

ACTION PLAN FOR THE AZORES BULLFINCH
(Pyrrhula murina)



Compiled by:

JAIME A. RAMOS (Universidade dos Açores, Portugal)

ACTION PLAN FOR THE AZORES BULLFINCH (*Pyrrhula murina*)

Compiled by:

JAIME A. RAMOS (Universidade dos Açores, Portugal)

With contributions from:

C. J. Bibby (Birdlife International, U.K.)

B. Heredia (BirdLife International, U.K.)

Timetable

First draft: October 1994

This version: September 1995

Reviews

This document should be reviewed and updated 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 island of São Miguel (Azores, Portugal).

CONTENTS

SUMMARY - 3 -

INTRODUCTION..... - 4 -

PART 1. BACKGROUND INFORMATION..... - 4 -

Distribution and population..... - 4 -

Life history - 5 -

 Taxonomic status - 5 -

 Breeding - 5 -

 Feeding - 5 -

 Habitat requirements..... - 6 -

Threats and limiting factors..... - 6 -

 Habitat loss..... - 6 -

 Food shortage in winter - 7 -

 Food shortage in summer - 7 -

 Random demographic and environmental factors - 7 -

 Predation - 7 -

 Low breeding success and natural mortality - 7 -

Conservation status and recent conservation measures - 8 -

PART 2. AIMS AND OBJECTIVES - 8 -

AIMS - 8 -

OBJECTIVES..... - 8 -

1. POLICY AND LEGISLATIVE..... - 8 -

2. SPECIES AND HABITAT PROTECTION - 9 -

3. MONITORING AND RESEARCH..... - 11 -

4. PUBLIC AWARENESS AND TRAINING - 11 -

REFERENCES - 12 -

SUMMARY

Background

The Azores Bullfinch *Pyrrhula murina* is a very distinct form occurring in the east of the island of São Miguel. It was a locally abundant pest of fruit orchards in the nineteenth century but became rare after 1920. The present population of about 120 pairs is largely confined to native vegetation, which has been reduced and invaded by aggressive exotic plants: *Pittosporum undulatum*, *Cryptomeria japonica*, *Hedychium gardnerianum* and *Clethra arborea*.

A three-year study of its population and ecology revealed that native vegetation is preferred all year round but exotic vegetation with open patches is used to some extent in summer. Birds feed on seeds of herbaceous plants in summer, seeds of fleshy fruits in autumn, tree seeds and fern sporangia in winter, and flower buds in spring. A mosaic of vegetation types is thus necessary. Seeds of exotic plants are important from May to July and from October to March, but during periods of food scarcity (late March to early May) the birds are heavily dependent on flower buds of *Ilex perado*. Apart from *Clethra arborea* the seeds of common exotics are ignored.

This action plan is based on the results of a project which received EU funding through a LIFE grant and aims to restore and expand the area of Laurel forest and increase the population of Azores Bullfinch to about 150–200 pairs.

Threats and limiting factors

- * **Habitat loss - critical**
- * **Food shortage during late winter - critical**
- * **Food shortage in summer - low/medium**
- * **Random demographic and environmental factors - low/medium**
- * **Predation - unknown**
- * **Low breeding success and natural mortality - unknown**

Conservation priorities

- * **Control the expansion of exotic flora - critical**
- * **Protect and increase the population of key food plants - critical**
- * **Promote the regeneration of laurel forest - high**
- * **Provide supplementary feeding - high**
- * **Continue population monitoring - high**

INTRODUCTION

The Azores Bullfinch *Pyrrhula murina*, also known as the São Miguel Bullfinch or Priolo, is a very distinct form occurring only in the east of the island of São Miguel in the Azores archipelago (Portugal). It is listed as Endangered in IUCN's *Red List of Threatened Animals* (Groombridge 1993) and in the Portuguese Red Data Book (Cabral *et al.* 1990). It is included in Annex I of the EU Wild Birds Directive. Laurel forest, the habitat of this species, is listed as a priority habitat in Annex I of the EU Habitats Directive (45.61 to 45.63 Macaronesian Laurel Forests).

