

**ACTION PLAN FOR THE HOUBARA BUSTARD  
IN THE CANARY ISLANDS**  
*(Chlamydotis undulata fuertaventurae)*



**Compiled by:**

BORJA HEREDIA (BirdLife International, U.K.)



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### **Compiled by:**

BORJA HEREDIA (BirdLife International, U.K.)

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### **Timetable**

Workshop: July 1993 - La Laguna, Tenerife

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### **Reviews**

This document should be reviewed by BirdLife International every four years. An emergency review will be undertaken if sudden major environmental changes, liable to affect the population, occur within the species' range.

### **Geographical scope**

The islands of Fuerteventura, Lobos, Lanzarote and Graciosa in the east of the Canary Islands archipelago.

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## CONTENTS

<b>SUMMARY</b> .....	- 3 -
<b>INTRODUCTION</b> .....	- 5 -
<b>PART 1. BACKGROUND INFORMATION</b> .....	- 5 -
Distribution and population .....	- 5 -
Life history.....	- 6 -
Taxonomic status .....	- 6 -
Breeding.....	- 6 -
Feeding.....	- 7 -
Habitat requirements.....	- 7 -
Threats and limiting factors .....	- 7 -
Habitat loss in critical areas .....	- 7 -
Disturbance and habitat change due to tourism.....	- 7 -
Disturbance from military activity.....	- 8 -
Disturbance from truffle collecting.....	- 8 -
Abandonment of traditional agriculture.....	- 8 -
Overgrazing .....	- 8 -
Illegal hunting .....	- 8 -
Collisions with powerlines.....	- 9 -
Transmission of parasitic diseases .....	- 9 -
Predation .....	- 9 -
General increase in the numbers of people.....	- 9 -
Desertification and climatic factors .....	- 9 -
Conservation status and recent conservation measures .....	- 10 -
<b>PART 2. AIMS AND OBJECTIVES</b> .....	- 11 -
<b>AIMS</b> .....	- 11 -
<b>OBJECTIVES</b> .....	- 11 -
1. POLICY AND LEGISLATIVE.....	- 11 -
2. SPECIES AND HABITAT PROTECTION .....	- 13 -
3. MONITORING AND RESEARCH .....	- 16 -
4. PUBLIC AWARENESS AND TRAINING.....	- 18 -
<b>REFERENCES</b> .....	- 19 -

## SUMMARY

The Canary Islands Houbara Bustard *Chlamydotis undulata fuertaventurae* is a subspecies endemic to the Canary Islands, being found on the islands of Fuerteventura, Lobos, Lanzarote and Graciosa. The total population is estimated at 700–750 birds (300–350 on Fuerteventura and Lobos and 400 on Lanzarote and Graciosa). The species is protected under Spanish legislation and classed as Endangered in the national Red Data Book (Blanco & González 1992); there has been a Recovery Plan in existence since 1985. It is also listed in Annex I of the EU Wild Birds Directive.

### **Threats and limiting factors**

- \* **Habitat loss - critical**
- \* **Disturbance and habitat change due to tourism - high**
- \* **Abandonment of traditional agriculture - medium/high**
- \* **Disturbance from military activity - medium**
- \* **Disturbance due to truffle collecting - low**
- \* **Illegal hunting - unknown, potentially high**
- \* **Collisions with powerlines - unknown, potentially medium**
- \* **Overgrazing - unknown**
- \* **Predation - unknown**
- \* **Parasitic disease - unknown**
- \* **General increase in the number of people - unknown**
- \* **Desertification and climatic factors - unknown**

### **Conservation priorities**

- \* **Adoption as Royal Decree of an updated Recovery Plan - essential**
- \* **Enforce restrictions on vehicle use in key areas and launch a public awareness campaign on this issue - essential**
- \* **Prevent habitat loss in key areas - essential**
- \* **Purchase key areas - essential**
- \* **Continue research and monitoring - essential**

