Zoologia Caboverdiana 8, 1, 03–10
Available at www.scvz.org

Artigo original | Original article

Twenty years later: updating the status of the osprey *Pandion haliaetus* in the Cabo Verde Islands, West Africa

Luís Palma [1, *], Samir Martins [2], Rosiane Fortes [3], Isabel Rodrigues [4], Marcos Hernández-Montero [5] & Rui Freitas [3]

[1] *CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Laboratório Associado, Universidade do Porto, Campus Agrário de Vairão, 4485-661 Vairão, Portugal*
[2] *BIOS.CV, Conservação do Ambiente e Desenvolvimento Sustentável, Sal Rei, Boavista, Cabo Verde*
[3] *Faculdade de Engenharia e Ciências do Mar, Universidade de Cabo Verde, CP 163, Mindelo, São Vicente, Cabo Verde*
[4] *Biosfera I, Mindelo, São Vicente, Cabo Verde*
[5] *Projecto Biodiversidade, Mercado Municipal, Santa Maria, Sal, Cabo Verde*

**Corresponding author e-mail: luis.palma@cibio.up.pt*

RESUMO

O primeiro censo global da população reprodutora de guincho *Pandion haliaetus* nas ilhas de Cabo Verde realizou-se entre Dezembro de 1997 e Setembro de 2001. Desde então, passaram cerca de 20 anos sem uma nova avaliação da situação geral da espécie no arquipélago. No entanto, decorreram alguns estudos e trabalho de monitorização em várias ilhas, especialmente após 2016. É de realçar a monitorização de longo termo conduzida na ilha da Boavista, recentemente seguida por semelhantes levantamentos anuais na ilha do Sal. Apesar de nem todo o arquipélago ter sido convenientemente coberto, os dados actualmente disponíveis são suficientemente sólidos para uma actualização fidedigna da situação da espécie ao longo da maior parte da distribuição da mesma e para evidenciar a evolução desta desde o início do século. O número de casais de guincho aumentou de forma notável na maioria das ilhas setentrionais, que albergam a grande maioria da população reprodutora, enquanto nas ilhas meridionais há indícios de alguma recuperação. Este crescimento resultou provavelmente do gradual abandono da colheita de ovos e crias nidícolas pelos humanos, uma prática comum até meados do século XX, que agora se tornou rara. A população reprodutora de guincho em Cabo Verde está actualmente estimada em cerca de 115 casais, mostrando um aumento de mais de 30% nos últimos 20 anos.

Palavras-chave: Arquipélago, Atlântico Norte, ave de rapina, monitorização, situação actual

ABSTRACT

The first countrywide census of the osprey *Pandion haliaetus* breeding population in the Cabo Verde Islands took place from December 1997 to September 2001. Since then, about 20 years have elapsed without a new full assessment of the species situation in the country. Yet, some studies and monitoring work have been done in several islands, especially from 2016 onwards. Most notably, long-term monitoring has been carried out on the island of Boavista, recently followed by similar annual surveys on Sal. Although not covering the whole archipelago adequately, data currently available are sufficiently robust for allowing a reliable update of the species situation throughout most of its range and evincing its evolution since the turn of the century. The number of osprey pairs increased remarkably across most of the northern islands, which contain the large majority of the breeding population, while there are apparent signs of some recovery in the southern islands. This growth has presumably resulted from the gradual abandonment of the human harvesting of eggs and nestlings, a formerly widespread practice up to the mid-20th century that has now became rare. The osprey breeding population in Cabo Verde is currently estimated at about 115 pairs, showing an increase of over 30% in the last 20 years.

Keywords: Archipelago, North Atlantic, raptor, present status, monitoring

INTRODUCTION

The Palearctic osprey, *Pandion haliaetus haliaetus* (Linnaeus, 1758) is widely distributed across Eurasia and the Mediterranean with projections into the southern edge of the Palearctic in Africa (*sensu* Roselaar 2006), in Cabo Verde and the Red Sea (Palma *et al.* 2004, Monti *et al.* 2015, Habib 2019). Ospreys are considered resident in Cabo Verde (Monti *et al.* 2018a) and show genetic affinity with northern European ospreys, so probably originated from birds wintering in West Africa that settled in the archipelago (Monti *et al.* 2018b).

