

# **Bonelli's Eagle** **(*Hieraaetus fasciatus*)**





## European Union Species Action Plan for Bonelli's Eagle (*Hieraetus fasciatus*)

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### Reviews

This action plan should be reviewed and updated every four years. An emergency review will be undertaken if sudden environmental changes, liable to affect the population, occur within the species' range.

### Geographical scope

Within the EU this action plan needs active implementation in: France, Greece, Italy, Portugal and Spain. In addition action needs to be taken for the species in Albania, Bulgaria, Croatia, Cyprus, and Turkey.



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## SUMMARY

The Bonelli's Eagle *Hieraaetus fasciatus* is an endangered species at European level having experienced a large decline throughout almost all of its European range, with a population now numbering less than 2500 pairs. It is listed on Annex I of the EU Wild Birds Directive and Appendix II of the Bern and Bonn Conventions. The European population is sedentary.

The European population numbers 862-1072 breeding pairs. The global population is not concentrated in Europe and Spain holds about 65% of the European population, the rest having an irregular distribution in the Mediterranean.

### **Threats and limiting factors**

- Persecution - critical
- Electrocution - critical
- Habitat destruction - high
- Shortage of food - high
- Human disturbance - medium
- Interspecific competition - low

### **Conservation priorities**

Elimination of direct persecution by the enforcement of existing hunting and conservation regulations – essential.

Identification and modification of dangerous powerlines which have caused Bonelli's Eagle deaths – essential.

Protection is required in the most important breeding and dispersal areas, with designation of key IBAs as SPA to be included in the NATURA 2000 network and subject to management plans – high.

Promotion of land-use policies to avoid deterioration of breeding and dispersal habitat (and disturbance) – high.

Increase prey populations by strengthening and enforcing hunting regulations and regulation of hunting activities – high.

Development and implementation of a programme to monitoring population size, distribution and trends, juvenile dispersion, causes of mortality, etc.) - high/medium.

Undertake public awareness and educational campaigns – medium.

## 1. Introduction

The Bonelli's Eagle *Hieraetus fasciatus* is endangered at a European level having undergone large declines throughout almost all of its European range between 1970 and 1990, reducing the population to 862-1072 breeding pairs (Tucker and Heath 1994). The declines have exceeded 50% over twenty years in some areas and in Spain, which holds up to 65% of the European population, the population appears to have declined by 25% from 1980 to 1990. This downward trend is contrary to that of other big eagles, such as the Spanish Imperial Eagle and Golden Eagle, whose populations are either stable or recovering. It is thought to be due to persecution, electrocution by powerlines, disturbance at nest sites and loss and deterioration of dry grassland and garrigue habitats. The global population is not concentrated in Europe. In Europe the species is irregularly distributed in the Mediterranean basin.

The species is listed on Annex I of the EU Wild Birds Directive, and Appendix II of the Bern Convention, Bonn Convention and CITES Convention.

An international workshop was held in Madrid on 10 January 1997 to identify priority actions necessary for the conservation of Bonelli's Eagle. It was attended by eight specialists from the main EU range-states (Greece, France, Portugal and Spain).

## 2. Background Information

### 2.1. Distribution and population

The global range of the Bonelli's Eagle extends from the Iberian Peninsula and NW Africa across southern Europe, the Middle East and Arabian Peninsula through Afghanistan to India, south China and Indonesia. The relatively small proportion of the global population which occurs in Europe breeds in the countries listed in Table 1.

**TABLE 1: Population status of the Bonelli's Eagle in Europe.**

<b>Country</b>	<b>Number of breeding pairs</b>	<b>Year of estimate</b>	<b>Population trend</b>	<b>Source</b>
Albania	0-2	(1994)	unknown	Tucker and Heath (1994)
Bulgaria	1-5	1991	unknown	Nankinov et al (1991)
Croatia	5-10	(1994)	stable	Tucker and Heath (1994)
Cyprus	10-15	(1994)	small decrease	Tucker and Heath (1994)
France	29	1997	stable	Cheylan and Ravayard (1997)
Greece	85-105	1997	small decrease	Bourdakis (1997)
Italy	12-15	1997	small decrease	Gallo-Orsi (Madrid workshop, 1997)
Portugal	83-96	1997	decline	Palma (Madrid workshop, 1997)
Spain	627-695	1997	decrease	Arroyo and Ferreiro (Madrid workshop, 1997)
Turkey	10-100	(1994)	unknown	Tucker and Heath (1994)
<b>Total</b>	<b>862-1,072</b>			