- \* **Adequate protection under the new Countryside Law and Wildlife Protection Law - high**
- \* **Designate additional SPAs - high**
- \* **Encourage management to benefit Houbaras under EU agri-environment regulation - high**
- \* **Eradicate illegal hunting- high**
- \* **Avoid the use of key Houbara areas for military manoeuvres - high**
- \* **Increase wardening - high**

## **INTRODUCTION**

The Houbara Bustard *Chlamydotis undulata* is not considered threatened at world level in *Birds to Watch 2* (Collar *et al.* 1994) due to the fact that large numbers are found in Asia and North Africa but it is considered as a Vulnerable species by IUCN (Groombridge 1993). In Europe, it is present only in the Canary Islands (Spain) where the endemic subspecies *fuertaventurae* occurs, and it was provisionally classified as Endangered (Tucker & Heath 1994). The subspecies is listed in Annex I of the EU Wild Birds Directive and in Appendix II of the Bern Convention. The populations of north-east Africa are listed in Appendix I of the Bonn Convention.

This action plan incorporates the discussions and conclusions of a workshop held in La Laguna in July 1993 which was attended by those involved in the conservation of the species and its habitat: the other four threatened species found in the Canary Islands were also discussed. This document recommends priority actions for the conservation of the Canary Islands Houbara Bustard and it is hoped that it will serve as a stimulus for the approval of a legally binding Recovery Plan in accordance with current Spanish legislation.

## **PART 1. BACKGROUND INFORMATION**

### **Distribution and population**

The Houbara is found in suitable areas on Fuerteventura and Lanzarote although it has also recently been recorded on Graciosa (A. Martín pers. comm.) and is occasionally observed on Lobos. The total population in the Canary Islands is estimated at 700–750 birds; 300–350 on Fuerteventura and Lobos (ORNISTUDIO 1992) and 400 on Lanzarote/Graciosa (Martín *et al.* in press). Census studies carried out in December 1993 on Lanzarote (Martín *et al.* in press) show that the Houbara population there is much bigger than was thought; these authors consider that the Fuerteventura population must also be larger and has been underestimated. Table 1 shows the results of censuses carried out to date.

**Table 1.** Summary of the censuses and population estimates of the Houbara Bustard in Fuerteventura (F) and Lanzarote (L).

Year	No. of birds observed	Estimated population			Author
1979		42	80–100	(F)	Lack (1983)
		7	15–20	(L)	Lack (1983)
1981		—	59–90	(F)	Collins (1984)
1984		24	69–86	(F)	Osborne (1986)
		6	—	(L)	Osborne (1986)
1988		127	262–318	(F)	ORNISTUDIO (1989a)
1989		124	262–318	(F)	ORNISTUDIO (1989b)
1989		153	153–378	(F)	ORNISTUDIO (1990)
1991		67	—	(L)	ORNISTUDIO (1991)
1992		—	300–350	(F)	ORNISTUDIO (1992)
1993		146	400	(L)	Martín <i>et al.</i> (in press)

## Life history

### \* Taxonomic status

Taxonomists recognise three subspecies of Houbara: *C. u. macqueenii* in the deserts of Russia, Asia and the Middle East; *C. u. undulata* in North Africa; and *C. u. fuertaventurae* in the eastern Canary Islands (Collar and Goriup 1983). The Canary Islands subspecies, first described in 1894, is the most threatened and is distinguished by its smaller size, darker and more extensive markings on its back and by its generally less sandy colouring than other subspecies.

### \* Breeding

In the Canary Islands the males defend separate territories of around 500–1,000 m. Both sexes tend to be solitary during the breeding season and only come together for mating. The males are probably polygynous and do not take part in rearing the young (Collins 1984). Courtship takes place in December–March and consists of the male ruffling his head and neck feathers while moving over a distance of about 100–200 m in a straight line or circle. The female lays two or three eggs between February and April in a small scrape she makes on the ground. The chicks are nidifugous and follow the female after hatching.