The archipelago of Cabo Verde comprises 10 islands and several islets of volcanic origin located in the Atlantic about 570 km off West Africa. Ospreys in Cabo Verde nest from coastal sand dunes to mountain peaks far inland (Naurois 1987, Palma *et al.* 2004), and live off variable fish diets according to the island (Martins *et al.* 2011) and the exposition to trade winds (Fortes 2016). Apparently, ospreys have always been widespread in the north of the archipelago, previously known to harbour circa 94% of the population (Palma *et al.* 2004) and much scarcer in the south, presumably due to different prey availability driven by ecological factors (Naurois 1987). Higher exposition to the northeasterly trade winds that blow during most of the year (Duarte & Romeiras 2009) and to the Canary current is associated with higher prey availability and richer osprey diets. This fact provides a possible explanation for the species higher abundance in northward and eastward facing coasts at island scale, and its higher abundance in the northern islands (Martins *et al.* 2011, Fortes 2016).

Up to the mid-20th century, Cabo Verde ospreys were strongly affected by the overharvest of eggs and nestlings by humans (Naurois 1969, 1984). This practice decreased thereafter, allowing numbers to grow from 46–71 in the 1960s (Naurois 1987) to 72–81 pairs towards the end of the century at the time of the first countrywide assessment, carried out in 1998 and 1999 with a complementary survey in Santo Antão in 2001 (Palma *et al.* 2004).

After 1999, ospreys were surveyed in Boavista in 2001–2002, with an estimate of

10–14 pairs (López-Suárez 2012), and in 2004–2007 when the number of breeding pairs grew from 14 to 17 (Siverio *et al.* 2013). A partial shoreline survey was also undertaken in 2003 (Ontiveros 2003). After a gap in 2008–2011, annual monitoring resumed in 2012 by the NGO BIOS.CV. On Sal, after an opportunistic survey in 2016 by L. Palma, monitoring has been carried out yearly since 2017 by the NGO 'Projecto Biodiversidade'. On São Nicolau, a comprehensive assessment was done in January-April 2016 (Fortes 2016). Sectors uncheckable by land were visited by boat, and only 6% of the coastline remained unsurveyed. Old records and osprey-related place names (see Palma 2017 for contextualisation) were also checked.

The objective of this work was updating the osprey population estimate in the country about 20 years past the 1998–2001 census.

MATERIAL AND METHODS

To update the osprey status in the country we reviewed all available post-2000 information, including publications (Ontiveros 2003, Siverio *et al.* 2013), theses (Fortes 2016) and the unpublished yearly monitoring reports of BIOS.CV and 'Projecto Biodiversidade'. Otherwise, surveys were undertaken by the authors in islands lacking recent information with the purpose of checking the species current distribution and numbers, as described below.

Among the northern islands, São Vicente was surveyed in March 2016, except for the southeast coast (circa 20% of the coastline) due to its inaccessibility from land. Raso and Santa Luzia were surveyed in April 2016 and April 2017, respectively. Branco was visited in May and September 2017 (K. Delgado, pers. comm.). In the southern islands, only fragmentary recent data was available. Therefore, short visits were made to Maio, Santiago, Fogo, and Brava in May–June 2017 and to Santiago and Maio in June 2019. On Maio, old records and information provided by residents and the Maio Biodiversity Foundation were also checked. Furthermore, key informants questioned about recent osprey sightings on Santiago, Fogo and Rombos provided useful complementary information (C. Monteiro, N. Barbosa, A. Leal, A. Veiga, D. Alinho, pers. comm.).

The reliability of the data available for updating the numbers of ospreys pairs on each island was assessed according with the following data quality categories: 0= anecdotal/ fragmentary data (no update possible); 1= incomplete survey (unreliable update); 2= single comprehensive survey (reasonable update); 3= repeated comprehensive surveys (reliable update); and 4= systematic annual surveys (very reliable update).

