

Vietnam Edwards's Pheasant Working Group

Action Plan for the Conservation of the Edwards's Pheasant *Lophura edwardsi* 2015 – 2020



Hanoi, March 2015

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List of Acronyms

CEPF	Critical Ecosystem Partnership Fund
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
EAZA	European Association of Zoos and Aquaria
EBA	Endemic Bird Area
ECBG	European Conservation Breeding Group
EEP	Endangered Species Programme
EPWG	Edwards's Pheasant Working Group
FPD	Forest Protection Department
ISB	International Stud-Book
IUCN	International Union for Conservation of Nature
IUCN-SSC GSG	IUCN-Species Survival Commission Galliformes Specialist Group
TAG	Taxon Advisory Group
Viet Nature	Viet Nature Conservation Centre
WPA	World Pheasant Association

Foreword

To be added to the finalized version.

DRAFT

Executive Summary

Edwards's Pheasant is a Critically Endangered bird endemic to the central Vietnam. Its historical distribution range is from Ha Tinh to Thua Thien Hue provinces. Its last confirmed record in the wild was from 2000; and it's now feared that it may have gone extinct in the wild. Yet, there is very limited knowledge of the species – its distribution, habitat requirements and basic ecology. It's inferred that Edwards's Pheasant inhabits exceedingly damp hill forests, favouring thick under-bush and lianas. All early collecting localities were in the forested level lowlands and there is no evidence that it can live above 300 m. Currently, there is a captive population of Edwards's Pheasant of about 1000 individuals in Europe, Japan and American zoos and private breeders. However, this captive stock likely originated from a tiny founder population (28 specimens, of which only 6-8 were female, collected between 1924 and 1930) which was never subsequently supplemented with wild birds, and is therefore heavily inbred.

In 1964, a similar form of pheasant (but with white central tail feathers in the male) was observed at either end of Edwards's Pheasant's known range and described as Vietnamese Pheasant *Lophura hatinhensis* (Vo Quy 1975). However, in 2012, it was proved that Vietnamese Pheasant was an inbred morph of Edwards's Pheasant (Hennache *et al.* 2012).

The occurrence of birds showing inbred characteristics since the 1960s, and the lack of any records in the last 15 years is an indication that remaining wild populations, if any, are extremely small, fragmented and declining. Root causes for the rarity of Edwards's Pheasant are believed to be intensive indiscriminate hunting coupled with fragmentation and loss of suitable habitat (due to human-induced changes, climate change and possibly coupled with the species' subtle habitat requirements).

From early 1990s up to now, several protected areas have been established in Edwards's Pheasant's range for the conservation of this species and other lowlands species and habitats, namely Ke Go, Phong Dien, Darkrong and Bac Huong Hoa Nature Reserves. These have had some success in slowing deforestation, but threats persist, most notably continued forest degradation and severe hunting/trapping, which results in some areas becoming so-called 'empty forests'.

In response to this critical situation of the species, since 2011 intensive camera trap surveys have been carried out to search for the species in its most suitable remaining habitats in Quang Binh and Quang Tri provinces, but no records was obtained. From mid-2013, various national and international stakeholders have come together to formulate an Edwards's Pheasant Conservation Strategy, establish a voluntary Edwards's Pheasant Working Group in Vietnam (VN-EPWG) and develop this 5-year budgeted Action Plan (2015-2020) for VN-EPWG members and their partners to operationalize the Strategy.

As it is widely agreed that time is running out for this species and its habitat, 'business as usual' is no longer working. Highest priority should be given to securing its remaining suitable habitat and improving the management of Edwards's Pheasant's gene pool (in the captive population) to prepare for the worst situation (i.e. when reinforcement or

reintroduction is needed), while continued efforts should be made to clarify its status in the wild and basic ecology. A conservation breeding programme in Vietnam should start as soon as resource permits to learn more about Edwards's Pheasant ecology in (semi-) natural environment and to produce best birds for reinforcement/reintroduction when deemed necessary. Four programmes, namely Site Protection and Management, Conservation Breeding, Research, and Coordination and Resource Mobilization, are included in this first Action Plan, all of which need to be implemented in parallel to contribute to the overall goal of having a sustainable Edwards's Pheasant population in the wild **by 2030**.

DRAFT

Introduction

Edwards's Pheasant is a Critically Endangered galliformes described in 1896 and endemic to the central region of Vietnam. Its last confirmed record was from 2000; and it's now feared that it may have gone extinct in the wild. Yet, there is very limited knowledge of the species – its distribution, habitat requirements and basic ecology. It's inferred that Edwards's Pheasant inhabits exceedingly damp hill forests, favouring thick under-bush and lianas. All early collecting localities were in the forested level lowlands and there is no evidence that it can live above 300 m.

Root causes for the rarity of Edwards's Pheasant are believed to be intensive indiscriminate hunting coupled with fragmentation and loss of suitable habitat (due to human-induced changes, climate change and possibly coupled with the species' subtle habitat requirements).

Luckily, there is a captive population of Edwards's Pheasant of about 1000 individuals in Europe, Japan and American zoos and private breeders. However, this captive stock originated from a tiny founder population (28 specimens, of which only 6-8 were female, collected between 1924 and 1930) which was never subsequently supplemented with wild birds, and is therefore heavily inbred.

From early 1990s up to now, several protected areas have been established in Edwards's Pheasant's historical range for the conservation of this species and other lowlands species and habitats, namely Ke Go, Phong Dien, Darkrong and Bac Huong Hoa Nature Reserves. These have had some success in slowing deforestation, but threats persist, most notably continued forest degradation and severe hunting/trapping, which results in some areas becoming so-called 'empty forests'.

Since 2010, alarmed by the long paucity of Edwards's Pheasant recording in the wild, efforts have been accelerated to reassess its conservation status, which resulted in it being up-listed to Critically Endangered category in IUCN Red List in 2012. Intensive camera trap surveys have been carried out to search for the species in its most suitable remaining habitats in Quang Binh and Quang Tri provinces, but no records was obtained.

Also in 2012, it was proved that Vietnamese Pheasant *L. 'hatinhensis'*, previously described as a species, is actually an inbred form of Edwards's Pheasant that has been observed at either end of, and within, the known range of Edwards's Pheasant (Hennache *et al.* 2012, J. Eames *in litt.* 2012) and Vietnamese Pheasant has no longer been separately assessed in the IUCN Red List; all records of it are treated as Edwards's Pheasants.

From 2011 up to now, intensive camera trap surveys have been carried out to search for the species in its most suitable remaining habitats in Quang Binh and Quang Tri provinces, but no records was obtained.

The occurrence of birds showing inbred characteristics since the 1960s, and the lack of any records in the last 15 years is an indication that any remaining populations are extremely small, fragmented and declining.