The *macqueenii* subspecies has been bred in captivity in the Al Ain Zoo in Abu Dhabi (Ramadan-Jaradi and Ramadan-Jaradi 1989), and at Taif in Saudi Arabia there are also captive breeding facilities for Houbaras and other bustards (Renaud 1989).

\* **Feeding**

Information from other parts of the world suggests that the Houbara is a very versatile species as regards its diet. In Baluchistan 31.5% of its prey consists of beetles and ants as well as 21 plant species (Mian 1986). In the Canary Islands the birds feed alone or in small groups, taking both animal matter (beetles, grasshoppers, ants, larvae, snails, small lizards) and plant material (cereal seeds, peas, lentils, *Lycium*, *Ononis*, *Launaea* berries). The chicks need insects to grow properly (Collar and Goriup 1983).

\* **Habitat requirements**

Houbara habitat in the Canary Islands is made up of plains and rocky slopes of a semi-desert type, coastal plains and immobile dunes. The vegetation cover is made up of bushes with a predominance of *Launaea arborescens*, *Lycium intricatum* and *Salsola vermiculata* (Domínguez and Díaz 1985). On Lanzarote the birds select areas with taller vegetation (Martín *et al.* in press). They occasionally feed in cereal and legume fields early in the morning or towards dusk, but avoid forested areas, human settlements, cornfields and lava flows.

### **Threats and limiting factors**

\* **Habitat loss in critical areas**

Recent examples of developments causing loss of Houbara habitat include the Jandía Wind Energy Park and the gravel quarries in Lajares. These developments also give rise to other associated impacts such as the construction of new roads and tracks, increased human presence, establishment of new tracks through the use of vehicles off-road, noise, etc.

Importance: critical

\* **Disturbance and habitat change due to tourism**

The increase in the number of tourist developments (such as Costa Calma on the isthmus of Jandía and Corralejo) over the last few years has led to an increase in the number of tourist vehicles using tracks and travelling cross-country in Houbara areas. This is linked to the fact that four-wheel-drive rental companies organise safaris through the most remote parts of the islands. Frequent vehicle movement disturb the Houbaras directly and cause habitat change through the establishment of new tracks. In Fuerteventura this problem is especially serious in Corralejo, Jandía and Lajares.

Importance: high

- \* **Disturbance from military activity**  
Some areas, such as Llanos de Lajares, are especially suitable for military manoeuvres. These activities cause direct disturbance to the birds in the breeding season. These areas are still open to use by the public so military activity does not bring a reduction in disturbance from other activities.  
Importance: medium
- \* **Disturbance from truffle collecting**  
The collecting of truffles (“criadas”), takes place during the breeding season and seems to have increased over the last few years. The presence of people searching the ground causes direct disturbance to the Houbara and may lead to breeding failure in incubating birds.  
Importance: low
- \* **Abandonment of traditional agriculture**  
The Canary Islands countryside has witnessed the progressive abandonment of arable and livestock agriculture during the twentieth century. In the eastern islands, traditional cereal and legume crops produced via the “gavias” system (small terraces adapted to this type of farming) were formerly very widespread and provided an additional food source for the Houbara. The abandonment of this type of farming is positive in the sense that some of these areas have seen the return of natural vegetation, but the negative side is that they are no longer valuable food sources. A return to this type of farming could increase the likelihood of a rise in Houbara numbers.  
Importance: medium/high
- \* **Overgrazing**  
The grazing of goats in Fuerteventura and Lanzarote has generally had negative effects on the vegetation and has contributed to soil loss and desertification on the islands. Following a steep decline over the last few decades, the number of goats is increasing in some parts of Fuerteventura due to subsidies from the local government and the livestock farmers are organising themselves into cooperatives. In the sixteenth and seventeenth centuries there was much more livestock than at present but despite this there were quite a lot more Houbaras. It is currently thought that grazing has a negative effect on the vegetation and may have repercussions on the Houbara, although it is not clear to what extent. The use of vehicles by shepherds contributes to disturbance to the species.  
Importance: unknown
- \* **Illegal hunting**  
This has probably been the reason for the Houbara's disappearance from some parts of Fuerteventura and Lanzarote. It is currently very difficult to quantify the extent to which illegal hunting affects populations and there are no estimates of the number of birds killed annually. The problem appears to be associated mainly with some areas where poaching is a deeply rooted tradition, e.g. Tuineje in Fuerteventura.  
Importance: unknown, potentially high
- \* **Collisions with powerlines**

