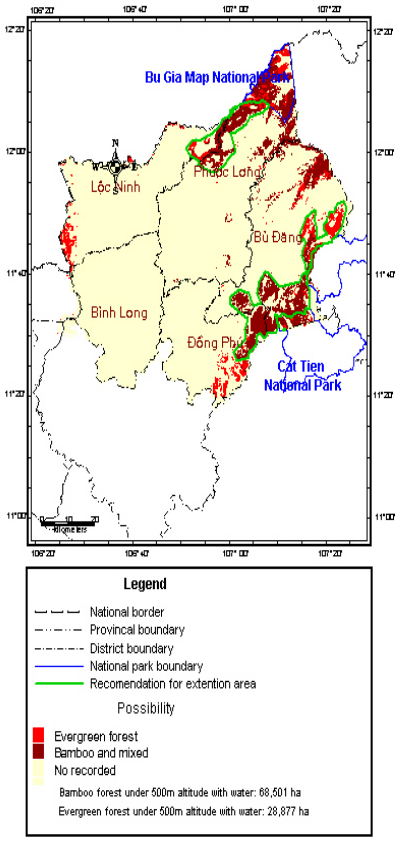
Map 3: Orange-necked Partridge recording sites in Binh Phuoc province

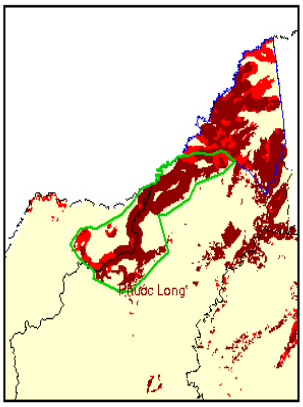


Map 4. Predicted distribution of Orange-necked Partridge in Binh Phuoc province

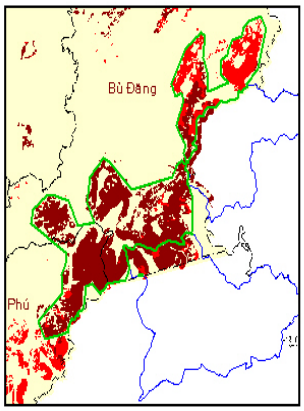


Map 5. Proposed extension for the distribution of Orange-necked Partridge in Binh Phuoc province





- Total area 24,100 ha
- Bamboo forest under 500m altitude with water: 11,161 ha (46.31%)
- Evergreen forest under 500m altitude with water: 2,564 ha (10.64%)



- Total area 50,430 ha
- Bamboo forest under 500m altitude with water: 24,505 ha (48.59%)
- Evergreen forest under 500m altitude with water: 7,382 ha (14.64%)

Appendix 1: Survey position and notes

No	Date	Co-ordinates (UTM)	Notes
1.	25 April 2005	0742979-1344036	Camp1 (Bu Gia Map National Park)
2.		0743073-1344383	01 Orange-necked Partridge was observed
3.		0743213-1344590	
4.	26 April 2005	0746004-1349077	
5.		0744775-1346975	
6.		0743543-1345461	
7.	27 April 2005	0743307-1344571	01Germain's Peacock Pheasant
8.		0743330-1344354	
9.		0743055-1344677	
10.	28 April 2005	0743036-1342778	01Germain's Peacock Pheasant
11.		0743234-1342430	
12.		0743211-1342975	
13.		0742686-1343694	
14.	29 April 2005	0742514-1343316	01 Orange-necked Partridge was heard
15.		0742330-1342994	
16.		0741956-1342032	02 Orange-necked Partridge were observed
17.		0741768-1341376	Camp2 (Bu Gia Map National Park)
18.	30 April 2005	0742095-1341298	
19.		0742122-1341467	
20.		0742776-1341970	
21.	1 May 2005	0742983-1342013	
22.		0741442-1341146	
23.		0741063-1340980	
24.	2 May 2005	0741938-1341232	01 Orange-necked Partridge was heard in the early morning
25.		0740936-1340617	02 Orange-necked Partridge were heard
26.		0740444-1340520	
27.		0739476-1339624	
28.		0738775-1338114	
29.		0738756-1336319	
30.	3 May 2005	0727710-1346435	
31.		0734382-1353156	
32.		0735522-1354921	Camp3 (Bu Gia Map National Park)
33.		0734784-1355198	
34.	4 May 2005	0734214-1355360	
35.		0733885-1355370	
36.		0733561-1354852	
37.		0733329-1354327	
38.		0733927-1354295	01Germain's Peacock Pheasant
39.		0734624-1354566	