## 2.2. LIFE history

### **Breeding**

The stick nest is usually located on rocky cliffs, rarely on trees, and over the years it can reach a huge size. Laying extends from early January to mid April but most clutches are laid between mid February and mid March. Normally two eggs are laid, sometimes one and rarely three, with an average clutch size of 1.9. Incubation is mainly by the females and lasts 37-40 days. The fledging period is 61-77 days and the juveniles stay in the parental territory around 12-16 weeks before reaching independence. Breeding success is high (82 %), though 30 % of the pairs do not lay. Productivity is 0.82 chicks/pair and 1.56 fledging per successful nest but there are appreciable differences between years and regions.

### **Feeding**

The Bonelli's Eagle preys on medium-sized mammals and birds of a wide range of species. Rabbits and partridges are the preferred prey but it also preys on hares, squirrels, rodents, pigeons, corvids and lizards. In recent years, declines in both rabbits and partridges have caused diet changes and less profitable prey is becoming important. Carrion feeding is rare.

### **Habitat requirements**

In Europe Bonelli's Eagle is restricted to the Mediterranean regions. It lives in mountainous areas and other rugged terrain at medium to low altitude - sea level to 1500 m, averaging 660 m with only 11 % of pairs nesting above 1000 m. It tends to prefer short or sparse vegetation, such as garigue, dry grassland and rocky habitats but the vegetation cover of its habitat can be highly variable including forests and parkland (dehesas) as well as bushes and scrub. It is also often found in mosaics of open habitat with non-intensive crops, vineyards, olive groves, non-irrigated orchards, small woodlands and pasture (Tucker and Heath 1994). The average distance between pairs is 11.9 km although neighbouring pairs may breed only 2 km apart (Arroyo *et al.*, 1995).

### **Movements**

Breeding birds are sedentary but juveniles and immature may wander over large distances, and are frequently found on low altitude plains with high prey density which normally lack breeding pairs.

### **Persecution**

Predation on both game and domestic species is used as an excuse for Bonelli's Eagle persecution, especially by hunters, shepherds and also pigeon fanciers. Shooting and trapping are the main causes of mortality and are responsible for a decline in numbers of breeding pairs. These threats are considered a key factor in restricting the range of the species.

Importance: critical

### **Electrocution**

Electrocution at power lines mainly affects immature and juvenile birds. It is the main cause of mortality for these age groups in Spain and France. (Arroyo *et al.*, 1995; Cheylan *et al.*, 1996). This is because such powerlines are more abundant in the areas to which the young birds disperse (which are often more densely populated by humans) and are used as perching sites for hunting. In some regions electrocution and collisions are also the main causes of adult mortality, e.g. in Spain.

Electrocution can change the natural dynamics of the population making critical the already high juvenile mortality - 77% in the first fifteen months of life (Arroyo *et al.*, 1994) or 90% from fledging to recruitment (Real and Mañosa, 1997).

Importance: critical

### **Habitat destruction**

New infrastructures, constructions and associated activities (reservoirs, quarries, mining and built developments) can cause irreversible habitat loss. In Spain 20% of territory desertions result from such developments. Forestry operations can also cause problems, e.g. in Portugal. Loss of mixed farming in favour of increased specialisation is expected to be a serious factor in future.

Importance: high

### **Shortage of food**

Diseases such as myxomatosis and haemorrhagic pneumonia have considerably reduced the number of rabbits, the eagles' favourite prey. Habitat changes related to rural abandonment (natural regeneration of woodland), intensification of agriculture

including hedge removal and pesticide use), and high game hunting pressure reduce the availability of food and so reduce productivity of the eagles.

Importance: high

#### ***Human disturbance***

Disturbance during the breeding period can reduce breeding success. Recent leisure activities such as climbing, trekking, mountain biking, camping, etc. increase human disturbance, despite rural abandonment, and have a detrimental impact on productivity. Likewise disturbance associated with quarries and forestry can be a problem.