Several cases of Houbara deaths due to collisions with powerlines have been recorded. The incidence among steppe-living birds of this type is generally well known and it would not be surprising to find that such collisions are more frequent than is so far apparent.

Importance: unknown, potentially medium

\* **Transmission of parasitic diseases**

It is increasingly common for farm-bred game species such as Red-legged Partridge *Alectoris rufa* and Barbary Partridge *A. barbara* to be released into the countryside without adequate sanitary supervision. This situation makes more likely the spread of parasitic diseases to which the Houbara is not resistant, and this has the potential for severe effects on the population.

Importance: unknown

\* **Predation**

Houbara predators include Raven *Corvus corax*, possibly Barbary Falcon *Falco peregrinoides* and Buzzard *Buteo buteo*. Normally only one chick survives from each clutch, occasionally two. Potential egg predators include rats *Rattus*, Algerian hedgehog *Atelerix algirus*, Egyptian Vulture *Neophron percnopterus* and Raven. The Barbary ground squirrel *Atlantoxerus getulus*, an introduced species, does not appear to have any contact with the Houbara (Collar and Goriup 1983, Domínguez and Díaz 1985) although it may compete for some prey such as snails (M. Nogales *in litt.* 1994).

Predation by feral dogs and cats is a potential threat, although it has not been proved to affect the Houbara.

Importance: unknown

\* **General increase in the numbers of people**

The population of Fuerteventura has tripled in recent years. If this trend continues, it may have very negative long-term repercussions on the Houbara although, at the moment, it is difficult to evaluate what the impact will be.

Importance: unknown

\* **Desertification and climatic factors**

This is another factor that could effect the Houbara in the long term although at the moment it is impossible to predict to what extent. The prolonged drought affecting the eastern Canary Islands could affect the Houbara reducing food availability and breeding success.

Importance: unknown

### **Conservation status and recent conservation measures**

The species is classified as Endangered in both the Red Data Book of Canary Islands Land Vertebrates (Martín *et al.* 1990) and in the Red Data Book of Spanish Vertebrates (Blanco and González 1992). In current legislation it is classified as Endangered by Royal Decree 439/90.

The history of the Houbara Bustard in the Canary Islands up to 1978 has already been summarised by Collar (1983). Recent conservation measures are summarised below in chronological order:

1979. ICBP (subsequently to become BirdLife International) organised Expedition Houbara to Fuerteventura during which the first population census, including Lanzarote, was carried out, and the results were published in the first issue of *Bustard Studies*.
1981. D. R. Collins completed his Masters thesis on the behaviour and ecology of the Houbara in Fuerteventura, including an estimate of population size (Collins 1984).
1984. ICBP carried out a general survey of the birds of Fuerteventura together with a census of the Houbara both there and on Lanzarote (Osborne 1986).
1985. In view of the alarming results of the censuses mentioned above, ICONA (now DGN) decided that a Recovery Plan should be drawn up which included guidelines on the setting up of reserves, experimental captive breeding (Domínguez and Díaz 1985) and education and awareness-raising among the local people. As part of the implementation of this Plan the following actions were undertaken: three reserves in Fuerteventura (Jandía Isthmus, Lajares and Tesjuate Lagoon) and two in Lanzarote (Rubicón and Teguisse) were declared under the Law that regulates the close season; census work was carried out in Fuerteventura in 1988, 1989, 1991 and 1992 (ORNISTUDIO 1989a,b, 1990, 1991, 1992); the La Oliva facilities were built and specimens caught for captive breeding; a poster about the Houbara was prepared; and a joint project with farmers was undertaken to promote a return to former farming methods (Domínguez 1993).
1987. The Canary Islands Countryside Law was passed, making two important areas for the Houbara into Natural (regional) Parks (Corralejo and Jandía).
1988. Since Spain's entry into the EU in this year three SPAs containing Houbaras have been declared: Jandía, Dunas de Corralejo and Lobos and Lajares.
1989. The Countryside and Wildlife Conservation Law 4/89 was passed establishing measures necessary to guarantee wildlife conservation and giving priority to endemic species and subspecies.
1993. EU funding under LIFE regulation was granted for a habitat restoration project in Lajares which is an important area for Houbara.
1994. The new Canary Islands Countryside Law was passed. The Vice Council for the Environment organised a census covering the whole of the Houbara's range.

