



Agreement on the Conservation of Albatrosses and Petrels

Sixth Meeting of Advisory Committee

Guayaquil, Ecuador, 29 August – 2 September 2011

Listing of New Species – Balearic shearwater, *Puffinus mauretanicus*

Spain

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Listing of New Species – Balearic shearwater, *Puffinus mauretanicus*

Spain

The Government of Spain has advised the Secretariat of its intention to nominate the Balearic shearwater, *Puffinus mauretanicus* for listing under Annex 1 of the Agreement. To assist Parties in their consideration of this request, the Government of Spain has provided the attached species assessment for the Balearic shearwater.

Cooper and Baker, in their assessment of candidate species for inclusion under the Agreement (AC3 Doc 18, Listing of New Species), concluded that the Balearic shearwater is a strong candidate for inclusion under the Agreement.

Recommendation:

In accordance with Article IX, 6 a) of the Agreement, the Advisory Committee is requested to provide advice to the Meeting of the Parties on the scientific and/or technical merits of listing the Balearic shearwater, *Puffinus mauretanicus* under Annex 1 of the Agreement.



Balearic Shearwater

Puffinus mauretanicus

Pardela Balear
Puffin des Baléares

CRITICALLY ENDANGERED ENDANGERED VULNERABLE NEAR THREATENED LEAST CONCERN NOT LISTED

Also referred to as:

Vivot petit (local name, in Catalan language)

TAXONOMY

Order Procellariiformes

Family Procellariidae

Genus *Puffinus*

Species *P. mauretanicus* (Lowe, 1921)

In ornithological literature, the Balearic Shearwater was traditionally regarded a subspecies of the Manx Shearwater *Puffinus puffinus* [1, 2, 3, 4] and, later, of the Yelkouan Shearwater *Puffinus yelkouan* [5, 6]. However, enough evidence in the 1990s recommended its consideration as a single species based on differences in morphology, genetics, behaviour and ecology [7, 8, 9]. This is the current view of the scientific and the conservation communities. The genetics of *Puffinus mauretanicus* have received much attention recently, as the species was seen to show a low interspecific difference with *Puffinus yelkouan*; the population is poorly structured, revealing unexpected levels of dispersion [10, 11, 12, 13]. The introgression of *P. yelkouan* breeding in *P. mauretanicus* colonies in Minorca may induce natural hybridisation, although this is not presently a conservation concern for the critically endangered Balearic Shearwater [14].

CONSERVATION LISTINGS AND PLANS

International

- 2010 IUCN Red List of Threatened Species – Critically Endangered (listed in 2004) [14, 15]
- Bonn Convention on Migratory Species (Appendix I and Resolution 8.29) [16, 17]
- European Union Council Directive 2009/147/EC on the conservation of wild birds [18]
- European Union Council Directive 92/43/EEC (Habitats Directive) [19]
- BirdLife International Species Action Plan [20, 21]
- Barcelona Convention on the Protection of the Mediterranean Sea (Appendix II and Action Plan) [22]
- Bern Convention – Protected Fauna (Appendix II) [23, 24]

National – Spain

- Listed in Annex IV of *Law 42/2007 on Natural Heritage and Biodiversity* [25]
- Listed in *National Catalogue of Threatened Species* under 'In danger of extinction', which sets obligation to adopt a recovery plan [26]

- Strategy for the Conservation of the Balearic Shearwater (*Puffinus mauretanicus*) [27]
- Spanish Red Data Book [28]

Regional – Balearic Islands

- Autonomous Government of the Balearic Islands - Recovery Plan (Decree 65/2004) [29, 30]

BREEDING BIOLOGY

Puffinus mauretanicus is a philopatric, colonial species which breeds annually in crevices and caves in small islets and inaccessible cliffs. A single egg is laid in March-April and incubation lasts for 48-52 days [31]. Pre-laying exodus is apparently short and incubation shift lengths are not known. Fledging period is around 60-70 days and is centred around late June [31]. Age of first breeding is ≥ 3 years old and maximum longevity is at least 23 years [29]. Some birds are known to take ‘sabbatical years’ when they skip breeding, and unusual reproductive behaviour, such as the formation of trios, has been described [32].

