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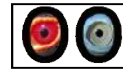
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NUMBER OF NESTS OWNED BY INDIVIDUAL CAPE WEAVER MALES

H. Dieter Oschadleus^{1*} and Leah Werner²

¹ Animal Demography Unit, University of Cape Town, Rondebosch, 7700

² University of Maryland, College Park, United States

* Corresponding author: doschadleus@gmail.com

PHOTOS of Weaver Nests (PHOWN) is a Virtual Museum, citizen science project of the Animal Demography Unit, to collect and monitor breeding distributions and colony sizes of weaver birds globally. This is the fourth paper in a series of exciting new results from PHOWN, the previous three being Oschadleus (2014, 2015, et al. 2015).

Introduction

In this study we estimate the number of nests owned by male Cape Weavers *Ploceus capensis* on a single day. This is important because more nests present in a colony results in a higher number of nests accepted by females, as has been shown in Village Weavers *Ploceus cucullatus* (Camara-Smeets 1982) and Southern Red Bishops *Euplectes orix* (Lawes et al. 2002).

The Cape Weaver, a near endemic to South Africa, is colonial and polygynous, attracting up to eight females per male in a breeding season (Elliott 1973). The breeding season of the Cape Weaver is from June to December in the winter-rainfall region of the Western Cape. Cape Weavers prefer trees, and also use reeds as nesting sites. Colonies consist of a single male or, more often, 2–20 males

(Hockey *et al.* 2005). Individual males build multiple nests consecutively within a small territory in a colony to attempt to attract several females and thus increase their reproductive success (Elliott 1973). Males demolish selected nests that were not used for breeding or where breeding is finished (successfully or not), to make space for new nests because females of polygynous weaver species typically only accept green nests (Collias and Victoria 1978). Thus a male may build up to about 30 nests in a season (Elliott 1973) but only a few are present on any day.

Methods

Observations were conducted at four colonies in Pinelands, Cape Town, South Africa, from 19 June to 5 August 2013. A fifth colony with one male was found on 28 June, and included in the study from 3 July. The four main colonies are well established and were known since at least 2005 (Oschadleus 2006), with colony "Plane" being found as early as 1999 (HDO, pers. obs.).

The study was conducted in the early part of the breeding season for this species. Colonies were in trees on pavements between roads and gardens, and these provided a range of colony sizes. The colonies were in gum *Eucalyptus*, plane *Platanus*, and stone pine *Pinus pinea* trees. Two colonies included nearby sub-colonies, within 20 m of the larger colony, and these were treated as single colonies.

The colonies were visited every 4.4+–4.9 days by LW, with observation periods of 20–60 minutes duration per colony. During observations, total nests were counted. The nests were plotted on a sheet of paper and males were observed to see which nests they spent time at (building, displaying, hanging). This allowed groups of nests to be assigned to the territories of individual males. Males in full breeding plumage were observed (immature males are often

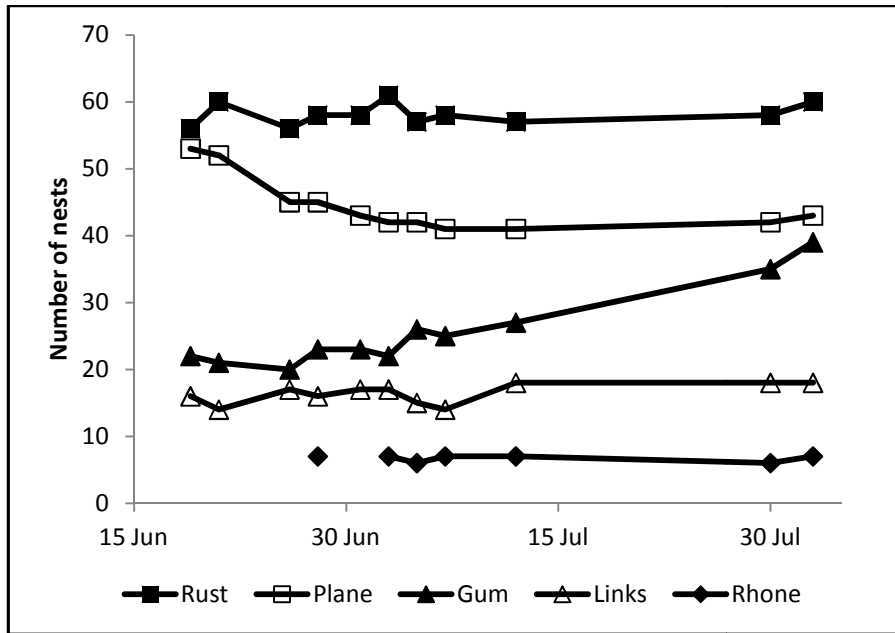
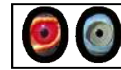