In response to this critical situation of the species, from mid-2013, various national and international stakeholders have come together to formulate an Edward's Pheasant Conservation Strategy, establish a voluntary Edwards's Pheasant Working Group in Vietnam (VN EPWG) and develop this 5-year budgeted Action Plan (2015-2020) for VN-EPWG members and their partners to operationalize the Strategy. Like many other single species action plans, this one includes five main parts, namely The Species; Threats; Policy, Legislation and On-going Activities; Framework for Action; and References. Hopefully, this document and its implementation will give Edwards's Pheasant a better chance to survive in the wild.

DRAFT

1. The Species

1.1 Taxonomy and Ecology

TAXONOMY The Edwards's Pheasant *Lophura edwardsi* is a member of the genus *Lophura*. The species was first described in 1896. Twenty eight years after its discovery, another *Lophura*, Imperial Pheasant *Lophura imperialis* was described from a live pair obtained from missionaries, said to have been captured in the southern boundary of Quang Binh province, northern Quang Tri (Delacour & Jabouille, 1925). There were only three further field records of Imperial Pheasant (BirdLife International 2001), until it was shown to be a hybrid between Edwards's Pheasant and Silver Pheasant *Lophura nycthemera* following Rasmussen (1998), Garson (2001), BirdLife International (2001) and Hennache *et al.* (2003). In 1964, a third similar form of pheasant was discovered (but with white central tail feathers in the male) and it was named as Vietnamese Pheasant *Lophura hatinhensis* (Vo Quy 1975). Since its discovery, the incidence of Vietnamese Pheasant reports rose quickly, then dropped off rapidly, with the last record in 1999 (BirdLife International 2001). Most records of Vietnamese Pheasant are from the north of the Edwards's pheasant's range in Ha Tinh and Quang Binh provinces, but one was from the Huong River, 15 km south of Hue, Thua Thien - Hue Province, in 1999, almost at the southern limit of Edwards's Pheasant's range (BirdLife International 2001, Hennache *et al.* 2012). Vietnamese Pheasant was recently proved to be an inbred morph of *L. edwardsi* (Hennache *et al.* 2012). Therefore, Edwards's Pheasant is the only one of these three now recognized and included in the IUCN Red List. Henceforth, Edwards's Pheasant records referred to in this document include all records of birds formerly treated as Vietnamese Pheasant.

ECOLOGY There is very limited knowledge of the species, its distribution, habitat requirements and basic ecology.

Food Nothing is known about the diet of this species in the wild.

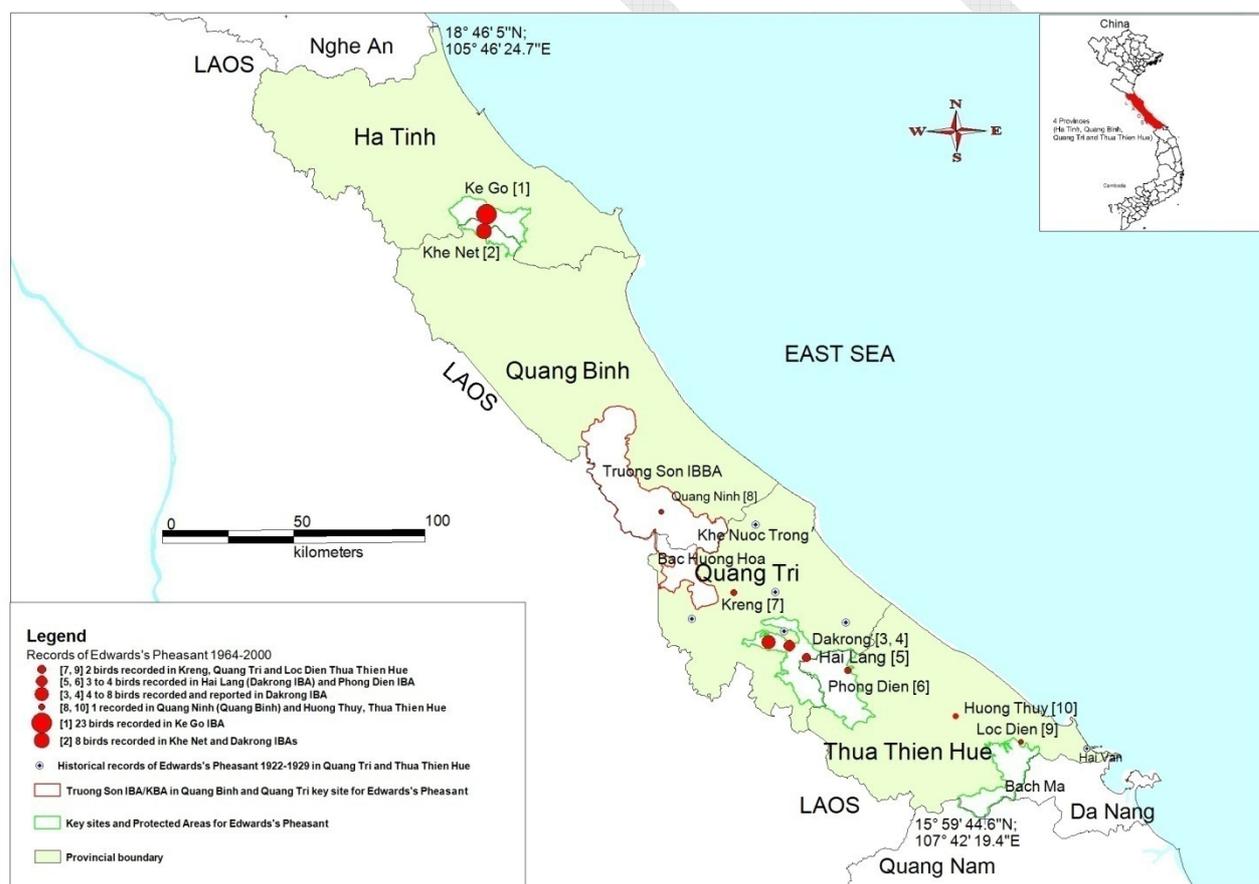
Breeding A very young juvenile was collected on 15 April 1926 at Hue and reared by Pierre Jabouille (specimen in *Muséum National d'Histoire Naturelle*, Paris, France). All other information derives from observations of captive birds. Eggs tend to be laid between March and May; the first clutch recorded comprised five eggs that took 21 days to hatch; as a rule individuals breed only after they are two years old (Delacour 1977). A male hatched in captivity survived 22 years (Delaware Museum of Natural History, Greenville, USA, label data). Another male died when it was 22 years old in Jersey Durrell Wildlife Park (Hennache per comm. 2015). The wild male collected in Quang Tri in December 1996 when it was about one year old and kept at Hanoi Zoo survived for 17 years more, until 2013 (Dang Gia Tung, per. comm. 2015).

