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Update on the population status and distribution of Mediterranean shearwaters

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SUMMARY

Three shearwater species live in the Mediterranean Sea and are listed in ACAP (*Puffinus mauretanicus*), or have been proposed as potential candidate species (*Calonectris diomedea*, *Puffinus yelkouan*). This paper brings an update on their conservation status, based on two specific workshops, coordinated by BirdLife International Europe, that took place as a back-to-back meeting to the 13th Medmaravis pan-Mediterranean Symposium (2011). For *Calonectris diomedea*, the breeding population was estimated at 142,478–222,886 pairs (427,000–669,000 individuals) and predicted to decline by c.2% over 3 generations. Importantly, it also identified a lack of data on monitoring and research. Until estimates of adult survival and breeding probabilities in key countries (Tunisia, Italy) become available, any global population trend estimate for the species will remain purely speculative. This workshop also identified *Calonectris diomedea* as a frequent victim of bycatch in Mediterranean waters, although information from several fleets is lacking.

Following the mentioned workshops, the status of *Puffinus yelkouan* was upgraded from Near Threatened to Vulnerable on the IUCN 2012 Red List. Its global population was estimated at 15,337–30,519 pairs, or 46,000–92,000 individuals. If the decline would continue at the current rate, the global population would decrease by c.50% over 54 years (3 generations). The main drivers of population decline were bycatch mortality and predation by invasive predators. Top identified research priorities were searching for new breeding colonies, monitoring the population at key breeding and bottleneck sites, assessing mortality rates and studying demographic parameters.

For *Puffinus mauretanicus,* new estimates at sea indicated that the global population size might be around 25,000 individuals. A simple demographic model failed to explain such figure, indicating that the breeding population might be underestimated. The species continues to face serious threats on land and at sea, and its declining trend seems beyond doubt. Geolocator tracking and visual monitoring revealed its increasing use of NE Atlantic waters.

RECOMMENDATIONS

1. Mediterranean countries that are Parties to ACAP are encouraged to propose *Calonectris diomedea* and *Puffinus yelkouan* for listing in Annex I.
2. Policymakers are encouraged to implement and enforce measures that reduce accidental bycatch of Mediterranean shearwater species in commercial fishing operations in the Mediterranean and Black seas.
3. Rats and feral cats should be controlled, or if possible eradicated, at breeding colonies, according to a priority analysis and at sites with evidence of predation.
4. The identification and implementation of measures to reduce/ mitigate the effects of light pollution on Mediterranean shearwater species are also recommended.
5. The population assessments reported here have highlighted the paucity of available data due to a lack of monitoring and research. Accurate and regular research and monitoring are needed in order to obtain reliable estimates of population size and trends and to assess the impact of threats on these species.

Actualización sobre el estado de población y distribución de las pardelas mediterráneas

En el Mar Mediterráneo, habitan tres especies de pardela y están incluidas en el ACAP (Puffinus mauretanicus), o se las ha propuesto como posibles especies candidatas (Calonectris diomedea, Puffinus yelkouan). Este documento proporciona una actualización sobre su estado de conservación, sobre la base de dos talleres específicos coordinados por BirdLife International Europa, que se realizaron como reunión consecutiva al XIII Simposio pan-Mediterráneo de Medmaravis (2011). Para la especie Calonectris diomedea, la población reproductora se estimó en 142.478–222.886 parejas (427.000–669.000 ejemplares), y se anticipó que dicha población se reduciría aproximadamente el 2% luego de tres generaciones. Cabe destacar que también se identificó la falta de datos sobre monitoreo e investigación. Hasta tanto se disponga de estimaciones sobre la supervivencia de adultos y las probabilidades de reproducción en los países clave (Túnez, Italia), cualquier estimación de la tendencia poblacional para la especie se considerará puramente especulativa. Este taller también identificó a la especie Calonectris diomedea como una víctima frecuente de la captura secundaria en las aguas mediterráneas, aunque no se dispone de información de varias flotas.

Luego de los talleres mencionados, se subió de grado el estado de la especie Puffinus yelkouan desde Casi Amenazada a Vulnerable en la Lista Roja de la UICN de 2012. Se estimó que su población global era de 15.337–30.519 parejas, o 46.000–92.000 ejemplares. Si la disminución continuara con el ritmo actual, la población global se reducirá aproximadamente un 50% en 54 años (3 generaciones). Los factores principales que influyen en la reducción de la población fueron la mortalidad por captura secundaria y la depredación por parte de depredadores invasivos. Las principales prioridades identificadas para la investigación fueron la búsqueda de nuevas colonias reproductivas, el monitoreo de la población en sitios clave de reproducción y cuello de botella, la evaluación de las tasas

de mortalidad y el estudio de los parámetros demográficos.