40.		0735729-1355054	
41.		0736048-1355295	
42.		0736266-1355108	
43.	5 May 2005	0740847-1360141	Camp4 (Bu Gia Map National Park)
44.		0735840-1356204	
45.		0735407-1356778	
46.		0737074-1357660	
47.		0738660-1357744	
48.		0739453-1359225	
49.		0740616-1360281	
50.	6 May 2005	0740506-1359851	
51.		0740353-1359559	
52.		0740139-1359444	
53.		0739649-1359329	01 Germain's Peacock Pheasant
54.		0739354-1359135	
55.		0732441-1340544	Camp5 (Bu Gia Map National Park)
56.		0734696-1353339	
57.	7 May 2005	0733830-1351309	
58.		0731544-1350956	
59.		0729705-1349444	
60.		0728932-1348721	
61.		0729117-1346658	
62.	8 May 2005	0726375-1343561	
63.		0724721-1341929	
64.		0728601-1339616	
65.		0733081-1339532	
66.		0732660-1340267	
67.	9 May 2005	0731626-1340487	
68.		0731410-1340746	
69.		0731120-1341081	
70.		0730973-1341467	
71.		0731366-1341413	
72.		0731554-1340719	
73.	10 May 2005	0733448-1339769	
74.		0736062-1341753	
75.		0735778-1341113	
76.		0735593-1340317	01 Wreathed Hornbill
77.	12 May 2005	0720106-1306476	Ba Ra Mountain
78.		0718898-1307568	
79.		0719113-1307942	
80.		0719100-1305660	
81.		0717670-1305310	
82.		0716893-1306029	
83.		0718876-1307229	
84.	13 May 2005	0722072-1339612	Camp 7 (Dac O State Forest Enterprise) (03 Orange-necked Partridge called from

			three different directions).
85.		0723535-1340829	
86.		0722265-1339973	
87.		0722713-1340177	
88.		0722961-1340667	
89.		0723181-1340784	02 Orange-necked Partridge observed and heard
90.	14 May 2005	0721660-1339424	02 Great Hornbills
91.		0720995-1339150	05 Wreathed Hornbills, 01 Germain's Peacock Pheasant
92.		0720167-1339029	02 Orange-necked Partridge were heard and seen
93.		0718746-1337521	
94.	16 May 2005	0719149-1338002	
95.		0719579-1338474	
96.		0719725-1338848	
97.		0721898-1339621	02 Orange-necked Partridge were observed
98.		0721835-1339811	
99.	17 May 2005	0710992-1333259	Camp 8 (Bu Dop State Forest Enterprise)
100.		0711270-1333368	02 Orange-necked Partridge were observed
101.		0711632-1333609	
102.		0711048-1333187	02 Orange-necked Partridge were seen and photos
103.		0711197-1333211	02 Orange-necked Partridge were heard, 01 Germain's Peacock Pheasant
104.		0710574-1332786	
105.	18 May 2005	0710432-1332191	02 Orange-necked Partridge were seen
106.		0710769-1332118	
107.		0710083-1331837	
108.		0710345-1333296	
109.	19 May 2005	0709879-1333166	
110.		0709811-1333029	01 Orange-necked Partridge was heard
111.		0709949-1333417	
112.		0709834-1333319	
113.	20 May 2005	0711603-1333113	
114.		0711408-1332931	
115.		0711863-1333660	
116.	21 May 2005	0708883-1333786	
117.		0707387-1333730	
118.		0705107-1334567	
119.		0703027-1334137	
120.	22 May 2005	0756441-1306865	Camp 9 (Bu Dang State Forest Enterprise)
121.		0759180-1305088	