Table 1. *Breeding cycle of P. mauretanicus.*

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
At colonies												
Egg laying												
Incubating												
Chick provisioning												

BREEDING STATES

Table 2. *Breeding distribution of the global population of P. mauretanicus.*

Spain	
Breeding pairs	100%

BREEDING SITES

The Balearic Shearwater is an endemic species breeding in the caves and cliff cavities of the most of the Balearic islands and surrounding islets of Spain, western Mediterranean (Table 2) [28, 33]. The total breeding population within the archipelago in 2007 was estimated to be $\geq 2,135$ -2,185 breeding pairs [30] (Table 3). A revised population update, based on data obtained from more intensive surveys in the Balearics, estimated ≥ 3200 breeding pairs in 30 colonies in 2009 [34]. The size of the global population is difficult to assess, and it has been suggested that there may be a large floating population of immatures and non-breeders; however, most authors agree that the global figure must lie in the range of 6,000-10,000 mature individuals [14, 15]. Over half of the breeding population used to breed on the island of Formentera until the early 2000s [31], but the most recent census on the island has shown a steep population decline to 685 pairs in 2007 [30].

Table 3. Estimates of the population size (breeding pairs) for *P. mauretanicus*. 2007 census data from DGCAPEA [30].

Breeding site location	Jurisdiction	Years monitored	Monitoring method	Monitoring accuracy	Annual breeding pairs (last census)
<i>Balearic Archipelago</i> 39° 55'N, 4° 10'E	Spain		?		
Mallorca	Spain	Early 1990s, 1999, 2001, 2005, 2007	?	Low	500-550 (2007)
Cabrera	Spain	Early 1990s, 1999, 2001, 2005, 2007	?	Low	300 (2007)
Menorca	Spain	Early 1990s, 1999, 2001, 2005, 2007	?	Low	< 200 (2007)
Ibiza	Spain	Early 1990s, 1999, 2001, 2005, 2007	?	Low	450 (2007)
Formentera	Spain	Early 1990s, 1999, 2001, 2005, 2007	?	Low	685 (2007)

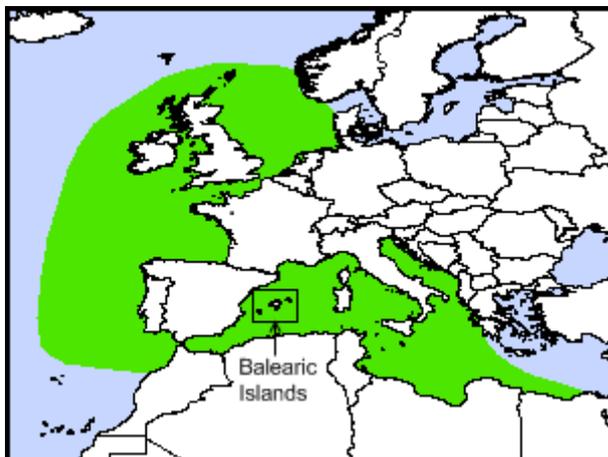


Figure 1. The approximate range of *P. mauretanicus*. Map provided by BirdLife International [14].

POPULATION TRENDS

This species is thought to have been abundant prior to human settlement in Pitiusas (Ibiza and Formentera), based on numerous fossil remains from the upper Pleistocene [31]. About 60% of the breeding colonies on Cabrera Island have disappeared in the past few decades, and a recent survey on Formentera Island recorded no breeding activity at 30 suitable caves where ancient remains of breeding activity were found [35]. Previously, the breeding range included extensive colonies on the mainlands of Ibiza and Cabrera, both of which are currently deserted [11]. The estimated adult survival rate of 0.78 (estimated from data on predator-free colonies) is unusually low for a long-lived seabird and the most important demographic parameter in the population dynamics influencing the growth rate [35]. Based on data 1997-2002, the population was estimated to be declining at a rate of 7.4% per year and population viability analysis, published in 2004, estimated a mean extinction time of 40.4 years [35] for an initial population of 1750-2125 breeding pairs, making the Balearic Shearwater one of

the world's rarest seabirds and earning it the status of Critically Endangered [14]. The situation has changed little in 2010, when 20% of that time has elapsed and virtually the same threats continue to menace the species [34].

Table 4. Summary of population trend data for *P. mauretanicus*.

