

## S11-1 Is the current protected area system adequate to support viable populations of forest Galliformes in eastern Asia?

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**Abstract** The Galliformes are one of the most threatened of avian orders; more than 25% of their species are considered at risk of extinction compared with 11% of all birds. Direct exploitation is believed to be the main reason for this substantially higher level of endangerment. Using additional and recently collected locality data from east Asian protected areas, analysis here revises an earlier study in 1999 that assessed the degree to which the existing protected area network in eastern Asia covered the 101 species of grouse, partridges and pheasants endemic to that region. A network of important protected areas is identified that secures each species in a minimum of three protected areas, our preset target. China and India are key countries in this network, and Malaysia and Indonesia are important for Sundaic tropical forest species. Many of the protected areas are irreplaceable because they alone contain the most under-represented species. Indeed, some species, including some of the region's most threatened Galliformes, occur entirely outside protected areas or in just one or two, such as the Sichuan hill partridge and Edwards' and Vietnamese pheasants in central Vietnam. Although the present network is likely to prove crucial for the survival of these species, it is not sufficient on its own because of shortcomings in species representation, the size of individual protected areas, and their connectivity.

**Key words** Galliformes, Asia, Protected areas, Pheasants, Partridges, Grouse

### 1 Introduction

A quarter of Asia's bird species are of global conservation concern, being listed as threatened, near-threatened or data deficient in the 2000 IUCN Red List (Hilton-Taylor, 2000; also BirdLife International, 2000). Habitat loss is thought to be the overwhelming threat facing these species, as forest clearance is now widespread, leaving forests severely fragmented almost everywhere, including the Himalayas, much of China, and the Sundaic forests of South east Asia. Such fragmentation splits populations of forest specialists, leading to isolation of subpopulations, decline and an increased probability of extinction.

Amongst the most threatened of Asia's bird groups is the order Galliformes. There are 112 species in continental eastern Asia, 99 of which are endemic and another two centered in the region. Globally, 25% of all Galliformes are threatened (Hilton-Taylor, 2000), and 35% of the eastern Asian species are at risk. Of special concern are the pheasants, with 24 of the 50 Asian species threatened and a further nine near-threatened. The reason for such heightened endangerment appears to lie in the additional threat posed by hunting (McGowan, 2002), such that the combined impacts of habitat loss and hunting place the long term survival of many of these species in the balance.

Mitigating these pressures to ensure that the threat-

ened Galliformes of Asia have a future requires a range of conservation measures. One fundamental requirement is a network of well-managed protected areas that are devoted primarily to maintaining biodiversity. McGowan et al. (1999) documented what is currently known about the representation of Galliformes in east Asian protected areas, paying particular attention to the large number of endemic species. The study also identified a network of protected areas that would make a considerable contribution towards the conservation of the Galliformes, provided that they were managed properly. Since then, additional field surveys have yielded much new distributional information, and in some cases, new protected areas have been created or their status assessed. Because strategic conservation recommendations need to be based on current and accurate distributional information, this paper sets out to update the analysis carried out by McGowan et al. (1999) by (1) reassessing the representation of endemic regional Galliformes in east Asian protected areas, and (2) revising the near-minimum network of protected areas required to include each species in three protected areas wherever possible. As the emphasis of this symposium was to provide information on Chinese Galliformes and to draw upon international experience to help in their conservation, the representation of Galliformes in protected areas in China is highlighted.

### 2 Methods

To allow direct comparison with previous work, methods were as detailed in McGowan et al. (1999). Additional species locality information was obtained from reports by fieldworkers to the World Pheasant Association, the Pheasant Specialist Group and the Partridge, Quail and Francolin Specialist Group. In addition, BirdLife International kindly provided the database used to generate distribution maps and locality lists for their recent assessment of the threat status of Asian birds, *Threatened Birds of Asia* (Collar et al., 2001).

The protected areas included in this analysis were those assigned IUCN management categories I–IV (IUCN, 1994), with primarily biodiversity conservation objectives. In compiling the near-minimum network, we again set a target to include each species in at least three protected areas. Some species, however, were present in as many as three protected areas. Those protected areas that did contain such suites of poorly represented species were termed ‘irreplaceable’, as they had to be included in the network to avoid reducing representation further. The algorithm used for selecting the remainder of the protected areas (termed ‘others’) is given in McGowan et al. (1999).

### 3 Results

#### 3.1 Summary statistics

Eleven species with main distributions outside eastern Asia were first discarded from the analysis: *Ammoperdix griseogularis*, *Coturnix japonica*, *Coturnix ypsilophora*, *Falcipennis falcipennis*, *Lagopus lagopus*, *Lagopus muta*, *Lyrurus tetrax*, *Perdix perdix*, *Tetrao parvirostris*, *Tetrao urogallus*, *Tetraogallus altaicus*.

For the 101 species remaining (99 east Asian endemics and two with core ranges in east Asia), we collated more than 6 000 records, including more than 3 000 from China. From this dataset, 1 127 species records were extracted and from 399 protected areas. In China, there were 225 records

from 104 protected areas. Nine of the species involved are Chinese, and all except *Arborophila atrogularis* are endemic to that country. 21 species were recorded from fewer than three protected areas (Table 1), five of which are still not known to occur in any protected area. Of those 21, 13 inhabit forest, 10 of which are probably forest specialists and globally threatened.

