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BREEDING DATA ON THE BIRDS OF NAMIBIA: LAYING MONTHS, COLONY AND CLUTCH SIZES AND EGG MEASUREMENTS

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ABSTRACT

The timing of bird breeding in Namibia and the sizes of clutches and nesting colonies are presented per species, derived from 7 231 nest record cards, over 300 publications, museum and private egg collections and via personal communications. Of the 687 bird species recorded to date for Namibia some 514 species are likely to breed in Namibia. Of these 449 species (87.4%) have been confirmed to do so while 65 species (12.6%) expected to breed in Namibia have not yet been recorded doing so. Of the 449 species confirmed breeding in Namibia, 24 species have insufficient information to establish accurate breeding data such as laying month or clutch size. 134 species (26%) have more than 30 records on laying month, 89 species (17%) have more than 50 records and 37 species (7%) have 100 or more records. Only three of Namibia's 16 endemic and near endemic species have more than 50 records of laying month and only 13 of Namibia's 55 breeding Red Data bird species have more than 50 records.

Breeding trends for different taxa and for different ecological groups, e.g. birds with different diets, levels of arid-adaption and different lifestyles (migrant versus resident, arborial, cursorial or aerial) are presented and discussed in the context of various ultimate and proximate factors. The information contributes to an improved understanding of breeding in arid tropical and subtropical regions. However, there is considerable scope for more detailed work based on Namibia's growing bird breeding data sets. The data have been placed in the public domain at http://goo.gl/8MLbVw to encourage students, researchers and scientists to investigate in greater depth the environmental factors determining the breeding strategies of birds in arid environments in the tropical and subtropical regions of Africa.

INTRODUCTION

The first recorded mention of birds breeding in the region that is now Namibia was by early mariners in the fifteenth century who noted penguins and other seabirds nesting on islands off the Namibian coast. Further records of seabirds breeding on islands in the 17th to early 19th centuries by whalers, sealers and later guano collectors (Kinahan 1990, 1992, Kemper 2006) pre-date the first recorded breeding observations of terrestrial birds, which were probably those of the Swedish trader and explorer Charles Andersson who noted four White-backed Mousebird *Colius colius* nests in the 1850s (Andersson and Gurney 1872). Axel Eriksson, another Swede, came to Namibia in 1866 to work for Andersson and made the first collection of bird eggs in the country, now in the Vänersborgs Museum in Sweden, between 1876 and 1887.

In 1969 a formal nest record card scheme was started for Namibia by Charles Clinning, ornithologist in the then Directorate of Nature Conservation. This scheme was supported and promoted by later

generations of ornithologists: Tony Williams, Chris Brown and Rob Simmons. Some 45 years have now elapsed since the start of the bird nest record card scheme in Namibia. Over this period some 7 231 nest record cards have been submitted by more than 330 contributors (see Acknowledgements). More than 300 publications and reports provide information on breeding of Namibia's birds (see References, summarized in Table 1). Of these, the Namibia Bird Club newsletter/journal *Lanioturdus* alone represents almost 30% of the references and, together with its predecessor, the *Mitteilungen der Ornithologischen Arbeitsgruppe* which ran from 1965 to 1984, they contribute almost 36% of the references. This illustrates just how important is a local newsletter/journal such as *Lanioturdus* to not only the birding community in Namibia, but also to science and conservation in Namibia and southern Africa. The next most important contributors of breeding references on Namibian birds are *Ostrich*, which nowadays tends not to publish basic field observations, and *Madoqua* which is no longer published. This makes the role of *Lanioturdus* doubly important.

Table 1: Source of published information on breeding birds in Namibia (n=305)

Publication	Percent
Lanioturdus	29.8
Lanioturdus + Mitteilungen der Ornithologischen Arbeitsgruppe	35.9
Ostrich	15.8
Madoqua	11.9
Cormorant	4.3
Bokmakierie	4.0
Gabar/Journal of African Raptor Biology	2.5
Raptors Namibia Newsletter	1.8
Journal of the SWA/Namibia Scientific Society	1.8
Others - journals, books, reports	22.0

Breeding information on birds in tropical and subtropical regions lags far behind that of birds in temperate regions. Breeding information from arid regions, particularly in Africa also lags behind that of higher rainfall areas. As a result, our understanding of the trends and patterns of bird breeding in arid and semi-arid tropical and subtropical regions in Africa is rather poor. This publication aims to help redress this situation. We present the following breeding information, per species, for birds in Namibia:

- the months in which eggs (clutches) were laid,
- clutch sizes,
- egg measurements – but only those extracted from nest record cards, notebooks and personal correspondence, not from the literature,
- colony sizes in the case of colonial nesting species,
- in the case of parasitic species, the host species recorded, and
- for falcons, kestrels, owls and Red-headed Finch which use a range of different nesting sites and/or different species' nests, the nest sites recorded.

We then use the above information to look at breeding trends in different taxonomic and ecological groups of birds.

The data presented here are updated from time to time with new records and are freely available in Excel® spreadsheets at the following link: http://goo.gl/8MLbVw

METHODS

The breeding birds of Namibia are those recorded or expected to breed within the territory of Namibia as recognised by the international community through the United Nations, including Namibia's territorial and exclusive economic coastal and marine

zones and its off-shore islands. Information was extracted from the Namibian and southern African Nest Record Card schemes, Namibia's Avifaunal Database (Jarvis *et al*. 2001), museum and private collections, publications, research reports, websites, private note books, photo collections and through personal communications. If any breeding information on birds in Namibia covered by this publication exists in publications or reports not listed in the Reference section, then that information has not been included here. It should be drawn to the senior author's attention so that it might be added to the Excel® spreadsheets referred to above.

In solitary nesting species an active nest represents one breeding record. In colonial species the entire colony, consisting of perhaps many active nests, also represents a single breeding record. The colony size is measured by the number of active nests.

"Egg-laying month" is the month in which the clutch was laid. In detailed breeding biology studies, frequent visits to a nest allow the laying date to be accurately determined. In less detailed studies, but where a number of visits to a nest took place across the nesting cycle, the laying date can usually be calculated to within a few days. Many nest record cards contain just one-off observations. In some cases a single nest visit happened to coincide with a stage in the breeding cycle that provided information that could be used to estimate the laying date of the clutch. For example, if a single visit to the nest of an African Red-eyed Bulbul *Pycnonotus nigricans* found two newly hatched chicks a day or two old and one egg on 8 December, then the laying month was November (i.e. incubation period of about 12 days which takes the laying date back to about 25 or 26 November). The clutch size is three. However, if a nest record card for the same species with just one visit recorded two eggs on 8th December, there is no way to determine (a) exactly when the clutch was laid, and (b) whether the clutch is complete. The clutch could have been laid up to 12 days ago or could have been laid over the last two days. For these types of records and for species with incubation periods of up to about 34 days, the laying date was calculated by subtracting half the incubation period, i.e. for the Bulbul, six days from the date of the visit. The clutch was thus taken to have been laid from 2 December. The clutch size could not be determined. If a second visit to this nest had taken place three days later and the clutch size was still 2 eggs, then the clutch would have been recorded as 2. For species with incubation periods in excess of about 34 days, the method of calculating the laying date from one visit based on half the incubation period was considered too inaccurate. These records were not included in this publication.

White-backed *Gyps africanus* and Lappet-faced *Torgos tracheliotus* Vultures have enjoyed a number of decades of monitoring, ringing and research in Namibia. Many hundreds of nestlings have been ringed and measured. Mundy's (1982) age-wing length growth curves for these two species were used to calculate the ages of chicks when ringed and thus the dates when the eggs were laid.

For parasitic species such as cuckoos, honeyguides, whydahs and indigobirds, the clutch size refers here to the number of eggs of the parasitic species in a single nest. Some parasitic species typically lay a single egg in each host nest, while others may lay two or three eggs per nest. Parasitic species may lay a few dozen eggs in the course of a breeding season, spread across the nests of many different host pairs (Tarboton 2011).

In a broad collection of data such as in this study it is not possible to ensure that the information is without various biases. For example, eggs from a clutch could be lost to predation or egg breakage before

the nest is monitored, and eggs could be dumped into the nests by conspecific females. The eggs of parasitic birds that closely resemble those of the host could have been overlooked. These biases are likely to be relatively small.

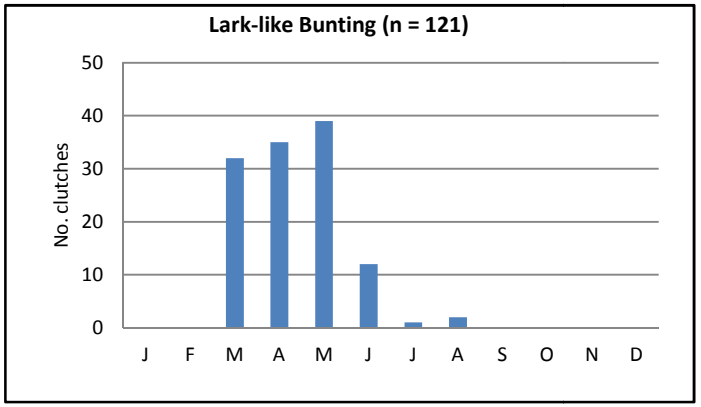
A number of nest record cards, publications, reports, museum labels and other potential sources of information did not contain sufficient breeding data to allow egg-laying dates or clutch sizes to be determined. Only those sources of information which allowed the laying month and/or the clutch size to be determined with a reasonable degree of confidence were used.

In the case of egg measurements, we present only information contained on nest record cards, recorded in note books and via correspondence. The information is captured here so that the data are not lost. Egg measurements have not been extracted from the literature or from collections.

The breeding data per species are presented in Annexes 1 to 3. Annex 1 contains tabulated laying months and colony sizes as well as scientific names. Annex 2 contains tabulated clutch sizes. Annex 3 provides a summary of egg measurements. The data in the Annexes are explained below:

Explanation of Annex 1 (a): Egg laying months – solitary nesting species

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lark-like Bunting *Emberiza impetuani*	0	0	32	35	39	12	1	2	0	0	0	0	**121**	**121**



Number of clutches that were laid in that month (i.e. 12 clutches in June which is also the number of breeding records for that month).

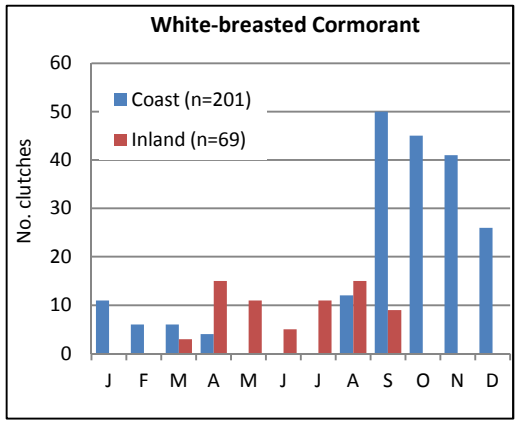
Total records = sum of number of clutches for all the months. In the case of solitary nesters the total records = total nests.

Explanation of Annex 1 (b): Egg laying months – colonial species

Family, Species and Colony size		Egg-laying month												Total records	Total nests
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Phalacrocoracidae															
White-breasted Cormorant	C	11	6	6	4	0	0	0	12	50	45	41	26	**201**	**87**
Phalacrocorax carbo															**2,550**
Coastal: mean = 22 (1-79) n=114	I	0	0	3	15	11	5	11	15	9	0	0	0	**69**	**24**
Inland: mean = 13 (1-200) n=45															**569**

Mean = the average number of nests (i.e. 13) in the sample of 45 records that provide info on size of colony, with the range being 1 to 200 nests.

C = coastal breeding population, **I** = inland breeding population

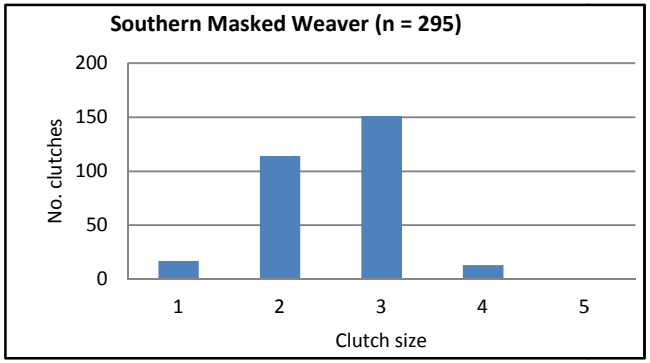


Number of records.

Number of nests. Of the 201 coastal records, 114 provided data on no. of nests – in total 2 550 nests. 87 records did not provide any data on no. of nests.

Explanation of Annex 2: Clutch sizes

Species	Summary				Clutch size						
	Min	Mean	Max	n	1	2	3	4	5	6	7
Southern Masked Weaver	1	2.5	4	295	17	114	151	13			



The total number of clutches recorded for Southern Masked Weaver (n) was 295. The average (mean) clutch size was 2.5 eggs, the smallest clutch was 1 and the largest clutch was 4.

There were 151 records of 3-egg clutches.

Explanation of Annex 3: Egg measurements

Species	Summary										
	Length (mm)			Width (mm)				Mass (g)			
	Min	Mean	Max	Min	Mean	Max	n	Min	Mean	Max	n
Gabar Goshawk	35.6	39.2	40.2	30.5	31.3	32.1	9	17.0	19.8	21.5	9

The sample size (n) is 9 eggs. The average length and width (or breadth) of the eggs is 39.2 mm by 31.3 mm respectively. The range of lengths is 35.6 to 40.2 mm; the range of widths is 30.5 to 32.1 mm.