1.2 Distribution:

Edwards's Pheasant is endemic to central **Vietnam** and was recorded historically in four provinces (Ha Tinh, Quang Binh, Quang Tri and Thua Thien Hue). The species was first described from four specimens collected from Quang Tri by French missionaries (types

held in MNHN). During 1923-1929, Delacour organized seven expeditions in Indochina and collected 64 specimens, c.28 of which were exported alive to France and were believed to be the founder population of the existing captive population (Ciarpaglini & Hennache 1997).

There were no confirmed records of Edwards's Pheasant in its typical morph between 1930 and 1996, but between 1964 and 1995, there were at least 31 individuals of the inbred morph (i.e. with white central tail feathers in the male) were recorded in Ke Go and Khe Net of Ha Tinh and Quang Binh provinces. In 1996, individuals in its typical morph were recorded near to the Phong My Commune, Thua Thien Hue, and also near the Huong Hiep Commune, Quang Tri (Le Trong Trai *et al.* 1999). Since then several other individuals were found in the Quang Tri and Thua Thien Hue Provinces, but the last confirmed recent record was in 2000, where one male was confiscated from a hunter and held in captivity in the Hai Lang District Forest Protection Department, Quang Tri. In 2009 a possible female was recorded near Hai Van Pass, but there are doubts about the identification (A. Hennache *in litt.* 2012). For detailed records of Edwards's Pheasant, see Annex 1.



Map 1: The distribution of Edwards's Pheasant.

(1) Ke go; (2) Khe Net; (3, 4) Dakrong; (5) Hai Lang; (6) Phong Dien; (7) Krong village; (8) Quang Ninh; (9) Loc Dien commune (10) Huong Thuy. Sites of historical records are not numbered. Historical records: pre-1950; recent records: from 1964 to present.

1.3 Habitat Requirements

Most historical records of the species have come from sites less than 300 m in elevation and in evergreen forest (BirdLife International 2001). Delacour and Jabouille (1925) saw an Edwards's pheasant flying over the road at the top of the Hai Van pass (the only one they saw on that expedition that was not in a trap), which is an estimated 480 m elevation (Maximum 480 m a.s.l. if at the top of the pass, calculated using Google Earth). Its upper altitudinal limit was given as 900 m by Delacour (1977), revised for unknown reasons from the 600 m given by Delacour and Jabouille (1931), but there is no solid evidence that the species occurred at these higher altitudes (Eames *et al.* 1992, 1994). Moreover, more forest that is largely less degraded remains in the hills above 500 m so these altitudes had relatively high levels of survey effort during the late 1980s and 1990s. The absence of records or credible reports of Edwards's Pheasant from them makes it most likely that if it occurs at all above 300–450 m it is exceptionally localised. All collecting localities were in the flat forested lowlands and there is no definite evidence to support Delacour's belief that the species occurs at higher altitudes (Eames *et al.* 1992, Lambert *et al.* 1994). The individual captured in 1998 in Loc Dien commune was found at c.300 m in "regenerating forest with many scattered shrub trees and creepers" (Huynh Van Keo 2000).

The species is reported to prefer "exceedingly damp forests of the mountains at low and moderate altitudes", and to be extremely wary, seldom leaving the "thick underbrush and liana-covered hillsides" (Delacour 1977). Consistent with this, in captivity Hennache (2001) considered Edwards's Pheasant to be the only pheasant species that seems to like rain.

All in all, Edwards's Pheasant is believed to be a lowland ever-wet forest specialist, and possibly on gentle terrain.

The following is the description from BirdLife International 2001 about habitats where inbred individuals of Edwards's Pheasant were trapped in during the 1990s. As recent records of Edwards's Pheasant in its typical form only came from confiscated specimens, this information gives us some ideas about its tolerance to habitat change:

"The species inhabits primary and secondary evergreen forest in lowlands and hills from sea-level (at least historically) to c.300 m (Carlberg 1993, Lambert *et al.* 1994). Its presence in "seriously degraded" forest around Ke Go lake was suspected by Eames *et al.* (1994), and the recent record at Huong Thuy district was from bamboo forest close to habitation (A. W. Tordoff verbally 2000). Thus, like many other *Lophura* pheasants, it might tolerate heavy habitat degradation. Individuals are apparently often trapped close to streams where the vegetation is densest (Robson *et al.* 1991). While it was initially thought to favour level or gently sloping areas with abundant palms and rattans in the understorey, interspersed with patches of bamboo (Robson *et al.* 1991, 1993, Nguyen Cu *in litt.* 1997), most individuals in the Net river watershed were observed on low ridge-tops and adjacent steep slopes (Eames *et al.* 1994, Lambert *et al.* 1994). Despite concerted effort at this site, none was seen on the level valley floors where vegetation

tended to be sparser; instead, birds were observed in areas where the understorey was dominated by saplings and occasional small palms, in closed-canopy forest where relatively recent selective logging had created frequent small clearings (Eames *et al.* 1994, Lambert *et al.* 1994). One pair was observed on a steep slope (45°) with sparse understorey (visibility uninterrupted for c.20 m) and light leaf-litter; large trees, rattans and palms were virtually absent from this area, contradicting previous habitat information (Lambert *et al.* 1994)."

1.4 Population Size and Trends

Wild population

This pheasant was historically collected in at least eight localities and thought to be "fairly common" around Hue and Da Nang (Tourane). Indeed, the fact that 10 skins and 22 live specimens were snared in this region during an early collecting trip (Delacour 1977, Delacour and Jabouille 1925, 1927a, 1931) implies that this judgement was accurate. However, the species was described as "not common" in its limited range in central Annam (Delacour *et al.* 1928). At some sites, "dozens" were apparently caught by local trappers, while only two were observed in the field during several months' collecting (Delacour 1977). In 1922, P. Jabouille stated in a notebook that "the natives consider them as rare as *Rheinardtius* [sic] *ocellatus*" (Ciarpaglini and Hennache 1995), although as the Crested Argus can be quite common this statement is difficult to interpret. In 1923, 22 individuals were snared in the "back hills" of Quang Tri province (Delacour 1977). When B. Björkegren collected around Thua Luu in 1938 he failed to encounter any Edwards's Pheasant, suggesting that the species had already declined since Delacour's expeditions a decade earlier (Eames and Ericson 1996).

During the period from 1964 to 1995, at least 31 individuals of the species in the in-bred form (which was then known as *L. hatinhensis*) were recorded, all were from the north of the species range (i.e. Ke Go – Khe Net forest complex of Ha Tinh and Quang Binh provinces), but one was from the Huong river, 15 km south of Hue, Thua thien – Hue province, almost at the southern limit of its range.