Godman identified the bullfinch in 1866 and described it as being characteristic of mountainous areas. It had once a wider range since it was regarded as a pest in orange orchards around Furnas and was easily collected for museums (Bannerman & Bannerman 1966 and references cited there, Le Grand 1983). The reduction of its range is associated with the cutting of the Laurel forest for grazing and agriculture, afforestation with *Cryptomeria japonica*, and the introduction of aggressive exotic plants that are now widespread: *Pittosporum undulatum* on slopes along streams up to 500 m, *Hedychium gardnerianum* on disturbed ground and streams, and *Clethra arborea* which is scattered widely through the whole of the native forest.

Habitat change due to the spread of exotic vegetation is the main conservation threat facing this bird. Between 1991 and 1993 a study was undertaken to evaluate this threat (Ramos 1993) and this action plan draws on the results of that study. It is now virtually impossible to eradicate the exotic plants, some of which have become naturalized. However, action should be taken to control them and to restore and enlarge the remaining patches of Laurel forest. It should be noted that native plants are slow growing and positive results may thus be seen only in the long term.

PART 1. BACKGROUND INFORMATION

Distribution and population

The Azores Bullfinch is largely confined to native vegetation in eastern São Miguel, from 300 to 800 m above sea-level. It has never been recorded in the western part of the island. Two main patches of native vegetation are present within its range: the largest, centred on Pico da Vara summit, where birds occur all year round, and Salto do Cavalo, on the west of the range, where birds have been observed from September to December (Ramos in press a). Only juveniles have been seen at Salto do Cavalo suggesting post-fledging dispersal. Azores Bullfinches range widely within the main area. The largest movements were of about 3 km, recorded in May along streams.

The population was estimated at 30–40 pairs in the late 1970s (Le Grand 1983), 100 pairs in 1989 (Bibby & Charlton 1991, Bibby *et al.* 1992) and between 60 and 200 pairs (mean 120) in 1991, 1992 and 1993 (Ramos in press a).

Life history

* **Taxonomic status**

Azores Bullfinches differ from their mainland counterparts and seem likely to merit the species rank which they are accorded here. The sexes are virtually identical in colour, though males sometimes show the slightest suffusion of reddish-tawny on the abdomen and flanks (Bibby *et al.* 1992, Ramos 1994a). Preliminary studies of phylogenetics show the Azores Bullfinch to differ consistently from British and north European Bullfinches *P. pyrrhula* on two bases of the mitochondrial DNA (Ramos 1993). These differences are greater than those amongst crossbill *Loxia* species in Britain (R. Dawson pers. comm.), but a full evaluation of this point must include DNA from Iberian birds.

* **Breeding**

Breeding occurs from mid-June to late August. During the recent study, two nests were found 3 m above the ground on a *Cryptomeria japonica* tree, both surrounded by dense vegetation (*Cryptomeria japonica* and *Clethra arborea*). Nests are like those of mainland bullfinches, with two layers. Nest materials include twigs of *Clethra arborea* and *Erica azorica*, grass, rootlets and moss. Clutch size is unknown. Young fledge from mid-July. Adults moult from September onwards (Ramos 1994a).

* **Feeding**

The diet shows marked monthly variation and comprises at least 37 different plants, of which only 13 are known to be important. In summer birds take herbaceous seeds (*Polygonum capitatum*, *Prunella vulgaris*, *Hypericum humifusum*, *Leontodon filii*); in autumn, seeds of fleshy fruits (*Vaccinium cylindraceum*, *Rubus* sp., *Leicosteria formosa*); in winter, tree seeds (*Clethra arborea*) and fern sporangia (*Woodwardia radicans*, *Culcita macrocarpa*); in spring, flower buds (*Ilex perado*), fern sporangia (*Osmunda regalis*) and fern fronds (*O. regalis*, *Pteridium aquilinum*) and moss tips (Ramos 1995a).