The sample size (n) is 9 eggs. The average mass is 19.8 g and the range is 17.0 to 21.5 g.

RESULTS AND DISCUSSION

Overview

Of the 687 bird species recorded to date for Namibia 162 are non-breeding migrants, pelagics and vagrants (Table 2). Eleven species could possibly breed in Namibia but, on current evidence, are unlikely to do so (Table 3). That leaves a total of 514 bird species likely to breed in Namibia. Of the likely breeding birds, 449 species (87.4%) have been confirmed to breed in Namibia. Sixty-five species (12.6%) of birds expected to breed in Namibia have not yet been recorded doing do (Table 4). Of the 449 species confirmed breeding in Namibia, 24 species have insufficient information to establish accurate breeding data such as laying month and/or clutch size (Table 5). There are 425 breeding species in Namibia with sufficient information to determine a laying month and/or clutch size. The laying months and clutch sizes for these species are set out in Annexes 1 and 2 respectively.

Annex 1 contains a total of 16 399 breeding records for egg-laying months representing over 3.284 million clutches. While this may seem a large set of data, when looked at across all the species it can be seen that only 134 species (26% of the 514 likely to breed in Namibia) have more than 30 records, only 89 species (17%) have more than 50 records and only 37 species (7%) have 100 or more records (Table 2). While this shows that considerably more breeding data are needed on Namibia's birds, we can take heart from the fact that, in 1979 when Clinning compiled a summary of breeding information on Namibia's birds there were only 239 species with breeding information and only seven species had more than 50 records. In 1987 the comparative figures were 289 and 20 species respectively (Brown 1987) and in 2015, 425 and 89 species respectively (Table 6). This means that, of the 514 bird species expected to breed in Namibia, the percentage of species with no breeding information fell from 53% in 1979 to 44% in 1987 to 17% in 2015.

Table 2: Numbers of non-breeding and breeding birds in Namibia and numbers of breeding records.

Breeding status		**No. species**	**%**	**% of the 514 likely breeding species**	
1. Birds that do not breed in Namibia		162	23.6		
2. Birds that could possible breed in Namibia, but are considered unlikely to do so (Table 3)		11	1.6		
3. Birds expected to breed in Namibia but have not yet been confirmed to do so (Table 4)		65	9.5	12.6	12.6
4. Birds confirmed breeding in Namibia but with no details on laying dates (Table 5)		24	3.5	4.7	
5. Birds confirmed breeding in Namibia and with breeding information on laying dates (Annex 1)	< 10 records	188	61.8	36.6	87.4
	10-19 records	67		13.0	
	20-29 records	36		7.0	
	30-39 records	21		4.1	
	40-49 records	24		4.7	
	50-74 records	30		5.8	
	75-99 records	22		4.3	
	100+ records	37		7.2	
	Total	*425*		81.3	
Overall total		**687**			

Table 3: Bird species that could possibly breed in Namibia but are considered, on the strength of current knowledge, unlikely to do so.

Australasian Gannet	Cape Clapper Lark	Angola Swallow
Eurasian Bittern	Karoo Lark	Croaking Cisticola
Crowned Eagle	Dusky Lark	Cardinal Quelea
Ross's Turaco	Eastern Saw-wing	

Table 4: Bird species expected to breed in Namibia but for which there are as yet no confirmed records.

Woolly-necked Stork	Crowned Hornbill	Stierling's Wren-Warbler
African Cuckoo-Hawk	Trumpeter Hornbill	Cinnamon-breasted Warbler
Black Harrier	Brown-backed Honeybird	Chinspot Batis
African Goshawk	Greater Honeyguide	Amethyst Sunbird
African Hobby	Olive Woodpecker	Malachite Sunbird
Crested Guineafowl	African Broadbill	Southern Double-collared Sunbird
Red-chested Flufftail	Flappet Lark	African Yellow White-eye
Denham's Bustard	Large-billed Lark	Grey-headed Bushshrike
Lesser Jacana	Woodland Pipit	Orange-breasted Bushshrike
Black-cheeked Lovebird	Plain-backed Pipit	African Golden Oriole
Thick-billed Cuckoo	Rosy-throated Longclaw	Common Myna
Red-chested Cuckoo	White-breasted Cuckoo-Shrike	Yellow-throated Petronia
African Emerald Cuckoo	Cape Bulbul	Cape Weaver
Coppery-tailed Coucal	Eastern Nicator	Orange-winged Pytilia
White-browed Coucal	Red-capped Robin-Chat	Jameson's Firefinch
Black Coucal	Angola Cave Chat	Orange-breasted Waxbill
Swamp Nightjar	Collared Palm Thrush	Bronze Mannikin
Pennant-winged Nightjar	Bearded Scrub Robin	Cuckoo Finch
Narina Trogon	Sickle-winged Chat	Broad-tailed Paradise Whydah
Brown-hooded Kingfisher	Red-faced Cisticola	Purple Indigobird
African Pygmy Kingfisher	Namaqua Warbler	Yellow-fronted Canary
Half-collared Kingfisher	Yellow-breasted Apalis	

Table 5: Bird species that have been confirmed breeding in Namibia but for which there is insufficient detailed information to derive laying dates and clutch sizes.

White-faced Whistling Duck	Coqui Francolin	Eastern Black-headed Oriole
Hottentot Teal	Cape Spurfowl	Miombo Blue-eared Starling
Bat Hawk	Baillon's Crake	Common Starling
Hooded Vulture	Alpine Swift	White-winged Widowbird
African Harrier-Hawk	Green-backed Honeybird	Fan-tailed Widowbird
Black Sparrowhawk	Terrestrial Brownbul	Cinderella Waxbill
African Marsh Harrier	Little Rush Warbler	Cut-throat Finch
Ovambo Sparrowhawk	Green-capped Eremomela	Pin-tailed Whydah

Table 6: Comparison of breeding information on the birds of Namibia over the past 35 years

Date	Sources	No. nest record cards	No. breeding publications	No breeding records	Approx no. nests (millions)	No species with breeding data	No. spp with >50 records
1979	Clinning	2 484	101	2 477	-	239	7
1987	Brown	5 000	142	5 148	1.5	289	20
2015	This publication	7 231	305	16 399	3.284	425	89

For some species there is a large number of breeding records (Table 7), e.g. laying months for Lappet-faced Vulture (1 274 records), Damara Tern *Sterna balaenarum* (1 073) and White-backed Vulture (872). However, there remain far too many species with no and/or too few records to provide a meaningful understanding of their breeding. Collection of breeding information remains important for improving our understanding of the biology of many species. This should be a particular priority for endemic (Table 8) and Red Data (Table 9) species.

Table 7: The 37 bird species with more than 100 egg-laying month records in Namibia and the highest number of clutch-size records

Laying month		Clutch size	
Species	**No. records**	**Species**	**No. clutches**
Lappet-faced Vulture	1 274	Lesser Flamingo	50 500
Damara Tern	1 073	Greater Flamingo	27 000
White-backed Vulture	872	African Penguin	2 797
White-fronted Plover	407	Hartlaub's Gull	1 104
Southern Masked Weaver	295	Lappet-faced Vulture	1 069
White-breasted Cormorant	270	Cape Cormorant	1 019
African Penguin	211	Damara Tern	1 012
Red-knobbed Coot	211	Swift Tern	906
Laughing Dove	210	Red-billed Quelea	773
Common Ostrich	203	Wattled Starling	655

White-browed Sparrow-Weaver	174	Cape Gannet	639
Rock Martin	165	Pied Avocet	602
Lesser Moorhen	164	Great White Pelican	590
Crowned Lapwing	163	Black-necked Grebe	429
African Reed Warbler	149	Kelp Gull	361
Monteiro's Hornbill	148	Grey Heron	295
Chestnut Weaver	145	White-fronted Plover	298
Namaqua Sandgrouse	143	Southern Masked Weaver	295
Little Grebe	141	White-breasted Cormorant	291
Pale Chanting Goshawk	133	Whiskered Tern	246
Southern Grey-headed Sparrow	129	African Openbill	231
Cape Crow	128	African Darter	203
Grey Heron	128	Laughing Dove	178
Greater Kestrel	128	Red-knobbed Coot	157
Lark-like Bunting	121	Chestnut Weaver	149
Kelp Gull	118	South African Cliff Swallow	147
Cape Cormorant	116	African Reed Warbler	147
Acacia Pied Barbet	116	Lesser Moorhen	144
Blacksmith Plover	116	Crowned Lapwing	140
Black-chested Prinia	109	Rock Martin	131
African Red-eyed Bulbul	107	Common Ostrich	114
Cape Turtle Dove	107	White-browed Sparrow-Weaver	116
African Grey Hornbill	106	Lark-like Bunting	115
Kittlitz's Plover	105	White-backed Vulture	118
Tawny Eagle	104	Reed Cormorant	111
Fork-tailed Drongo	104	Greater Kestrel	104
Pririt Batis	102	Namaqua Sandgrouse	104

Of Namibia's 16 endemic and near endemic (>90% of world population) species, seven have fewer than 20 nesting records, 12 have fewer than 50 records and only two species have over 100 records.

Table 8: Number of breeding records for Namibia's endemic and near endemic birds - Red shading <20 records, orange 20-49, yellow 50-99, green 100+ records.

Species	No records of laying date	No. records of clutch size
Hartlaub's Spurfowl	39	23
Rüppell's Korhaan	88	84
Damara Tern	1 073	1 012
Rüppell's Parrot	10	4
Violet Woodhoopoe	11	9
Monteiro's Hornbill	148	92
Damara Hornbill	40	33
Dune Lark	44	29
Barlow's Lark	13	8
Benguela Long-billed Lark	5	4
Gray's Lark	47	28
Herero Chat	9	7
White-tailed Shrike	60	37
Bare-cheeked Babbler	14	11
Rockrunner	31	17
Carp's Tit	12	2

Fifty-five of Namibia's 71 Red Data bird species (Simmons *et al*. in press) breed, potentially breed or have bred (in the case of the nationally extinct Egyptian Vulture) in Namibia. Of these, six species have no breeding information, 31 species, including the six with no breeding data, have fewer than 20 records (56% of the confirmed and likely to breed Red Data species), 40 species (73%) have fewer than 50 records and only six species (11%) have over 100 records. The endemic and Red Data species with large amounts of breeding information have all been the subject of focused research and/or long-term monitoring. Breeding information on laying dates for Namibia's Red Data birds per Red Data category is summarized in Table 10.

Table 9: Number of breeding records for Namibia's Red Data birds
NB = not breeding in Namibia; UB = unlikely to breed in Namibia; NC = not yet confirmed breeding in Namibia but expected to do so; CB = confirmed breeding in Namibia but no details on laying dates or clutch sizes. Red shading <20 records, orange 20-49, yellow 50-99, green 100+ records.

Red Data status	Species	No. Records of laying date	No. Records of clutch size
Nationally extinct	Egyptian Vulture	1	0
Critically Endangered	Black-cheeked Lovebird	NC	NC
	Blue Crane	48	26
	Cape Gannet	52	639
	Cape Vulture	69	49

	Eurasian Bittern	UB	UB
	Great Crested Grebe	11	7
	Grey Crowned Crane	3	1
	Pel's Fishing Owl	1	0
	Tristan Albatross	NB	NB
Endangered	African Penguin	197	2,797
	African Finfoot	1	1
	African Marsh-Harrier	CB	CB
	Atlantic Yellow-nosed Albatross	NB	NB
	Bank Cormorant	79	95
	Bateleur	28	23
	Black-browed Albatross	NB	NB
	Black Harrier	NC	NC
	Black Stork	3	5
	Booted Eagle	3	0
	Cape Cormorant	116	1,019
	Cinderella Waxbill	CB	CB
	Hooded Vulture	CB	CB
	Ludwig's Bustard	20	12
	Martial Eagle	42	28
	Rock Pratincole	16	15
	Rufous-bellied Heron	3	2
	Saddle-billed Stork	6	4
	Slaty Egret	12	22
	Southern Ground-Hornbill	1	0
	Tawny Eagle	104	69
	Violet Wood-hoopoe	11	9
	Wattled Crane	14	11
	White-backed Vulture	872	118
	Yellow-billed Oxpecker	3	0
Vulnerable	African Fish-Eagle	28	25
	African Skimmer	13	37
	Caspian Tern	14	15
	Greater Flamingo	8	27,000
	Great White Pelican	32	590
	Hartlaub's Gull	60	1,104
	Lappet-faced Vulture	1,274	1,069
	Lesser Flamingo	5	50,500
	Secretarybird	53	42
	Spectacled Petrel	NB	NB
	Wandering Albatross	NB	NB
	White-chinned Petrel	NB	NB
	White-headed Vulture	11	11
Near Threatened	African Black Oystercatcher	17	14
	Angola Cave-Chat	NC	NC
	Black-necked Grebe	50	429
	Black-winged Pratincole	NB	NB
	Cape Eagle-Owl	5	5
	Chestnut-banded Plover	94	81
	Crowned Cormorant	76	72
	Damara Tern	1,073	1,012
	Eurasian Curlew	NB	NB
	European Roller	NB	NB
	Great Snipe	NB	NB
	Kori Bustard	33	26
	Maccoa Duck	21	10
	Marabou Stork	8	29
	Northern Giant-Petrel	NB	NB
	Pallid Harrier	NB	NB
	Peregrine Falcon	7	6
	Red-footed Falcon	NB	NB
	Rüppell's Parrot	10	4
	Sclater's Lark	4	2
	Sooty Shearwater	NB	NB
	Verreaux's Eagle	78	47
	White-capped Albatross	NB	NB

Table 10: Number of breeding records (laying dates) for Namibia's Red Data birds

Red Data category	No. breeding spp. / No. spp	No. breeding records (laying dates)						
		0	1-9	10-29	30-49	50-74	75-99	100+
Nationally extinct	1 / 1	-	1	-	-	-	-	-
Critically Endangered	7 / 9	1	2	1	1	2	-	-
Endangered	23 / 25	4	7	6	1	-	1	4
Vulnerable	10 / 13	-	2	4	1	2	-	1
Near-threatened	14 / 24	1	4	3	1	1	3	1
Totals	**55 / 71**	**6**	**16**	**14**	**4**	**5**	**4**	**6**

Another important group of birds are those endemic to the south-west arid zoo-geographic region of southern Africa for which Namibia holds significant proportions of the world population. Table 11 lists the species with about 30% or more of their world population in Namibia. Forty-five species have between 30 and 89% of their world population in Namibia. (Species with 90+% of their world population

in Namibia are termed endemic and near endemic species – see Table 8) Of the 45 species, 33% have fewer than 20 laying date records, 58% have fewer than 50 records and only 13% have 100 or more records.

