Short Communication

Evaluation of a potential reintroduction site for the white-winged guan *Penelope albipennis* (Aves, Cracidae) in northern Peru

Fernando Angulo and Javier Barrio

Abstract The white-winged guan *Penelope albipennis* (Aves, Cracidae) is a Critically Endangered bird endemic to northern Peru. We surveyed a protected area suitable for its reintroduction north of the species' current range. Following IUCN guidelines, four factors were evaluated: diversity and quantity of plant species that are part of the white-winged guan's diet, year-round water sources, resting and roosting cover, and extent of undisturbed forest. Several suitable small valleys or *quebradas* were inspected, but our evaluation focused on three. We identified all shrub and tree species to compare with habitat currently used by the guan. Cover for nesting places was assessed visually. We found species composition and microhabitat types to be similar to habitat presently used by wild guans. Thus, all habitat components are favourable for reintroduction. The high degree of protection of the area makes it particularly suitable as a reintroduction site. We recommend experimental extension of the species current range to mitigate the risk of extinction posed by catastrophic events.

Keywords Aves, Cracidae, Critically Endangered, *Penelope albipennis*, Peru, reintroduction, white-winged guan.

The white-winged guan *Penelope albipennis* is a Critically Endangered cracid (Aves, Caracidae) endemic to the dry forests of the north-west Peruvian coast (Stattersfield *et al*., 1998; Birdlife International, 2000). The species, described in 1877 and later believed to be extinct, was rediscovered in 1977 by Gustavo del Solar and John O'Neill (De Macedo-Ruiz, 1979; Williams, 1980). Several years later, a captive-breeding programme was established to provide individuals for reintroduction. In 2001, 16 individuals were released in the Chaparri Private Conservation Area, Department of Lambayeque (Fig. 1), and the first wild-born chick from captive-raised parents hatched the following year in the same area. However, new potential sites for reintroduction need to be identified, and successful procedures from the pilot reintroduction project replicated to improve the species' chance of survival. This paper deals with the survey of a potential new reintroduction site.

The white-winged guan is considered an immediate conservation priority (Collar *et al*., 1992; BirdLife International, 2000; IUCN, 2003) and included in Appendix I of CITES. It is listed as Endangered in Peru (Ministerio de Agricultura, 1999) and a sanctuary for the species, the Laquipampa Reserved Zone, has been established (Ministerio de Agricultura, 1982; Flanagan & Angulo, 2002). The species is currently threatened by habitat loss and overhunting, and its total population may not exceed 200 individuals (Ortiz & Díaz, 1997). Because of the species' restricted distribution, habitat loss, degradation and fragmentation are likely to have negative impacts on existing wild populations. The reintroduction programme is taking place within the guan's current range, but new sites across its former range must be evaluated to ensure the long-term survival of the species.

Reintroduction is defined as 'an attempt to establish a species in an area that was once part of its historical range, but from which it has been extirpated or become extinct' (IUCN, 1995). Two criteria that a potential area for reintroduction must fulfill are: the factors that caused the extirpation are no longer present or have been eradicated, and there is enough suitable habitat to establish viable populations (IUCN, 1987; Balmford *et al*., 1996; Seddon & Soorae, 1999). The white-winged guan was described (Taczanowski, 1877), based on specimens collected by J. Stolzmann in December 1876 on Condesa Island in the Tumbes River delta, Department of Tumbes, and by C. Jelski in January 1877 at the Hacienda Pabur, Department of Piura, 200 km south and 130 km inland from Condesa Island (Collar *et al*., 1992). The species was rediscovered in 1977 in dry forest 40 km south of Hacienda Pabur (De Macedo-Ruiz, 1979). Currently it is

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Received 24 March 2003. Revision requested 1 July 2003. Accepted 5 March 2004.

© 2004 FFI, *Oryx*, **38**(4), 448–451 DOI: 10.1017/S0030605304000833 Printed in the United Kingdom

