**Supplementary Material**

## Cabo Verde Egyptian Vulture Neophron percnopterus on the brink: community perceptions, inferences and facts of an extreme population crash

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Table S1. Unpublished sightings of Egyptian Vultures seen by the authors or reported by ornithologists and birdwatchers (1998–2018).

**Appendix S1. Island accounts**

The Island Accounts are based on all data available since the beginning of the study, including Egyptian Vulture sightings since 1998 compiled from reports and personal observations (Supplementary Materials, Appendix I).

**Eastern Islands**

Sal

Previous Egyptian VCulture records from Sal were very few and relatively old. During the osprey *Pandion haliaetus* surveys conducted in 1998-2001 (Palma *et al*. 2004) an incubating adult was observed in Monte Cagarral in 1998 and in the following year another nest was seen in Rotchinha de Rabo de Junco, contradicting the presumed extinction of the species as a breeding bird in the island at the end of the 1990s (Hazevoet 1995, Barone and Delgado 1998, Barone *et al*. 1999, Hille and Thiollay 2000). Still, 1998-1999 observations might concern just one remaining pair that subsequently disappeared, and indeed Santos (2002) could not find the species in the island shortly after. The species absence from Sal was recently confirmed, so any recent sightings probably concern vagrants, possibly from Boa Vista (Palma 2016).

Boa Vista

Boa Vista has one of the highest numbers of sightings since 1998 (Appendix I). We listed 125 observations, including the ones obtained during the 1998-1999 osprey survey (Palma *et al*. 2004), the sightings obtained by P. López in 2013-2018 during the Bios.CV routine bird monitoring for Cabeólica S.A, and a compilation of sightings by several bird watchers done by C. Hazevoet (pers. comm.) in 2017. The distribution and frequency of sightings appears not to have decreased much since 1998: a minimum of 26 sightings (one or more birds each time) in 20 days (1.3 sightings/day) in the period 1999-2009; and 94 in 86 days (1.09 sightings/day) in 2011-2018. Still, it must be kept in mind that the observation effort is much higher at present as it results from comprehensive routine bird surveys by P. López, so apparent stability in observation frequency may be deceptive. For instance, J. Ferreira reported 3 pairs in 1998 around Morro de Santo António and 2 pairs around Monte Estância, but recent observations do not support the existence of such concentrations. Most striking is the sharp decrease in the proportion of juveniles and immatures vs. adults: 5 in 36 (min.) in 1999-2009 (14% of birds seen), and 3 in 124 since 2011, only 2.4% of birds seen (cf. Appendix I). This suggests that decline in numbers even if slight went together with a very substantial decrease in fecundity.

Boa Vista population had been previously estimated at <10 pairs, likely 5-6 (Barone and Delgado 1998). In 2014, there were presumably 2-4 pairs left (Bios.CV 2014 Annual Bird Monitoring Report), then 1-3 pairs in 2016, and no more than 6-8 individuals in 2017 and 7-9 individuals in 2018, including 1-2 pairs (Bios.CV 2017 and 2018 Annual Bird Monitoring Reports), although the current estimated number of pairs seems below what would be expected from the frequency of adult sightings. In short, the Boa Vista population may have slightly decreased during the last 20 years but seems currently breeding at (very?) low frequency, and consequently the population is probably ageing and thus becoming less and less productive. Clarifying the situation demands further surveys specifically targeting the species.

Maio

The distribution of the Egyptian vulture in Maio seems to have remained consistent from 1998-1999 up to the present, with sightings roughly occurring in the same areas but currently at lower frequency. For example, 4 sightings and 2 nests found by J. Ferreira in two consecutive days in September 1998, and more than 6 observations in two consecutive days by P.V. Pinto in March 1999, in both cases during surveys not specifically targeting the species. Barone *et al*. (2001) also referred the observation of several individuals on a single day, including 1 subadult and 4 adults seen together, and estimated the population at 3-4 pairs. Conversely, 5 days of direct searches in 2015 yielded only 5 sightings (this study), although two simultaneously. In 2017 there were 4 incidental sightings of solitary adults by one of us (A. Tavares), but in a 2-day field survey of ospreys in May 2017 no vulture was seen (R. Fortes, pers. comm.).

Enquiry responses were largely consensual in that in the past there were “many” vultures, which began to disappear about 20-40 years ago; and that drought and the resulting decrease in food supply, were the cause. Still, despite its relatively small size, the island of Maio still harbours a small residual population, apparently restricted to the highlands.

**Barlavento mountainous islands**

Santo Antão

This is one of the islands where changes look to have been more severe. At the time of the 1998-2001 osprey survey (Palma *et al*. 2004), and with no particular effort, the Egyptian vulture was a common view all over the island: e.g. 57 sightings in 22 days (2.6 sightings/day, only accounting days with observations), of which 16 (28%) of pairs and 15 of juveniles and immatures (Appendix I). More striking is the fact that it was not rare to make multiple (4-6) observations in one single day, especially in the “green” farmland areas of the north-northeast of the island. Conversely, since 2014 only 15 vultures were observed in 14 days (1.1 sightings/day with observations), but including intensive direct searches, and all in the desert rangelands of the south and southwest of the island.

Despite no vulture or recent signs were seen in the northern part of the island during the study, the many old roost whitewashes observed throughout the area made clear that the species was previously quite common there (Palma 2016). This survey also showed that recent sightings reported from this part of the island at enquiries were better explained by incursions from the desert areas of the south-southwest. Also, in opposition to the past, vultures now rarely visit even the remotest urban areas, an indication that these provide very little food resources at present and that the former mutualistic association with human communities has been lost (Palma 2016).