Table 11: Number of breeding records for bird species endemic to the south-west arid zoo-geographic region of southern Africa for which Namibia has about 30% or more of the world population.
Red shading <20 records, orange 20-49, yellow 50-99, green 100+ records.

% of world population	Species	No. records of laying date	No. records of clutch size
30-39%	Pale Chanting Goshawk	133	100
	Red-crested Korhaan	35	29
	Northern Black Korhaan	17	13
	African Black Oystercatcher	17	14
	Double-banded Sandgrouse	25	18
	Burchell's Sandgrouse	12	10
	White-backed Mousebird	60	48
	Southern Yellow-billed Hornbill	84	40
	Bradfield's Hornbill	8	4
	Monotonous Lark	47	12
	Eastern Clapper Lark	5	1
	Karoo Long-billed Lark	10	6
	Grey-backed Sparrow-Lark	93	74
	African Red-eyed Bulbul	107	67
	Kalahari Scrub-Robin	37	29
	Karoo Chat	8	6
	Black-chested Prinia	109	77
	Barred Wren-Warbler	17	16
	Chat Flycatcher	16	5
	Marico Flycatcher	94	87
	Ashy Tit	9	7
	Crimson-breasted Shrike	84	66
	Scaly-feathered Finch	88	63
	Red-headed Finch	54	37
	Shaft-tailed Whydah	1	1
	White-throated Canary	17	13
40-49%	Crowned Cormorant	76	72
	Red-billed Spurfowl	96	65
	Ludwig's Bustard	20	12
	Namaqua Sandgrouse	143	29
	Tractrac Chat	13	13
	Dusky Sunbird	87	67
	Pale-winged Starling	29	9
	Burchell's Starling	28	20
	Great Sparrow	68	44
	Lark-like Bunting	121	115
50-59%	Burchell's Courser	30	20
	Sociable Weaver	51	12
60-69%	Cape Cormorant	116	1 019
	Stark's Lark	45	44
	Short-toed Rock-Thrush	19	9
70-79%	Bradfield's Swift	41	7
80-89%	Bank Cormorant	79	95
	Rosy-faced Lovebird	30	8
	Black-faced Babbler	4	1

From this analysis is it clear that, while the sets of breeding data on Namibia's birds have grown steadily over the years, they are far short of the desired levels of information for most species. The breeding information needs are, in order of priority:

1. Namibia's Red Data bird species (Table 9), particularly the species shades in red and orange;
2. Namibia's endemic bird species (Table 8), particularly the species shaded in red and orange;
3. Species endemic to the south-west arid zoo-geographic region of southern Africa for which Namibia supports a significant percentage of the global population (Table 11), particularly the species shaded in red and orange and the species with the higher percentage of their world population in Namibia; and
4. Breeding information on other bird species with fewer than 20 breeding records, particularly species not yet recorded breeding in Namibia but likely to do so (Table 4) and species recorded breeding, but with no detailed information on laying dates and clutch sizes (Table 5).

Local students and researchers, visiting scientists and keen birders should direct their efforts towards these priority species.

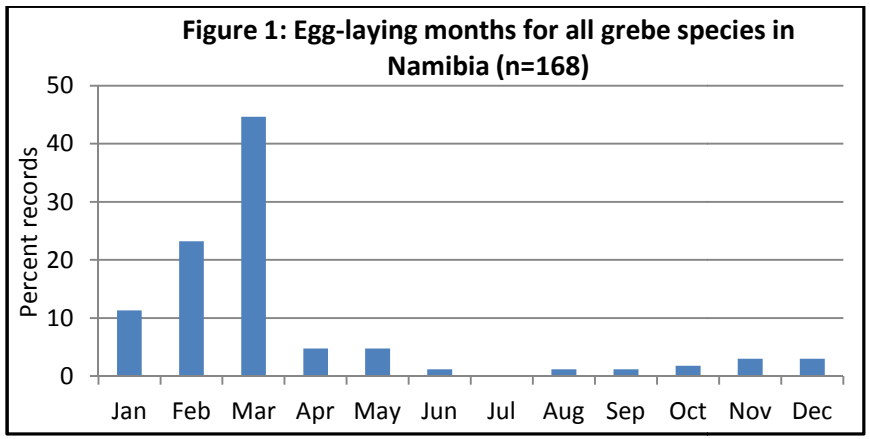
Breeding trends for different taxa

Information is provided in this section for those taxa with both

sufficient information and clear and consistent trends across most or all of the species in each respective taxon. The Anatidae (ducks and geese) are not shown for example because, while most species breed throughout the year, some have a peak early in the year (e.g. White-backed Duck *Thalassornis leuconotus* and Red-billed Teal *Anas erythrorhyncha*), some breed mid-year (e.g. South African Shelduck *Tadorna cana*) and others breed more or less equally in any month of the year (e.g. Egyptian Goose *Alopochen aegyptiaca* and Cape Teal *Anas capensis*). Summing all the Anatidae and showing the data as a percentage of breeding records per month would simply reflect the trends of those species with the largest data sets. For these taxa it is more appropriate to look at the breeding information of the individual species (Annex 1).

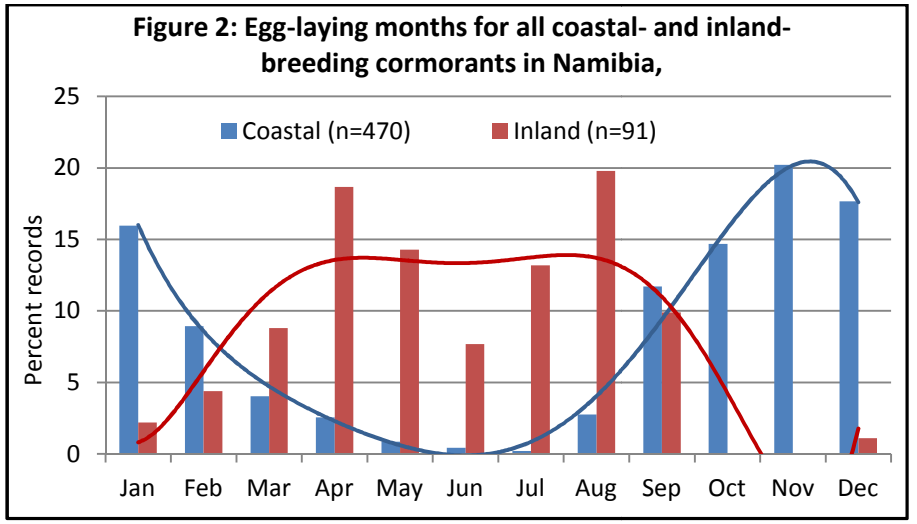
Grebes

Egg laying peaks in January to especially March (Figure 1), with these three months accounting for 79% of all records. This coincides with the times when the pans fill from the rains and aquatic vegetation starts to emerge.



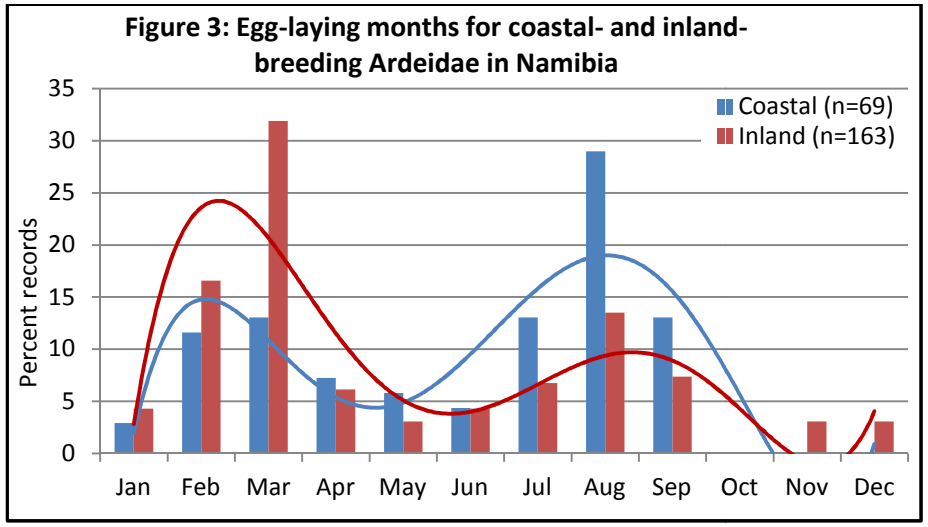
Cormorants

Coastal nesting cormorants lay mainly from September to January (80% of records) whereas inland breeding cormorants lay mainly from April to September (84% of records), with a bimodal trend peaking after the rains April-May once the floodplains become inundated and fish move into this new habitat to breed, and again in July-August as water levels drop and fish become concentrated in smaller water bodies (Figure 2).



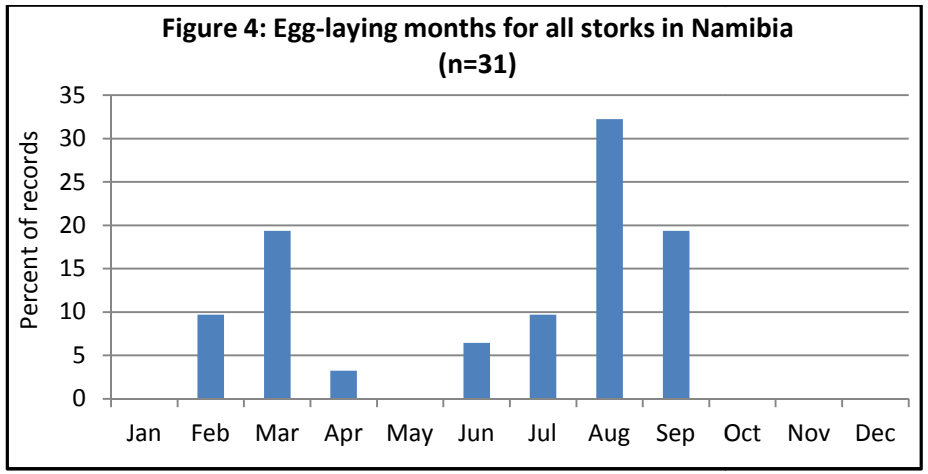
Herons and egrets

The Ardeidae show a similar bimodal trend but for both coastal and inland breeding birds in Namibia (Figure 3), the first peak coinciding with the rains when pans and dams fill up in February and March, the second coinciding with the period from July to September when water bodies shrink, perennial rivers are at their lowest and aquatic food becomes more concentrated and accessible. Inland breeding birds have their greater peak in the early part of the year while coastal breeding species peak later in the year.



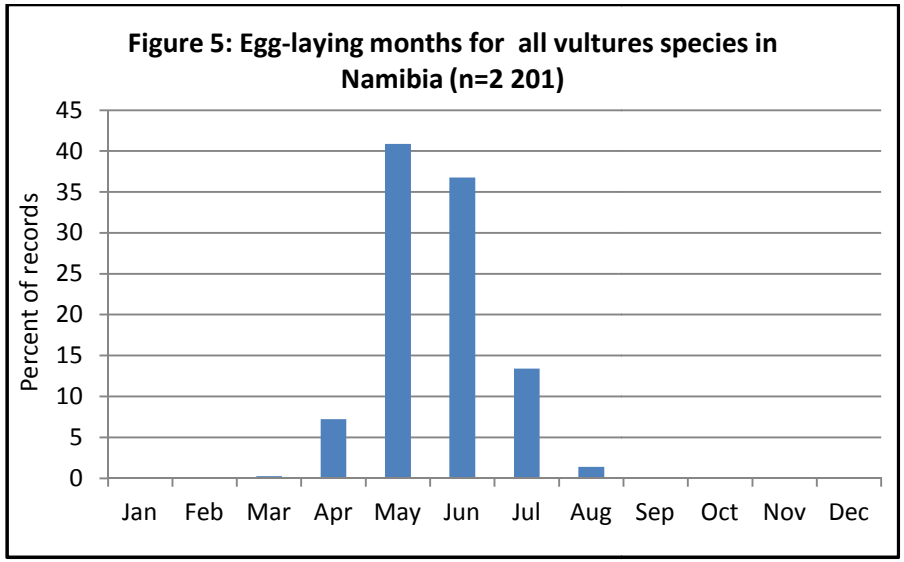
Storks

Storks show the same bimodal pattern as inland breeding cormorants, herons and egrets with breeding peaks in March and August-September, these three months accounting for 71% of their breeding records (Figure 4).



