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A PIED CROW *CORVUS ALBUS* SURVEY COVERING 4 000 KM^2 OF THE KAROO: AUTUMN 2015

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This report is focused mainly on the Pied Crow *Corvus albus* because the ongoing second Southern African Bird Atlas Project (SABAP2) shows that the abundance of the species has increased over more than 60% of South Africa in two decades, often massively (Fincham *et al*. 2015, LG Underhill, *in litt*.). This is cause for concern because of documented heavy predation on tortoises by Pied Crows while rearing chicks (Fincham *et al.* 2014, Fincham *et al.* 2015). This cited case of predation is not exceptional because Pied Crows are known to have killed at least 454 tortoises where there were 14 nests along a power line near Koekenaap in the northern parts of the Western Cape Province (K Retief, *in litt*.). Elsewhere, at least 39 tortoises were killed in the vicinity of two nests in the Calvinia district in the Northern Cape Province (F van der Merwe, *in litt*.).

Another indigenous corvid, the White-necked Raven *Corvus albicollis*, has also been recorded as taking tortoises to feed chicks (Uys 1966). However, the distribution of the raven is restricted and the abundance of the species does not appear to have changed between SABAP1 and SABAP2 (Underhill *et al.* 2014). In contrast, the Pied Crow is a versatile, non-migratory species with a continental and off-shore island distribution, which confirms that it is adapted to a wide range of habitats, climatic conditions and altitudes (Sinclair *et al.* Ryan 2010, Fincham *et al.* 2015, H Kolberg, *in litt*., N Thompson, *in litt*.).

Since Pied Crows are numerous and widespread, and can kill so many tortoises, it is logical that they must be capable of inflicting serious damage on other vulnerable prey species (Fincham *et al.* 2014, Cunningham *et al.* 2015, Fincham *et al.* 2015). This must be especially so where their abundance has increased substantially. It is also rational to conclude that their sheer numbers, spread over most of South Africa, correlate with the serious decline in prevalence of competing avian predators and scavengers, and might even be directly causal (Simmons *et al.* 2011, Fincham *et al.* 2015, Ogada *et al.* 2015).

The Karoo Survey

Specific results for the Pied Crow and other corvids were extracted from pentad lists that were compiled for all bird species during a co-ordinated atlasing expedition. In each pentad crows and ravens were also counted as an additional task. The survey was conducted by a group of 12 experienced atlasers in a remote part of the Nama Karoo from 25 April to 3 May 2015. The overall methodology and results have been described elsewhere (Nupen 2015, Schmidt *et al.* 2015, Tripp 2015). Atlasers worked from bases on Damesfontein and Ouland Farms in the Murraysburg district. The geographical area within which surveyed pentads were situated was bounded by the N1 freeway in the north-west, and the towns of Nieu-Bethesda (north), Graaff-Reinet (east) and Aberdeen (south). The general locality typifies the kind of remote situation where more atlas coverage is needed in order to progressively improve estimates of species abundance and demarcation of distribution (LG Underhill, *in litt*.). Atlased pentads were three of the South African provinces, namely the Eastern, Northern and Western Cape Provinces.

A total of 191 species were recorded on 70 full protocol atlas cards that were derived from 67 pentads (Nupen 2015). A pentad is a square measuring 5 min latitude x 5 min longitude, which covers approximately 60 km^2 of ground surface, depending on topography and global curvature. Therefore, the data relate to a total area of at least 4000 km.

The results for Pied Crows and other corvids are summarised in Table 1. Note: the term "murder" as used in the footnotes to the table is the collective noun for a group of crows.

Table 1. Summary of the prevalence of Pied Crows, White-necked Ravens and Cape (Black) Crows in pentads.

	Pied Crows	White-necked Ravens	Cape (Black) Crows
Pentads with crows (%)	89.6 (60/67)	44.8 (30/67)	8.9 (6/67)
Mean crow #/pentad	4.8 (323/67)	1.06 (71/67)	0.13 (9/67)
Maximum corvid #/pentad	27[a]	14[b]	2
[a]A murder of 27 Pied Crows was seen scavenging from a road kill in pentad 3155_2400.			
[b]A murder of 14 White-necked Ravens and 12 Pied Crows was seen in pentad 3155_2350, also scavenging from a road kill.			

Discussion

Pied Crows and White-necked Ravens were clearly the predominant scavengers in the surveyed area. Inevitably, both species will also be significant predators of a wide range of vulnerable avian, mammalian and reptilian prey. The presence of White-necked Ravens reflects the mountainous nature of much of the terrain. Cape (Black) Crows (*Corvus capensis*) were seen in only six pentads.

The primary objective of SABAP2 atlasing is to list bird species detected in a pentad within a limited time. To simultaneously enumerate a species is an extra secondary task. It follows that if the main objective had been to specifically seek out crows, the numbers recorded would have increased. Nevertheless, it is reasonable to infer that Pied Crows were resident in all the pentads covering an area of at least 4000km^2, and White-necked Ravens in about half of them.

Because of recently proven heavy predation on tortoises by Pied Crows when nesting (Fincham *et al.* 2014, Fincham *et al.* 2015, K Retief, *in litt*., F van der Merwe, *in litt*.), research is needed urgently on prey utilisation in particular, but also on the biology, behaviour and ecology of the species (especially in relation to re-distribution). For instance, personal observations (by JEF) in an urban situation suggest that Pied Crows operate as family groups of up to eight birds, in which the young remain for a long time after they have become adults. This is not mentioned in Roberts VII (Hockey *et al*. 2005). Another research aspect is that it might be necessary to use molecular scatology to detect prey that has been digested to the extent that there is little or no physical evidence as to its identity (Oehm *et al.* 2011). For example, hatchling tortoises are small and soft, and may be swallowed whole or be eaten piecemeal, with the result that no carapace or plastron may be discarded beneath crow nests. The same applies to a range of other prey, including chameleons, geckos, nestling birds, eggs and invertebrates.

The results provided here for the Pied Crow add to the emerging overall SABAP2 picture of widespread increased and more localised decreased abundance of this species (Fincham *et al.* 2015, LG Underhill, *in litt*.). It has been mooted that deliberate or inadvertent poisoning with agrochemicals might explain decreases in abundance in crop-farming areas in the north east of South Africa, but this is unlikely according to expert opinion (GH Verdoorn, *in litt*.). Another

possibility is that crows from these areas have moved into the adjacent Gauteng Province, where crow abundance has increased markedly. Gauteng is heavily populated by humans. Therefore, food litter and other waste that is inevitably attractive to crows is available to them.

Raptors were scarce in the surveyed area, except that five pairs of Verreaux's Eagles *Aquila verreauxii* were seen, a juvenile and an adult were photographed, and incubation had started at one nest. The Southern Pale Chanting Goshawk *Melierax canorus* and Jackal Buzzard *Buteo rufofuscus* were widespread but not apparently numerous. African Fish-Eagles *Haliaeetus vocifer* were present at large dams with semi-permanent water. No vultures were recorded.

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