Therefore, whilst Santo Antão may have had the largest vulture population in the archipelago until recently (Hazevoet 1995, Barone and Delgado 1998, Palacios 2001, and this study), the subsequent decline was dramatic and the species almost totally vanished with the exception of a small number of birds remaining in the desert rangelands of the island, associated with what is left of the free goat herding and refuse dumps.

São Nicolau

Egyptian vulture numbers apparently dropped earlier in São Nicolau than in Santo Antão (Hazevoet 1995). Barone *et al*. (1999) already saw few birds and signs of presence, and there was only one sighting during the 1998-1999 osprey survey as well. Later, also few sightings could be compiled by C. Hazevoet (Appendix I).

No observation was made during the interviews in February-March 2015 despite results have suggested that the species could still be present in the island in low numbers. This conjecture was not confirmed during the 2016 systematic searches (Palma 2016), neither any breeding attempts (e.g. 3 birds reportedly seen together in March 2015: Monteiro *et al*. 2015) nor even the species presence in the island. No vulture was seen as well during the comprehensive and intensive osprey survey carried out on the island by R. Fortes in January-April 2016 (pers. comm.). Therefore, the sightings reported both at the enquiries and later may be attributable to some solitary individual remaining or to irregular visits from outside the island.

Most reports came from the cultivated and populated mountainous area but, like in Santo Antão, this seems to have resulted from the fact that most respondents were residents in the area, rather than due to any remnant resident birds remaining. The possibility that some vultures persisted in the arid rangelands from where they visited the populated areas could not be confirmed either. This absence might be explained by the general scarcity of food resources that resulted from human depopulation and extensive abandonment of goat herding (Palma 2016). In short, no active vulture breeding territory seemed to remain in São Nicolau, at least not in a regular manner.

São Vicente, Santa Luzia, Raso, Branco

Previous information on the Egyptian vulture in São Vicente is scanty (but see Barone *et al*. 1999). Observations in 1998 during osprey surveys (Palma *et al*. 2004) indicated that the species was still around at the time, as several pairs were seen in different parts of the island, apparently even in small breeding clusters. In contrast, neither 2015 fieldwork (Monteiro *et al*. 2015) nor subsequent surveys (Monteiro *et al*. 2017) produced a single sighting. Moreover, a comprehensive osprey survey carried out in 2016 by one of us (I. Rodrigues) throughout the island did not reveal any signs of vulture presence. As this is a relatively small and populated island it seems thus certain that the species is absent.

The vanishing of the species from Santa Luzia and Raso islet is also certain for no recent records exist despite the frequent visits by wildlife researchers, including one of us (I. Rodrigues). The species is also almost certainly absent from Branco despite the islet has been seldom visited. Its tiny size and geographic position amidst islands presently without vultures makes the species presence highly unlikely, and indeed no vulture was seen during a recent expedition of several days in 2017 (K. Delgado, pers. comm).

**Sotavento mountainous islands**

Santiago

No Egyptian vulture was observed in Santiago in 1998 during the 1998-2001 osprey survey (Palma *et al*. 2004), although the hinterland of the island could not be entirely searched. Hille and Thiollay (2000) also did not find the species in the island and Correia (2007) could not collect any information about the species either. Yet, Cesarini and Furtado (2006) estimated a remnant population of 1-2 pairs or 1-4 individuals, despite no further details are provided. Other keen observers failed seeing the species recently (A. Rendall, pers. comm.) and to our best knowledge, the only recent reliable observation in Santiago was of a single individual seen in 2010 by S. Martins (pers. comm.). During the interview work in 10 localities of the island in June 2015 no vulture was seen and only six recent sightings were reported by respondents from between 2012 and 2015. Also, during 3 days of osprey survey by R. Fortes (pers. comm.) in early June 2017 no vulture was seen whatsoever. The rarity of observations and oral reports suggests only sporadic vagrancy.

Fogo

Fernandes (2008) could not find the species in the island. This was not unexpected as already Hazevoet (1995) and, Barone and Delgado (1998) stated that the vulture had likely become extinct in Fogo. Indeed, during the interviews in 23 localities in April 2016 no vulture was seen and the latest among the very few recent sightings reported dated from 3 years before (in all, 16 sightings were reported at enquiries from 2013 back to about 1980). R. Fortes (pers. comm.) also could not see any vulture during 4 days of osprey survey in May 2017. The few oral reports may thus concern vagrants.

Despite the fact that the above data suggest that the species stopped breeding in Fogo earlier than in Santiago, the interview responses suggest on the contrary that the major decline occurred at least some 10 years later than in the neighbouring island. Deliberate dog poisoning was seldom referred in Fogo in opposition to Santiago, and this may be the reason why the species may have disappeared later there. The reasons for the apparent extinction in Fogo seem to be more structural, being primarily linked with the reported decrease in food availability due to better livestock sanitary conditions (less mortality) and changes in carcasses disposal (increased burial).

Brava

Brava Island was not surveyed during the study, but no definite data on the species persistence in this island could be otherwise obtained. In 1999, Hille and Thiollay (2000) claimed not having seen the bird in Brava. The presence of breeding Egyptian vultures in Brava seems thus highly unlikely. Still, in June 2017, during an osprey survey, R. Fortes (pers. comm.) received information of an alleged sighting from some months earlier, which might refer to a vagrant bird.

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