Vultures

Vultures in Namibia lay in winter between April and August, with a peak in May and June (78% of records, Figure 5). Large data sets are available for White-backed and Lappet-faced Vultures, based on wing measurements of nestlings when ringed. Mundy's (1982) known-age wing-length relationship was used to calculate the age of ringed nestlings. The laying date was then determined by subtracting the age of the nestling and the species' incubation period from the date when it was measured and ringed. Two sets of data are available for White-backed Vultures, from the Etosha National Park and from the Central areas of Namibia respectively (Figures 6 and 7), and two sets for Lappet-faced Vultures, from the Etosha National Park and from the Namib (Figures 8 and 9). At the national level, laying peaks for White-backed Vultures in May (65% of clutches, n=866) and for Lappet-faced Vultures, June (51%, n=1 256).



The median laying date for White-backed Vultures measured and ringed in Etosha (Figure 6) over a 15 year period (1998-2012) was 13 May and slightly later, 18 May, for White-backed Vultures in central Namibia (Figure 7) over an 11 year period (2003-2013). The median laying date for measured and ringed Lappet-faced Vultures in Etosha (Figure 8) over the same 15 year period was 31 May and somewhat later in the Namib (Figure 9) at 8 June (16 year period, 1993-2008). These results would indicate that (a) the peak of White-backed Vulture egg-laying takes place about 3 weeks earlier than that of Lappet-faced Vultures, and (b) both species lay about a week earlier in the north of Namibia than in the central and western areas.

Figure 6: Laying dates for White-backed Vultures in Etosha National Park based on wing measurements using known age - wing length relationship (Mundy 1982), (annual data 1998-2012, n=345)

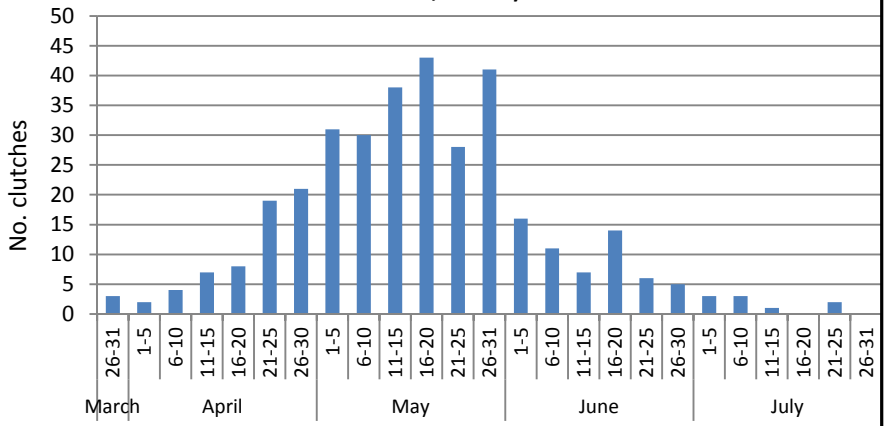


Figure 7: Laying dates for White-backed Vultures in the central regions of Namibia based on wing length measurements and using known age - wing length relationship (Mundy 1982), (annual data 2003-2013, n=347)

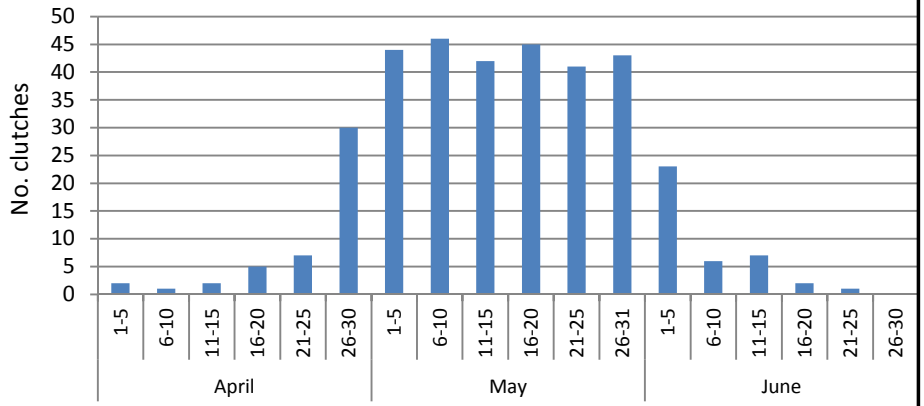
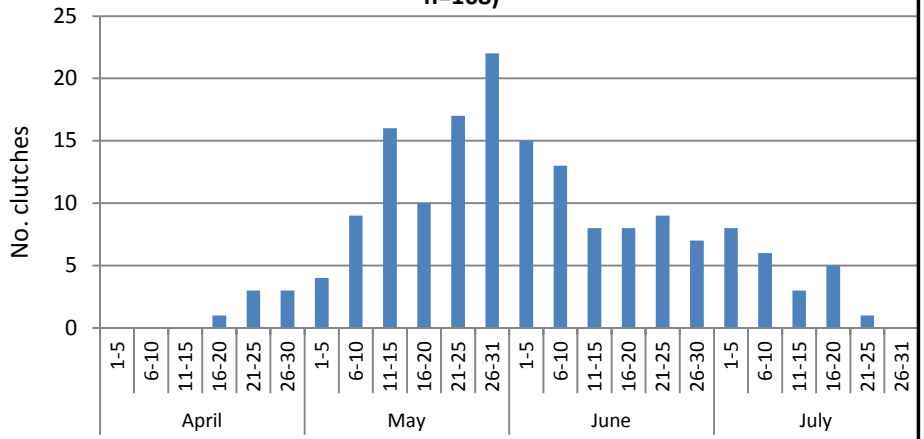
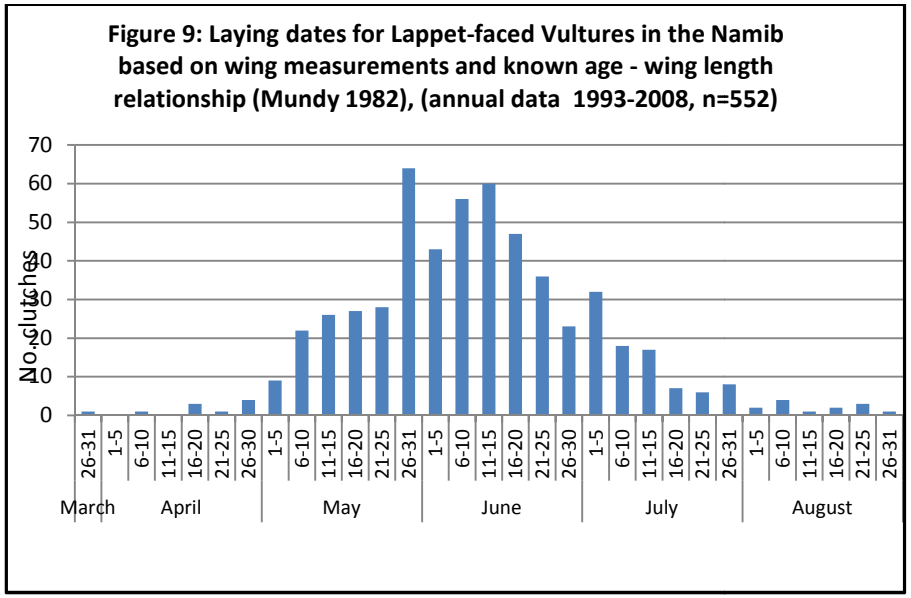
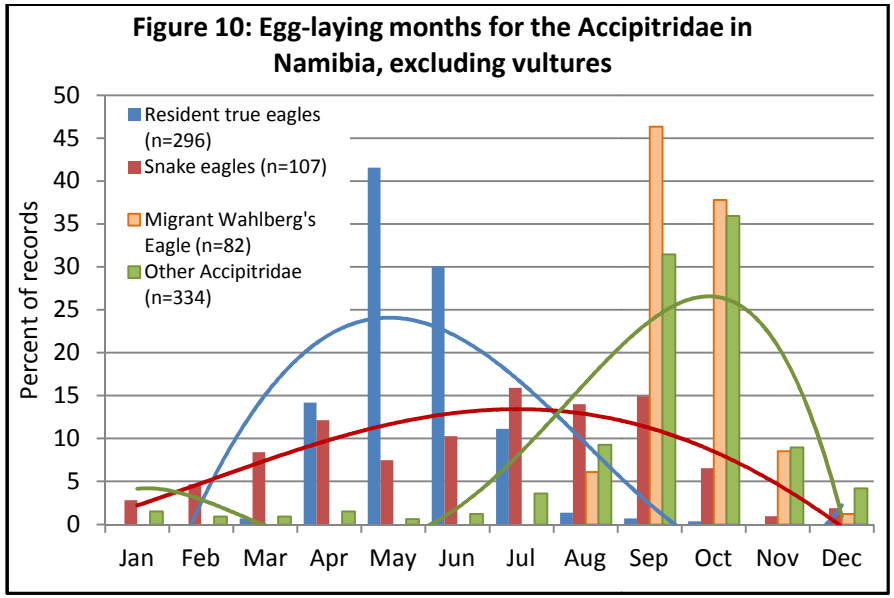


Figure 8: Laying dates for Lappet-faced Vultures in Etosha National Park based on wing measurements and known age - wing length relationship (Mundy 1982), (annual data 1998-2012, n=168)







White-backed, Cape *Gyps coprotheres*, Lappet-faced and White-headed *Trigonoceps occipitalis* Vultures all typically lay a single egg. Two-egg clutches were recorded for White-backed and Lappet-faced Vultures but these were fewer than 3% and 2% of clutches respectively. It is not known whether these two-egg clutches were laid by the same female. There are two record of pairs of Lappet-faced Vultures successfully raising two nestlings (Bridgeford *et al*. 1995, Kolberg 2014).

Eagles, kites, goshawks, sparrowhawks and buzzards

Resident "true" eagles (i.e. not including snake eagles and Bateleur *Terathopius ecaudatus*) lay in the same period as vultures, i.e. April to July, with about 72% of records being in May and June (Figure 10). They lay one or two eggs. Most species that lay two eggs raise just one young as a result of sibling aggression.

Snake eagles and Bateleur lay throughout the year with snake eagles laying mainly from April to September and the Bateleur from January to April. They all lay a single egg.

Wahlberg's Eagle *Aquila walbergi*, an intra-African migrant, lays from August to December, but with 84% of clutches laid in September and October. It lays one egg with fewer than 3% of clutches being two eggs.

The other Accipitridae, e.g. kites, goshawks, sparrowhawks and buzzards, lay mainly in spring, in September and October (67% of records).

Kestrels and falcons

The Falconidae all lay in spring, mainly from August to November, with 58% of records being in September and October (Figure 11).

They typically lay 3-4 eggs. They do not build their own nests but use the nests of other birds and lay directly on ledges on cliffs and buildings (Table 10). While Pygmy Falcons *Polihierax semitorquatus* use the nesting chambers in Sociable Weaver *Philetairus socius* nest structures, Greater Kestrels *Falco rupicoloides* have been recorded nesting on top of these structures. Usually disused nests of crows and birds of prey from previous breeding season are used. There are two records of Greater Kestrels nesting on the outer edge of large Lappet-faced Vulture nests in the central Namib and raising young successfully while the vultures were nesting.