Importance: medium

#### ***Interspecific competition***

Competition for nest sites between Bonelli's Eagle, Griffon Vulture and Golden Eagle can be a problem in some regions. Normally these species can coexist, but the decline of Bonelli's Eagle along with the recovery of Griffon Vulture and Golden Eagle populations allows, under certain circumstances, these raptors to colonize the Bonelli's nests or territories, preventing their recolonization (Fernández and Insausti, 1990).

Importance: low

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

#### **Albania**

Population estimate 0-2 pairs (Tucker and Heath, 1994). No more data available.

#### **Bulgaria**

Population estimate 1-5 pairs (Nankinov *et al.*, 1991). No more data available.

#### **Croatia**

Population estimate 5-10 pairs (Tucker and Heath, 1994). There are four IBAs where breeding may occur, and two others where it occurs as a non-breeding visitor. All are protected areas.

#### **Cyprus**

Population estimate 10-15 pairs (Tucker and Heath, 1994). The most important IBA is protected, but the Adelphi forest, with 2-4 pairs appears not to have permanent protection.

#### **France**

Classified as Endangered in the Red Data Book.

The breeding range is restricted to the Mediterranean region, in the southeast of the country. The species has suffered a great decline in recent decades, from 55-60 breeding pairs in 1970-75 to 29 pairs in 1997. Now it seems stable but very fragile (Cheylan and Ravayrol, 1997). The main threats are shooting, a key factor in the decline in breeding numbers, deterioration of the habitat, and the increase in human disturbance in the nesting areas. Electrocution by powerlines is the principal cause of juvenile mortality, being responsible for 85% of deaths (Cheylan *et al.*, 1996).

Since the late 1980s France has been developing a monitoring programme for the species, studying different aspects of the biology of the Bonelli's Eagle (reproduction, ringing and tagging juveniles, habitat changes, mortality rates and causes, etc.). In addition a captive breeding programme has started.

A project to protect Bonelli's Eagle habitat in southern France, undertaken by LPO was funded by the EC ACE-Biotopes programme from 1989-1993. This resulted in the designation of five SPAs covering 30,092 ha and one *Réserve Naturelle Volontaire*. Actions to improve foraging opportunities, in cooperation with the forestry authorities in Provence-Alpes-Côte d'Azur, led to a considerable increase in the number of juveniles and the re-occupation of an abandoned nest site. The project also ensured that a high-speed rail link avoided serious damage to an important site. However, the problem of high-tension power lines was not addressed.

#### **Greece**

Bonelli's Eagle is legally protected by the Joint Ministerial Decision 414985/85 and is classified as Vulnerable in the Greek Red Data Book.

The species range occupies a large part of south and west continental Greece and many islands. More than 50% of its population is

found on the Aegean Islands and Crete. Its breeding range seems to show a small decrease (possibly local extirpation), mainly in the northern and central mainland. Despite limited data and although many potential areas have not been adequately surveyed, the total population is estimated at 85-105 breeding pairs (Bourdakis, 1997).

The principal threats known are human persecution (hunters and shepherds), habitat destruction (extensive road construction, quarries, mining, housing developments), human disturbance at nest sites (including increased tourism and mountain sports) and possible shortage of prey in some areas. There are no data for electrocution or trapping. No studies on the ecology of this species have been carried out. Just 10% of the population inhabit protected areas. Of the ten most important IBAs identified, four are not protected (Ikaria island, the East Lakonia mountains, and the islands of Chalki and Nisiros with their neighbouring islets); three are small game refuges and only four are included in the list of proposed SCIs under the EU Habitats Directive. However, up to 72 IBAs may have Bonelli's Eagles present, the great majority having only one or two pairs, or non-breeding visitors. Thus the species is widely and thinly dispersed.

### **Italy**

The species is classified as Endangered in the Italian Red Data Book.

Present breeding range is limited to Sicily and a very small sector of Calabria. The Bonelli's Eagle may have completely disappeared from Sardinia where it was regularly present until a few years ago. The total population is 12-15 breeding pairs compared to 18-24 pairs in 1986. This decline is due mainly to human persecution, habitat loss (i.e. building of new houses and roads), nest robbery, and human disturbance in the breeding areas.