Breeding site	Current monitoring	Trend years	% average change per year	Trend	% of population
Mallorca Sa Cella and Conills	Yes?	1997-2002	-7.4% [32]	Decrease	241 nests [35]

Table 5. Demographic data for *P. mauretanicus*.

Breeding site	Mean success Range or [95%CI]	breeding Mean survival [95%CI]	juvenile Mean adult survival [95%CI]	Years
Mallorca				
Sa Cella and Conills	0.59 [0.51-0.67] [32]	0.70 [0.63-0.78]	0.78 [0.74-0.82]	1997-2002 [32]
Conills	0.45-0.81 [33]			1986-2004 [33]
Malgrats	0.33-1.00 [33]			1986-2000 [33]
Sa Cella	0.45-0.88 [33]			1997-2004 [33]
Cabrera	0.44-0.89 [33]			1993-2000 [33]
Menorca				
Maó	0.50-0.84 [33]			1999-2004 [33]

BREEDING SITES: THREATS

The restricted breeding area, that is limited to the Balearic archipelago, along with a small population, significantly adds to the vulnerability of this long-lived species to all threats, with a particular incidence of those factors that affect the survival of adult birds. The deterministic demographic model of Oro *et al.* (2004) [35] suggests a high adult mortality by sources other than predators. Historically, take for human consumption (mostly on Ibiza and Formentera) was common, with 2,400-2,700 birds taken yearly until the 1970s [17] but harvesting of shearwaters is currently mostly anecdotal [20]. In the past, large declines or local extinctions of Balearic Shearwaters were likely due to human predation and loss of breeding habitat through urban development [35]. Presently, alien mammals such as feral cats (*Felis domesticus*), black rats (*Rattus rattus*) and common genet (*Genetta genetta*) are thought to be the greatest threats on land [28] and have been responsible for the wiping out of Balearic Shearwaters on some islands in recent times [30]. European rabbits (*Oryctolagus cuniculus*) at some colonies may degrade nesting habitats [14].

Table 6. Summary of known threats of *P. mauretanicus*. Data taken from Species Action Plans [20, 22, 29], with additions from C. Carboneras, M. Louzao and J.M. Arcos (pers comm.)

Location	Human disturbance	Fisheries	Egg collection and hunting	Oil spills	Habitat loss or alteration	Predation (alien species)	Contamination	Increased impact by native species
Balearic Islands	Low	High ^a	Low present; Locally high?	at Potentially high	Low ^b	High	Unknown	Unknown ^c
Spanish Continental Waters	Low	High ^a	--	Potentially high	Medium ^d	--	Unknown	Unknown ^c

^a - Category represents fishing bycatch in longlines and fishing nets. Overfishing (depletion of fish stocks), which may cause changes in winter and post-breeding distribution, is also rated as 'High'.

^b - All known colonies are included in the EC-Natura 2000 network as Special Protection Areas (SPAs), but management may be ineffective.

^c - Competition may occur for nest cavities with Cory's Shearwater (*Calonectris diomedea*).

^d - Alteration of coastline already significant through housing developments (tourism) and construction of infrastructure and harbours. New threats include plans to develop extensive wind farms close to foraging areas or along migratory routes.

FORAGING ECOLOGY AND DIET

Balearic Shearwaters feed by surface-seizing and underwater pursuit, mainly on small pelagic fish such as shoaling clupeiforms [36, 37]. Although this species has been reported to feed on plankton in crepuscular hours, it is not known to feed at night [38]. Flocks have been recorded engaging in a pursuit sequence of plunging, diving, running on the water surface, short flights and then plunging repeatedly. Birds fly and plunge about 1-2 m from the water and enter the sea head first with opened wings; dives may extend to a depth of 26 m and last up to 40 s [39]. They also obtain much of their food by taking advantage of fishery discards, particularly from trawlers; their excellent diving abilities give them an alternative for reducing competition with gulls [36]. During the breeding season, their diet is based on sardines (family Clupeidae) and anchovies (family Engraulidae), complemented to a various degree with fishery discards along the eastern Iberian Peninsula coastline, especially in the vicinity of the Ebro Delta [33, 36, 37, 38]. Within this area, there is evidence that the operation of trawlers conditions the foraging ranges of shearwaters, suggesting that discards represent more than an opportunistic resource for the species [40], at least during part of the cycle. Post-breeding birds tend to feed on discards in the Bay of Biscay [41] but concentrate mainly on pelagic fish during the rest of the year [38].