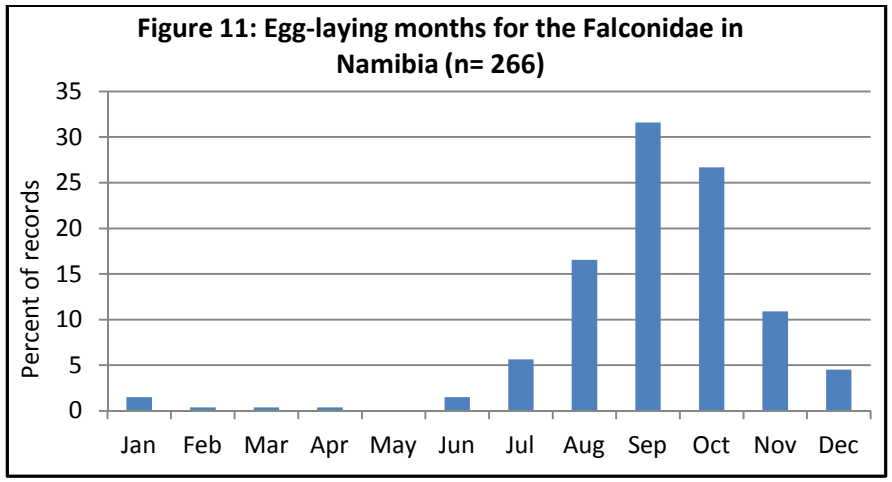
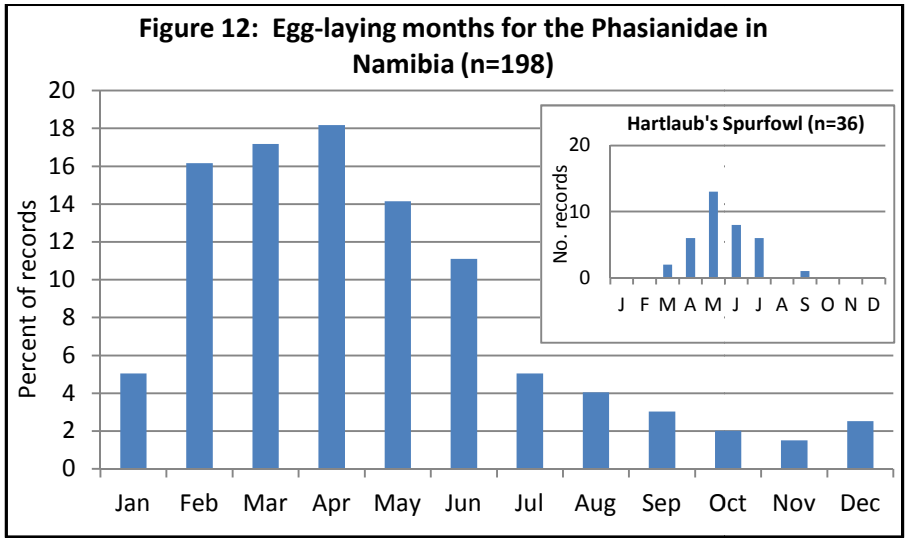


Table 10: Nest sites used by kestrels and falcons in Namibia

Nest site	Pigmy Falcon	Rock Kestrel	Greater Kestrel	Grey Kestrel	Red-necked Falcon	Lanner Falcon	Peregrine Falcon
Ledge on cliff		41				11	7
Ledge on building		7					
Hole in *Hyphaene* palm tree				1			
Lappet-faced Vulture nest			12			2	
Secretarybird nest			2				
Black-chested Snake Eagle nest			3				
African Hawk-Eagle nest							
Augur Buzzard nest on cliff ledge		1					
Cape Crow nest		7	42		14		
Pied Crow nest		2	9		3	1	
Unidentified crow nest		6	24		17		
On top of Sociable Weaver nest			4				
In Sociable Weaver nest chamber	81						
In Red-billed Buffalo-Weaver nest chamber	1						
In White-browed Sparrow-Weaver nest	2						
Total	**84**	**63**	**96**	**1**	**37**	**14**	**7**

Quail, francolins and spurfowl

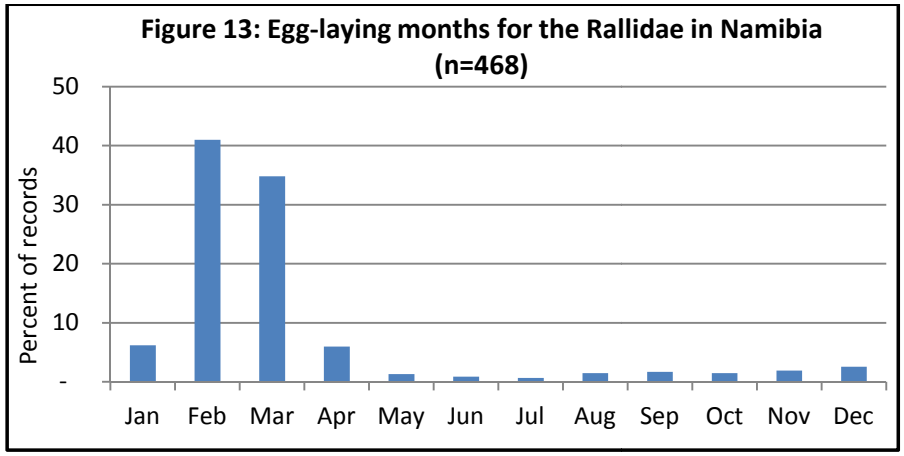
In Namibia the Phasianidae breed mainly towards the end of, and after, the rains, from February to June, with 77% of egg-laying recorded for this period (Figure 12). Clutches are typically 4-6 eggs except for the near-endemic Hartlaub's Spurfowl which averages about 3 eggs. Hartlaub's Spurfowl *Pternistis hartlaubi*, the most arid-adapted francolin, lays later than the other Phasianidae, from April to July (inset). This is a trend seen in a number of taxa where species occupying the most arid regions breed later than species in more mesic regions.

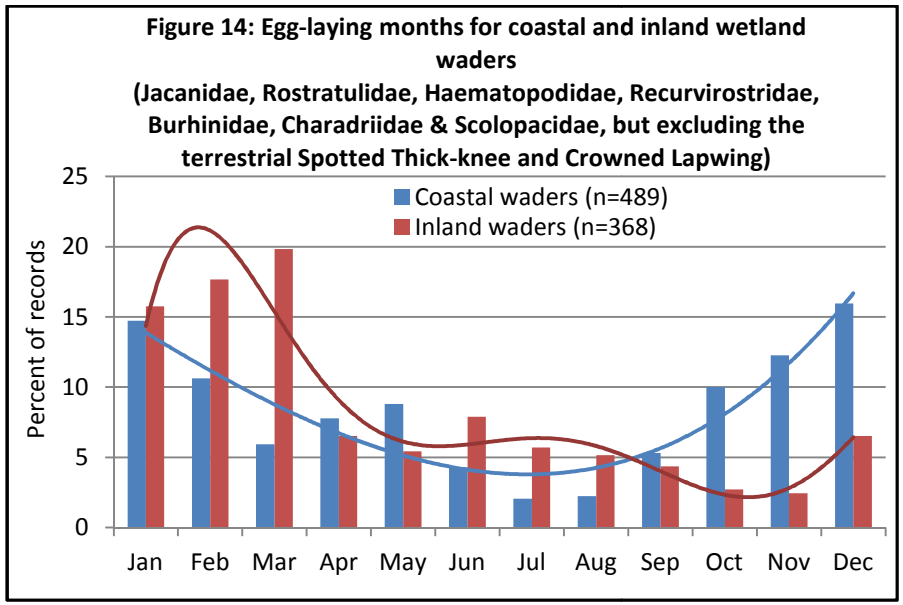


The incubation period of the Red-billed Spurfowl *Pternistis adspersus* is given by Tarboton (2011) as 22 days, based on birds in captivity. Two sets of nest records from wild birds in Namibia allow accurate determination of their incubation period, both as 23 days.

Crakes, rails, moorhens, gallinules and coots

The Rallidae have a highly defined breeding season in Namibia, with 76% of clutches laid in February and March, towards the end of the rainy season (Figure 13). Clutch sizes in the moorhens and coot are large, up to 14 eggs, but averaging about 6 and 7 eggs respectively. In crakes and gallinules, clutch size averages about 3-4 eggs.





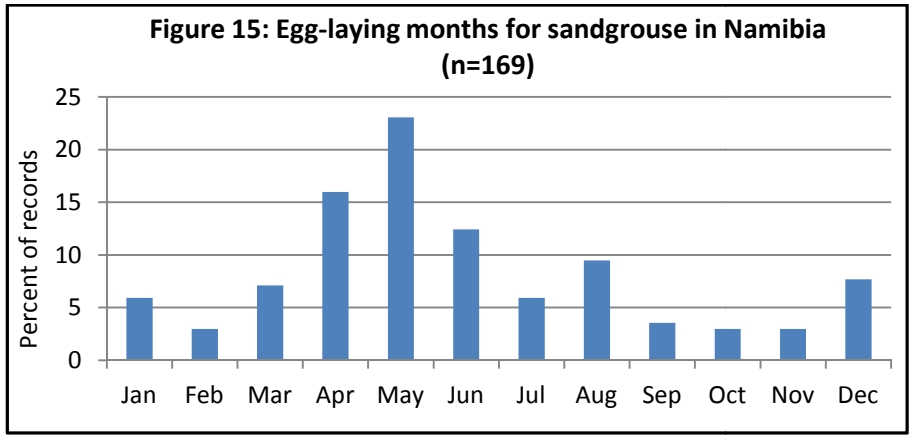
Wetland waders

Coastal-breeding wetland waders lay throughout the year, but mainly between October and February (64% of clutches) while inland-breeding wetland waders lay mainly with the rains from January to

March (53% of clutches, Figure 14).

Sandgrouse

Sandgrouse lay throughout the year, but with a clear peak after the rains, from April to June (51% of clutches), when grass seed is set (Figure 15). The median clutch is 3 eggs.

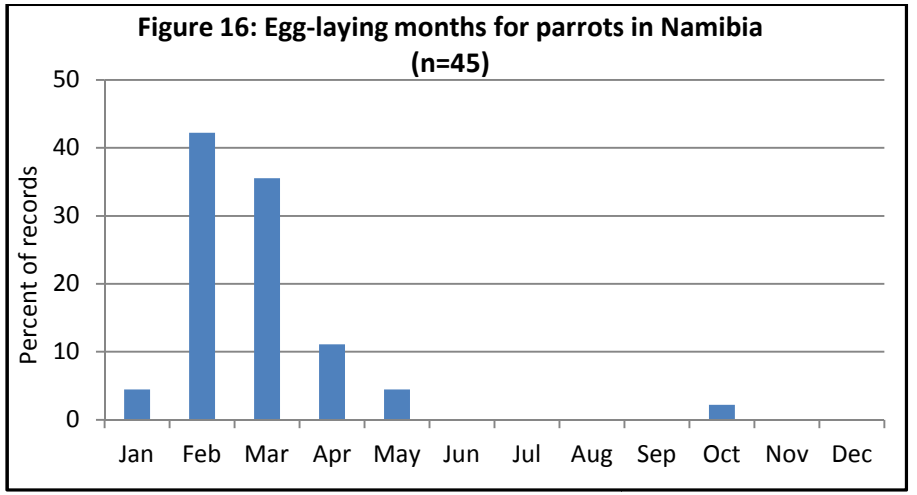


Parrots

In Namibia parrots, including the Rosy-faced Lovebird *Agapornis roseicollis*, breed mainly in February and March (78% of records), coinciding with the end of the rainy season and the peak in fruiting and production of seed pods on trees and shrubs (Figure 16).

Cuckoos

The seven species of cuckoos recorded breeding in Namibia are all parasitic intra-African migrants, arriving in this region in October and departing in April. They lay mainly from December to March (91% of records, Figure 17). Some species are host-specific (e.g. the African Cuckoo *Cuculus gularis*) while others parasitise a range of hosts



(e.g. Great Spotted Cuckoo *Clamator glandarius* has five recorded hosts in Namibia (n=39) and Diederik Cuckoo *Chrysococcyx caprius* has 9 (n=68), Table 11). Some typically lay a single egg per host nest (e.g. Diederik Cuckoo) while others may lay 2-3 eggs per host (e.g. Great Spotted Cuckoo).

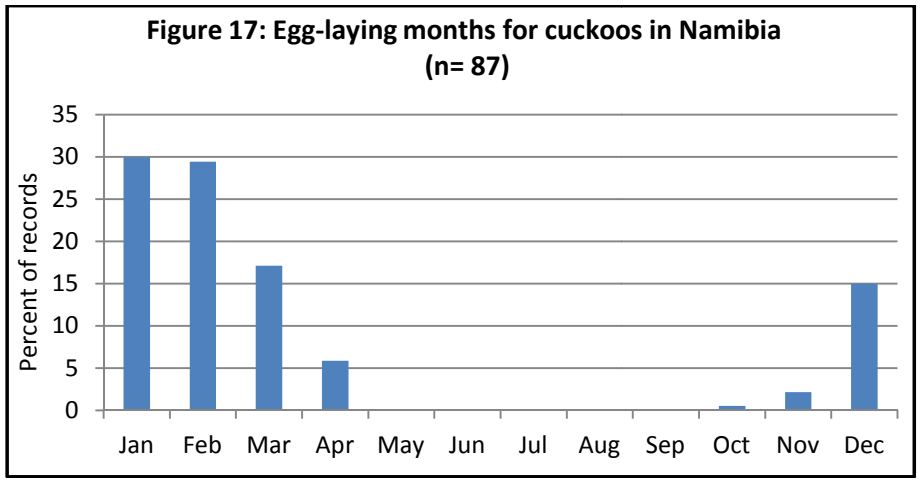


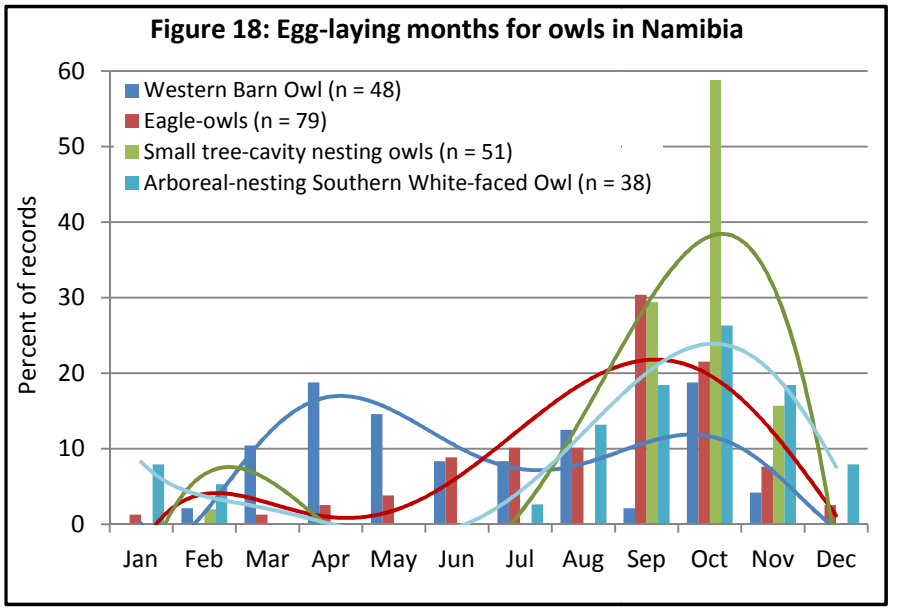
Table 11: Host species parasitised by cuckoos in Namibia

