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Nota editorial

Ano a dobrar

O ano de 2019 foi um ano difícil e simultaneamente marcou o renascimento da revista. Um membro importante do comité editorial entregou a tese doutoral e outros dois foram pais pela segunda vez. Assim, as prioridades repensaram-se e uma tese e dois bebés nasceram, mas a *Zoologia Caboverdiana* ficou compreensivelmente para segundo plano. No entanto, o entusiasmo dos investigadores e naturalistas que trabalham em Cabo Verde afortunadamente não refreou. Desta forma, temos agora em braços o dobro dos trabalhos científicos aguardando ser publicados neste ano que inicia a segunda década do século. Assim, surgiu como solução a ideia de excepcionalmente tentar duplicar os números da revista, como que a celebrar a chegada de 2020 que também vem com números a dobrar.

Neste número extra, que sai antes da edição usual de Agosto, temos um artigo e duas notas breves. O primeiro, intitulado "*Vinte anos depois: actualização do estado do guincho* Pandion haliaetus *nas ilhas de Cabo Verde*", resume a evolução no número de casais reprodutores desta espécie nas diferentes ilhas do arquipélago. Este estudo mostra que a população desta ave de rapina parece seguir a tendência de crescimento do resto do Paleárctico ocidental. O artigo frisa também a necessidade de melhorar os dados em algumas das ilhas e de realizar planos de monitorização regulares.

As notas breves revelam novos registos de doenças e espécies em Cabo Verde devidamente documentados com registos fotográficos. A primeira refere-se ao "*Primeiro registo documentado de fibropapilomas em tartarugas verdes* Chelonia mydas *nas ilhas de Cabo Verde, África ocidental*". Nesta nota são discutidas as implicações desta doença nos indivíduos e possíveis causas da mesma. A segunda nota, com um único autor, descreve o "*Primeiro registo do camarão zebra (Crustacea, Decapoda, Palaemonidae) nas ilhas de Cabo Verde*". Apesar de ser uma espécie facilmente reconhecível devido ao padrão listado, esta passou despercebida devido à baixa abundância ou ao hábito de se esconder debaixo de rochas.

Convém acrescentar que em todas as publicações deste número participaram investigadores e naturalistas cabo-verdianos e, em duas delas, como primeiros autores. Isso demonstra que na linha da frente da investigação em Cabo Verde se encontram pessoas muito motivadas e dedicadas. Logo resta-me desejar que assim continue e que a revista possa prosseguir a produzir mais e melhor ciência de e para Cabo Verde neste ano em que a Sociedade Caboverdiana de Zoologia celebra 10 anos de existência. Parabéns SCVZ!

Doutora Raquel Vasconcelos
Editora-chefe da *Zoologia Caboverdiana*

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Editorial note

Double year

The year of 2019 was a difficult year and simultaneously it marked the rebirth of the journal. One important member of the editorial committee delivered the doctoral thesis, and two others were parents for the second time. Thus, the priorities were rethought and a thesis and two babies were born, but *Zoologia Caboverdiana* was understandably in the background. However, the enthusiasm of researchers and naturalists working in Cabo Verde fortunately has not restrained. In this way, we now have to handle with twice as many scientific works waiting to be published in the year that begins the second decade of the century. Hence, the idea of trying to exceptionally double the numbers of the journal emerged as a solution, as if celebrating the arrival of 2020, which also comes with double numbers.

In this extra issue, which comes out before the usual August edition, we have an article and two short notes. The first, entitled '*Twenty years later: updating the status of the osprey* Pandion haliaetus *in the Cabo Verde Islands, West Africa*", summarizes the evolution in the number of breeding pairs of this species on the different islands of the archipelago. This study shows that the population of this bird of prey seems to follow the growth trend of the rest of the Western Palearctic. The article also stresses the need to improve data on some of the islands and to carry out regular monitoring plans.

The short notes reveal new records of diseases and species in Cabo Verde duly documented with photographic records. The first refers to the '*First documented record of fibropapillomas in green turtles* Chelonia mydas *on the islands of Cabo Verde, West Africa*'. In this note, the implications of this disease on individuals and its possible causes are discussed. The second note, with one author only, describes the '*First record of the striped bumblebee shrimp (Crustacea, Decapoda, Palaemonidae) in the Cabo Verde Islands*'. Despite being an easily recognizable species due to its listed pattern, it went unnoticed due to low abundance or the habit of hiding under rocks.

It should be added that Cabo Verdean researchers and naturalists participated in all publications of this number, and, in two of them, as first authors. This shows that very motivated and dedicated persons are in the front line of research in Cabo Verde. Therefore, I can only hope that this will proceed and that the journal can continue to produce more and better science to and from Cabo Verde in this year that the Zoological Society of Cabo Verde is celebrating 10 years of existence. Happy birthday SZCV!