Para la especie Puffinus mauretanicus, las nuevas estimaciones en el mar indican que el tamaño de la población global podría ser de alrededor de 25.000 ejemplares. Un simple modelo demográfico no explicó esta cifra, e indicó que es posible que población reproductora esté subestimada. La especie continúa enfrentando amenazas graves en la tierra y el mar, y su tendencia decreciente parece estar fuera de dudas. El rastreo mediante geolocalizadores y el monitoreo visual revelaron su uso cada vez mayor de las aguas del Noreste Atlántico.

RECOMENDACIONES

1. Se alienta a los países del Mediterráneo que son Partes del ACAP que propongan a las especies *Calonectris diomedea* y *Puffinus yelkouan* para que se las incluye en la lista del Anexo I.
2. Se alienta a las autoridades responsables de formular políticas que implementen y exijan medidas que reduzcan la captura accidental de la pardela mediterránea en las operaciones de pesca comercial en el Mar Mediterráneo y Mar Negro.
3. Se debe controlar a las ratas y los gatos silvestres, o de ser posible, se los debe erradicar de las colonias reproductoras, conforme a un análisis de prioridades y en los sitios en los que haya evidencias de depredación.
4. También se recomiendan la identificación e implementación de medidas para reducir/mitigar los efectos de la contaminación leve en la especie de la pardela mediterránea.
5. Las evaluaciones de población que se informan en este documento han destacado la escasez de datos disponibles debido a la falta de monitoreo e investigación. Se requieren una investigación y un monitoreo preciso y periódico para obtener estimaciones confiables del tamaño de la población y las tendencias, y para evaluar el efecto de las amenazas en estas especies.

Actualisation de l'état de la population et de la répartition des puffins de Méditerranée

Trois espèces de puffins vivant en mer Méditerranée sont inscrites à l'ACAP (*Puffinus mauretanicus*) ou font l'objet d'une proposition d'inscription (*Calonectris diomedea*, *Puffinus yelkouan*). Ce document présente une mise à jour de l'état de conservation de ces espèces, sur la base de deux ateliers spécifiques, coordonnés par BirdLife International Europe, qui ont été organisés dans la foulée du 13^{e} Symposium pan-méditerranéen Medmaravis (2011). S'agissant de *Calonectris diomedea*, on estime à 142 478–222 886 le nombre de couples reproducteurs (427 000–669 000 individus) ; ce nombre devrait diminuer d'environ 2% sur 3 générations. Qui plus est, le présent document met en lumière un manque de données en matière de contrôle et de recherche. Tant que les estimations sur la survie des adultes et les probabilités de reproduction dans les pays-clés (Tunisie, Italie) ne seront pas disponibles, les estimations générales en matière de tendances démographiques resteront purement spéculatives. Au cours

de cet atelier, il a également été reconnu que l'espèce *Calonectris diomedea* est fréquemment victime de captures accidentelles en Méditerranée, bien que plusieurs flottes n'aient transmis aucune information.

Au terme des ateliers précités, le statut de *Puffinus yelkouan* est passé de "quasi menacé" à "vulnérable" sur la Liste Rouge 2012 de l'UICN. On estime que cette espèce compte 15 337–30 519 couples, ou 46 000–92 000 individus. Si le déclin se poursuivait au rythme actuel, sa population diminuerait d'environ 50% sur 54 ans (3 générations). Les principaux catalyseurs de ce déclin sont la mortalité liée aux captures accidentelles et la prédation par les animaux invasifs. En matière de recherche, la priorité a été accordée à la découverte de nouvelles colonies de reproduction, au contrôle de la population sur les principaux sites de reproduction, à l'évaluation des taux de mortalité et à l'étude des paramètres démographiques.

S'agissant de *Puffinus mauretanicus,* de nouvelles estimations menées en mer indiquent que l'espèce compterait environ 25 000 individus. Un simple modèle démographique n'est pas en mesure d'expliquer ce chiffre, ce qui laisse à penser que le nombre de couples reproducteurs est probablement sous-estimé. D'importantes menaces terrestres et marines continuent à peser sur l'espèce et son déclin semble inévitable. Des systèmes de géolocalisation et des dispositifs de contrôle visuel ont révélé que cette espèce est de plus en plus présente dans les eaux de l'Atlantique NE.