## **PART 2. AIMS AND OBJECTIVES**

### **AIMS**

In the short term to maintain the range and population of the Canary Islands Houbara Bustard at no less than the 1994 levels. In the medium to long term to promote an increase in the population and an expansion of its range.

### **OBJECTIVES**

#### **1. POLICY AND LEGISLATIVE**

##### **1.1. To ensure the adoption and publication as Royal Decree of an updated Recovery Plan for the Canary Islands Houbara Bustard**

The Recovery Plan drawn up in 1985 by F. Domínguez and G. Díaz may be considered ideal for its time, but it needs to be revised and updated in the light of the new political and administrative situation in the Canary Islands.

Current Spanish legislation on nature conservation includes Recovery Plans for the species listed as Endangered (Law 4/89, Art. 31.2) which include the Canary Islands Houbara Bustard (R.D. 439/1990), and specifies that it is the Regional Government's responsibility to prepare and pass these Recovery Plans. The Vice Council for the Environment should review the Houbara Recovery Plan and prepare an updated version. The adoption and publishing of this document as a Royal Decree with legal status by the Canary Islands Regional Government would represent political support for the Recovery Plan and help ensure adequate staffing and the financial means to implement it.

Priority: essential

Time-scale: short

**1.2. To ensure that regulations on the use and management of protected countryside in the Canary Islands cover the conservation of the Houbara and its habitat**

Law 12/1987, which declared natural areas in the Canary Islands, has been inadequate to conserve the Houbara's habitat due to its almost exclusively urban emphasis and to the lack of resources. The new Canary Islands Countryside Law passed in 1994 includes Use and Management Plans, Master Plans (Planes Directores), Conservation Regulations and Special Plans as planning guidelines for the different protected areas. The regulations for areas containing Hobaras must guarantee that the uses to which they are put and the activities that take place there are compatible with conservation requirements for the species and its habitat. These plans could be used to address the problem of overgrazing, for example. Nature conservation organisations must be represented on the Island Boards of Management of the Protected Natural Areas.

Priority: high

Time-scale: medium

**1.3. To complete the network of Special Protection Areas (SPAs) in the Canary Islands**

The EU Commission has assigned to the Houbara a "high" threat category which means that at least 80% of the population should be included in SPAs. Present coverage for the Houbara in the SPA network is far from this figure, especially in Lanzarote where it is recommended that priority is given to the designation of Tache-Guanapay and Rubicón. On Fuerteventura the areas of Lajares and Los Alares should also be considered a priority for SPA designation.

The Administration should ensure that effective measures to prevent changes in the Houbara's habitat are taken in existing SPAs.

Priority: high

Time-scale: short

**1.4. To ensure a suitable general protection framework for the Houbara Bustard under the new Canary Islands Wildlife Protection Law**

The draft of the new Wildlife Law is at the consultation stage and includes the Regional List of Endangered Species and the new status of Biological Refuge as a precautionary protection measure. This legislation should ensure that the Houbara is protected throughout its distribution in the Canary Islands, both inside and outside the protected areas, in accordance with Law 4/89 (Articles 26 and 27).