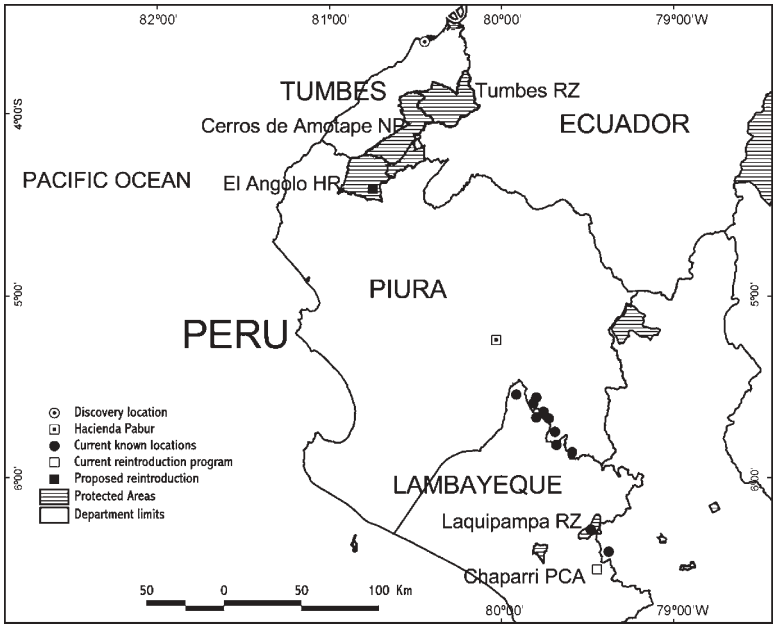

Fig. 1 The known distribution of the white-winged guan, with the locations of the Tumbes Reserved Zone, Cerros de Amotape National Park and El Angolo Hunting Reserve (the proposed reintroduction area) within the North-west Peru Biosphere Reserve, the Laquipampa Reserved Zone (established for the white-winged guan) and Chaparri Private Conservation Area (site of the current reintroduction programme).

found in a narrow belt along a few valleys (Ortiz & Díaz, 1997; Flanagan & Angulo, 2002; Fig. 1). The location of the original discovery in the 1870s shows that the species' former range was more extensive, probably extending over the southern portion of the Tumbesian dry forest.

The *c.* 130,000 km² Tumbesian Endemic Bird Area extends from west Ecuador to north-west Peru and south to the central coastline of Peru (Stattersfield *et al*., 1998) and contains 57 restricted-range bird species (ICBP, 1992; Best & Kessler, 1995; Stattersfield *et al*., 1998). Within this Area, the North-west Peru Biosphere Reserve includes 200,000 ha of dry forest with >96% forest cover (Best & Kessler, 1995). The Reserve includes El Angolo Hunting Reserve (65,000 ha), Cerros de Amotape National Park (91,300 ha) and the Tumbes Reserved Zone (75,102 ha) (Centro de Datos para la Conservación, 1992).

El Angolo Hunting Reserve was probably once close to the centre of the white-winged guan's range (Fig. 1) and currently comprises the southern portion of the North-west Peru Biosphere Reserve (Centro de Datos para la Conservación, 1992; Barrio, 1997). Like the rest of the Biosphere Reserve, El Angolo is poorly protected by the Peruvian Government. However, part of El Angolo, including 6,000 ha that is currently fenced, is leased to a white-tailed deer *Odocoileus virginianus* hunting club and is well protected; only regulated deer hunting is allowed (Barrio, 1997). Hunters pay for the rights to hunt deer, as well as for hunting scouts, and this generates income for local people. Access is regulated by a permit system, making the area a suitably protected place for guan reintroduction. We believe the guan disappeared from El Angolo at least 100 years ago.

The protected fenced area is uninhabited and is probably the most appropriate place to develop a white-winged guan reintroduction programme north of its current range. The dominant plant species at *c.* 700–900 m altitude are similar to those of the guan's current habitat: *Cordia lutea*, *Myrcianthes discolor*, *Styrax tarapotensis*, *Psidium guajaba*, *Pithecellobium* spp. and *Capparis prisca*. Along the ravines *Ficus padifolia*, *Erythrina smithiana*, *Geoffroea striata*, *Terminalia valverdae* and *Styrax tarapotensis* are common (Centro de Datos para la Conservación, 1995).

We conducted a field survey for 3 days in each of August 2001 and February 2004 to establish if suitable habitat conditions for the white-winged guan still existed at El Angolo. Within ravines (*quebradas*) we evaluated four factors and their availability to guans: (1) diversity and quantity of plant species that are part of the white-winged guan's diet, and availability of (2) year-round water sources, (3) cover for nesting and resting during the day, and (4) undisturbed forest and undergrowth. As most of the plant species in the white-winged guan's diet are associated with water, the first two factors are linked. We inspected several ravines but focused on three with permanent year-round water: El Espino, Cañas and Toro Muerto. The total length of ravines surveyed was *c.* 12 km.