Although the Balearic Shearwater is threatened in the long-term by commercial fishing via bycatch and overfishing, trawler discards may favour the species in the short-term by supplying a significant proportion of the energy requirements during the breeding season [36, 38, 43]. Indeed, the time when Balearic Shearwaters take most advantage of discards coincides with the season when energetic demands are high and surface productivity is naturally low throughout the Mediterranean Sea [38, 44]. Availability of fishing discards is reported to influence breeding performance [36]. Establishment of fishery moratoria may therefore produce unknown short- and long-term outcomes as discards could decrease and thus increase forage fish populations [36, 42, 43]. To mitigate these and other potential threats, implementation of Marine Protected Areas (MPAs) has been recommended to protect the foraging areas and movement corridors of the Balearic Shearwater [36].

MARINE DISTRIBUTION

Balearic Shearwaters are restricted to the western Mediterranean during the breeding season. High concentrations of the species have been recorded both inshore and offshore, ≥ 200 km from breeding sites, with most concentrations in the highly productive waters off the Ebro Delta [42, 45]. After breeding, most of the population leaves the Mediterranean through the straits of Gibraltar and disperses into the Atlantic, concentrating in favourable areas like the Bay of Biscay, where moulting occurs [41]. However, some remain off western Iberia and others go further into the North Sea, regularly reaching the English Channel and some travelling as far north as Scotland and southern Scandinavia; towards the South, vagrants have occurred along the West African coast [31]. After the Atlantic exodus, which occurs June through to September, most birds return to the Mediterranean and concentrate in large gatherings along the eastern Iberian coast; at this time, they also visit the breeding colonies [31, 33, 46]. The recent, rapid northward range expansion of the post-breeding distribution to north-east Atlantic waters

has been attributed to climate-driven shifts in prey distribution through increasing sea surface temperature (SST) [47]. However, this view has been disputed [48].

Table 7. Summary of the known Range States and Regional Fisheries Management Organisations that overlap with the marine distribution of *P. mauretanicus*.

	Breeding and feeding range	Foraging range only	Few records - outside core foraging range
Range States	Mainly Spain, also south-east France, Algeria	Algeria, France, Italy, Morocco, Portugal, Gibraltar, Ireland, United Kingdom, Tunisia, Malta	Belgium, Cape Verde, Germany, Greece, Israel, Netherlands, Norway, Poland, Sweden
Regional Fisheries Management Organisations	ICCAT ^a , FAO Marine Fishing Area 37, GFCM ^b	CCAT, FAO Fishing Areas 27, 34, GFCM	ICCAT, FAO Fishing Areas 27, 34, GFCM

^a International Commission for the Conservation of Atlantic Tunas

^b General Fisheries Commission for the Mediterranean

MARINE THREATS

The main conservation concern for Balearic Shearwaters is adult survival, which is unusually low for a Procellariiform [35]. Mortality at sea, caused by interaction with fisheries, has been long suspected [35, 43] but until now has escaped detection by the scientific observer programmes in operation in Spain (by IEO), possibly because these were targeted at fisheries where bycatch occurs with low frequency or only sporadically. However, recent reviews [49, 50] have collated information that unveils the severity of this threat (particularly bycatch in longline fisheries) and the irregular pattern with which it occurs, at least in Spanish Mediterranean waters. The number of birds implicated in each mortality occasion is highly variable but may be substantial, with up to 0.6% of the global population involved in a single episode [51]. This variability makes the species more vulnerable to extinction.

Table 8. Summary of known bycatch events of Balearic Shearwaters in Spanish Mediterranean waters in the period 1999-2010. The list includes mortality episodes of both mauretanicus-like and yelkouan-like phenotypes, since both have been known to co-occur and identification at species level may not be straightforward.