The species went unrecorded in its typical form from the 1930s to 1996 when it was rediscovered in Thua Thien Hue province (see Distribution). Since then, at least 25 more individuals have been recorded (see Annex 1), but the last confirmed was in 2000.

The occurrence of birds showing inbred ('hatinhensis') characteristics since the 1960s, and the complete lack of records since 2000 is an indication that remaining populations are extremely small, fragmented and declining, and it has even been suggested that the species may already be extinct in the wild. In the absence of better data the population is placed in the band 50-249 mature individuals (IUCN Red List of Threatened Species, version 2014.3).

Captive population

The species breeds well in captivity, and the captive collection stood at 690 birds in 1982 (Howman 1985), 734 in 1996 (Hennache 1997), and, currently, over 1,000, although some of these contain genes from Swinhoe's Pheasant *Lophura swinhoei* (Hennache *et al.* 1998). This stock may have derived from c.28 individuals, since these are the only ones

documented as being exported from Vietnam, all between 1924 and 1930, and all going to France, England and Japan (Ciarpaglini and Hennache 1995, 1997).

DNA analyses showed that all captive Edwards's Pheasant analyzed (about 70 till today) have the same haplotype (mt DNA) at D-Loop mitochondrial DNA; then they are probably derived from a single female, after an important bottle neck occurred between 1942 and 1947 (there are probably other small bottlenecks)(Alain Hennache *in litt.*).

Currently, there are three parallel studbooks for Edwards's Pheasant

- An International Studbook (ISB) created in 1994 by European Association of Zoos and Aquaria (EAZA) based on an early studbook run by the World Pheasant Association (WPA). This register lists the most active and productive population. At the end of 2014, this included 89.63 *L. edwardsi* type birds (i.e. 89 males and 63 females) accurately and effectively managed in 21 public and 55 private locations in several European countries.
Apart from these, a register of 62.63 *hatinhensis* type birds in 48 locations in Europe is kept.
- A register created by European Endangered Species Programme (EEP), which were first kept by Alain Hennache together with the ISB until 2009, and now kept by Prague Zoo from 2012. This includes some 70.56 birds (as at Oct. 2012) kept in 40 locations; however, this population has decreased until today (Hennache *in litt.* 2015).
- In America, below 50 individuals are managed in a "Red SSP" (Species Survival Program) of the Association of Zoos and Aquaria (AZA).

Besides, there exists a considerable population (including both the typical and the inbred form of Edwards's Pheasant) in mostly private collections worldwide apart from those listed in studbooks. DNA investigations are currently conducted on WPA/ECBG and EAZA Galliformes TAG initiative. Once they will have been finished, it will become possible to test any of these birds regarding the purity and relationship and to include them into the core-studbook if necessary (Heiner Jacken *in litt.* 2014).

2. Threats

Edwards's Pheasant is restricted to the Annamese Lowlands EBA. It is believed to be an extreme lowland specialist as it has not definitely been recorded above about 300 m.

Root causes for the rarity of Edwards's Pheasant are believed to be hunting/trapping coupled with fragmentation and loss of suitable habitat (due to human-induced changes and probably climate change) and possibly coupled with the species' subtle habitat requirements (See discussion about **habitat requirements** and **wild population** above – somehow the species might have been become quite rare many decades ago: When B. Björkegren collected around Thua Luu in 1938 he failed to encounter any Edwards's Pheasant, suggesting that the species had already declined since Delacour's expeditions a decade earlier (Eames and Ericson 1996) and the inbred form of the species occurred already from the 1960s).

2.1. Habitat Loss, Fragmentation and Degradation

Several decades of war from the 1940s to 1975, with intensive use of defoliants, bombs and landmines, and heavy fighting, has brought about devastating effects on Vietnam's forest cover and forest ecosystem, especially in the South of Vietnam (from Quang Tri province southwards). According to Phung Tuu Boi (2002), during the Vietnam War, the United States sprayed over 72 million litres of herbicides on forests (61 million litres) and fields (10 million litres), thereby inflicting environmental damage of varying severity on approximately ten percent of southern Vietnam's total land area. The chemicals were mainly sprayed from the 17th parallel southwards. Inland forests were heavily affected by the herbicide attacks, accounting for about 77 percent of total spraying missions. Initial research findings indicate that about 1.4 million hectares of forest land were affected, with countless trees defoliated and destroyed. With regard to altitude, distribution of the spraying was approximately as follows:

- below 300 meters, 16 percent
- 300-700 meters, 42 percent
- 700-1000 meters, 30 percent
- above 1000 meters, 12 percent.

As a result, the forest cover in Vietnam reduced from 43% in 1943 to c.34% in 1976 (at the end of the war). After the war, deforestation continues, bringing the forest cover to the lowest level of c.27% in 1990 (see Table 1 below). Much of forest clearing after the war resulted from commercial logging, over-collection of fuel-wood, charcoal production, forest fire, forest clearance for agriculture, including the shifting cultivation practised by some ethnic minorities, and plantation development. From 1990s to date, intensive reforestation and forest rehabilitation brings back forest cover to 33% and 41% in 1999 and 2013 respectively (MARD 2014). Despite that fact, the area and quality of natural forest continue to decline; fragmentation is occurring throughout much of Viet Nam's remaining natural forests.

CHANGES IN THE FOREST COVER OF VIETNAM, 1943-1999							
1000s hectares							
	1943	1976	1980	1985	1990	1995	1999
Natural forest	14,000	11,077	10,486	9,308	8,430	8,252	9,444
Plantation	0	92	422	584	745	1,050	1,471
Total hectares	14,000	11,169	10,608	9,892	9,175	9,302	10,915
% of total area	43.0	33.8	32.1	30.0	27.2	28.1	33.2

Source: Vietnam Ministry of Agriculture and Rural Development. No accurate data available for period from 1943-1976.

Table 1: Changes in the Forest Cover of Vietnam, 1943 - 1999

Forest loss in the range of Edwards's Pheasant has been dramatic, and the last forest areas known to support the species are subject to continuing degradation (J. C. Eames *in litt.* 1999). Lowland forest in Quang Tri and Thua Thien Hue provinces has been significantly reduced by the defoliation of vast tracts during the Vietnam War and human exploitation. Only small fragments now remain in Phong Dien, Dakrong and Huong Hoa

districts, which are now parts of Phong Dien, Dakrong and Bac Huong Hoa Nature Reserves. Small-scale cutting of timber is still widespread; pressures of forest conversion for agriculture and plantation development are still present in the area (Le Trong Trai per. comm. 2015).