Native vegetation comprises the majority of the diet in August/September (*L. filii* and *V. cylindraceum*) and April (*I. perado*). The fact that birds are heavily dependent on flower buds of *I. perado* in April and that large ferns are important food from November to March (Ramos 1995a) may explain why birds are not present in the area of native vegetation at Salto do Cavalo in winter, since these plants are present there in much lower densities than around Pico da Vara (Ramos 1995a).

Observations in the field and trials with captive birds showed that all fleshy fruits are greatly preferred to *Clethra arborea* seeds. These seemed preferred to fern sori in autumn but the opposite was true in April. Then, birds preferred *I. perado* over fern sori, and these over *Clethra arborea*. Seeds of *Clethra arborea* are ignored once flower buds reach a length of about 2.8–3.0 mm. Seeds of *Hedychium gardnerianum* and *Cryptomeria japonica* (birds do not extract seeds from cones) were consumed only very rarely and *Pittosporum undulatum* was never taken (Ramos in press b). Fern fronds were only taken when other food items were scarcer (Ramos 1994b).

* **Habitat requirements**

In the nineteenth century this species was considered a locally abundant pest of fruit orchards but at present orchards are very small and far from forest cover so they are no longer used by the species.

Native vegetation is always greatly preferred but there are some important seasonal variations in habitat selection. In summer, birds select bare ground, short vegetation (less than 2 m high) and forest margins. Plantations of *Cryptomeria japonica* (especially those less than 6 m high) and copses of *Pittosporum undulatum* within 200 m of the native forest are used to some extent from May to November. From January to April about 90% of the bird records were in native vegetation (Ramos in press a).

To complete the annual cycle birds need a mosaic of several vegetation types. This is reflected in their home-ranges, which are wide around a regular base. Birds move from area to area following the fruiting of food plants. They are more mobile during summer (June–September) because they have to cross areas of mature forest that are unsuitable for foraging. Longer movements (up to 3 km, down from 700 m to about 300 m) were recorded in early May when birds moved to feed on ripening herbaceous seeds (Ramos in press a).

Threats and limiting factors

* **Habitat loss**

The remaining native forest (about 580 ha) supports about 120 pairs of Azores Bullfinches. Loss of native forest and its large-scale invasion by exotics seem to be the major factors explaining the gradual contraction of the Azores Bullfinch range and present small population levels. Exotic vegetation is of limited use because it does not provide food. Exotic forests could be of some value if they were less dense, allowing the development of an understorey with herbaceous plants and shrubs. Forest margins at lower altitudes with herbaceous plants and fleshy-fruit-producing shrubs should be considered as valuable habitats for this bird (Ramos in press a). Fruit orchards are no longer important as a habitat for this species as they are small and far from forest cover. Importance: critical

* **Food shortage in winter**

Seeds of *Clethra arborea* and sori of large ferns are the main foods from November to March. In April birds feed on flower buds of *I. perado* (though *Clethra arborea* seeds are still present, but presumably too dry and indigestible). An experiment with netted trees

showed that most buds are consumed, and Azores Bullfinches may thus face food shortage in late winter (Ramos 1995a). A higher proportion of fern fronds and moss tips was consumed in 1993 when larger buds and herbaceous seeds became available about 20 days later than usual. These foods are of low quality and birds may not survive when feeding on them alone (Ramos 1994b). Thus higher mortality due to shortage of good-quality food may occur from mid-March to mid-May.

Importance: critical

* **Food shortage in summer**

There is no evidence of a lack of herbaceous seeds in summer. Several species are present and some may replace others. However, they occur on disturbed ground, which, at some sites, may become carpeted by exotics, especially *Hedychium gardneranum*. Most food resources appear to have been consumed in the 1991 and 1992 summers (Ramos 1995a). Openings in the vegetation will be formed naturally every year since the ground is very steep. However, if these are very far apart there may be an increased cost for breeding birds and breeding success may be reduced. The area at Salto do Cavalo is less steep and openings are consequently less frequent.