Date	Fishing Ground	Province	mauretanicus	yelkouan	Total Puffinus	Fishery	No. sets	Source
29-11-1999	Tarragona	Tarragona	50?	0?	50	trawler?	?	Arcos & Oro (2004)
winter 2000/01	Arenys	Barcelona	60	0	60	demersal longline	2	E. Badosa <i>in</i> ICES (2008)
14-06-2001	Castellón	Castellón	3	0	3	demersal longline	237	Belda & Sánchez (2001)
spring 2004	--	Valencia	12	0	12	demersal longline	89	Gualart (2004)
18-05-2006	Torredembarra	Tarragona	0	1	1	demersal longline	?	C. Carboneras, unpublished
19-05-2006	Llançà -- Gulf Lyons	Girona	?	> 2	20	unspecified longline	?	C. Carboneras, unpublished
2003-2007	--	Barcelona, Tarragona, Girona	27	0	27	unspecified longline	25 visits to port; 229 birds in total	J. González-Solís & J.L. Roscales <i>in</i> ICES (2008)
June 2007	Ebro delta	Tarragona	12	0	12	unspecified longline	4 nm transect	J. Torrent <i>in</i> ICES (2008)

16-05-2008	L'Escala	Girona	60	12	72	pelagic-type *coastal* longline	1	CRAM (2008)
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Due to its ecology and its tendency to aggregate, the Balearic Shearwater is also at risk from other threats at sea, particularly oil spills if they coincide in time/location with concentrations of the species ^[15]. Factors that contribute to the general degradation of the marine environment are also of concern: bioaccumulation of pollutants (mercury, hydrocarbons), reduced availability of prey (depletion of stocks through over-fishing) and increased presence of waste (plastics, remains of fishing gear) ^[14, 15, 52, 53].

Oro *et al.* (2009) ^[33] listed, by order of priority, the measures that should be put into practice for the long-term conservation of *Puffinus mauretanicus*:

1. Addressing accidental mortality in fisheries (bycatch)
2. Control of alien predators
3. Effective protection of nesting areas
4. Stopping direct take by humans
5. Sustainable fisheries (reducing overexploitation)
6. Fisheries discards reduction and trawling moratoria
7. Avoiding oil pollution and its effects
8. Addressing pollution by heavy metals
9. Measures to reduce competition with other species
10. Special Protection Areas of Mediterranean Importance (SPAMIs)
11. Applied research

Several countries have initiated the process to designate Marine Protected Areas (MPAs) for this species. The inventories of marine Important Bird Areas (IBAs) in Spain and Portugal, completed in 2009 by SEO/BirdLife and SPEA respectively ^[53, 54], was a significant step in that direction. The process is to be concluded with the designation of those areas as Special Protection Areas within the EC-Natura 2000 network and the establishment of appropriate management tools. This process is already ongoing in France ^[56] and the United Kingdom (Gibraltar) ^[57]. To date, the Balearic Shearwater has generated the identification and designation of the following sites for protection:

Country	Type of marine IBA	Number of marine IBAs	Number of marine SPAs declared
France	offshore concentration	(ongoing)	9 ^[56]
Gibraltar (to UK)	migration hotspot	1 ^[57]	1 (proposed)
Portugal	offshore concentration	3 ^[55]	--
Spain	all	22 ^[56]	--

Spain has legislation in place that promotes the use of some mitigation measures (bird-scaring lines, night-setting, reduced lighting on deck, minimisation of offal discharge) in domestic longline fisheries, although this is not compulsory and only 'will be favoured', and is thus judged insufficient ^[58]. The development of a Community Plan of Action for reducing seabird bycatch in longline fisheries has been proposed by BirdLife International as a conservation measure to favour this species, among others ^[58]. ICCAT adopted Resolution 02.14 that urges its member States to adopt a national Plan of Action for reducing seabird bycatch in longline fisheries and to provide information on the incidental catch of seabirds in their fisheries ^[59].

KEY GAPS IN SPECIES ASSESSMENT

The Balearic Shearwater, as a Critically Endangered species, merits a rapid response to gaps in current knowledge. More comprehensive understanding of population trends, size and distribution (both at sea and at breeding colonies), threats and competition with other bird species is required, as well as research on small pelagic fish populations, fishery interactions and the impact of pollutants and heavy metals on this species [14]. Specifically, determination of factors that affect the breeding success and, most importantly, survival of adults is of high priority [20, 35, 36]. To achieve this, resumption of the population monitoring programme (through capture-recapture of breeding birds) and the establishment of observer programmes in the most relevant fisheries (particularly demersal longlining) are paramount.

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Agreement on the Conservation of Albatrosses and Petrels. 2010. Species assessments: Balearic Shearwater *Puffinus mauretanicus*. Downloaded from <http://www.acap.aq> on.....