Cuckoo species	Host species	No. records
Jacobin Cuckoo	African Red-eyed Bulbul	8
Levaillant's Cuckoo	Bare-cheeked Babbler	5
Great Spotted Cuckoo	Pale-winged Starling	12
	Cape Glossy Starling	9
	Burchell's Starling	9
	Cape Crow	7
	Meves' Starling	2
Black Cuckoo	Crimson-breasted Shrike	23
African Cuckoo	Fork-tailed Drongo	8
Klaas's Cuckoo	Pririt Batis	9
	Dusky Sunbird	7
	Yellow-bellied Eremomela	3
	Long-billed Crombec	2
	Marico Sunbird	1
Diederik Cuckoo	Southern Masked Weaver	35
	Mountain Chat	7
	Chestnut-vented Titbabbler	7
	Great Sparrow	6
	Southern Grey-headed Sparrow	4
	Lesser Masked Weaver	4
	Familiar Chat	2
	Marico Flycatcher	2
	Black-chested Prinia	1

Owls

There is considerable variation in breeding seasons of different owl species and groupings in Namibia. The Barn Owl *Tyto alba* breeds in any month with no clear pattern. The Cape *Bubo capensis* and Verreaux's *Bubo lacteus* Eagle-Owls breed in winter while the Spotted Eagle-Owl *Bubo africanus* breeds mainly in spring. The small owl species that nest in tree cavities, i.e. African Wood Owl *Strix woodfordii*, Pearl-spotted Owlet *Glaucidium perlatum* and African Scops Owl *Otus senegalensis*, lay in September to November and the Southern White-faced Owl *Ptilopsis granti* has a similar but more extended laying period, from August to January (Figure 18).

Figure 18: Egg-laying months for owls in Namibia



Apart from the ground-nesting Marsh Owl *Asio capensis* which makes a rudimentary nest usually in thick grass or vleis, the other species do not construct nests. They lay their eggs on cliff ledges, on the ground, in man-made structures, in the abandoned nests of other bird species or on top of active Social Weaver and Red-billed Buffalo-Weaver *Bubalornis niger* nest masses (Table 12).

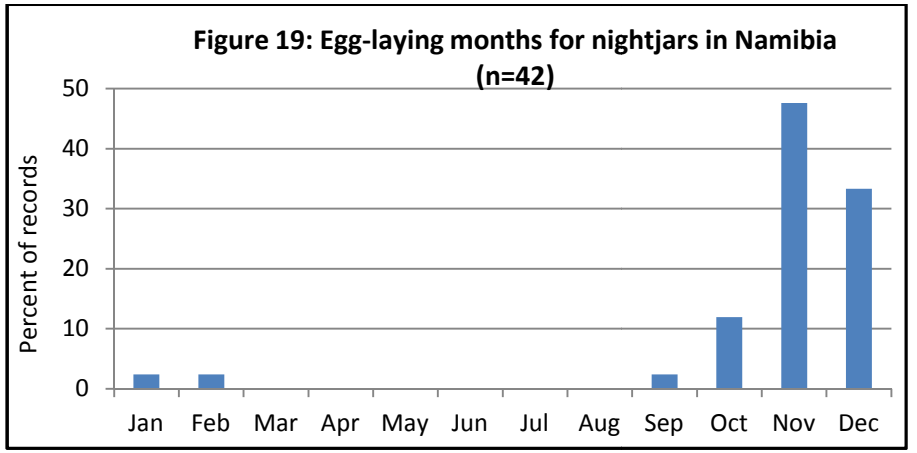
Table 12: Nest sites used by owls in Namibia

Nest site	Western Barn Owl	African Scops Owl	Southern White-faced Owl	Cape Eagle-Owl	Spotted Eagle-Owl	Verreaux's Eagle-Owl	Pearl-spotted Owlet
Ledge/cave on cliff	9			2			
Ledge on river bank	2				3		

On ground, usually base of tree					31		
Under overhanging rock on koppie		1			3		
Well or pit in ground	5						
Buildings	7						
Empty water tank	1						
In-use mobile airport fuel bowser					1		
Bowl-like fork in large tree					32	2	
Hollow tree/branch stump	3	4	2		3		
Cavity in tree trunk	1	2					21
Nesting box		8					11
White-backed Vulture nest						1	
Wahlberg's Eagle nest						2	
Gabar Goshawk nest			8				
Shikra nest			1				
Grey Go-away-bird nest			4				
Cape Crow nest			2				
"Crow" nest			3				
On top of Sociable Weaver nest					7	4	
On top of Red-billed Buffalo-Weaver nest			2			1	
Total	**28**	**15**	**22**	**2**	**80**	**10**	**32**

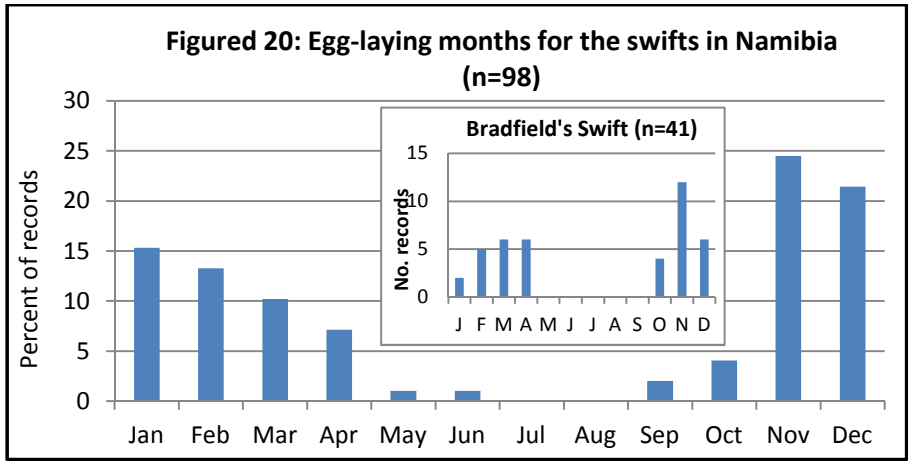
Nightjars

Nightjars usually lay a two-egg clutch from October to December (93% of clutches, Figure 19).



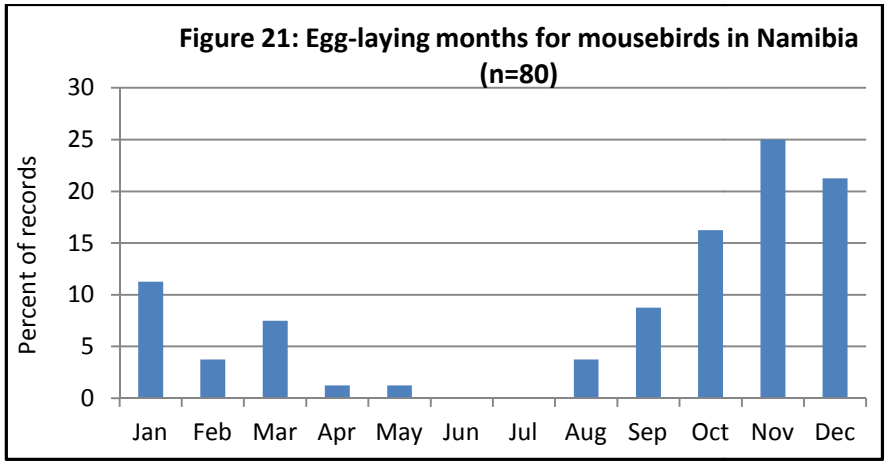
Swifts

In Namibia swifts usually lay a two-egg clutch from November to March (85% of records, Figure 20). Bradfield's Swift *Apus bradfieldi* (inset), with over 70% of its global population in Namibia and the most arid adapted of Namibia's swifts, seems to lay with an insect emergence in November-December, followed by a second smaller peak with and after the rains from February to April. The breeding of this species warrants closer examination.



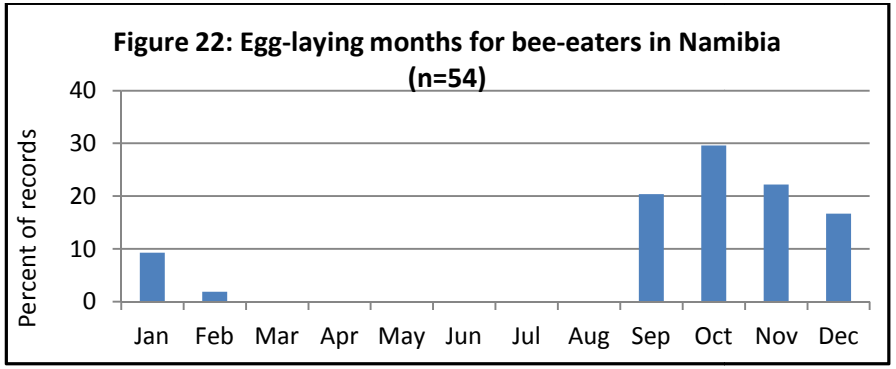
Mousebirds

Mousebirds normally lay 2-3 eggs from October to January (74% of clutches, Figure 21).



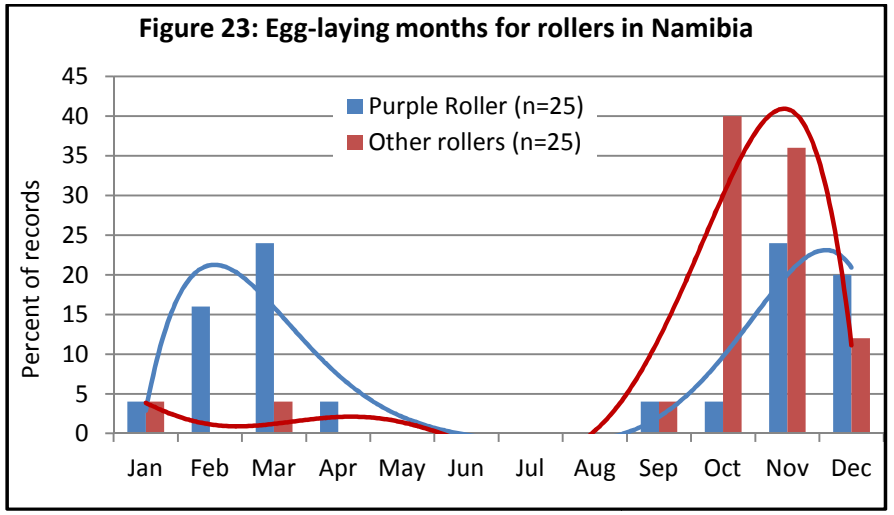
Bee-eaters

All bee-eaters nest in tunnels, most into earth banks but some into holes on flat ground. The clutches are difficult to reach. Based on small sample sizes, most species lay on average 3-4 eggs. These are laid mainly from September to December (89% of clutches, Figure 22).



Rollers

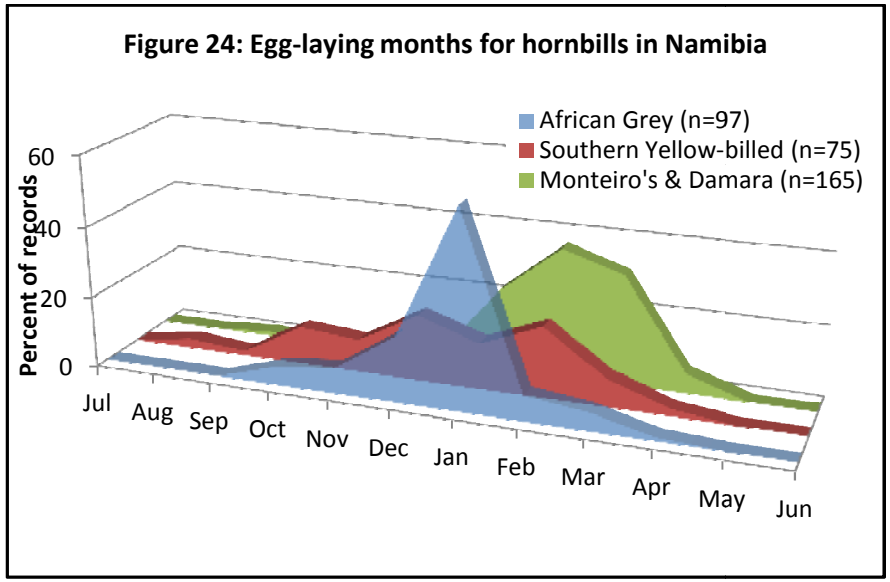
The arid adapted Purple Roller *Coracias naevius* lays mainly from November to March (88% of clutches) while the other species have an earlier and more restricted season, mainly from October to December (88% of clutches, Figure 23). They typically lay 2-3 eggs per clutch.