Only 25% of breeding pairs are in protected areas. No national monitoring and research programme has yet been developed, although there are local efforts such as guarding of breeding sites by volunteers.

### **Portugal**

The species is classified as Rare in the Portuguese Red Data Book.

It is distributed throughout the country, excluding the northwest. Highest densities are

found in the international sector of the Douro river, where the IBA is unprotected and in the southwest mountain ranges. The number of breeding pairs is 83-96, showing a decline of 15% in the last ten years. This decrease is particularly severe in northeastern Portugal and the northern Tejo basin. A notable number of pairs nest in trees in the southern region.

The main threats are shooting, habitat alterations (forestry works, road construction), human disturbance and shortage of food. Only 6% of breeding pairs live in protected areas. Four large IBAs contain up to 45 individual between them, but are unprotected (Upper Douro and Agueda valleys, Sabor e Maças, Vale do Côa and the international stretches of the river Tejo). There are no official conservation and research plans. Different studies are being carried out, at regional level, on habitat selection, diet and food resources, reproductive performance, banding and genotypic variability (Palma *et al.*, 1996).

### **Spain**

The Bonelli's Eagle is included in the National Catalogue of Threatened Species (Royal Decree 439/90) as a species of Special Interest and was classified as Vulnerable in the National Red Data Book.

The species is unevenly distributed, with more than half of the pairs found in the Mediterranean coastal provinces. Other important sites are located in some interior regions but the species is particularly rare or absent in the vast plains, the Cantabrian region and in the northwestern quarter of the country. In 1990, the first national survey found 679-755 pairs (Arroyo *et al.*, 1995) but the current estimate is 627-695 pairs. Throughout the 1980s and 1990s the Bonelli's Eagle showed definite signs of decline and up to 26% of the total population appears to have disappeared. The original range of the Bonelli's Eagle is reduced and fragmented.

The reasons for decline are not wholly understood, but direct persecution and electrocution are probably key threats (Real and Mañosa, 1997). Other important factors are the scarcity of food resources (declines in the main prey species), habitat loss and deterioration and human disturbance (eg from rock-climbing and hiking) in the breeding areas.

Despite the recommendations of the National Red Data Book there is not, at present, any national programme of actions. Nevertheless,

at the regional level some actions such as surveys, breeding monitoring, marking of young (radiotelemetry and wing-tagging) and studies on demography and habitat change, are being carried out.

Only in Navarra region is there currently a legal Recovery Plan approved for the species and a LIFE Nature project (1997-2000) run by the Navarra Environment Ministry entitled *Recovery actions for Bonelli's Eagle in the Mediterranean area - Navarra*. (2-3 breeding pairs). It will modify pylons and regulate and warden hunting, rock-climbing and forestry activities within SPAs; intervene in the process of concentration of rural land holdings seeking to conserve the mosaic of scrub, field margins and arable fields; survey and monitor the population; and raise local public awareness and support for the eagles.

Only 16% of the Spanish population is in SPAs. Of this 74 % are within 95 IBAs and 48-57% are within 41 IBAs, each of which holds at least 5 breeding pairs. Key IBAs for the species in need of effective legal protection are:

Alange  
Arribes del Duero - Famoselle  
Río Huebra - Arribes del Duero - Campo de Argañán  
San Sebastián mountain ranges and Entrepeñas reservoir  
Canyons at the middle section of River Cabriel  
Montsant and Prades Mountains  
Espadán mountain range  
Turia canyon and Los Serranos  
Rivers Cabriel and Júcar canyons  
Mountain range and salplans at Cabo de Gata  
Antequera mountain range- El Chorro  
Sierra Nevada mountain range  
Low course of River Matarraña-Ribarroja  
La Safor and North Alicante mountain ranges  
Lerida steppes  
El Valle, Altaona and Escalona mountains  
Central Badajoz mountain ranges  
Puerto de Mejoral - Almorchón - Cabeza del Buey  
Morella pass  
Marina mountain ranges  
Alhamilla Mountain range - Campo de Nijar Plain  
Sierra Morena de Sevilla (mountain range)  
Subbetic mountain ranges of Cordoba  
Bujeo, Ojén, del Niño and Blanquilla mountain ranges

## Turkey

Population estimated at 10-100 pairs. The species is present, though rare, along the Mediterranean coast, where it occasionally breeds on small islands (Tucker and Heath, 1994). No further data available.