Priority: high

Time-scale: short

**1.5. To encourage appropriate management in key Houbara areas through the use of schemes under EU agri-environment regulation 2078/92**

Ecologically Sensitive Areas are included in the Canary Islands Law on the Prevention of Ecological Impact and may be declared if Hobaras are present. The impact declarations in the ESAs are binding and the environmental discipline mechanisms (if it is desired that they be implemented) are conclusive.

This mechanism could be used to encourage a return to traditional farming techniques and to reduce grazing pressure through fencing and removal of animals from key areas. Experience from the restoration of former "gavias" presently taking place in Lajares highlights how

important this type of agriculture is for this species. It might be advisable to fence restored plots to keep goats and rabbits out.

Priority: high

Time-scale: medium

### **1.6. To enforce the ban on off-road driving**

The possibility of establishing a penalty system for those using four-wheel drive vehicles incorrectly in Houbara areas should be explored.

Priority: essential

Time-scale: short

## **2. SPECIES AND HABITAT PROTECTION**

### **2.1. To prevent non-natural mortality**

#### *2.1.1. Eradicate illegal hunting*

In the short term the best way of dealing with illegal hunting is by increasing surveillance, especially in hunting reserves established under the Annual Close Season Order where hunting is not permitted. The current wardening levels in the eastern islands are too low to meet conservation needs. It is important to involve the Civil Guard in wardening work and formally request the setting up of a SEPRONA unit (Civil Guard wildlife service) in Fuerteventura. It would be advisable to set up new hunting reserves in areas with Houbaras such as Los Llanos de Tao and Los Llanos de Triquivijate.

As yet, there have been no prosecutions for killing Houbara but it is important that, should there be one, the strong penalties included in current legislation be applied in full (one million pesetas fine, Order of 14 September 1988 on the Updating of the Value of Game and Protected Species).

Priority: high

Time-scale: short

#### *2.1.2. Prevent collisions with powerlines*

The first step in eliminating this cause of death is to find out where this type of accident most frequently occurs. To do so it is necessary to patrol the powerlines in Houbara areas searching for dead birds. Once the places are identified, the company owning the line must be invited to take the necessary preventive measures. As a precaution, all new lines in Houbara areas should be laid below ground, or their routing altered with the lines appropriately marked.

Priority: medium

Time-scale: medium

### 2.1.3. *Prevent predation by non-natural predators*

#### 2.1.3.1. *Control of feral dogs and cats*

Although it has not been proved that there is a problem with feral dogs and cats, it would be advisable to remove animals that are regularly detected in the same area as Houbaras as a precautionary measure. Given the frequent use of dogs for hunting and the increase in numbers of people, feral animal numbers will probably increase.

Priority: low

Time-scale: medium

#### 2.1.3.2. *Control of rats in Houbara Bustard areas*

It is suspected that rats may take Houbara eggs and chicks, but more information is needed before embarking on control programmes (see 3.1.5).

Priority: low

Time-scale: long

## 2.2. **To prevent human disturbance**

### 2.2.1. *Restrict and control vehicle movement in critical areas*

Vehicle movement along tracks in protected natural areas and SPAs where Houbaras are found needs to be restricted via the 1989 Order on Regulation of the Use of Tracks on Public Land and Other Areas For Tourist/Recreational Purposes. It will also be necessary to ban traffic from tracks and roads. These measures must be accompanied by an increase in surveillance, especially in Corralejo and Matas Blancas.

Priority: essential

Time-scale: immediate

### 2.2.2. *Avoid holding military manoeuvres in critical areas*

It is necessary to establish direct contact with military authorities to provide them with information on areas in which it is recommended that manoeuvres should not be carried out, and to suggest alternatives in areas less important for wildlife.