122.		0759331-1304128	
123.		0758861-1303767	
124.	23 May 2005	0758665-1302827	02 Orange-necked Partridge were heard and observed
125.		0759121-1308507	
126.	24 May 2005	0753050-1306890	
127.		0754365-1326680	Camp10 (Bu Dang State Forest Enterprise)
128.		0753515-1326225	
129.	25 May 2005	0752691-1326300	
130.		0751441-1326163	
131.		0751785-1325986	
132.	26 May 2005	0752470-1326256	
133.		0752225-1326731	
134.	27 May 2005	0753530-1326948	

Appendix 2: Orange-necked Partridge data sheet:

Location		Co-ordinates:
Count No:	Observers:	
Observation date: / /	Starting time:	Finishing time:
Moon:	Weather:	Cloud cover%:
Elevation:	Slop:	

Data on Orange-necked Partridge

No.	Time	Bearing	S/H	M/F/J	>500m	distance	Calls

Habitat

Forest type	Evergreen	D / P / A	**Understory**	Grass	D / P / A
Forest cover %	Deciduous	D / P / A		Scrub	D / P / A
	Mixed forest	D / P / A		Bamboo	D / P / A
	Riverine	D / P / A		Fire	D / P / A

Hydrology

Running water:	T / F	Distance:
Standing water:	T / F	Distance:

Human

Cultivation:	D / P / A	Plantation trees:
Grazing:	D / P / A	Species:
Setlement:	D / P / A	Distance:

Notes/Other key species:

Appendix 3: Bird species recorded during the survey

No.	**English Name**	**Scientific Name**	**Notes**
		Galliformes	
		Phasianidae	
1	Chinese Francolin	*Francolinus pintadeanus*	
2	Scaly-breasted Partridge	*Arborophila chloropus*	
3	Orange-necked Partridge	*A. davidi*	EN
4	Red Junglefowl	*Gallus gallus*	
5	Siamese Fireback	*Lophura diardi*	NT
6	Germain's Peacock Pheasant	*Polyplectron germaini*	VU
		Anseriformes	
		Anatidae	
7	Lesser Whistling-duck	*Dendrocygna javanica*	
		Podicipediformes	
		Podicipedidae	
8	Little Grebe	*Tachybaptus ruficollis*	
		Piciformes	
		Capitonidae	
9	Lineated Barbet	*Megalaima lineata*	
10	Green-eared Barbet	*M. faiostricta*	
11	Blue-eared Barbet	*M. australis*	
12	Red-vented Barbet	*M. lagrandieri*	
		Picidae	
13	White-browed Piculet	*Sasia ochracea*	
14	Grey-capped Pygmy Woodpecker	*Dendrocopos canicapillus*	
15	Laced Woodpecker	*Picus vittatus*	
16	Bay Woodpecker	*Blythipicus pyrrhotis*	
17	Common Flameback	*Dinopium javanense*	
18	Greater Flameback	*Chrysocolaptes lucidus*	
		Bucerotiformes	
		Bucerotidae	
19	Oriental Pied Hornbill	*Anthracoceros albirostris*	
20	Great Hornbill	*Buceros bicornis*	NT
21	Wreathed Hornbill	*Aceros undulatus*	
		Trogoniformes	
		Trogonidae	
22	Red-headed Trogon	*Harpactes erythrocephalus*	
		Coraciiformes	
		Alcedinidae	
23	Common Kingfisher	*Alcedo atthis*	
24	Black-backed Kingfisher	*Ceyx erithacus*	
25	Banded Kingfisher	*Lacedo pulchella*	
26	Stork-billed Kingfisher	*Halcyon capensis*	
27	White-throated Kingfisher	*H. smyrnensis*	
		Meropidae	
28	Chestnut-headed Bee-eater	*Merops leschenaulti*	
		Coraciidae	
29	Indian Roller	*Coracias bengalensis*	