## **3. Aims and Objectives**

### Aims

In the short term, to maintain the existing populations of Bonelli's Eagle in Europe.

In the medium to long term, to increase the population size of the Bonelli's Eagle and to encourage recolonization of the former range.

### Objectives

#### **3.1. Policy and legislation**

3.1.1. *Promote national and international policies to ensure the conservation of the Bonelli's Eagle and its habitat*

3.1.1.1. Adopt agricultural policies that will encourage the maintenance of traditional mixed farming practices.

Priority: medium  
Time-scale: medium

3.1.1.2. Enact new legislation and regulations to avoid the installation of powerlines and poles of a design which risks electrocution of birds of prey.

Priority: high  
Time-scale: short

#### **3.2. Species and habitat conservation**

3.2.1. *Elimination of mortality due to direct persecution*

3.2.1.1. Strict implementation of legal sanctions for offenders.

Priority: essential  
Time-scale: short

3.2.1.2. Increase the numbers of forestry/nature wardens and funding.

Priority: high  
Time-scale: short

3.2.1.3. Employ specialised wardens in raptor conservation.

Priority : high  
Time-scale: medium

3.2.1.4. Ban hunting in those game preserves where birds of prey are killed, trapped or poisoned.

3.2.1.5. Undertake educational programmes for hunters and forestry/nature wardens.

Priority: medium  
Time-scale: medium

3.2.2. *Elimination of mortality caused by electrocution*

3.2.2.1. Seek removal or modification of electricity pylons that cause the electrocution of birds.

Priority: essential  
Time-scale: short

3.2.2.2. Prevent the construction of new power lines in high density breeding and dispersal areas.

Priority: high  
Time-scale: short

3.2.3. *Protection of breeding territories and nest sites*

3.2.3.1. Avoid road and track building and the installation of new quarries, dams and built developments near the breeding areas.

Priority: high  
Time-scale: short

3.2.3.2. Designate high density breeding areas as Special Protection Areas and also designate new reserves (or similar protected areas) on areas with a low number of pairs to maintain the distribution range.

Priority: essential  
Time-scale: short

3.2.3.3. Control access within 1 km of nests.

Priority: high  
Time-scale: short

3.2.3.4. Avoid forestry operations or other such activities within 2 km of nests during the breeding period.

Priority: high  
Time-scale: short

3.2.3.5. Regulate disturbing recreational activities (climbing, angling, aerial and mountain sports) in the breeding areas.

Priority: high  
Time-scale: short/medium

3.2.4. *Protection of the dispersal areas*

3.2.4.1. Designation of SPAs, new reserves or similar protected areas in the most important dispersal areas.

Priority: high  
Time-scale: short/medium

3.2.5. *Management and habitat improvement*

3.2.5.1. Maintain traditional agriculture practices in the most important breeding and dispersal areas.

Priority: high  
Time-scale: medium/ongoing

3.2.5.2. Prevent large-scale changes in land use (forestry plantations, agriculture intensification etc.) in the main breeding and dispersal areas.

Priority: high  
Time-scale: medium/ongoing

3.2.5.3. Ensure enhancement of prey populations (rabbits, pigeons) by habitat improvement and regulation of hunting activities.

Priority: high  
Time-scale: medium

3.2.5.4. Establish game preserves or implement special game management regulations in the breeding and dispersal areas.

Priority: high  
Time-scale: medium

3.2.5.5. Preserve or recreate favourable breeding sites that are now abandoned.

Priority: medium  
Time-scale: medium

3.2.6. *Encourage the development of national recovery plans in EU member states.*

Priority: high  
Time-scale: medium

3.2.7. *International co-operation*

The lack of available information about the status and threats to the Bonelli's Eagle in some countries (Albania, Bulgaria, Croatia, Cyprus, Turkey) must be resolved. International co-operation is needed to provide funds, equipment and expert advice to undertake basic surveys and initiate conservation measures. Countries that have embarked on the process of accession to the European Union should consider what opportunities exist to use the approximation process and any associated funding support to establish and manage a network of protected areas and other measures compatible with EU legislation.