To the north, the lowlands forest habitats in Ha Tinh and Quang Binh provinces were less impacted by defoliants during the war, but bombing and heavy disturbance during the war certainly made permanent changes in the quality of natural forest, which was worsened by subsequent logging, clearance for agriculture, plantations and other development purposes after the war. Surveys by BirdLife Vietnam Programme and Viet Nature Conservation Centre in the last decade showed that relatively undisturbed moist lowland evergreen forest now only exists in small fragments in the sparsely-populated south-western part of Quang Binh, near the borders with Lao PDR. The Ke Go – Khe Net forest complex – the most important site in the northern range of Edwards’s Pheasant – had suffered from heavy exploitation both by forest enterprises and by local communities for subsistence use. The forest vegetation has re-grown quite well in the last several years, but recent surveys found a very poor animal community.

Furthermore, the country’s human population experienced a rapid increase: it doubled in around 30 years, from c. 37.5 million in 1964 to c. 73 million in 1996, and reached c. 90 million in 2013 (General statistic office-Vietnam), placing an ever-increasing pressure on natural habitats.

2.2. Hunting

Any populations of Edwards’s Pheasant remaining are likely to be threatened by uncontrolled disturbance by illegal loggers and non-timber forest product (e.g. palm and rattan, etc.) collectors, whose presence has been noted more frequently since 1990, and who often snare terrestrial animals for food. Snaring is indiscriminate. Many types of snares and traps are used, which can catch all types of ground-dwelling vertebrates, resulting in fast depletion of many species, both those of high trade value and low trade value. So, as a large bodied, ground-dwelling bird, Edwards’s Pheasant is definitely among the victims, even though it is not the target of commercial wild life trade (Le Trong Trai *et al.*, 2002).

In recent years, with rapidly increased wealth and bush meat becoming ‘delicacies’, in addition to subsistence hunting, hunting for commercial purpose has resulted in ‘empty forests’ syndrome where the forests are structurally intact or re-grown but almost devoid of large animal life. Camera trap surveys by the Small Carnivores Programme at Ke Go – Khe Net forest complex – once the home of *L. hatinhensis* – over 3 years (2007-2008 and 2010) recorded only 3 bird species, namely Thick-billed Green-pigeon, Red-collared Woodpecker and Orange-headed Thrush (Le Trong Trai per.comm. 2014).

Perhaps, hunting/trapping is the most important factor that drives the remaining, already extremely vulnerable, wild population of Edwards’s Pheasant to the verge of extinction, like the situation with many other rare and endemic species of the Annamites such as Saola, Giant Muntjac, etc.



Photos 1 and 2: Snare lines

2.3. Competition

If the process of deforestation has forced different *Lophura* species to coexist within the shrinking tracts of habitat remaining, it is feasible that the least specialised forms or those with any competitive advantage would displace others; thus as the endemic *Lophura* pheasants are likely to be more specialised than Silver Pheasant *L. nycthemera* and Siamese Fireback *L. diardi*, it is possible that they are declining through competition and even hybridisation (Imperial Pheasant was shown to be a hybrid between Edwards's Pheasant and Silver Pheasant). However, all game-birds are probably snared and hunted to such low population densities that any competitive effects are minimal, and in any case extremely difficult to assess (Eames *et al.* 1994).

2.4. Captive breeding

There are problems with inbreeding and hybridisation in the captive population (Hennache 1997). The captive collection may have derived from a very small founder population (c.28 individuals exported to Europe nearly 90 years ago) with the supplement of only one wild male to Hanoi Zoo ever since. Moreover, recent DNA studies showed that the current captive population probably derived from a single female due to a major bottle-neck during the 1940s.

In addition, a large number of individuals (70–80% of the worldwide stock) kept by private collectors fall outside the current studbook programme owing to language barriers, legislative constraints and the “often self-imposed isolation” of many western breeders (Hennache 1997).

2.5. Knowledge gaps

Insufficient knowledge is not a threat *per se* to the Edwards's Pheasant, but the very limited knowledge of the species, its distribution, habitat requirements and basic ecology hampers the effectiveness of conservation actions, making the task of conserving of it almost like ‘fighting with a windmill’. Most importantly, knowledge about its ecology and habitat requirements must be improved if we want to have a sustainable Edward's Pheasant population in the wild in the next 10-15 years.

3. Policies, Legislation and Ongoing Activities

3.1 Policy and Legislation

Currently, the species is included in the Vietnamese Red Data Book as “Endangered”, though in IUCN Red List, it was up-listed to Critically Endangered since 2012. It is also listed on CITES Appendix I.

Most importantly, it is included in Group 1B of Decree 32/2006/ND-CP dated 30th March 2006 on the “Management of Endangered, Precious, and Rare Species of Wild Plants and Animals”, meaning the processing and trade of individuals of this species and their products for commercial purposes is prohibited, except for some special cases as regulated by the law.

3.2 Site Protection and Management

Within the historical distribution range of Edwards’s Pheasant, the following protected areas have been or proposed to be established:

	Name	Province	Current land use	Year est.	Total Area (ha)	Historical records? Area of lowland habitats below 500 m asl.?
1	Ke Go Nature Reserve	Ha Tinh	SUF	1997	21,759	Historical records. Elevations from 50 to 497 m asl (most area below 300 m asl.)
2	Khe Net proposed Nature Reserve	Quang Binh	WPF	-	26,800	Historical records. Mostly below 400 m asl.
3	Khe Nuoc Trong proposed Nature Reserve	Quang Binh	WPF	2006	19,187	A historical record in Quang Ninh district (1998), c.25 km north of Khe Nuoc Trong, in the same forest complex. Supports c.9,000 ha of level lowland moist evergreen forest under 300 m asl. (Le Trong Trai <i>in litt.</i> 2014).
4	Bac Huong Hoa Nature Reserve	Quang Tri	SUF	2007	23,456	Kreng village - a recent location where the species has been trapped – is in the buffer zone of the NR. Elevations from xxx to xxx m asl.; c. xxx ha below 500 m asl.
5	Dakrong Nature Reserve	Quang Tri	SUF	2001	40,526	Includes a recent location (Ba long valley, Dong Che) where the species has been trapped. Elevations from xxx to xxx m asl.; c. xxx ha below 500 m asl.
6	Phong Dien Nature Reserve	TT-Hue	SUF	2002	30,263	Includes a recent location (Phong my commune) where the species has been trapped. Elevations from xxx to xxx m asl.; c. xxx ha below 500 m asl.
7	Bach Ma National Park	TT-Hue, Quang Nam	SUF	1986	37,487	A recent unconfirmed record from close by (Huynh Van Keo 2000). Elevations from xxx to xxx m asl.; c. xxx ha below 500 m asl.
	TOTAL				199,478	

Table 2: Existing and proposed protected areas with or close to records of Edwards's Pheasant

Note

- SUF = Special Used Forest (or Protected Area)
- WPF = Watershed Protection Forest

- Figures on the current area of each of the above SUF follow Decision 45/QĐ-TTĐ (14/1/2014) on the National Biodiversity Masterplan to 2020 with vision to 2030.