30	Dollarbird	*Eurystomus orientalis*	
		Cuculiformes	
		Cuculidae	
31	Banded Bay Cuckoo	*Cacomantis soneratii*	
32	Plaintive Cuckoo	*C. merulinus*	
33	Drongo Cuckoo	*Surniculus lugubris*	
34	Green-billed Malkoha	*Phaenicophaeus tristis*	
35	Greater Coucal	*Centropus sinensis*	
		Psittaciformes	
		Psittacidae	
36	Red-breasted Parakeet	*Psittacula alexandri*	
37	Vernal Hanging Parrot	*Loriculus vernalis*	
		Apodiformes	
		Apodidae	
38	Asian Palm Swift	*Cypsiurus balasiensis*	
39	Silver-backed Needletail	*Hirundapus cochinchinensis*	
		Stringiformes	
		Stringidae	
40	Asian Barred Owlet	*Glaucidium cuculoides*	
41	Brown Hawk Owl	*Ninox scutulata*	
42	Mountain Scops Owl	*Otus spilocephalus*	
		Caprimulgiformes	
		Caprimulgidae	
43	Large-tailed Nightjar	*Caprimulgus macrurus*	
		Columbiformes	
		Columbidae	
44	Spotted Dove	*Streptopelia chinensis*	
45	Emerald Dove	*Chalcophaps indica*	
46	Orange-breasted Green Pigeon	*Treron bicincta*	
47	Thick-billed Green Pigeon	*T. curvirostra*	
48	Yellow-footed Green Pigeon	*T. phoenicoptera*	
49	Green Imperial Pigeon	*Ducula aenea*	
		Gruiformes	
		Rallidae	
50	White-breasted Waterhen	*Amaurornis phoenicurus*	
51	Bronze-winged Jacana	*Metopidius indicus*	
		Charadriiformes	
		Charadriidae	
52	Red-wattled Lapwing	*Vanellus indicus*	
		Falconiformes	
		Accipitridae	
53	Oriental Honey Buzzard	*Pernis ptilorhynchus*	
54	Black-shouldered Kite	*Elanus caeruleus*	
55	Crested Serpent Eagle	*Spilornis cheela*	
56	Eastern Marsh Harrier	*Circus spilonotus*	
57	Crested Goshawk	*Accipiter trivigatus*	
58	Shikra	*A. badius*	
59	Besra	*A. virgatus*	
60	Grey-headed Fish Eagle	*Ichthyophaga ichthyaetus*	NT

61	Changeable Hawk Eagle	*Spizaetus cirrhatus*	
		Ciconiformes	
		Ardeidae	
62	Purple Heron	*Ardea purpurea*	
63	Little Egret	*Egretta garzetta*	
64	Cattle Egret	*Bubulcus ibis*	
65	Chinese Pond Heron	*Ardeola bacchus*	
66	Little Heron	*Butorides striatus*	
67	Yellow Bittern	*Ixobrychus sinensis*	
		Ciconiidae	
68	Woolly-necked Stork	*Ciconia episcopus*	
		Passeriformes	
		Pittidae	
69	Bar-bellied Pitta	*Pitta elliotii*	
70	Hooded Pitta	*P. sordida*	
71	Blue-winged Pitta	*P. moluccensis*	
		Eurylaimidae	
72	Silver-breasted Broadbill	*Serilophus lunatus*	
73	Black and Red Broadbill	*Cymbirhynchus macrorhynchos*	
		Irenidae	
74	Great Iora	*Aegithina lafresneyei*	
75	Blue-winged Leafbird	*Chloropsis cochinchinesis*	
76	Asian Fairy Bluebird	*Irena puella*	
		Laniidae	
77	Brown Shrike	*Lanius cristatus*	
		Dicruridae	
78	Ashy Drongo	*Dicrurus leucophaeus*	
79	Spangled Drongo	*D. hottentottus*	
80	Black Drongo	*D. macrocercus*	
81	Greater Racket-tailed Drongo	*D. paradiseus*	
82	Bronzed Drongo	*D. aeneus*	
83	Ashy Woodswallow	*Artamus fuscus*	
		Corvidae	
84	Red-billed Blue Magpie	*Urocissa erythrorhyncha*	
85	Racket-tailed Treepie	*Crypsirina temia*	
86	Indochinese Green Magpie	*Cissa hypoleuca*	
87	Large-billed Crow	*Corvus macrorhynchos*	
		Oriolidae	
88	Black-naped Oriole	*Oriolus chinensis*	
		Campephagidae	
89	Bar-winged Flycatcher Shrike	*Hemipus picatus*	
90	Scarlet Minivet	*Pericrocotus flammeus*	
		Monarchidae	
91	Asian Paradise Flycatcher	*Terpsiphone paradisi*	
92	Black-naped Mornarch	*Hypothymis azurea*	
		Turdinae	
93	White-rumped Shama	*Copsychus malabaricus*	
94	Oriental Magpie Robin	*Copsychus saularis*	