We used a stepwise approach to calculate the percentages of change in the population between 1998–2001 (Palma *et al.* 2004) and 2016–2019 (present work). First, we compared the recent (2016 onwards) estimates in the areas reliably surveyed with those from the previous survey within the corresponding areas. Current numbers for Boavista and Sal were extracted respectively from López-Suárez (2019) and Hernández-Montero (2019).

Then, we calculated the present countrywide total estimate by adding to the recent cumulative estimate: 1) the number of pairs identified during the previous census that presumably persist within the areas now left unsurveyed, i.e. Santo Antão and minor parts of São Vicente and São Nicolau (see above), assuming stability as the precautionary guess (within the general upward trend); and 2) the numbers suspected on the islands of the Sotavento. Finally, we compared the current total estimate with the previous total to calculate the percentage of change in the archipelago.

RESULTS

All northern islands with the exception of Santo Antão were well monitored, so we consider the respective estimates reliable. The updating of the osprey population in Santo Antão was hindered by the lack of human and logistic resources to tackle the large size and abrupt relief of the island. In contrast with the northern islands in general, we considered the numbers presumed for most of the south unreliable (Fig. 1), although Fogo, Brava and Maio were better covered than Santiago.

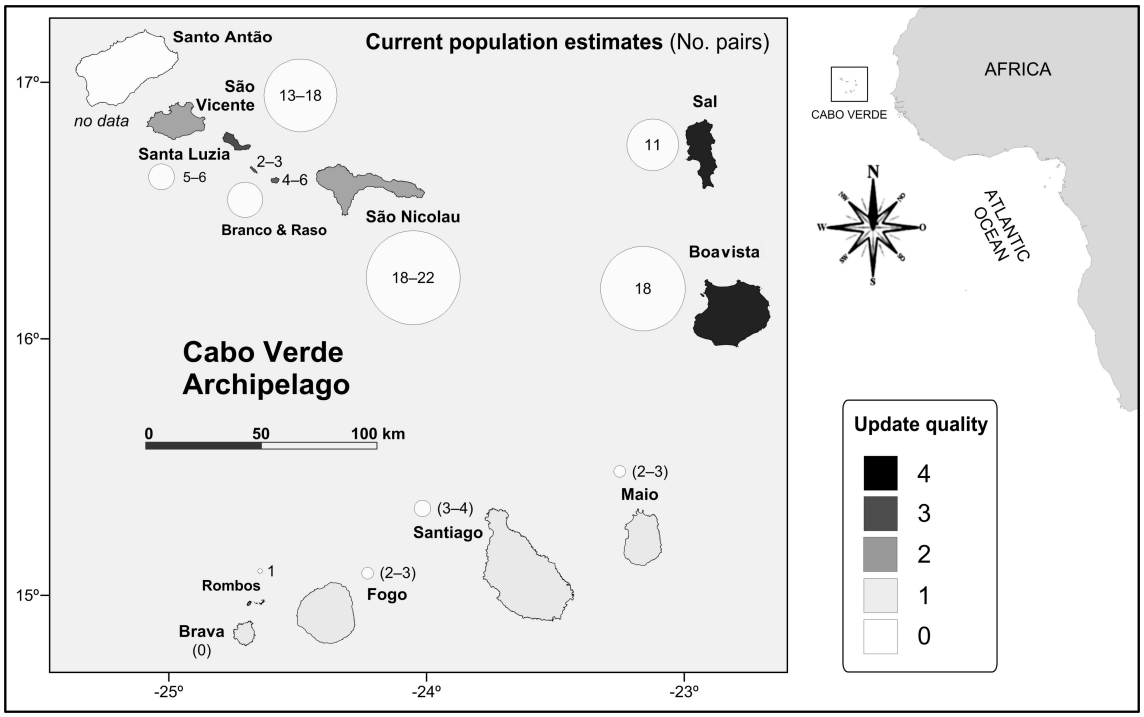

Fig. 1. Current osprey population estimates and their update reliability in the Cabo Verde Archipelago. The sizes of the circles are proportional to the estimated number or mean number of pairs (see Material and Methods for details). Branco and Raso are represented by a common cumulative circle. Numbers in brackets indicate uncertainty due to incomplete surveys. The darker the grey shading of the islands the higher the update reliability.