Importance: low/medium

* **Random demographic and environmental factors**

Such a small population may be affected by random environmental and demographic factors. The effect of inbreeding is unknown but it may have lowered the reproductive output of individuals.

Importance: low/medium

* **Predation**

There are no avian predators in the Azores which would take finches. Predation of adult Azores Bullfinches by cats has been recorded twice when birds were feeding on *Polygonum capitatum* by a road (Ramos 1994a). Some cats are now wandering in the area occupied by the finches following the abandonment of a garbage site at 350 m above sea-level. They are seen mainly at lower altitudes, however, and do not seem to have an impact on the population. Rats have been seen near nest-sites but it is not known if they prey on eggs or chicks.

Importance: unknown

* **Low breeding success and natural mortality**

Juveniles comprise 50–60% of the total population during the last 10 days of August. Breeding productivity is about two young per pair. Annual mortality is 45–60%. There is little information on recruitment: very small sample sizes indicate a value similar to that of mortality (Ramos 1994a). Information on post-fledging mortality is needed to evaluate whether recruitment matches mortality.

Importance: unknown

Conservation status and recent conservation measures

The Azores Bullfinch is a protected species under Decreto/Lei 75/91, which adapts the EU Wild Birds Directive to Portuguese Law. The only terrestrial Important Bird Area (IBA) in the Azores (Grimmett & Jones 1989) includes the area of native vegetation centred on Pico da Vara which is

the main area for the Azores Bullfinch. The area around Salto do Cavalo, Pico Bartolomeu and the mountain slopes above Monte Simplicio (Povoação) are not included in the IBA.

Pico da Vara was designated a Natural Forest Reserve (Reserva Florestal Natural) by the Regional Government of the Azores. It was also designated a Special Protection Area (Zona de Protecção Especial) by the Azorean Government (DRA 1991) under the EU Wild Birds Directive. No other Laurel forest fragments have been designated although those fragments above Monte Simplicio hold birds all year round. All areas are owned and managed by the Forestry Service (Direcção Regional dos Recursos Florestais).

A broad ecological research programme, which looked at feeding resources, limiting factors and habitat restoration, was carried out between 1991 and 1993 (Ramos 1993), laying solid foundations for practical conservation work. Habitat management (the control of invasive exotics and the planting of native species raised in nurseries) began in early 1995 following the recent approval of EU funding for this work through a LIFE grant. The main aim of this project is to re-establish and improve the Laurel forest in order to ensure that in the long term the Azores Bullfinch reaches a viable population size. Native plants are very slow growing and effects will be seen only in the long term. Areas planted with native species will need to be checked regularly to control invasion by *Hedychium gardneranum*.

A 50-page booklet on the special value of the Azores Bullfinch, its habitat, diet, feeding behaviour and conservation (Ramos 1995b) has been published by the Town Hall of Nordeste and will be distributed to all schools of São Miguel.

PART 2. AIMS AND OBJECTIVES

AIMS

To increase the Azores Bullfinch population to 150–200 pairs by the year 2010 and to extend the area of Laurel forest by 80 ha, reversing its continuing large-scale deterioration through the invasion of exotic flora.

OBJECTIVES

1. POLICY AND LEGISLATIVE

1.1. To ensure the adequate legal protection of the Azores Bullfinch and its habitat

1.1.1 *Increase the area of the Natural Forest reserve and Special Protection Area*

The Azorean Government is encouraged to increase the area of the Natural Forest Reserve of Pico da Vara to include all Laurel forest patches between Pico Bartolomeu and Salto do Cavalo. These areas should also be included in the Special Protection Area of Pico da Vara.