The establishment and operation of the above protected areas has slowed down the rate of habitat loss, but habitat degradation continues due to selective logging, over-exploitation of non-timber forest products and other disturbances. Also, hunting/trapping is still rampant, which drives many large bodied, ground-dwelling bird species (e.g. Green Peafowl and Crested Argus) to local extirpation. Most of these protected areas are under-resourced and lack capacity for effective law enforcement, species research and management.

In 2014, Viet Nature launched an initiative for long term protection of Khe Nuoc Trong as a nature reserve in effect. This initiative includes 768 ha of moist lowland evergreen forest, at elevations below 300 m, secured under a 30-year (2015-2045) forest environmental lease. This leased area is potentially suitable for the reintroduction of Edwards's Pheasant, when necessary.

3.3 Monitoring and Research Activities

Research The first-ever surveys for the species were conducted in 1988 and 1991 by an ICBP/Forest Birds Working Group (Eames *et al.* 1989a,b, Eames *et al.* 1992). In 1996 and 1997 in the Bach Ma National Park area, 500 posters were distributed depicting a male Edwards's Pheasant alongside a plea for information regarding the species's whereabouts (Eve 1997), resulting in its records in 1996 and in later years (see Annex 1). During the 2000s, there were no targeted surveys on Edwards's Pheasant, but bird surveys by BirdLife Vietnam Programme and other donor-supported projects (e.g. ADB-funded WWF-implemented Biodiversity Corridor Initiative project) in various protected areas in the Annamese Lowland EBA obtained no records of the species. Since 2011, intensive on-going camera traps surveys have been conducted at Dakrong Nature Reserve, Khe Nuoc Trong proposed Nature Reserve and Bac Huong Hoa Nature Reserve; no records of Edwards's Pheasant have been obtained. Since April 2014, hundreds of posters were distributed and community interviews made around Truong Son IBA (including Bac Huong Hoa Nature Reserve and Khe Nuoc Trong proposed Nature Reserve), but so far little information was obtained about the persistence of the species. More surveys are planned for 2015-2016 in the Truong Son IBA (Khe Nuoc Trong – Bac Huong Hoa area) by Viet Nature and in other less-surveyed key sites for Edwards's Pheasant by a CEPF-funded project (Jack Tordoff per. comm. Le Trong Trai 2014).

Captive breeding In 1923, J. Delacour shipped 15 birds to France and bred from four males and three females, and the captive stock has subsequently increased dramatically (Howman 1985) and now stands at over 1,000 individuals. A studbook was first developed in the 1960s, and abandoned in the 1970s owing to lack of resources, although efforts were renewed in the 1990s (Hennache 1997). Currently, there exist three parallel studbooks, but the majority of the captive population is kept outside those. The cooperation and information exchange among the three studbooks is good.

In recent years, WPA and EAZA have funded various DNA studies on the purity and genetic variability of the captive stock with an aim of producing a captive flock of

Edwards's Pheasant that can serve as the source for reintroduction if and when deemed necessary. In 2013, the World Association of Zoos and Aquaria (WAZA) appointed a new ISB-keeper, who shall manage a small future core-population, selected from the three existing studbooks according to their genetic value once the current DNA screening has been finished.

In Vietnam, Hanoi Zoo participated in the ex-situ Edwards's Pheasant Programme since early 1990s. In 1993, the Zoo had the first ever successful breeding of Edwards's Pheasant (the inbred – *hatinhensis* – form). In 1997, Hanoi Zoo received a wild male Edwards's Pheasant confiscated in December 1996 and sent to them by Quang Tri Forest Protection Department. It was able to breed successfully with a female from Europe donated by WPA, thus the very valuable genes of this wild male have been perpetuated. A Working Group operating on behalf of the EAZA Galliformes Taxon Advisory Group (TAG) and WPA is currently overseeing the transfer of four experienced breeding birds (one male and three females) to Hanoi Zoo, where male descendants of the wild male caught in 1996 currently lack unrelated mates. Subject to import licences being granted soon, these birds can be moved to Hanoi, and hopefully the resulting new pairs can be able to make breeding attempts in 2015 (Dang Gia Tung, pers. comm. March 2015).

4. Framework for Action

4.1. Edwards's Pheasant Conservation Strategy

Since mid-2013, national and international individuals and institutions interested in Edwards's Pheasant conservation have convened several times in Vietnam and almost finalized an Edwards's Pheasant Conservation Strategy with the following main content:

Vision: There exist self-sustaining wild population of Edwards's Pheasant.

Overall goal: To secure suitable habitats and best genetic resources for the long term persistence of Edwards's Pheasant in the wild.

Objectives: (1) Protect and/or restore Edwards's Pheasant's suitable and safe habitats for Edwards's pheasant protection, reinforcement or reintroduction when necessary; (2) Secure, maintain and restore the best possible Edwards's Pheasant genetic resources for its sustainable existence; (3) Coordinate actions and mobilize resources for effective Edwards's pheasant conservation.

4.2. Action Plan Proposed for the period 2015-2020

This Action Plan identifies activities to be implemented in the coming 5 years (2015-2020) by VN-EPWG and its partners to contribute to realizing the long term vision and goal described in the above Edwards's Pheasant Conservation Strategy.

The occurrence of birds showing inbred characteristics since the 1960s and the lack of any records of Edwards's Pheasant in the last 15 years indicates that its remaining wild populations, if any, are extremely small, fragmented and declining, highest priority should be given to securing its remaining habitat and improving the management of its existing gene pool (in the captive population), while continued efforts should be made to

clarify its status in the wild. At the meeting in July 2014, participants were also strongly convinced that it is now high time to consider (a conservation breeding programme) and prepare for its reinforcement or reintroduction.

Thus, the first 5-year Action Plan will consist of the following four priority programmes:

A. Site protection and management

While it's unknown when we can get evidence of Edwards's Pheasant's persistence in the wild, and while hunting is likely the biggest threat to the survival of this species, it is prudent to encourage the protection and management of the known key sites for Edwards's Pheasant which are, listed from North to South, Ke Go – Khe Net; Khe Nuoc Trong – Bac Huong Hoa (or Truong Son IBA); and Dakrong – Phong Dien forest blocks, aiming at complete cessation of hunting at these sites. By doing this, we are actively creating/restoring strongholds for Edwards's Pheasant's persistence. During the coming five years, more priority sites, where Edwards's Pheasant could be found to exist, can be added to the above list. The next step, in the medium term, would be to explore the feasibility and effects of using forest corridors to connect habitat fragments.