In the ravines we found the following species that are components of the diet of the white-winged guan (Collar *et al*., 1992; Ortiz & Díaz, 1997): *Pithecellobium excelsum*, *P. multiflorum*, *Erythrina smithiana*, *Caesalpinia paipai*, *Cordia lutea*, *Celtis iguanea*, *Cestrum auriculatum*, *Bursera graveolens*, *Acnistus arborescens*, *Muntingia calabura*,

https://doi.org/10.1017/S0030605304000833 Published online by Cambridge University Press

Geoffroea striata, *Acacia macracantha*, *Ficus padifolia*, *Ficus* sp. and *Eriotheca ruizii*. We found seven, 11 and 12 of these species in the three ravines, compared to 9–13 food plant species per ravine in areas with wild guans (F. Angulo, unpubl. data), and all were located close to water courses. The presence of two *Ficus* species is important because they fruit at all times of the year, even when most tree species lack edible fruits and leaves. The density of known palatable species was lower in the ravines at El Angolo than in current wild guan habitat, with 6–12 trees ha^{-1} compared to a minimum of 16 trees ha^{-1} in Laquipampa (F. Angulo, unpubl. data). However, the known diet of the guan (Ortiz & Díaz, 1997) is based on studies in the north of its current range, 160 km south of El Angolo, and it is possible that other species are eaten elsewhere. Captive white-winged guans show adaptability to new items in their diet (F. Angulo, pers. obs.).

In addition to the permanent water in the three ravines, scattered throughout the area is a large number of *jaguayes* or *aguas*, small ponds with year-round water. The guan prefers to build nests in places close to water, 2.5–6 m above the ground (Williams, 1980; Ortiz & Díaz, 1997), and usually nest in areas densely covered by shrubs and crossed by small lianas, similar to places used as daytime roosts (De Macedo-Ruiz, 1979; Williams, 1980). This type of microhabitat, similar to sites with wild nests, was found in the surveyed ravines.

Based on the four factors that were evaluated, the surveyed area at El Angolo appears to be suitable for a white-winged guan reintroduction programme, and more so than the present reintroduction site at Chaparri. El Angolo is also better protected than Chaparri. The feasibility of a guan reintroduction programme has been successfully demonstrated at Chaparri. Six of the 12 km surveyed at El Angolo were considered suitable for a reintroduction programme and, based on the known species' habitat usage (Ortiz & Díaz, 1997), the area surveyed could support at least six pairs of birds. The aim of reintroduction at El Angolo would be to create a new guan population in what is most likely a part of its former range, thus increasing the current range whilst reducing the risk of extinction.

The presence of guans would increase the conservation value of El Angolo and could bring economic benefits from ecotourism (Begazo & Valqui, 2000). Measures adopted to protect a reintroduced guan population at El Angolo could also favour the conservation of the small population of rufous-headed chachalaca *Ortalis erythroptera* occurring in the area (Barrio & Begazo, 1998). The chachalaca is found in the higher parts of El Angolo, and thus competition with guans for food and space is unlikely.

We recommend that El Angolo could support a viable white-winged guan population. Despite current populations being largely confined to creeks, guans readily disperse through unsuitable territory to other creeks (F. Angulo & J. Barrio, unpubl. data). Located 160 km north of the species' current range, a reintroduced population at El Angolo could be a source for future range expansion. Because of its highly restricted range, the current small wild population is at risk from the deleterious effects of stochastic events such as epidemics, and a reintroduction at El Angolo would reduce this risk. A reintroduced population could also be used as a reservoir of individuals for the captive breeding programme. This reintroduction could take place within a few years, following consultations between the hunting club in charge of the area and the White-winged Guan Captive Breeding Program. The initial reaction of the hunting club to this idea has been positive.

Acknowledgements

We thank Manuel Arribas, president of the Piura Hunting Club, for allowing us to use the housing facilities at El Angolo. We are also grateful to the Backus Foundation, who funded part of the expedition. The Conservation Data Center, La Molina, Peru, provided us with the base map used to record all white-winged guan locations. Luis Ruiz, Santiago Podestá and Victor González assisted us in the field. The advice of two anonymous referees improved this paper.

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Biographical sketches

Fernando Angulo is the Director of the white-winged guan breeding centre at Olmos, northern Peru, and is in charge of the white-winged guan reintroduction programme at Chaparri Private Conservation Area, where released guans are followed using radio telemetry. Javier Barrio was the Manager of El Angolo Hunting Reserve from 1994 to 1995, and since then has been lobbying for the reintroduction of white-winged guans into the Reserve.