Priority: medium

Time-scale: long

1.1.2. *Legislate on the planting of exotic species*

The Convention on Biological Diversity clearly states that exotic species should not be introduced and that they should be controlled or eradicated when they threaten ecosystems, habitats or species. These principles should be adequately reflected in domestic legislation. The Azorean Government is encouraged to clearly define the areas that are suitable for the planting of exotics, leaving a wide buffer zone between Laurel forest and such plantations and severely restricting afforestation with *Cryptomeria japonica* within the range of the Azores Bullfinch.

Priority: high

Time-scale: long

1.1.3. *Incorporate Species Recovery Plans into regional and national legislation*

Recovery plans are included as legal measures in other countries. Consideration should be given to incorporating the Action Plan for the Azores Bullfinch into appropriate legislation.

Priority: low

Time-scale: medium/long

1.1.4. *Review international and national legislation in light of taxonomic research*

If, as expected, the Azores Bullfinch is shown to be a full species it will necessary to add it to annex II to the Bern Convention and annex I of the EU Birds Directive.

Priority: medium

Time-scale: medium

1.2 To ensure an adequate framework for the management of the Natural Forest Reserve

For effective management the Reserve should be provided with a management body, a management plan, adequate regulations and continued funding.

Priority: high

Time-scale: medium

2. SPECIES AND HABITAT PROTECTION

2.1. To control the expansion of exotic flora and promote the regeneration of Laurel forest

The expansion of *Pittosporum undulatum*, *Hedychium gardnerianum* and *Clethra arborea* should be controlled either by physical removal or by use of arboricides (*Hedychium gardnerianum*) or tree trunk injections (*Pittosporum undulatum* and *Clethra arborea*).

The control of *Clethra arborea* is controversial since this is the best food option available to the birds between December and March (Ramos 1995a). However, it is outcompeting native species, notably *I. perado* and many areas may turn into monospecific stands of *Clethra arborea*. Control should therefore be carried out progressively as areas of native vegetation are restored and expanded. Financial resources must be allocated for continuing long-term control of exotics.

The control of exotics allows native seedlings to develop and helps the recovery of the Laurel forest through natural regeneration. This applies to most areas in Pico da Vara and Salto do Cavalo which have recently been degraded by goats and pigs, and by the extraction of topsoil by local people.

Areas that are now dominated by exotics should be converted to their original vegetation, including several areas densely carpeted by *Hedychium gardnerianum* and slopes that are not suitable for the planting of *Cryptomeria japonica* because of their exposure to strong winds. Restoration should start around the valley of Ribeira do Guilherme, within the main range of the Azores Bullfinch, and continue progressively towards the west.

Priority: critical

Time-scale: ongoing

2.2. To protect and increase the population of plants that provide key food sources

Populations of native plants should be re-established within and around the main area of native vegetation by planting seedlings. There is an urgent need to increase the population of flower-bud-producing species (*I. perado* and *Prunus lusitanica*, now extremely rare), because this is the only food available in spring, a time of food scarcity. This is especially important at lower altitudes where trees will produce larger buds earlier. Populations of the following species should also be increased: *Woodwardia radicans*, *Culcita macrocarpa* and *Rubus hochstetterorum*.

Priority: critical

Time-scale: ongoing

2.3. To provide supplementary feeding

This involves the installation of feeding stations where sunflower seeds will be placed from February to April, with a view to boosting winter survival. This should be carried out until food availability ceases to be a limiting factor.

Priority: high

Time-scale: ongoing

2.4 To supplement the wild population with captive bred individuals

Captive breeding should only be attempted if the population in the wild decreases dramatically as birds kept in captivity will not accept new foods easily and their normal food sources are difficult to find (Ramos 1993).