Although variably, the numbers of breeding pairs increased on most of the northern islands, from 28 to 37% on average, and only Santa Luzia and Raso showed stability or very slight population growth. On all well-surveyed islands, trends were stable or positive (Table 1). Overall, the increase reached on average 35.5% in the area surveyed and 32.5% in the whole archipelago.

Table 1. Present osprey population estimates (number of pairs) and trends over the last 20 years. (*) Only six in the area now surveyed; (**) percentages of change were calculated in relation to the area surveyed and corresponding ends of the interval; (***) see Material and Methods for further explanations. Numbers in brackets are uncertain.

Island group	Island	1998–2001	Present	% change**
Northern	Santo Antão	18–23	unavailable	unknown
	São Vicente	8*	13–18	54–67
	Santa Luzia	5–6	5–6	0
	Branco	1–2	2–3	33–50
	Raso	4–5	4–6	0–17
	São Nicolau	17	18–22	6–23
	Sal	4	11	64
Southern	Boavista	11	18	39
	Maio	1	(2–3)	unreliable
	Santiago	3–4	(3–4)	unreliable
	Fogo	0	(2–3)	unreliable
	Brava	0	(0)	unreliable
	Rombos	0	1	0–100
All	**In area surveyed**	48–51	71–84	32–39
	Total* **	72–81	103–125	30–35

DISCUSSION

We showed that the osprey breeding population in Cabo Verde grew by about one third during the last two decades, reaching the present estimate of 103–125 pairs (considering that there was no increase in Santo Antão and other unsurveyed areas in the northern islands). Even though it was not possible to update the population of Santo Antão, we assumed that its trend echoes the situation in the relatively similar nearby island of São Nicolau, i.e., the population remained roughly stable or slightly increased due to the natural protection afforded to nest sites by the rugged relief.

The southern islands remained poorly covered due to time and logistic constraints, especially Santiago because of its larger size and mountainous landscape. Surveying Santiago requires considerable time and resources, aggravated by the fact that some ospreys may be nesting far from the sea. There is at least one record from 2008 of a nest site 3.5 km inland (Cesarini & Furtado 2016). Although further fieldwork is needed in the south of the archipelago, there are signs of some recovery from the precarious situation during the 1960s. For instance, an osprey nest was observed on Ilhéu de Cima in June 2018 (N. Barbosa & A. Leal, pers. comm.), the first on the Rombos Islets since 1965 (Naurois 1987).

The stronger increases are found on the highly populated São Vicente, as well as on Sal and Boavista with more accessible terrain (making nest sites vulnerable). However, monitoring on Boavista showed inter-annual fluctuation (17.6 ± 2.1; 14–21 pairs), probably depending on the ecological conditions in the early breeding season, ultimately determining how many pairs attempt to breed, and thereby can be counted. For example, choosing the 21 pairs of 2016 instead of the 18 pairs of 2019 (López-Suárez 2019) would raise the population increase rate by 9% (from 39 to

48%). Therefore, calculating trends depends on the year considered.

Interestingly, the only relatively large northern island with no apparent change is Santa Luzia, the only one that long remained uninhabited. So, we think that the upward trends observed on most of the northern islands do reflect the recovery of the species in the region. To this adds the signs of recovery in the south. Altogether, there is strong support for assuming a robust countrywide recovery from the depleted osprey population of the mid-20th century, already evident at the turn of the century (Palma *et al.* 2004). Looking back to the estimates of the 1960s on some smaller islands and islets that were probably well surveyed by Naurois (1987), current recovery seems approaching pre-depletion numbers. For example, Naurois found only 1–2 pairs on Raso, no pairs on Rombos, and only two pairs on Santa Luzia (Fig. 1) stating that 10–20 years before all 5–6 nests or groups of nests he observed there were occupied (Naurois 1969).