Raquel Vasconcelos, PhD
Editor-in-chief of *Zoologia Caboverdiana*

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Artigo original | Original article

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

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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.

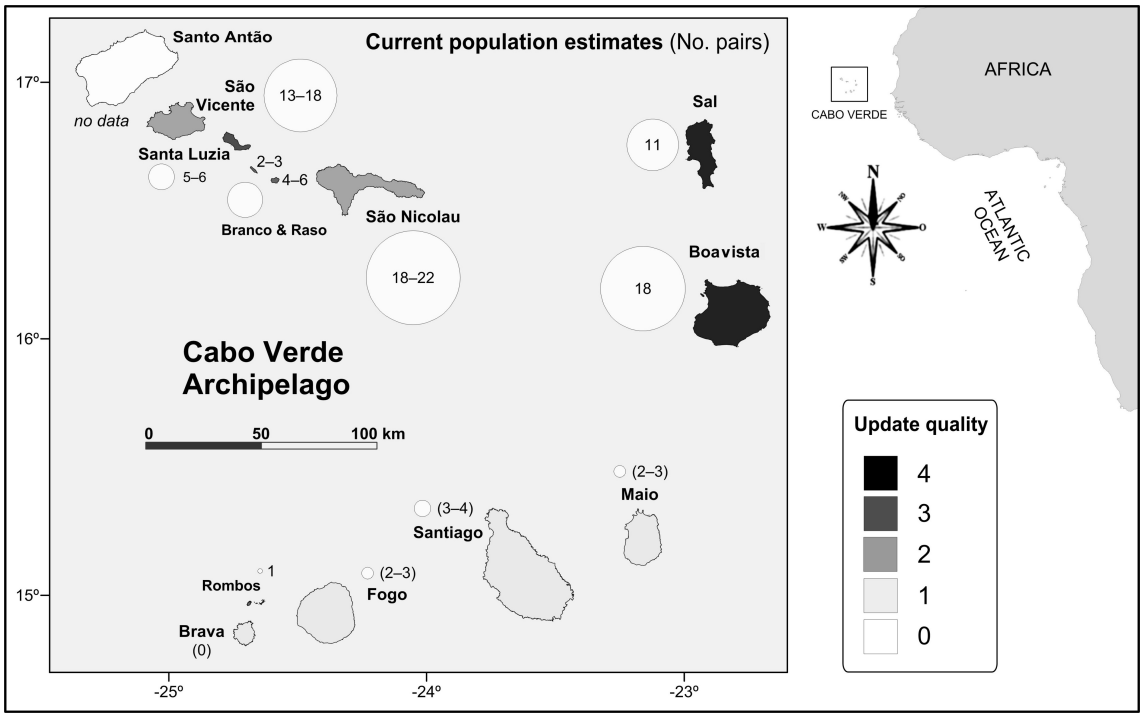

Fig. 1. Current osprey population estimates and their update reliability in the Cabo Verde Archipelago. The sizes of the circles are proportional to the estimated number or mean number of pairs (see Material and Methods for details). Branco and Raso are represented by a common cumulative circle. Numbers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

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Nota breve | Short note

First record of the striped bumblebee shrimp *Gnathophyllum americanum* (Crustacea, Decapoda, Palaemonidae) in the Cabo Verde Islands

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Keywords: Matiota bay, decapod fauna, cryptic species, zebra shrimp

The Cabo Verde marine decapod fauna is relatively well studied, and the state of knowledge was recently reviewed by González (2018). Despite this, cryptic habitats remain virtually unexplored in the archipelago, with common and widely distributed species recently recorded for the first time (e.g.: Neves, 2016; Wirtz, 2019). In addition, some groups, such as the ecologically cryptic palaemonid shrimps, remain poorly studied, with some frequently found species awaiting to be described or recorded for the first time (K. Neves unpub. data).

In the present work, the occurrence of the circumtropical striped bumblebee shrimp *Gnathophyllum americanum* Guérin-Méneville, 1855, is documented for the first time in the Cabo Verde Islands. The diagnostic characters of this species are the anterolateral angle of carapace reaching distinctly beyond level of the antennal spine; intermediate spines on distal margin of telson nearly twice as long as median pair; third maxilliped with exopod not overreaching endopod; second pereopod with carpus distinctly longer than broad; three posterior pereopods with dactyli distinctly longer than broad; posterior tooth of dorsal rostral series situated on rostrum anterior to level of orbital margin; and colour pattern composed of alternate transverse black and white stripes.