RECOMMANDATIONS

1. Il est recommandé que les pays méditerranéens Parties à l'ACAP soient encouragés à proposer l'inscription de *Calonectris diomedea* et *Puffinus yelkouan* à l'Annexe I.
2. Il est recommandé que les décideurs politiques soient encouragés à mettre en œuvre et à faire respecter des mesures d'atténuation de captures accidentelles de puffins de Méditerranée lors des opérations de pêche commerciale en mer Méditerranée et en mer Noire.
3. Il est recommandé de contrôler les rats et les chats sauvages, ou de les éradiquer dans la mesure du possible, dans les colonies de reproduction, selon une analyse des priorités, et sur les sites sujets à la prédation.
4. Il est également recommandé d'identifier et de mettre en œuvre des mesures de réduction/atténuation des effets de la pollution lumineuse sur les puffins de Méditerranée.
5. Les évaluations démographiques présentées ci-après mettent en exergue l'insuffisance des données disponibles en raison d'un manque de contrôle et de recherche. Des recherches et des contrôles réguliers et précis sont indispensables pour disposer d'estimations fiables sur la taille des populations et les tendances démographiques ainsi que pour évaluer l'impact de ces menaces sur ces espèces.

1. INTRODUCTION

1.1. 13th MEDMARAVIS SYMPOSIUM AND BIRDLIFE WORKSHOPS

The 13th Medmaravis pan-Mediterranean Symposium was held in Alghero, Sardinia (Italy) 14-17 October 2011 under the title "*Ecology and Conservation of Mediterranean Seabirds and other bird species under the Barcelona Convention: Update and Progress*". As a follow up after the Symposium, BirdLife International Europe convened two expert workshops, facilitated by Mia Derhé and Iván Ramírez, to develop population assessments for Cory's Shearwater *Calonectris diomedea* and Yelkouan Shearwater *Puffinus yelkouan*. This report summarises the outcomes of those meetings, particularly as they refer to species that are in the ACAP list or have been proposed as candidate ACAP species (Cooper & Baker 2008).

1.2. TAXONOMIC STATUS OF *Calonectris* SHEARWATERS

When the assessment of *Calonectris diomedea*, reported in this paper, was carried out and discussed at the 13th Medmaravis Pan-Mediterranean Symposium, the Cory's Shearwater *Calonectris diomedea* was considered as polytypic (2 races *C.d. diomedea* and *C.d borealis*). Since then, the Taxonomic Sub-Committee of the British Ornithologists' Union has recommended that these two races should be treated as two full species, Scopoli's Sheawater *Calonectris diomedea* and Cory's Shearwater *Calonectris borealis* (Taxonomic recommendations for British Birds: eight report. *Ibis* (2012) 154: 874-883). This recommendation is followed by Medmaravis and in this paper.

2. POPULATION ASSESSMENTS FOR MEDITERRANEAN SHEARWATERS

2.1. Population assessment for *Calonectris diomedea*

2.1.1. Methods

The population assessment was prepared by BirdLife International (Mia Derhé & Iván Ramírez) through extensive expert consultation and a review of the current literature. It summarizes current data on the species' distribution, population size and trends, the threats to its survival, and identifies key knowledge gaps and research needed.

2.1.2. Conservation status

Despite being listed as Least Concern on the IUCN Red List, the Cory's Shearwater was identified as having an unfavourable conservation status in Europe when it was evaluated as a single species, *Calonectris diomedea*.

2.1.3. Population size

The population of the Mediterranean Scopoli's Shearwater *C. diomedea* was estimated to comprise 142,478-222,886 pairs. This correlates with counts of c. 600,000 individuals carried out at the strait of Gibraltar during autumn passage when the birds leave the Mediterranean basin. Previous estimates put the Mediterranean population around 80,000 pairs. A recent study using distance sampling of occupied nests on Zembra Island in Tunisia has estimated the population to be around 140,000 breeding pairs on this colony (Defos du Rau *et al.*

2012). This apparent increase in population size from c.25,000 pairs (Isenmann & Moali 2000) is due to improved sampling methods rather than a genuine population increase.