Priority: low

Time-scale: long

3. MONITORING AND RESEARCH

3.1. To continue the monitoring of population size and reproduction

It is essential to continue with the monitoring scheme started in 1990 using point counts (Bibby & Charlton 1991). Population size and breeding success should be estimated once a year, in May/June and end of August/early September respectively. The key period of mortality appears to be March/April but this, and the importance of predation requires further study.

Priority: high

Time-scale: ongoing

3.2. To study the large-scale invasion of the Laurel forest by exotic flora

The continuing invasion by *Hedychium gardnerianum* and *Clethra arborea* is especially worthy of study. The results may be valuable in the control of such invasion.

Priority: medium

Time-scale: long

3.3. To promote studies of taxonomy

It is important to continue studies on the phylogenetics of mainland European Bullfinches, including Iberian birds, to clarify the taxonomic position of the Azores Bullfinch.

Priority: medium

Time-scale: short

4. PUBLIC AWARENESS AND TRAINING

4.1. To provide information about the Azores Bullfinch and its habitat to the local people of São Miguel and to visitors

A booklet about the Azores Bullfinch and its habitat will be distributed to all schools on the island (Ramos 1995b). Several placards will be placed at the main entrances of the Natural Forest Reserve so that the local population understands and supports the conservation measures carried out for this species and its habitat.

Priority: medium

Time-scale: ongoing

REFERENCES

- Bannerman, D. A. & Bannerman, W. M. (1966) *Birds of the Atlantic islands. 3: A history of the birds of the Azores*. Edinburgh, U.K.: Oliver and Boyd.
- Bibby, C. J. & Charlton, T. D. (1991) Observations on the Sao Miguel Bullfinch. *Açoreana* 7: 297–304.
- Bibby, C. J., Charlton, T. D. & Ramos, J. A. (1992) Studies of West Palearctic birds, the Azores Bullfinch. *Brit. Birds* 85: 677–680.
- Cabral, M. J., Magalhães, C. P., Oliveira, M. E. & Romão, C. (1990) *Livro vermelho dos vertebrados de Portugal, 1*. Lisboa: Serviço Nacional de Parques, Reservas e Conservação de Natureza.
- DRA (1991) Zonas de Protecção Especial. Horta (Açores): Secretária Regional do Turismo e Ambiente, Direcção Regional de Ambiente.
- Grimmett, R. F. A. & Jones, T. A. (1989) *Important Bird Areas in Europe*. Cambridge, U.K.: International Council for Bird Preservation (Techn. Publ. 9).
- Groombridge, B., ed. (1993) *1994 IUCN Red List of threatened animals*. Gland, Switzerland and Cambridge, U.K.: International Union for Conservation of Nature and Natural Resources.
- Le Grand, G. (1982) O Priôlo, a ave mais interessante de S. Miguel. *Açoreana* 6: 195–211.
- Le Grand, G. (1983) Der wiederentdeckte Azorengimpel. *Wir und Vogel* 15(1): 37–38.
- Ramos, J. A. (1993) *Status and ecology of the Priolo or Azores Bullfinch*. Oxford, U.K.: University of Oxford (Ph.D. thesis).
- Ramos, J. A. (1994a) The annual cycle of the Azores Bullfinch. *Arquipelago. Ser. Cien. Nat.* 12A: 101-109.
- Ramos, J. A. (1994b) Fern frond feeding by the Azores Bullfinch. *J. Avian Biol.* 25: 344-347.
- Ramos, J. A. (1995a) The diet of the Azores Bullfinch *Pyrrhula murina* and floristic variation within its range. *Biol. Conserv.* 71: 237–249.
- Ramos, J. A. (1995b) O Priôlo: sua relação com a floresta natural de altitude. Nordeste (Açores): Câmara Municipal de Nordeste.
- Ramos, J. A. (in press a) The introduction of exotic plants as a threat to the Azores Bullfinch population. *J. Appl. Ecol.*
- Ramos, J. A. (in press b) The influence of size, shape and phenolic content on the selection of winter foods by the Azores Bullfinch. *J. Zool.*