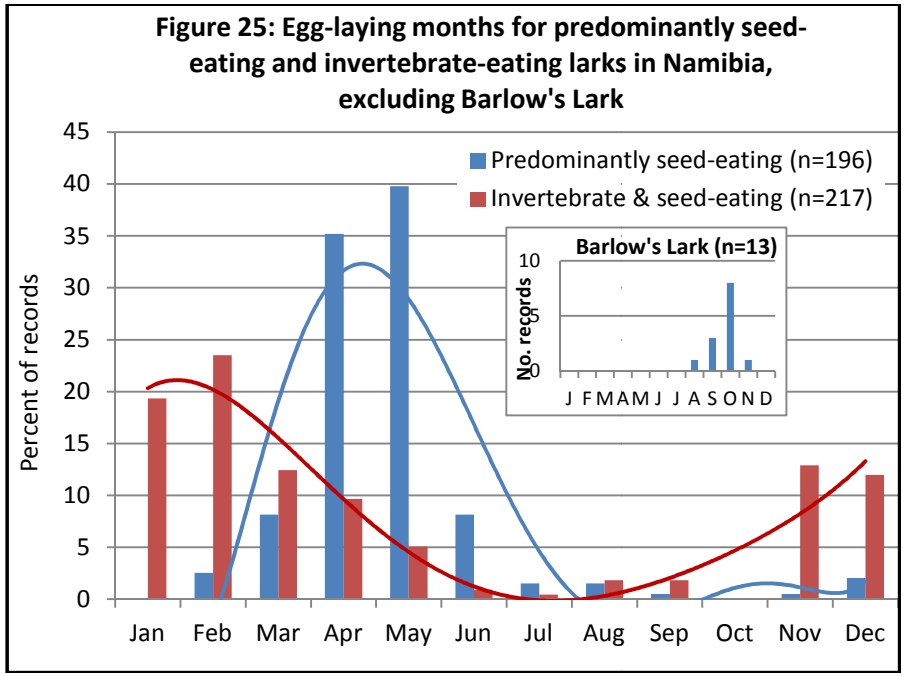


Hornbills

In Namibia hornbills lay mainly between October and March but with different species peaking at different times. The African Grey Hornbill *Tockus nasutus* has a short laying season in mainly December and especially January (74% of clutches, 56% in January alone). Southern Yellow-billed Hornbill *T. leucomelas* has a more extended laying season, mainly from October to February (72% of clutches) with most (36%) of clutches laid in February, whereas Monteiro's *T. monteiri* and Damara *T. damarensis* Hornbills, the most arid-adapted species, peak later (Figure 24), from January to March (90% of clutches). Most of the data on these species come from nest box

studies in the Windhoek district. Clutches are typically 3-5 eggs.



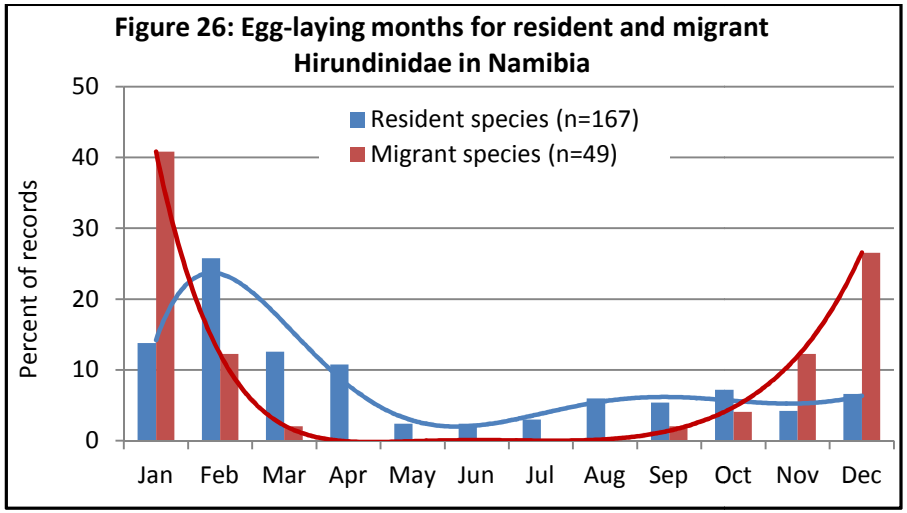


Larks

Larks that feed on insects as a significant part of their diet, e.g. Rufous-naped *Mirafra africana*, Eastern Clapper *M. fasciolata*, Dune *Calendulauda erythrochlamys* and Spike-heeled *Chersomanes albofasciata*, start breeding and peak considerably earlier (November to March, 80% of clutches) than larks that feed predominantly on seed, e.g. Gray's *Ammomanopsis grayi*, Stark's *Spizocorys starki* and sparrow-larks, which lay mainly in April and May (75% of clutches), after the rains and once the grass seed has set (Figure 25). Barlow's Lark *Calendulauda barlowi* (inset), which occurs only in the extreme south-western winter rainfall region of Namibia, lays mainly in September and October (11 of 13 records).

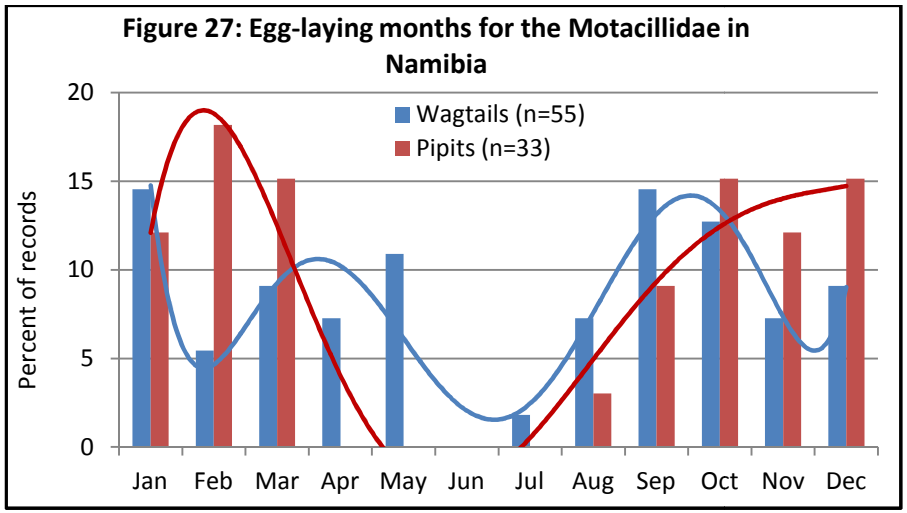
Swallows and martins

The Hirundinidae lay mainly from November to April (Figure 26). The migrant species, e.g. White-throated *Hirundo albigularis*, Greater Striped *H. cucullata* and Red-breasted Swallows *H. semirufa* and Banded Martin *Riparia cincta*, lay from November to February (91% of clutches), earlier than resident species, e.g. Wire-tailed *H. smithii* and Lesser-striped *H. abyssinica* Swallows and Brown-throated *R. paludicola* and Rock Martins *H. fuligula*, which lay throughout the year but with a peak in January to April (63% of clutches). They typically lay a clutch of 2-3 eggs.



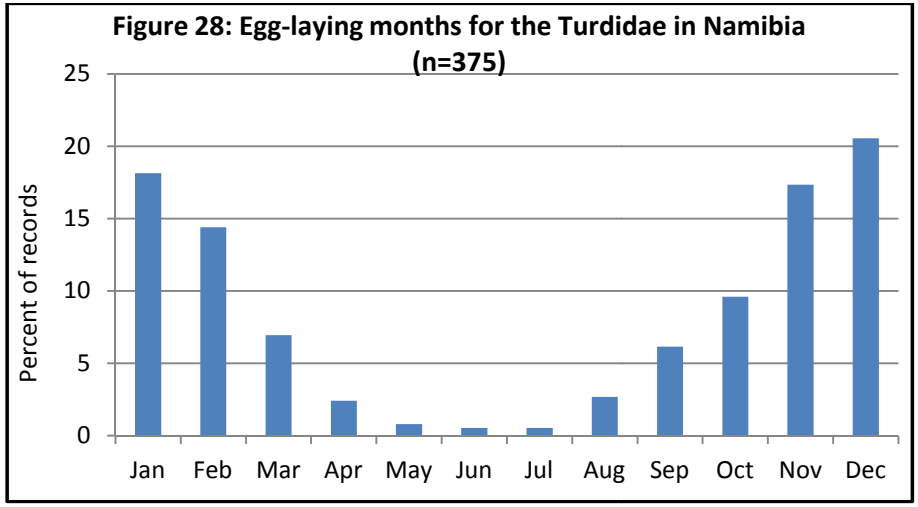
Wagtails and pipits

Wagtails lay throughout the year with no discernable pattern (Figure 27). Pipits lay mainly from October to March (88% of clutches).They both typically lay a clutch of 3 eggs.



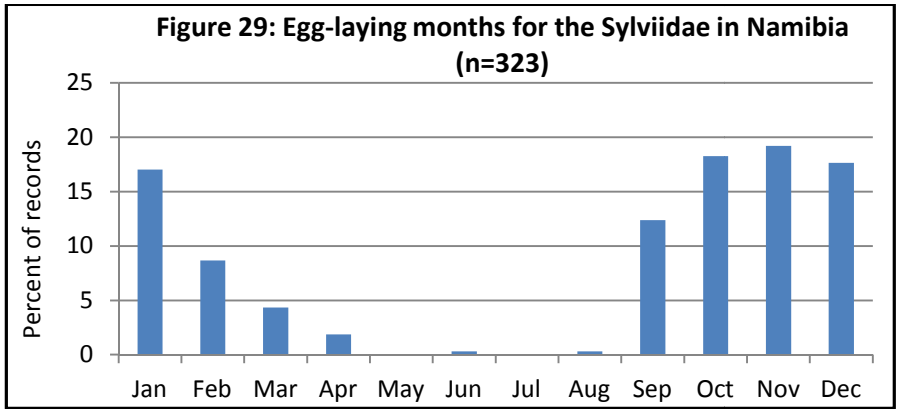
Robin-chats, chats, scrub robins, wheatears and thrushes

The Turdidae lay throughout the summer (Figure 28), from October through to February (80% of clutches). The arid adapted species have a more protracted breeding season, e.g. Karoo Scrub Robin *Cercotrichas coryphoeus* and Familiar Chat *Cercomela familiaris* starting to lay in August, Herero Chat *Namibornis herero* and Karoo Chat *Cercomela schlegelii* extending to April, and Mountain Wheatear *Oenanthe monticola* extending at both ends of the season. They typically lay a clutch of 2-3 eggs.



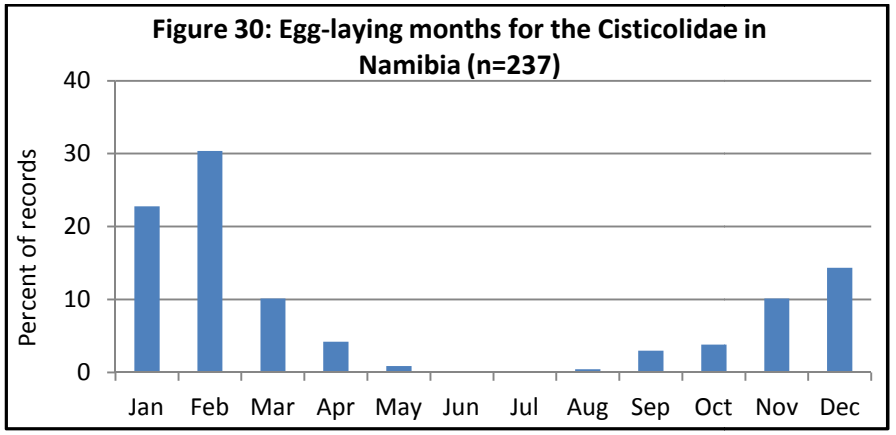
Warblers, eremomelas, crombec and titbabblers

The Sylviidae lay mainly in the early summer (Figure 29), from September to January (85% of clutches). They typically lay a clutch of 2-3 eggs.



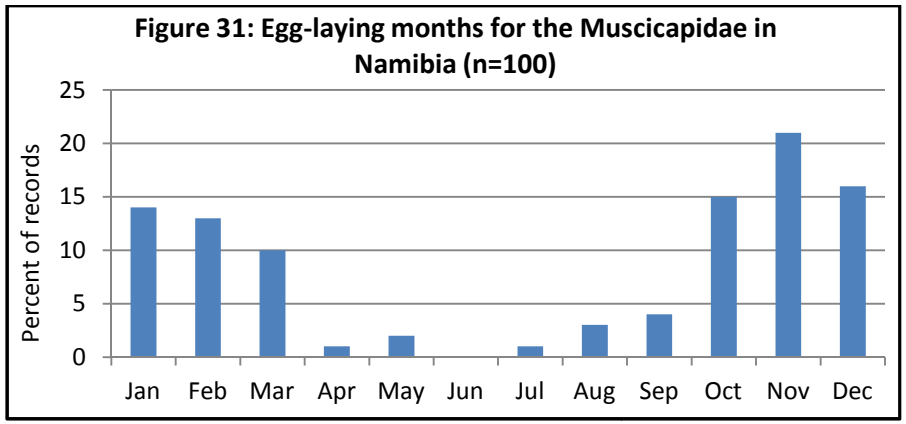
Cisticolas, prinias, warblers and wren-warblers

The Cisticolidae lay mainly in the second half of summer (Figure 30), from December to February (68% of clutches). Arid adapted species, e.g. Desert Cisticola *Cisticola aridulus* and Rufous-eared Warbler *Malcorus pectoralis*, have an extended breeding season through to April. Their clutch is normally 3-4 eggs.