2.1.4. Population trend

The population of Scopoli's Shearwater is predicted to be declining by c.2% over 3 generations (from 1980), although this is based on data from only 6% of the subpopulation. The recent work conducted on Zembra Island in Tunisia has highlighted the importance of this site as the largest colony of the species in the world (holding c.80% of the total global population). It is crucial that monitoring is conducted to determine the population trend and impact of threats on the Zembra colony. Until estimates of adult survival and breeding probabilities in Tunisia, as well as at other important locations (e.g., Italy), are available, any global population trend estimate for the species remains purely speculative.

2.1.5. Threats

The main threats to *Calonectris diomedea* are from invasive, non-native predators (predominantly black rats *Rattus rattus* and domestic and feral cats *Felis catus*), and mortality from fisheries bycatch.

Recent studies highlight the pressures imposed on breeding populations of Cory's Shearwaters by several introduced mammals (rats, cats, mice and rabbits) and colonies regularly show marked increases in breeding success during mammal control programmes (e.g. Igual *et al.* 2006, Pascal *et al.* 2008).

Scopoli's Shearwaters are one of the most frequently represented seabirds in bycatch in the Mediterranean, with estimates of the numbers of individuals killed annually by Spanish fleets ranging from 200 (García-Barcelona *et al.* 2010) to 467-1867 (estimated 4-6% of the local breeding population; Belda & Sanchez 2001). There have been fewer assessments of the impacts of long-line other national fisheries on *Calonectris diomedea*, but results from a questionnaire suggest significant bycatch by Maltese fleets.

2.1.6. Research needs

Research efforts should focus on determining the population size and trends, particularly conducting further studies on Zembra Island, Tunisia, to confirm the breeding population size; and conducting non-breeding/ migrating counts at bottleneck sites, e.g. at the strait of Gibraltar. Monitoring of the population at key breeding sites (i.e., Tunisia, Italy) is essential in order to estimate the species' demographic parameters and to reliably assess the impact of threats on population trends. Assessing mortality rates from accidental bycatch is a priority action. Research on the impact of introduced predators is needed to prioritise eradication and control efforts.

2.1. Population assessment for *Puffinus yelkouan*

2.1.1. Methods

The method of the assessment was (1) to identify the range states and those holding significant populations at any stage of the life cycle; (2) to identify potential contributors and data providers; (3) to collect data (through an electronic questionnaire) on national breeding and non-breeding population sizes and trends, threats which likely affect the population at national and international level, and stakeholders and interests; (4) to collate the data and produce a draft assessment document (species status report); and 5) to organise an expert

workshop, to a. verify the data collected, clarify any inconsistencies and agree on national figures and trends; b. elaborate a common expert assessment of the data (interpretation); c. identify key knowledge gaps; and d. identify and map key stakeholders and their interests in the species.

2.1.2. Conservation status

The Yelkouan Shearwater *Puffinus yelkouan* was uplisted from Least Concern to Near Threatened on the IUCN Red List in 2008 and has been identified as having an unfavourable conservation status in Europe. However, the species is poorly monitored and studied, particularly in its non-breeding range. The population assessment for Yelkouan Shearwater carried out during the Medmaravis 13th Symposium provided the basis for the evaluation of the species' status carried out by BirdLife International on behalf of IUCN. This led to the Yelkouan Shearwater being upgraded from Near Threatened to Vulnerable on the IUCN 2012 Red List.

2.1.3. Population size

The global population is estimated at 15,337-30,519 pairs/ 46,000-92,000 individuals. However, very high non-breeding season numbers reported in the Bosporus suggest that there is likely to be a large percentage of non-breeding birds in the population and estimates of breeding numbers at colonies may be underestimated. The global breeding population was previously estimated at 10,815-53,574 pairs (BirdLife International 2011), although figures pointed more to a total of 14,700-52,000 pairs (Tucker and Heath 1994) or 100,000 individuals. Bourgeois & Vidal (2008) suggested that the global breeding population may be smaller, ranging from 5,899–9,409 to 11,355-54,524 breeding pairs.

2.1.4. Population trend

By combining data for the three countries for which trend information is available, it is predicted that, if the species continues to decline at the current reported rate, the global breeding population will decrease by c.50% over 54 years, i.e. three generations, from 1995 onwards, assuming that the populations in all other countries remain stable (which is the best-case scenario). The global population trend has been projected from 1995 since this is the earliest date for which trend data are available. Due to the findings of this assessment, the species's global Red List status has now been uplisted from Near-Threatened to Vulnerable under criterion A3bcde as it is projected to be suffering a rapid population reduction of 30-49% over three generations.