Fig 1 - Total colony size (number of nests) by date for Cape Weaver colonies in Pinelands, Cape Town (no count was made at "Rhone" on 1 July, hence a gap in the line).

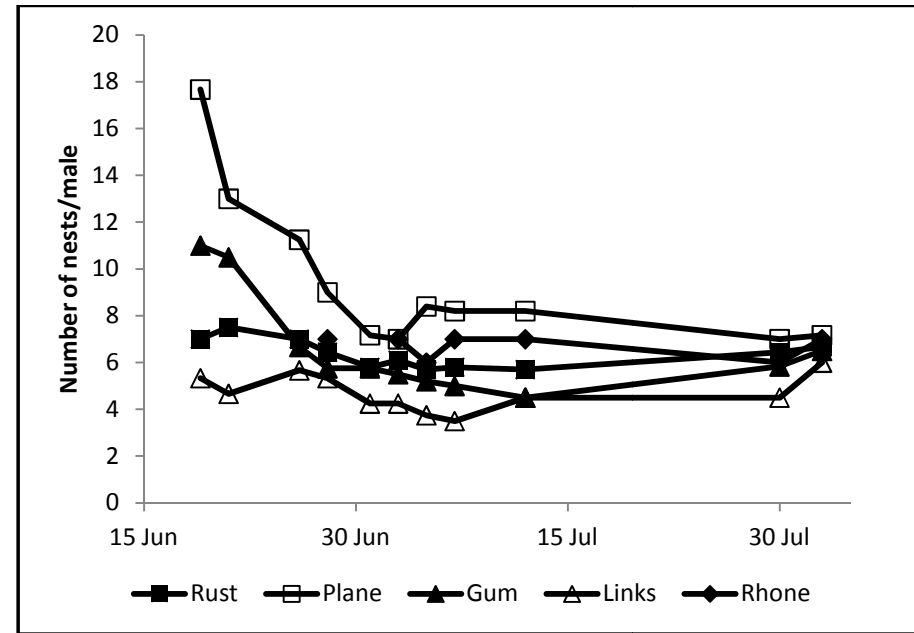


Fig 2 - Number of nests per male by date for Cape Weaver colonies in Pinelands, Cape Town.

present in colonies but were not observed in this study). Nests per male were counted directly and calculated as total nests in colony / number of males in colony. Colony records are archived in PHOWN.

Results

Colony size varied widely, from an average of 6.7 nests in "Rhone" colony to 58.1 nests in "Rust" (Fig 1,3,4). Through the study period, three of the five colonies showed small fluctuations around the average number of nests. Colony "Plane" showed an initial decline and colony "Gum" increased steadily after an initial plateau (Fig 1). A Mann-Whitney U test for two samples confirmed that the changes in

these two colonies were significant and the fluctuations in "Links", "Rust" and "Rhone" were not significant (Table 1).

The number of resident males varied from 1 to 10 males per colony. Colonies ranged from having no temporal change in the number of resident males (one male in "Rhone" colony) to an increase of four males (colony "Gum") from the start to the end of the study period, as new males settled in a colony. A Mann-Whitney U test for two samples showed that the changes in the number of males were significant between June and later counts, except for colony "Rhone" in which a result could not be calculated (Table 1).



Table 1. Cape Weaver colonies studied in Pinelands, Cape Town, June–August 2013 (* colonies that include sub-colonies), and testing for changes in colony size between June and July onwards (Mann-Whitney U test for two samples).