One specimen from Baía de Matiota, São Vicente Island, Cabo Verde (16.896528 -24.992389; WGS84) was found on November 9, 2019, snorkelling, two meters depth, associated with the echinoid *Echinometra lucunter* (Fig 1). Two additional specimens, not collected, were observed: one free-living under stones, another among red algae, all representing common habitats for this species (Tavares *et al.* 2017).

The collected specimen was examined with a dissecting microscope for identification based on the morphological characters described above.

Fig. 1. Striped bumblebee shrimp *Gnathophyllum americanum* found in Matiota bay, São Vicente Island, collected on November 9, 2019 (photo by K. Neves).

The single specimen examined was well in agreement with the descriptions and illustrations given by Holthuis (1949) and Manning (1963) of *Gnathophyllum americanum*. This species is known to have a pantropical distribution (González 2018). In the eastern Atlantic, it was known from Madeira (Araújo 2002), Canary Islands (Holthuis 1949), São Tomé (Wirtz 2003) and Gabon (Gauff & Liwouwou 2019). Therefore, it was expected it would also occur in the Cabo Verde Islands as revealed by the present study. Despite being a quite colourful and easily recognizable species, *G. americanum* has not been recorded so far from the Cabo Verde Islands. This may be due to its small size, the fact that it seems to be quite rare, or because the habitats where it occurs remain poorly studied in the archipelago. The specimen occurring under stones was observed occurring together with *Gnathophyllum elegans*, the only other species of the genus known in Cabo Verde, but none of them seems to be common in the sampled area. Actually, *G. elegans* had been recorded only once in the country (Turkay 1982), and this represents, therefore, the second documented record of the species in the islands.

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Nota breve | Short note

First documented record of fibropapillomas on green turtles *Chelonia mydas* in the Cabo Verde Archipelago, West Africa

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Keywords: Papillomavirus; Epizootic tumours; Ecosystem health; Boavista

Fibropapillomatosis (FP) is a neoplastic disease characterized by epizootic tumours of the skin, flippers, periocular tissues, carapace, and plastron on marine turtles (Quackenbush *et al.* 2001, Aguirre & Lutz 2004). It also can produce nodules in all internal organs (Aguirre & Lutz 2004) and, depending on the size and location of the tumours, it can interfere with organ function (Quackenbush *et al.* 2001). The larger tumours can severely hamper mechanical ability of turtles and, consequently, their fitness (Aguirre & Lutz 2004). The FP is found more frequently in neritic juveniles and subadults, rare in adults, and pelagic juveniles (Jones *et al.* 2016). The etiology and prevalence of FP are not fully understood, nevertheless, it has been associated with different viruses (Greenblatt *et al.* 2005) and related to coastal heavily polluted areas of high human activities, agricultural runoff, and/or biotoxin-producing algae (Aguirre & Lutz 2004, Van Houtan *et al.* 2010, Jones *et al.* 2016).

The FP have been found in tropical coastal oceans worldwide (Quackenbush *et al.* 2001, Aguirre & Lutz, 2004, Patrício *et al.* 2012), however in the East Atlantic records are rarer. The first report in this region was by Formia *et al.* (2007) in the Gulf of Guinea. Posteriorly, Loureiro *et al.* (2009) reported two cases in juvenile green turtle in São Tomé e Príncipe. In this communication, we report cases of sea turtle fibropapillomatosis in the Cabo Verde Archipelago.

In February of 2019, in less than two weeks, two juveniles of green turtle were found alive by a kiteboarder without mobility and floating in the water surface in Sal Rei bay (Fig. 1A and

B). The animals presented tumors distributed around the tail, ventral surface, the anterior and posterior flippers, the eyes, neck and mouth (Fig. 1C and D), and leeches near the tumors. All the individuals were very weak and died days later. Biopsy samples and leeches were collected for future histological evaluation.