B. Conservation Breeding

Given the critical situation of Edwards's Pheasant and our extremely limited knowledge of its basic ecology, a conservation breeding programme would serve two purposes: scientific research and preparing most suitable birds for reinforcement or reintroduction when necessary. As it takes time, at least 5-7 years (according to Alain Hennache *in litt.* 2015), to select and 'produce' suitable birds for release in the wild, this programme should take place as soon as possible when resource permits if we want to see a sustainable wild population of Edwards's Pheasant in the wild in another 15 years (i.e. by 2030) in 2-3 sub-populations.

C. Research

This programme includes three main parts: improvement of management of captive population; field surveys to search for Edwards's Pheasant remaining wild population, if any, as well as studies of its ecology in connection with the above conservation breeding programme; and feasibility study on the need, site preparedness and availability of suitable birds for reinforcement or reintroduction (to be carried out by 2020).

D. Coordination and resource mobilization

This programme would aim at supporting the timely and effective implementation of the above programmes.

Funding for the above programmes would be a challenge, but will be actively mobilized by each interested institution and, when opportunities arise, by VN-EPWG as a team; and would be updated periodically in an 'implementation' column in the Action Plan.

VN-EPWG ACTION PLAN FOR THE PERIOD 2015-2020

	Programme	Key actions	Resp. Stakeholders	Cost (USD)	Time scale
A	Site protection and management	<ol style="list-style-type: none"> 1. Improve law enforcement to address illegal hunting, logging and encroachments at 3 key forest blocks for EP: KG-KN, KNT-BHH, DR-PD; 2. Implement awareness raising programme to engender local stakeholders' support for EP; 3. Introduce and/or sustain MIST/SMART enforcement monitoring programme at the 3 above EP key sites. 4. Facilitate the establishment and operation of local conservation groups to support EP and site conservation; 5. Improve livelihoods of neighbouring forest-dependent communities to reduce pressures on these potential EP strongholds 6. Carry out intensive site protection and management at additional EP sites, where EP is found (if any). 	NGOs, FPDs in EP range, Management of key sites, local communities around key sites.	Approx. \$10/ha/year (over c. 160,000 ha)	2015-2020 and beyond
B	Conservation breeding	<ol style="list-style-type: none"> 1. Confirm government support and endorsement to EP conservation breeding; 2. Encourage interested stakeholders to form alliance to develop a conservation breeding project and fund-raise for it as soon as possible; 3. Establish (design, fund, construct, select and train staff and operate) an Edwards's Pheasant Breeding Centre in Vietnam, preferably in the distribution range of EP. 4. Carry out studies on EP ecology in semi-natural environment; 5. Produce best birds (at least after 1-2 generations of natural breeding) for release if and when reinforcement or reintroduction decision is taken. 	Ex-situ and in-situ conservation communities. Key implementing agencies are Hanoi Zoo, national NGO(s), site manager, local FPD(s).	Min. \$ 1,000,000 over 7 years	2015-2020 and beyond (Min. 7 years)
C	Research	<ol style="list-style-type: none"> 1. Carry out studies on the purity and genetic variability of the captive stock 2. Develop and manage a core population of EP in captivity through ISB system 3. Carry out field surveys to search for EP in the wild to clarify its status and habitat requirements. 4. VN-EPWG to commission feasibility study (site preparedness and availability of good birds for release) to decide on EP reinforcement or reintroduction (2020). 	Conservation NGOs, site 'owners', research institutions and individuals, site "owners"	Act. 1+2: \$15,000 Act. 3: \$100,000/site Act. 4: \$30,000	2015-2016 2015-2020 2020
D	Coordination and resource mobilization	<ol style="list-style-type: none"> 1. Coordinate EP conservation efforts, through regular information exchange, annual VN - EPWG meetings, EP dedicated websites, etc.; 2. Carry out awareness raising campaigns to raise EP profile in Vietnam and abroad; 3. Build partnerships, recruit EP champions and develop innovative financing for its long term conservation. 	All members of VN EPWG and their partners	\$30,000/year	2015-2020

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Annex 1: Records of Edwards's Pheasant

<i>Description</i>	<i>Year</i>	<i>Location</i>	<i>Province</i>	<i>No. of Individuals</i>
c.50 km north-west of Hue , Quang Tri, several individuals collected, 1895 (Delacour 1977), and c.30 km north of Hue, 1895 (Oustalet 1898, Delacour 1977),	1895	Hue	Thua thien - Hue	Several
Vinh Linh , Quang Tri, one male, 1922 (P. Jabouille's notebook, in Ciarpaglini and Hennache 1994);	1922	Vinh Linh	Quang Tri	1
Hai Lang , Quang Tri, two individuals, 1922 (P. Jabouille's notebook, in Ciarpaglini and Hennache 1994);	1922	Hai Lang	Quang Tri	2
Huong Hoa , Quang Tri, February 1924 (one male in MNHN), presumed the same as Huong Hoa, November 1923 (one male in BMNH);	1923	Huong Hoa	Quang Tri	1
Cam Lo , Quang Tri, December 1923 and March 1924 (one male, one female in BMNH);	1923 - 1924	Cam Lo	Quang Tri	2
Mai Lanh (possibly "Hai Lang"), Quang Tri, May 1924 (two males in MNHN), July 1925 or 1929 (one male in MNHN);	1924, 1925	Hai Lang	Quang Tri	2
Huong Hoa , Quang Tri, February 1924 (one male in MNHN), presumed the same as Huong Hoa, November 1923 (one male in BMNH);	1924	Huong Hoa	Quang Tri	1
Hai Van pass (Col des Nuages), Thua Thien Hue, one male observed flying over a road at the top (no great elevation—J. A. Tobias) of the pass, 1924 (Delacour and Jabouille 1925), 1935 (one female in BMNH);	1924, 1935	Hai Van	Thua thien - Hue	1
January 1925 (one male in BMNH), April 1925 or 1926 (specimen in MNHN), December 1925 (one male in MCZ), December 1927 (one male in MNHN), May 1928 (one male in FMNH);	1925 - 1928	Not specified	Not specified	5
Lang Khoai village, Quang Tri, November 1925, November 1929 (one male in AMNH, two males in BMNH);	1929	Lang Khoai	Quang Tri	2
"Thuy Ba" or "Thay Ba" (untraced), 1929 (one female in AMNH).	1929	Thuy Ba	???	1