Colony :	Links	Gum	Plane *	Rust *	Rhone
Tree species	Gum	Gum	Plane	Pine	Pine + gum
Max nests	18	39	43	61	7
Max males	4	6	6	10	1
Mean Nests/male	4.4	5.5	7.6	6	6.7
Changes in colony size	No U=7.5 p=0.25	Yes U=2 p=0.03	Yes U=28 p=0.01	No U=9 p=0.38	No U=4 p=0.75
Changes in no. of males	Yes U=2 p=0.01	Yes U=1 p=0.02	Yes U=1.5 p=0.02	Yes U=1 p=0.01	n/a U=3 n/a

During the observations, males each mostly visited 1-3 nests, and rarely up to 7 nests. This was lower than expected, so only calculated results (i.e. total nests/total males per colony) are used here. The number of nests per male was initially disproportionately large in two colonies, namely "Gum" and "Plane", due to many nests from the previous season still being present (Fig 2). By July the proportion of nests/male had stabilised in all colonies studied. Also, by this stage, very few year-old nests were thought to remain, based on the field sketches. Thus results from June were excluded. The overall average nests/male is 6.0 (SD = 1.2) for July and August, with the averages in different colonies ranging from 4.4 +/- 0.8 to 7.6 +/- 0.6 (n=7 observations per colony, Table 1).



Fig 3 - Cape Weaver colony ("Rust"), from PHOWN 6849.

Discussion

The range of colonies studied was large, from maximum nest counts varying from 7–61 nests (mean=32 nests) and 1–10 males per colony (Table 1). The overall range of colony sizes for this species is comparable with 1–348 nests (mean=19.9, n=1466, PHOWN database), showing that colony sizes in this species are normally small but can occasionally be very large.

The overall average nests/male is 6.0 (SD = 1.2), with the averages in different colonies ranging from 4.4 +/- 0.8 to 7.6 +/- 0.6. These results were obtained by calculation as males do not visit all their nests during an observation period – this was also found to be the



Fig 4 - Cape Weaver male building in colony ("Rust"), from PHOWN 6849

case in Southern Masked Weavers *P. velatus* (Walsh et al. 2013). We are confident that all males were counted at each colony, based on the field sketches. Another possible way of checking nests belonging to individual males, is to track each nest, but this would mean checking nests on a nearly daily basis, as some nests are destroyed within two days (HDO, pers. obs.), and preferably marking nests which would cause disturbance at the colony.

No previous study has adequately estimated nests per male in weavers. Rowan (1953) noted a Cape Weaver colony with 6–7 males, and suggested that each male had 2–3 nests, but no total

number of nests was provided. Elliott (1973) provided limited data on the number of active nests per male for the entire breeding season, but not on nests present on one day per male. Our study suggests that the number of nests visited per male in one observation period is an under-estimate of the nests owned by a male.

Early in the breeding season, there may be old nests present and not all males have settled in colonies, meaning that colony sizes and nest ownership are best estimated a month after nest building begins.

By having more nests present in a territory, even if some of these nests are old or occupied by females, a male can display from more of his nests, thus appearing to be fitter (than a male with less nests) to any passing female. Defending too many nests, however, presumably has costs and territory size is limited in larger colonies (Collias *et al.* 1971). This study suggests that 4.4 to 7.6 nests with an average of 6 ± 1.2 nests per male represents a trade-off between these costs of defending many nests and the benefits of having more nests to display from.

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Box 1. Weaver species pages

Each weaver species has a species web page. All species show the following sections:

1. Basic biology (based on the first Weaver Wednesday series, but occasionally updated)
2. Breeding facts (based on Handbook of the Birds of the World, Vol. 15.)
3. Thumb-nails of the most recent PHOWN records.
4. Breeding distribution

In addition, at the top of each species page, there may be two more sections:

Links to **species categories** that the species falls into (click to read more about the category and see which other weavers fall into the same category). More categories are added periodically.

Discovery of the weaver species. This is based on the second Weaver Wednesday series, and each week another species text is updated.

To view the species page for the Cape Weaver, see

<http://weavers.adu.org.za/sp.php?spp=799>

Use the drop-down menu to choose any other species.