#### 3.2 Significant changes from McGowan et al. (1999)

The most significant novelty from the present survey was the finding of *Arborophila rufipectus* in a protected area. Changes among other poorly represented species, all positive, were: *Polyplectron germaini* present in three protected areas, *Arborophila cambodiana* in three, *Arborophila gingica* in five, and *Lophophorus sclateri* in three.

#### 3.3 Near-minimum network

Using the guidelines established by McGowan et al. (1999), the near-minimum network produced a set of 86 protected areas that gave the best possible representation of species in protected areas based on the available data. The network comprised 44 irreplaceable protected areas and 42 others (Table 2).

### 4 Discussion

Since 1999, there has been only minor improvement in the representation of endemic east Asian Galliformes in protected areas. This may be significant for several individual species, notably *Arborophila rufipectus*, but there is still much cause for concern because of the many species still represented in fewer than three protected areas. The ten species currently believed to be forest specialists seem to be most at risk.

For the five species outside all protected areas, the message is mixed. Thus the status of *Perdica manipurensis* is of real concern, as this species has not

**Table 1** Species currently known from fewer than three protected areas of IUCN management categories I–IV in eastern Asia

Number of protected areas per species		
0	1	2
* <i>Crossoptilon harmani</i>	* <i>Alectoris magna</i>	* <i>Arborophila atrogularis</i>
<i>Ophrysia superciliosa</i>	<i>Arborophila davidi</i>	<i>Arborophila rubrirostris</i>
<i>Perdica manipurensis</i>	<i>Arborophila merlini</i>	* <i>Perdix dauurica</i>
<i>Polyplectron schleiermacheri</i>	* <i>Arborophila rufipectus</i>	<i>Polyplectron chalcurom</i>
<i>Syrnaticus soemmeringii</i>	* <i>Chrysolophus amherstiae</i>	* <i>Tetraogallus tibetanus</i>
	* <i>Crossoptilon crossoptilon</i>	
	<i>Lophura edwardsi</i>	
	<i>Lophura hatinhensis</i>	
	<i>Lophura imperialis</i>	
	* <i>Perdix hodgsoniae</i>	
	<i>Polyplectron napoleonis</i>	

\* denotes species occurring in China.

**Table 2** The number of protected areas in the near-minimum network in each country or territory

Country /Area	Irreplaceable sites	Others	Total
Bhutan		1	1
Cambodia	2	1	3
Mainland China	16	15	31
India	7	11	18
Indonesia	8	0	8
Laos			
Malaysia	3	6	9
Nepal	1	1	2
Pakistan		1	1
Philippines	1	0	1
Sri Lanka		3	3
Taiwan, China	3		3
Thailand		3	3
Vietnam	3	0	3
Total	44	42	86

The terms "Irreplaceable sites" and "Others" are defined in the text.

been recorded anywhere, let alone in a protected area, since the 1930s (Fuller et al., 2000); it may already be extinct. In contrast, *Crossoptilon harmani* seems likely to occur in some protected areas in its remote range, but even if not, it is probably well protected around Buddhist monasteries (Lu Xin, pers. comm.).

The size of the near-minimum network has increased from 82 to 86 since 1999. The additions contain the least well-represented species, and are Laojunshan Nature Reserve in China (Dai Bo and Dowell, oral paper in this symposium), and Virachey and Bokor National Parks and Snoul Wildlife Sanctuary, all in Cambodia (Setha and Bunnat, 2000).

Concerning the adequacy of the network of protected areas in China, current data indicate that China has the greatest number of protected areas globally important for Galliformes. There are 31 Chinese protected areas in the near-minimum network. Because so many species are endemic to China (Fuller and Garson, 2000; Fuller et al., 2000), its protected areas will always be very important at a global level. To determine which protected areas are the more important, however, there is an urgent need for better information on the occurrence of Galliformes within them. Data presented here (204 records from 112 protected areas) indicate an average of two species per protected area, clearly an underestimate. The skew appears to result from a focus on particular individual species, such as Temminck's tragopan, *Tragopan temminckii* (Li, 1991), instead of general surveys.

The list of protected areas from which this species has been recorded is comprehensive, but information on other species that might occur in them is not. This needs to be remedied; it seems probable that the information exists and has only to be collated.

It is not just presence in a protected area that is important, but whether or not the populations there are viable. This is especially true in China, where many protected areas include significantly altered habitats, such as those resulting from forestry operations undertaken before the site was declared protected. Data are available on habitat use by a range of pheasant and partridge species in some of these areas, and these now need to be used to determine population viability, both in China and elsewhere. Information on habitat use can also be used to ensure that management of forests in protected areas is appropriate for threatened species.

The size of many of the protected areas has been determined by administrative or geographical considerations, rather than the need to accommodate populations of viable size. As a result, many protected areas are likely to be too small to hold adequate populations of target species. Therefore, the potential for connecting the most important sites with corridors of habitat must be investigated as a matter of urgency.

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