<i>Description</i>	<i>Year</i>	<i>Location</i>	<i>Province</i>	<i>No. of Individuals</i>
Son Tung , Ky Son commune, Ky Anh district, Ha Tinh, 1964 (Vo Quy 1975, male in IEBR), with two males (identified from remains presented by hunters) caught nearby to the north, December 1987 (Robson <i>et al.</i> 1989, 1991);	1964, 1987	Son Tung, Ky Son, Ky Anh	Ha Tinh	3
Ky Thuong commune , Ky Anh district, Ha Tinh, where a second male specimen was collected, April 1974 (Dang Huy Huynh <i>et al.</i> 1974), remains of male identified, December 1987 (Robson <i>et al.</i> 1989, 1991, Nguyen Cu and Eames 1993);	1974, 1987	Ky Thuong, Ky Anh	Ha Tinh	2
Gat Che Me valley, Ky Thuong district, Ha Tinh, one male trapped and photographed on the valley floor, May 1992 (Nguyen Cu <i>et al.</i> 1992, Nguyen Cu and Eames 1993);	1992	Gat Che Me, Ky Thuong	Ha Tinh	1
Bau Mon , Ky Thuong commune, Ky Anh district, one female and chick reportedly caught, April 1992 (Nguyen Cu and Eames 1993);	1992	Bau Mon, Ky Thuong	Ha Tinh	2
Ke Go Nature Reserve, at Rao Cai, one male trapped by rattan collectors, January 1997 (Le Sau <i>in litt.</i> 1997), and Cat Bin, one male trapped immediately to the northwest, early 1990 (Robson <i>et al.</i> 1991), and 11 males and two females trapped in forest up to 12 km west of the town during one month, late January to late February 1990 (Robson <i>et al.</i> 1991, 1993), male, April 1995 (P. Alström, U. Olsson and D. Zetterström <i>in litt.</i> 2000);	1990, 1995, 1997	Ke Go NR	Ha Tinh	16
Khe Net watershed, Quang Binh province, at least eight (and possibly more than 10) observed in seven days, 200–300 m, June–July 1994 (Lambert <i>et al.</i> 1994), including 4–5 recently fledged juveniles, one of which (a male) was caught and blood samples taken;	1994	Khe Net, Tuyen Hoa district	Quang Binh	8
Phong My commune, at Lau stream near Hien Bac village, Phong Dien district, Thua Thien Hue, male and female trapped by hunters, August 1996, both birds later dying and retained at the headquarters of Bach Ma National Park (Nguyen Cu <i>in litt.</i> 1997, Eames and Tordoff in prep.), another male apparently being trapped and released in the same place, October 1996 (<i>Tragopan</i> 6: 2)	1996	Khe Lau, Phong Dien	Thua thien - Hue	3
Kreng village, Huong Hiep commune, Dakrong district, Quang Tri, one male and one female were trapped by hunters, December 1996; the female died soon after being caught and the male were transferred to Hanoi Zoo (Eames 1997a)	1996	Kreng, Dakrong	Quang Tri	2

<i>Description</i>	<i>Year</i>	<i>Location</i>	<i>Province</i>	<i>No. of Individuals</i>
Ba Long valley , Ba Long commune, Dakrong district, Quang Tri, 50–300 m, four trapped by local hunters, December 1997 (Le Trong Trai <i>et al.</i> 1999);	1997	Ba Long (Dakrong)	Quang Tri	4
Dong Che area, Dakrong district, Quang Tri, two trapped by local hunters, who reported seeing a flock of 8–10, 1997/1998 (Le Trong Trai <i>et al.</i> 1999);	1997 - 1998	Dong Che (Dakrong)	Quang Tri	10
In the west of Quang Ninh district (Truong Son commune), Quang Binh province, near to the Ke Bang limestone area, juvenile male collected, 1998 or 1999 (Do Tuoc <i>per J. C. Eames in litt.</i> 1999);	1998	Quang Ninh	Quang Binh	1
Loc Dien commune , Phu Loc district, 1 km north-east of the buffer zone of Bach Ma National Park, Thua Thien Hue, one individual captured, May 1998 (Huynh Van Keo 2000);	1998	Loc Dien, Phu Loc	Thua thien - Hue	1
15 km south of Hue , Huong Thuy district, Thua Thien Hue, one captured near the Huong river, 1999 (A. W. Tordoff <i>in litt.</i> 2000).	1999	15 km south of Hue	Thua thien - Hue	1
Two males, one female and four eggs taken by rattan collectors along the My Chanh river (unmapped), March 2000, one male held in captivity at Hai Lang District Forest Protection Department (A. W. Tordoff verbally 2000);	2000	My Chanh, Hai Lang	Quang Tri	4
Unconfirmed reports are from Tuyen Hoa and Minh Hoa districts, Quang Binh province, where individuals in Hanoi Zoo were reportedly caught , with no dates or localities specified (Rozendaal <i>et al.</i> 1991, Lambert <i>et al.</i> 1994); reports of all-dark pheasants at Cao Veu (c.18°50'N 105°00'E), could refer to this species (Rozendaal <i>et al.</i> 1991), although this claim must be treated with caution (Lambert <i>et al.</i> 1994).	N/A	Tuyen Hoa & Minh Hoa districts	Quang Binh	
Unconfirmed record in 2009 of a female caught at Forest Compartment no. 250, North of Hai Van pass (Dan Tri newspaper)	2009	Bac Hai Van	Thua thien - Hue	1

Source: compiled from BirdLife International. 2001. *Threatened birds of Asia: the BirdLife International Red Data Book*. BirdLife International, Cambridge, U.K. (*L. edwardsis* and *L. hatinhensis* factsheets), with corrections of minor details per personal communication with Le Trong Trai.

AMNH = American Museum of Natural History, New York, USA; BMNH = Natural History Museum, Tring, UK; FMNH = Field Museum of Natural History, Chicago, USA; MCZ = Museum of Comparative Zoology, Boston, Massachusetts, USA; MNHN = Muséum National d'Histoire Naturelle, Paris, France; IEBR = Institute of Ecology and Biological Resources

Annex 2: Camtrap survey efforts at key sites by March 2015

	Name	Total Area (ha)	Year	By	No. of camtrap days	Area (ha) surveyed	Photos wt wildlife	No. of species recorded		Species of conservation concern recorded
								Pheasants	Others	
1	Ke Go Nature Reserve	21,759	2007-2008; 2010	(4)						
2	Khe Net proposed Nature Reserve	26,800	2007-2008; 2010	(4)						
3	Khe Nuoc Trong proposed Nature Reserve	19,187	2011-date	(1), (2) and (3)						
4	Bac Huong Hoa Nature Reserve	23,456	1/2015 - date	(3)						
5	Dakrong Nature Reserve	40,526	2011	(1)						
6	Phong Dien Nature Reserve	30,263		-						
7	Bach Ma National Park	37,487								
	TOTAL	199,478								

- (1) BirdLife Vietnam Programme/CECARD/WPA
- (2) BirdLife Vietnam Programme
- (3) Viet Nature Conservation Centre
- (4) Small Carnivores Programme