Priority: medium  
Time-scale: medium

### 3.3. **Monitoring and research**

3.3.1. *Develop and implement a co-ordinated European programme to monitor population status and trends. Countries with reduced populations should undertake an annual census and those with large, healthy populations need only undertake a census every five years.*

Priority: high  
Time-scale: medium

3.3.2. *Identify and survey the dispersal areas*

Priority: high  
Time-scale: short

3.3.3. *Conduct studies on the biology of the species*

3.3.3.1. Undertake research to increase understanding of the species habitat requirements and the factors influencing population trends.

Priority: high  
Time-scale: medium

3.3.3.2. Undertake research to further develop knowledge of the dispersive strategies and factors influencing Bonelli's eagle populations in the main dispersal areas, as a basis for conservation action to protect these areas.

Priority: medium  
Time-scale: short/medium

3.3.4. *Planning and international co-ordination of captive breeding programmes in those countries with small populations of Bonelli's Eagle*

To improve the success of captive breeding, co-ordinate an international programme of genetic research, creation of a pool of breeding pairs, etc.

Priority: medium  
Time-scale: medium

### 3.4. **Public awareness and training**

3.4.1. *To raise public awareness and support for protection of the Bonelli's Eagle and its habitat.*

Develop an awareness/educational campaign addressed to both the general public and conservation administration bodies. Regional and national administrations should be responsible for their promotion and implementation with support from NGOs. These campaigns should be aimed at the general public, schoolchildren, hunters and game keepers (see also 2.1.5) as well as the education authorities, especially in the regions inhabited by the species.

Priority: high  
Time-scale: medium/ongoing

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## 5. ANNEX

### Recommended conservation actions by country

#### France

- 1.1.1, 2.3,  
2.4, 2.5 Maintain and enhance the habitat of breeding and dispersal areas.
- 2.1.1 Strictly enforce the law to help deter direct persecution by hunters.
- 2.1.2,  
2.1.3 Maintain wardening schemes at nests vulnerable to persecution or disturbance.
- 2.2.2 Remove or modify those power-lines that are dangerous to the eagles.
- 2.3.1 Avoid habitat destruction by infrastructure constructions, quarries, etc.
- 2.3.2,  
2.4.1 Designate important areas as SPA and other legally protected areas.
- 2.3.5 Strictly control human activities that risk significantly disturbing breeding pairs (climbing, trekking, hang-gliding, etc.). Develop and enforce plans to manage human activities and accessibility of nesting areas.
- 2.5.5 Encourage recolonization of abandoned breeding sites through appropriate management and habitat recreation.
- 2.6 Implement and review the existing French action plan for Bonelli's Eagle.
- 3.3 Undertake research on habitat selection.
- 4.1 Launch educational and public awareness campaigns about the Bonelli's Eagle and the problems it faces.

#### Greece

- 1.1.1,  
2.5.1 Maintain traditional agricultural practices that provide the basic ecological requirements of the species.
- 2.1.1 Enhance the enforcement of existing hunting regulations.
- 2.1.4,  
2.5.4 The Ministry of Agriculture should declare non-hunting zones over a large area surrounding vulnerable nesting sites. Once a sufficient level of protection has been assured, these areas should be managed appropriately for the conservation of the species.
- 2.3 Review and enforce the existing legislation concerning protected areas. Where the species occurs promote extension of the legal protected-area network, including NATURA 2000, especially to cover all relevant IBAs, in particular Ikaria island, the East Lakonia mountains, and the islands of Chalki and Nisiros with their neighbouring islets. Ensure these and all other nesting areas are managed appropriately and that habitat destruction (eg by developments such as road construction) and disturbance (by enforcing access restrictions) is prevented in the nesting areas.
- 2.5.3 Increase the abundance and availability of key prey species, wherever necessary.
- 3.1, 3.2 Undertake a national survey to determine population status, distribution and juvenile dispersal and develop a regular monitoring scheme.
- 3.3.1 Undertake research on habitat and food requirements, and identify factors affecting breeding success, mortality and recruitment.

- 2.1.5  
4.1 Undertake public awareness and educational campaigns for the Bonelli's Eagle and birds of prey in general aimed at hunters, shepherds, farmers and game keepers to reduce direct persecution.