Priority: high

Time-scale: ongoing

### 2.2.3. *Increase the number of wardens*

Warden numbers in the eastern islands are too low to meet current needs. On Fuerteventura the estimated number of rangers needed is 10 and on Lanzarote five with temporary help during the breeding season (December–April) and the peak of the hunting season (September). The wardening service needs to be rationalised and optimised.

Priority: high

Time-scale: short

### **2.3. To ensure the appropriate management of Houbara Bustard areas**

#### *2.3.1. Prevent habitat loss in critical areas*

Proposals for building or commercial projects (gravel extraction, new roads, windpower facilities, etc.) in critical Houbara areas will need to be accompanied by an environmental impact assessment including the effects on Houbaras and their habitat and measures to be taken to minimise these effects. It would be advisable to include this requirement in the updated version of the official Recovery Plan. Protected countryside, rural parks and peripheral protection areas containing Houbaras would have to be considered as Ecologically Sensitive Areas as laid down in the legislation on environmental ecological impact.

Priority: essential

Time-scale: short

#### *2.3.2. Acquire key Houbara Bustard areas*

The critical areas are those used for nesting and feeding. Once these have been identified (some are already known see 3.1.1.), acquisition of at least some of them should be considered as the best way to ensure that they are managed effectively to ensure the species' survival. Such areas could be used to reintroduce traditional farming techniques and measures to control grazing.

The possibility of temporarily leasing the land prior to acquisition should not be ruled out.

Priority: essential

Time-scale: short

#### *2.4. To review the captive breeding programme*

The review currently underway will consider if it is appropriate for the programme to continue. Facilities at the experimental captive breeding centre at La Oliva Biological Station seem to be adequate to breed Houbaras, but the centre lacks the funds required to fulfil its objectives. It would require a qualified biologist or veterinarian with some captive breeding experience and resident in Fuerteventura to be directly responsible for the technical side. Individual birds would also have to be ringed to permit individual identification.

If the centre is to continue operating it should have a workplan, clear objectives and some way of measuring the degree of success or failure. Some aspects that should be carefully considered are: (1) factors preventing breeding, (2) difficulty of rearing of chicks without imprinting, (3) expected time needed to achieve success, (4) the use to which captive bred birds will be put (see 3.2.3), (5) selection of release site, (6) monitoring after release. Information should be exchanged with the captive breeding programmes in Saudi Arabia and Abu Dhabi.

Captive breeding and subsequent releases should only be carried out if the IUCN criteria for reintroductions are met (Kleiman *et al.* 1994).

Priority: medium

Time-scale: ongoing

### **3. MONITORING AND RESEARCH**

### **3.1. To have up-to-date information on conservation status and population trends**

#### *3.1.1. Continue the inventory and mapping of the Houbara's distribution*

The objective of this basic study is to define the nesting areas and distribution of the different groups. This information is indispensable for evaluating the possible ecological impact of new roads, powerlines, building projects, etc.

Priority: essential

Time-scale: short

#### *3.1.2. Clarify population status and distribution in Lanzarote and Graciosa*

Fuerteventura has been the subject of almost all the studies, censuses and conservation efforts carried out to date. The Lanzarote population is much more restricted and, therefore, more vulnerable to any kind of disturbance or habitat change and so should receive urgent attention from those responsible for wildlife conservation in the Canary Islands.

Priority: high

Time-scale: ongoing

#### *3.1.3. Improve census methodology*

The transect method currently employed seems to be the most suitable as it is easy to use and has the advantage that the results are comparable with census results from previous years. However, it would be useful to combine this method with another (e.g. counting breeding males) in order to have another reference marker on population size. Observers who take part in the transect work should be equipped with radiotelephones so that they can communicate with each other.

Priority: high

Time-scale: ongoing

#### *3.1.4. Repeat censuses every 3–4 years*

The censuses provide indispensable information on population trends. The methodology currently used is a standardised version of the line transect in which groups of eight people walk 200 m apart. Census work should be done simultaneously on all the islands to find out the total population at a given moment and to avoid possible errors due to bird movements between islands.