2.1.5. Threats

Yelkouan Shearwater populations are known to be declining, with the main drivers being mortality from incidental fishing bycatch and predation by invasive predators (predominantly black rats *Rattus rattus* and feral cats *Felis catus*).

Data on Yelkouan Shearwater bycatch and fishing effort in the Mediterranean is limited. However, a recent study in France and Malta (Oppel *et al.* 2011) implicated fishing bycatch as a critical cause of mortality for the species. Recently, shearwater deaths by long-lines have also been reported in the Gulf of Lion, in the Straits of Bonifacio, in Italian waters and around Malta (Bourgeois & Vidal 2008). The impact of incidental bycatch on Yelkouan Shearwater has also been detected in Spain in more recent years. Demersal long-liners in

particular affect the species, often on an irregular basis, but can impact fairly large numbers at a time (Arcos *et al.* 2008, ICES 2008).

2.1.6. Research needs

Research efforts should focus on searching for new breeding colonies and censusing known breeding colonies, monitoring the population at key breeding and bottleneck sites, assessing mortality rates and studying the species' demographic parameters.

Assessing mortality rates from accidental bycatch is a priority action. More specifically, oceanographic and fisheries data (identification of prey, distribution of prey, which fish species are being fished, etc.) from across the Mediterranean can be related to seabird distribution data to identify bycatch 'hotspots'. Research should also be conducted on the scale of Mediterranean and Black Sea fisheries in order to assess correlation between species population trends and trends in fishing effort.

3. DISTRIBUTION AND ABUNDANCE OF THE BALEARIC SHEARWATER

3.1. New estimates at sea suggest a larger global population of the Balearic Shearwater *Puffinus mauretanicus*

Arcos *et al.* (2012) presented new estimates of the global population obtained from two different approaches: boat-based surveys at sea and coastal counts of migrating birds. Boat-based surveys consisted of transect counts that covered systematically the Spanish Mediterranean shelf in Nov-Dec 2003-2005, i.e. during the pre-breeding period, when the bulk of the global population is present in those waters. The global population estimate was inferred using bootstrap procedures from the observed densities at sea. Coastal counts were carried out in the Straits of Gibraltar from mid-May to mid-July 2007-2010, covering the peak of the post-breeding outflow to the Atlantic. Coverage varied among years from 37% to 67% of the daylight time and estimates for the whole period were inferred using GAM models. Both methodological approaches provided similar figures, consistent between years, with conservative estimates of about 25,000 birds. The authors contrasted their estimates with the currently estimated breeding population (3200 pairs), on the basis of a simple model that incorporated conceivable demographic parameters to link breeding and total populations. This approach failed to explain the figures obtained from counts at sea. An alternative explanation would be to consider that the breeding population is currently underestimated and might be closer to 5,000 breeding pairs, perhaps more. However, this is not so good news as might appear. Although the population figures now appear to be larger than previously expected, it is also likely that the alarming decline described by Oro *et al.* (2004) actually is even sharper, as it was based on data from colonies free of introduced predators. Ultimately, the species faces serious threats both on land (predation, disturbance) and at sea (fishing bycatch, pollution, fish prey overexploitation and others; see review in Arcos 2011), and its declining trend seems beyond any doubt.

3.2. Distribution and abundance of Balearic Shearwaters *Puffinus mauretanicus* in northeast Atlantic waters

Wynn & Guilford (2012) reported that geolocator tracking has revealed that Balearic Shearwaters spend the inter-breeding period in seasonally productive waters off northwest Portugal and southwest Brittany (France). Visual monitoring has also discovered large

concentrations further north, with up to 25% of the global population aggregating off NW Brittany and SW England in summer and autumn. These more northerly aggregations are thought to be dominantly composed of non-breeding birds, which may be shifting their distribution northwards in response to recent changes in prey fish availability and distribution. Increasing numbers of *Puffinus mauretanicus* near the coast of Brittany, France, were also reported by Yésou *et al.* (2012). Recent records included 5780 birds in northern Brittany in Jul 2010 and 5000 on the Atlantic coast of Brittany in Sep 2011. Increasing numbers of birds stay to mid-winter. This extension of range exposes the species to new at-sea threats, including the incidence of low frequency, high-impact events such as oil spills. Future conservation planning will have to take these into account.

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