### **Italy**

- 2.1.1 Effectively enforce hunting regulations and European Directives, with strong penalties for offenders, to act as a deterrent.
- 2.1.1 Prosecute illegal traders of live or mounted birds.
- 2.3  
2.5.4 Create new protected areas, including designation of SPAs and hunting bans around breeding areas. Ensure these areas are managed appropriately and that habitat loss and disturbance is prevented in the nesting areas, especially during the breeding season. Implement intensive surveillance at the nests.
- 3.1,  
3.3.1 Undertake detailed surveys and research in Sicily, Calabria and Sardinia to determine status, breeding success in relation to prey density and diet composition, causes of mortality and habitats changes.
- 4.1 Urgently undertake information and awareness campaigns.

### **Portugal**

- 2.1.  
2.5.4 Create non-hunting buffer zones around vulnerable nest sites and strictly control anti-predator actions on hunting estates. Legal sanctions and loss of hunting concessions should be applied to offenders.
- 2.2.1 Survey power-lines within breeding and dispersal areas to assess electrocution risk. Replace or modify dangerous poles.
- 2.3.1,  
2.5.2 Prevent inappropriate developments, such as new roads, dams, quarries, and forestry and agricultural intensification, in breeding and important dispersal areas.

- 2.3.2 Designate the most important areas, and in particular the Upper Douro and Agueda valleys, Sabor e Maças, Vale do Côa and the international stretches of the river Tejo, as Special Protection Areas.

- 2.3.4,  
2.3.5 Regulate forestry activities within a 2 km radius of nest sites and also other disturbing activities such as climbing, trekking, etc. in the vicinity of nest sites during the breeding season.

- 2.3.2 Protect nest trees at risk of logging (e.g. mature eucalyptus, pines, etc.), together with the surrounding trees and alternative nest-sites within the breeding habitat of tree-nesting pairs, including through purchase if necessary.

- 2.5 Provide economic benefits (e.g. tax reduction and exemption) and enhanced environmental subsidies in breeding and important dispersal areas.

- 2.5.3, Create game preserves and create or restore pigeon colonies in territories with depleted 2.5.4 food resources, if feasible. Subsidising traditional rural pigeon rearing should be considered.

- 3 Develop and implement a population monitoring programme, identify dispersal areas, undertake research on the species demography and genetics; habitat selection and use patterns; and incidence, prevention and treatment of diseases.

- 2.1.5,  
4.1 Undertake public awareness and educational actions, targeted at hunters, shepherds, armers and climbers. Provide advice for estate owners and managers, foresters, forest rangers and game wardens on minimising disturbance and habitat degradation in breeding and dispersal areas.

### **Spain**

- 2.1.1 Strictly enforce the law to deter direct persecution especially by pigeon-fanciers and hunters.

- 2.1.2 Increase staff and funds for forestry wardens.
- 2.1.5 Undertake educational programmes directed towards hunters and wardens.
- 1.1.2,  
2.2 Develop and implement nationally enforceable standard on new power-lines to avoid designs of poles that are dangerous for large birds (eagles, vultures, storks, etc.). In important breeding and dispersal areas modify or remove existing dangerous power-poles and powerlines and prevent the construction of new ones.
- 2.1,  
2.3 Increase vigilance at nesting areas with small or dispersed populations, which have experienced a marked decline, such as in Navarra, La Rioja, Castilla y León, Madrid, Gerona and Lerida. Consider declaration of these zones as small-protected areas.
- 2.3.1 Prevent construction of new roads and tracks, quarries and built developments in the vicinity of breeding sites.
- 2.3.4 Prevent forestry works within 2km of the nest during the breeding season.
- 2.5.1 Maintain traditional agricultural practices that favour main prey species.
- 2.5.3 In areas with low prey density enhance prey availability by habitat improvement, rabbit restocking, and rehabilitation of old dovecotes.
- 2.5.4 Create special hunting regulations in breeding areas, creating temporary or permanent non-hunting buffer zones.
- 3.1, Develop and implement a monitoring programme to assess population trends (including
- 3.2 mortality rates and causes of adult and juvenile mortality), breeding success, habitat, etc. and prepare a complete inventory of dispersal areas.