We think that the update deficiencies did not affect our countrywide assessment of the osprey breeding population because present numbers on Santo Antão are not expected to be much different from 2001; while in the south numbers are too low to be influential. Still, a thorough appraisal of the situation in the south is of utmost importance, because it probably represents the species demographic periphery, possible a population sink, likely to reflect the overall situation in the archipelago (Dias 1996). The reoccupation of the area by recruits from the north would probably confirm the overall regrowth, whereas the abandonment of nest sites would probably mean decline due to depleted recruitment.

CONCLUDING REMARKS

It is important to stress that apart from the now rare nest raiding, there are no other direct human behaviours negatively affecting the osprey in Cabo Verde as we could realise from our own observations since the end of the last century. Persecution of adult birds in particular, may have been fairly uncommon in the past and is extremely rare nowadays, as shown by the great tameness of the birds. To this probably contributed the absence of shotgun hunting activity in the country. The situation sharply contrasts with the long history of systematic persecution in Western Europe that drove the species to extinction in many countries during the 20th century, although there is now a general and steady comeback to the continent (Palma 2001, Schmidt-Rothmund *et al.* 2014). The exception is on the Canary Islands where the species continues to decline (Siverio *et al.* 2018).

On the opposite sense goes the growing impact of disturbance from tourism-related activities upon coastal nest sites on Boavista and Sal that jointly hold almost 30% of Cabo Verde ospreys (Palma *et al.* 2004, Siverio *et al.* 2013). That often results in breeding failure and is gradually causing the withdrawal of nest sites away from the coastline, undoubtedly a major concern for the species conservation (Palma *et al.* 2004, Siverio *et al.* 2013). Still, the positive population trend of the osprey in the country represents a good opportunity to implement preventive conservation actions, above all focusing on the control and reversal of impacts from unregulated tourism-related activities.

ACKNOWLEDGEMENTS

We are indebted to K. Delgado, C. Monteiro, A. Veiga, D. Alinho, N. Barbosa, A. Leal & T. Militão for the field data provided and to A. Vieira, A. Lopes, J. Graça, E. Neves, K. Lopes, A. L. Tavares, and A. Borges for helping on surveys. We are grateful to 'Biosfera I' and Maio Biodiversity Foundation, delegations of the Ministry of Agriculture and the Environment in Maio, São Nicolau and Sal, and Fogo Natural Park for the logistic support. We thank Cabeólica S.A. and BIOS.CV for using data from unpublished monitoring reports from Boavista, as to 'Projecto Biodiversidade' alike in relation to Sal. We also thank Cabeólica S.A. and The International Osprey Foundation for funding osprey studies and monitoring.

REFERENCES

Cesarini, D. & Furtado, A. (2006) *Preliminary ecological report – Serra Malagueta Natural Park*. Unpublished report, Ministério da Agricultura e ambiente – Direcção Nacional do Ambiente, Projecto Áreas Protegidas, Praia, Cabo Verde, 108 pp.

Dias, P.C. (1996) Sources and sinks in population biology. *Trends in Ecology & Evolution*, 11, 326–330.

Duarte, M.C. & Romeiras, M.M. (2009) Cape Verde Islands. *In*: Gillespie, R. G. & Clague, D. A. (Eds.), *Encyclopedias of the Natural World. Encyclopedia of Islands*. University of California Press, Berkeley, USA, pp. 143–148.

Fortes, R.D. (2016) *Situação Populacional e Ecologia do Guincho* (Pandion haliaetus) *na Ilha de São Nicolau, Cabo Verde*. BSc thesis. Faculty of Engineering and Marine Sciences, University of Cabo Verde, Mindelo, Cabo Verde.

Habib, M.I. (2019) Breeding Status of Ospreys in Egypt (Red Sea) from 2012 to 2018. *Raptors Conservation*, 38, 43–58.

Hérnandez-Montero, M. (2019). Estudo e Conservação do Guincho – *Pandion haliaetus* – na ilha do Sal, 2019. Unpublished report, Associação Projeto Biodiversidade, Santa Maria, Ilha do Sal, Cabo Verde, 11 pp.