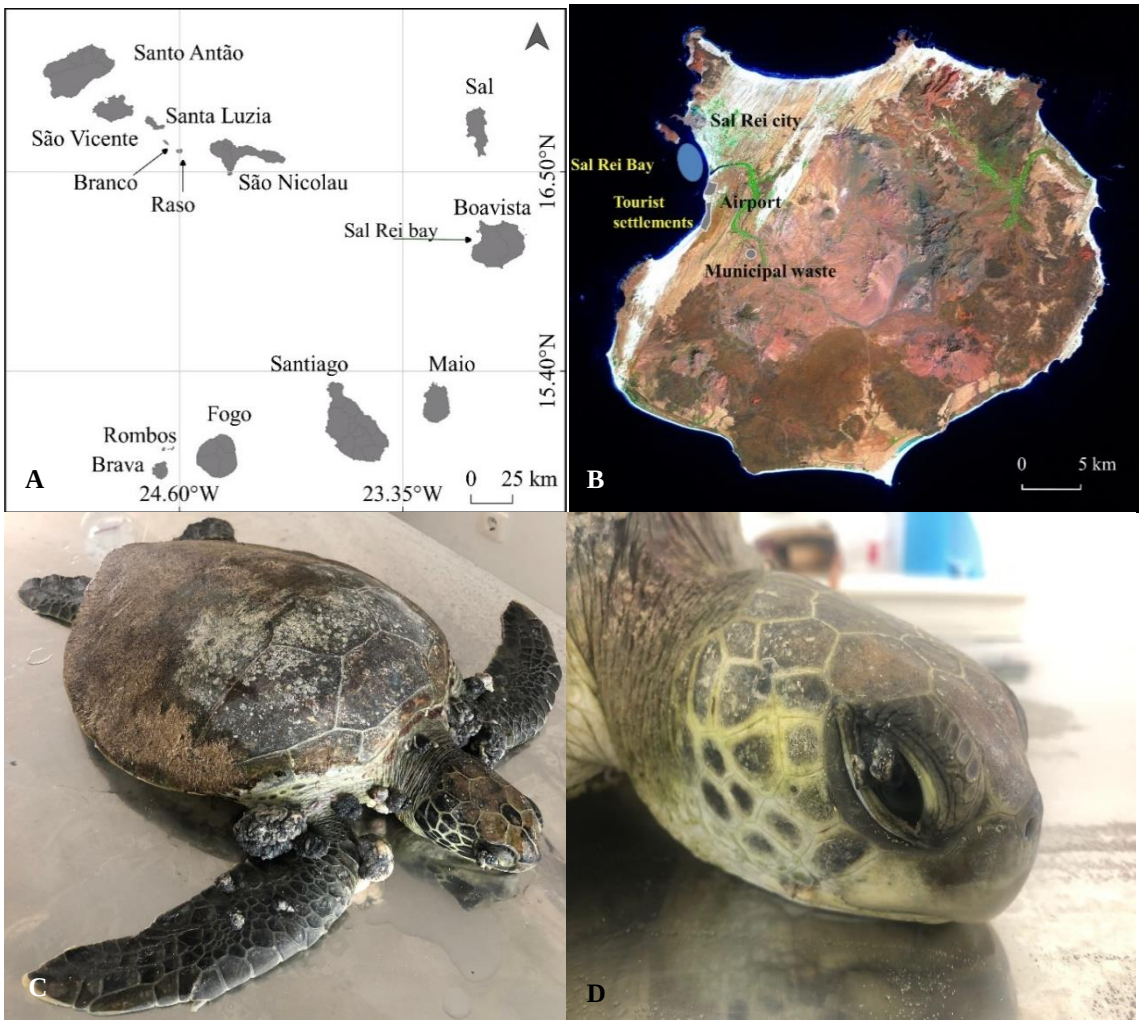

Fig. 1. Study area and study animals (photos by S. Martins). **A)** Map of the Cabo Verde Archipelago and location of the study area. **B)** Aerial photo of Boavista with the main city, Sal Rei, tourist settlements, the airport and municipal waste marked in grey, the agriculture area in green, and the area where the study animals were found in blue. **C)** General dorsal view of the 1st neritic juvenile green turtles afflicted by fibropapillomatosis. **D)** Snout view of the 2nd juvenile with a fibropapilloma in the eye.

The possible causes of recent records of FP in juvenile green turtles on Boavista Island are unknown, however these occurrences are consistent with previous reports that relate the prevalence of this disease with areas of high anthropogenic activity (Aguirre & Lutz 2004, Van Houtan *et al.* 2010, Jones *et al*. 2016). In fact, the bay of Sal Rei is one of the most touristic areas in Cabo Verde, and a runoff of the main city sewages. Furthermore, it is located in the mouth of Rabil lagoon (a RAMSAR site), with agricultural runoff and municipal waste running into the sea. If these factors are causing the disease outbreaks is unknown. However, this hypothesis needs to be tested.

Therefore, a continuous surveillance of FP in this area and water analysis in the Sal Rei bay for potential infection are important and may provide important information concerning the impact of this disease on this fragile ecosystem.

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Capa | Front cover

Águia pesqueira adulta empoleirada no chão à beira-mar, Cova de Inglesa, Ilha de São Vicente, Dezembro de 2016; Adult osprey perched on the ground by the sea shore, Cova de Inglesa, São Vicente Island, December 2016 (fotografia de | photo by José Pereira - ZPArt)

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