Priority: high

Time-scale: ongoing

#### *3.1.5. Improve knowledge of breeding biology and factors leading to breeding failure*

Almost nothing is known about the species' breeding biology in the Canary Islands. Among other things, this study should establish baseline data for periodic monitoring of breeding in pilot areas and for information on population dynamics. The impact of predators such as rats and feral dogs and cats should be monitored.

Priority: essential

Time-scale: short

### 3.1.6. *Regular monitoring of breeding success*

Every two years monitoring of breeding parameters should be carried out in a series of previously selected areas with subsequent analysis of the factors responsible for variations in breeding success.

Priority: high

Time-scale: medium

## **3.2. To promote the development of applied research to ensure effective management of the species and its habitat**

### 3.2.1. *Define the extent of Houbara movements and use of space and habitat*

The most effective way of carrying out this study is by fitting some individuals with transmitters and monitoring them. Conditions in Fuerteventura and Lanzarote are ideal for radiotelemetry: the land is flat and unforested so the signal can be received at great distances, allowing birds to be located and followed without disturbance. Such studies would enable home-ranges of individuals to be defined and would lead to a better understanding of causes of death.

Priority: high

Time-scale: short

### 3.2.2 *Initiate a study on the effects of grazing on Houbara habitat*

This study could be carried out when some of the plots have been fenced in to compare the regrowth of vegetation both outside and inside or to extrapolate the results of other studies on the effects of grazing in desert areas (see 1.5 and 2.3.2.).

Priority: medium

Time-scale: long

### 3.2.3. *Take advantage of facilities at La Oliva Biological Station in order to carry out basic research on the Houbara*

The existence of this captive population offers an excellent opportunity to study the bustard's reaction to different marking techniques (wing tags, radiotransmitters, harnesses, etc.). Information could also be obtained on microbiology, parasites, blood parameters, etc. It would be very interesting to analyze the genome of the current stock and check its variability as well as to compare the genetic make-up of the Canary Islands Houbara with that of other subspecies.

Priority: medium

Time-scale: medium

### 3.2.4. *Set up a study grant for the Houbara in the Canary Islands*

This possibility will be explored with the Steppe and Dry Grasslands group of BirdLife International, and contacts with possible sponsors will be established.

Priority: low

Time-scale: long

## **4. PUBLIC AWARENESS AND TRAINING**

#### **4.1. To inform and increase awareness about the need to protect the Houbara Bustard and its habitat in the eastern Canary Islands**

##### *4.1.1. Campaign to raise awareness of the ban on off-road driving*

This campaign would involve a leaflet with a code of conduct for vehicle users in Houbara areas emphasising both the need to use the tracks correctly and the ban on driving off the tracks and disturbing the birds. Other publicity measures would also be used.

Priority: essential

Time-scale: immediate

##### *4.1.2. Build a hide for observation of the Houbara Bustard in the wild*

An ever-increasing number of birdwatchers come to the eastern islands to see the Houbara and other endemic species. This demand could be controlled via the construction of a permanent hide in the vicinity of an area which Houbaras visit regularly for feeding, preferably in one of the protected areas. In this way, public access could be managed and birds in other areas would benefit from decreased disturbance. The possibility of observing the species in the wild would increase the tourist value of the islands and would help to educate the local population.

Priority: medium

Time-scale: long

##### *4.1.3. Undertake an educational campaign directed at young people and groups important for Houbara conservation*

This campaign would include a video and an educational notebook about the species. There would also be a series of talks for arable and livestock farmers, hunters, tour companies and the Civil Guard using local media to publicise the cause of the Houbara and emphasise the need to conserve it.

Priority: medium

Time-scale: medium

#### **4.2. To establish a local monitoring network**

By making use of the new infrastructure of the Spanish Ornithological Society (SEO) in Tenerife, a network of contacts with people interested in bird conservation will be set up to obtain direct information on any disturbance to Houbara habitat and to take part in conservation work related to this action plan.

Priority: low

Time-scale: long

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