López-Suárez, P. (2012) *Bird population monitoring report: ospreys and red-billed tropicbirds on Boa Vista Island (December 2011–May 2012)*. Unpublished report, ONG Cabo Verde Natura 2000, Sal-Rei, Cabo Verde, 15 pp.

López-Suárez, P. (2019) *8th Bird population monitoring report: Boa Vista 2019,* Unpublished report, BIOS.CV, Sal-Rei, Cabo Verde, 41 pp.

Martins, S., Freitas, R., Palma L. & Beja, P. (2011) Diet of Breeding Ospreys in the Cape Verde Archipelago, Northwestern Africa. *Journal of Raptor Research*, 45, 244–251.

Monti, F., Delfour, F., Arnal, V., Zenboudji, S., Duriez, O. & Montgelard, C. (2018b) Genetic connectivity among osprey populations and consequences for conservation: philopatry versus dispersal as key factors. *Conservation genetics*, 19, 839–851.

Monti F., Duriez, O., Arnal, V., Dominici, J.M., Sforzi, A., Fusani, L., Grémillet & D. Montgelard, C. (2015) Being cosmopolitan: evolutionary history and phylogeography of a specialized raptor, the Osprey *Pandion haliaetus*. *BMC Evolutionary Biology*, 15, 255.

Monti, F., Grémillet, D., Sforzi, A., Sammuri, G., Dominici, J.M., Triay Bagur, R., Muñoz Navarro, A., Fusani, L. & Duriez, O. (2018a) Migration and wintering strategies in vulnerable Mediterranean Osprey populations. *Ibis*, 160, 554–567.

Naurois, R. de (1969) Notes brèves sur l'avifaune de l'archipel du Cap Vert. Faunistique, endémisme, écologie. *Bulletin de l'Institut Fondamental d'Afrique Noire*. Tome XXXI, série A, 1, 8–218.

Naurois, R. de (1984) Contribution à l'ornithologie de l'archipel du Cap Vert: reproducteurs menacés d'extinction, nicheurs occasionnels, oiseaux mentionnés par erreur. *Boletim do Museu Municipal do Funchal*, 36, 38–50.

Naurois, R. de (1987) Le balbuzard (*Pandion haliaetus*) aux îles du Cap Vert. *Annali del Museo Civico di Storia Naturale*, 86, 657–682.

Ontiveros, D. (2003) Nesting distribution, food habits, and conservation of Osprey on Boavista Island (Archipelago of Cape Verde). *Journal of Raptor Research*, 37, 67–70.

Palma, L. (2001) The Osprey *Pandion haliaetus* on the Portuguese coast: past, present and recovery potential. *Vogelwelt,* 122, 179–190.

Palma, L. (2017) Tracking the ancestral Portuguese name of the Osprey across the Atlantic: hints from language, literature, history and geography. *Arquivos de Zoologia (S. Paulo*), 48, 115–130.

Palma, L., Ferreira, J., Cangarato, R. & Pinto, P. V. (2004) Current status of the Osprey in the Cape Verde Islands. *Journal of Raptor Research*, 38, 141–147

Roselaar, K.C.S. (2006) The boundaries of the Palearctic region. *British Birds*, 99, 602–618.

Schmidt-Rothmund, D., Dennis, R. & Saurola, P. (2014) The osprey in the Western Palearctic: breeding population size and trends in the early 21st century. *Journal of Raptor Research*, 48, 375–387.

Siverio, M., López-Suárez, P., Siverio, F., Rodríguez, B., Varo-Cruz, N. & López-Jurado, L.F. (2013) Density, nest site characteristics and breeding rates of the Osprey (*Pandion haliaetus*) in the southern limit of its range in the Western Palearctic (Boavista, Cape Verde Islands). *African Journal of Ecology*, 52, 50–58.

Siverio, M., Siverio, F., Rodríguez, B. & Del Moral, J.C. (Eds) (2018) *El águila pescadora en España y Portugal: población invernante 2016–2017, reproductora en 2018 y método de censo*. SEO/BirdLife. Madrid, Spain,103 pp.

Received 22 November 2019
Accepted 31 December 2019