		Muscicapidae	
95	Asian-brown Flycatcher	*Muscicapa dauurica*	
		Sturnidae	
96	Vinous-breasted Starling	*Sturnus burmannicus*	
97	Black-collared Starling	*S. nigricolis*	
98	Common Myna	*Acridotheres tristis*	
99	Hill Myna	*Gracula religiosa*	
		Sittidae	
100	Velvet-fronted Nuthatch	*Sitta frontalis*	
		Hirundinidae	
101	Barn Swallow	*Hirundo rustica*	
		Pycnonotidae	
102	Grey-eyed Bulbul	*Iole propinqua*	
103	Ochraceous Bulbul	*Alophoixus ochraceus*	
104	Puff-throated Bulbul	*A. pallidus*	
105	Red-whiskered Bulbul	*Pycnonotus jocosus*	
106	Black-headed Bulbul	*P. atriceps*	
107	Sooty-headed Bulbul	*P. aurigaster*	
108	Stripe-throated Bulbul	*P. finlaysoni*	
109	Black-crested Bulbul	*P. melanicterus*	
110	Black Bulbul	*Hypsipetes leucocephalus*	
		Timaliidae	
111	White-crested Laughingthrush	*Garrulax leucolophus*	
112	Lesser Necklaced Laughingthrush	*G. monileger*	
113	Black-throated Laughingthrush	*G. chinensis*	
114	Striped Tit Babbler	*Macronous gularis*	
115	White-bellied Yuhina	*Yuhina zantholeuca*	
116	Puff-throated Babbler	*Pellorneum ruficeps*	
117	Black-brown Fulvetta	*Alcippe grotei*	
118	Buff-breasted Babbler	*Pellorneum tickelli*	
119	Large Scimitar Babbler	*Pomatorhinus hypoleucos*	
120	Chestnut-capped Babbler	*Timalia pileata*	
		Syviidae	
121	Common Tailorbird	*Orthotomus sutorius*	
122	Dark-necked Tailorbird	*O. atrogularis*	
123	Grey-breasted Prinia	*Prinia hodgsonii*	
124	Yellow-bellied Warbler	*Abroscopus superciliaris*	
		Dicaeidae	
125	Scarlet-backed Flowerpecker	*Dicaeum cruentatum*	
		Nectariniidae	
126	Olive-backed Sunbird	*Nectarinia jugularis*	
127	Crimson Sunbird	*Aethopyga siparaja*	
128	Black-throated Sunbird	*A. saturata*	
129	Purple-naped Sunbird	*Hypogramma hypogrammicum*	
		Alaugidae	
130	Paddyfield Pipit	*Anthus rufulus*	
		Estrildidae	
131	White-rumped Munia	*Lonchura striata*	

		Ploeidae	
132	Eurasian Tree Sparrow	*Passer montanus*	

Bird names, sequence and species limits follow Inskipp *et al*. (1996).
Notes : EN = Endangered; VU = Vulnerable; NT = Near Threatened as per IUCN (2004).