Flycatchers

The Flycatchers lay throughout the summer (Figure 31), from October through to March (89% of clutches). They normally lay a 2-3 egg clutch. The Marico Flycatcher *Bradornis mariquensis* incubation period is not recorded (Tarboton 2011). One nest record card provided detailed information from which it was possible to determine an incubation period for this species of 13 days.

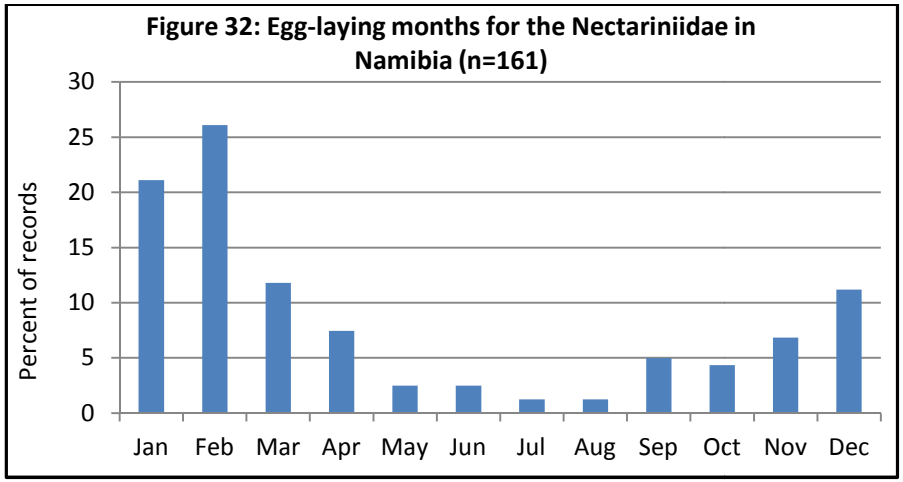


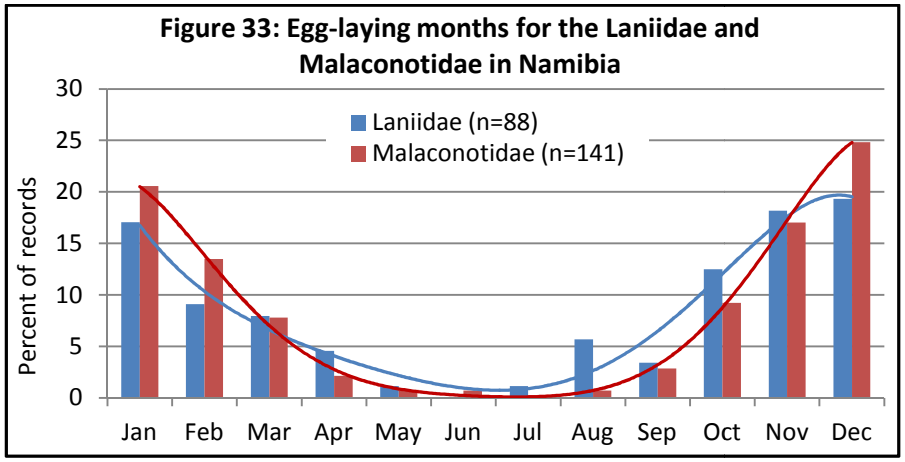
Sunbirds

Sunbirds lay mainly in late summer (Figure 32), from December to March (70% of clutches). The arid-adapted Dusky Sunbird *Cinnyris fuscus* has an extended laying season, into April and sporadically in all months of the year. Sunbirds typically lay 2 eggs but the Dusky Sunbird lays 3 eggs more often than 2 (54%).

Shrikes, bushshrikes, tchagras, puffback and Brubru

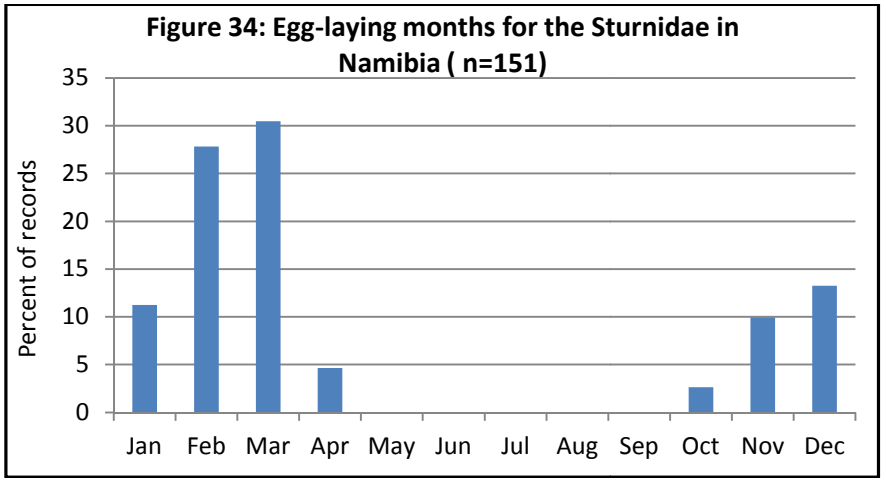
The Laniidae lay mainly in the early summer, from October to January (67% of clutches) while the Malaconotidae lay slightly later, from November to February (76% of clutches) (Figure 33).





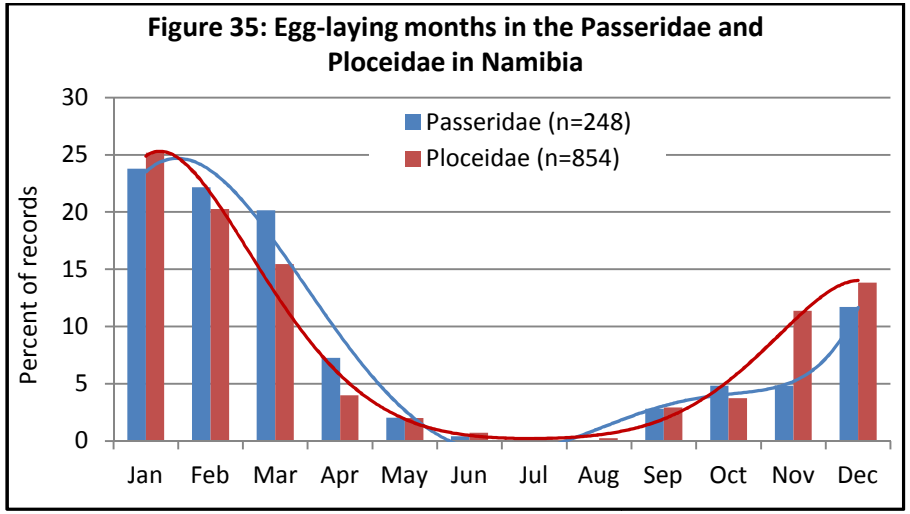
Starlings

They lay mainly between November and March (93% of clutches) but with a clear peak in January and February (58% of clutches) (Figure 34). Clutch size is typically 2-4 eggs.



Sparrows, weavers, queleas and bishops

The Passeridae and Ploceidae have similar laying months in Namibia (Figure 35), peaking from November / December to March (83% and 86% of clutches respectively), but with the latter starting slightly earlier than the former. They typically lay 2-5 eggs per clutch.



Waxbills, pytilia, firefinches and finches

The Estrildidae lay in late summer and into autumn (Figure 36), with 81% of clutches laid in January to May. They typically lay 3-5 eggs. The Red-headed Finch *Amadina erythrocephala* has been recorded laying up to 9 eggs, but it is possible that more than one female could have laid in the same nest. While most species in this family build a closed grass ball nest with a side entrance, a few species usually use old nests of other species. The Brown Firefinch *Lagonosticta nitidula* has been recorded using a Thick-billed Weaver *Amblyospiza albifrons* nest and Red-headed Finches have been recorded using five different nests in addition to their own nest (Table 13).

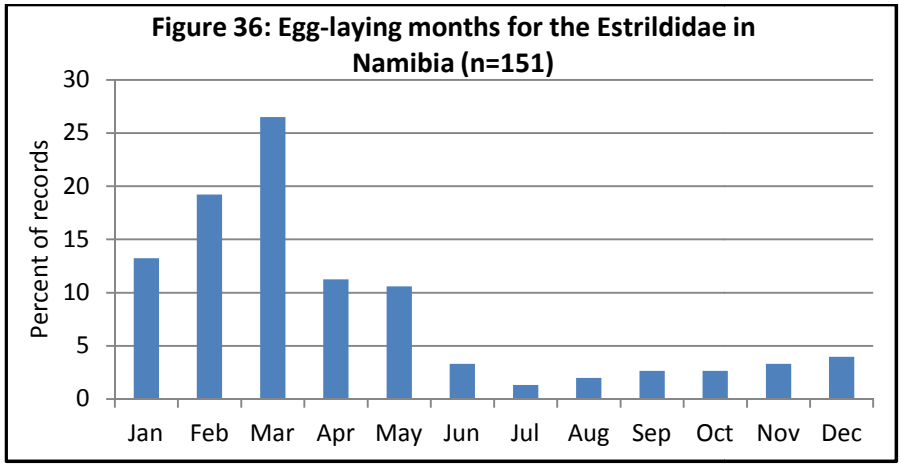
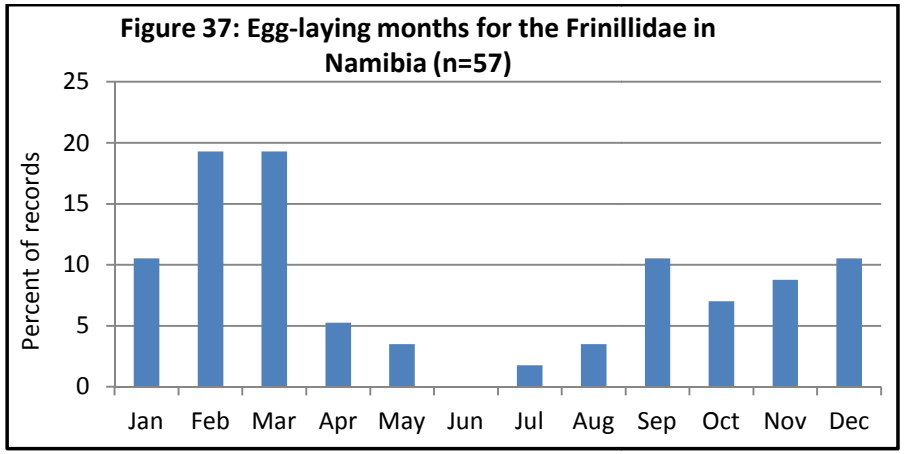


Table 13: Nests used by Red-headed Finches in Namibia

Species	No.
Southern Masked Weaver	15
Bradfield's Swift in *Washingtonia* palm fronds	12
Chestnut Weaver	9
Red-billed Buffalo-Weaver	7
Nesting box	5
Own nest	2
Total	**50**

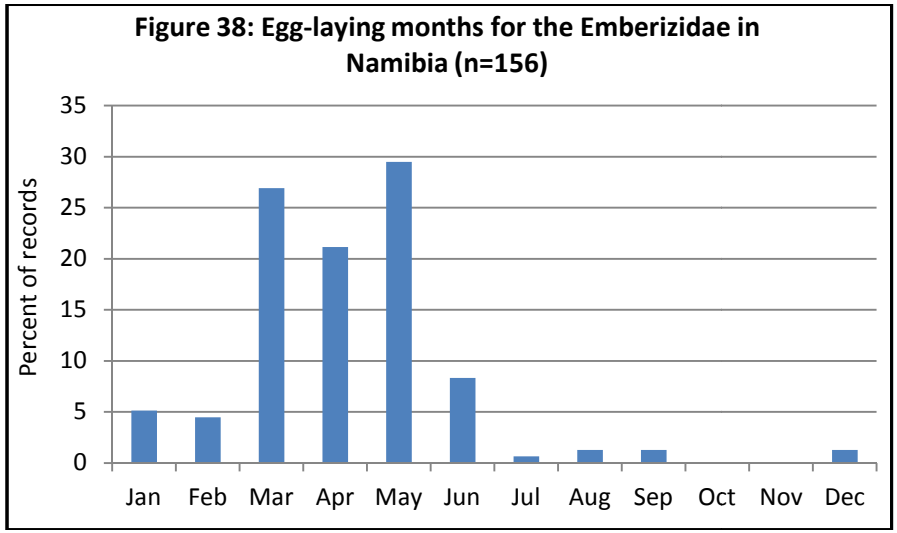
Canaries

The canaries have a protracted laying period from September to March (Figure 37), associated with the fact that many are arid zone adapted, e.g. White-throated *Crithagra albogularis* and Black-headed / Damara *Serinus alario* Canaries. There is a peak in February and March which accounts for 39% of clutches laid. The average clutch size is 3 eggs.



Buntings

The clutch is laid mainly in autumn going into winter (Figure 38), with 78% of clutches laid from March to May. Clutches are typically 2-4 eggs.



Breeding trends for different ecological groupings

Of the recurrent events undertaken by birds, reproduction creates the largest physiological demand and is timed to a period of maximum probability of leaving the highest number of successful offspring. Into this timing must also be fitted the moult cycle and, in the case of migrants, the optimum times of migration. The timing of these and other events in the life cycle of birds are highly adaptive to ensure that the chances of survival of individuals and their offspring are maximized. While all bird species breed at the time of year that is most profitable to them and their offspring, the dates and duration vary considerably between different ecological groups of birds depending on many factors including regional climatic conditions, habitat and diet (Lack 1950, Immelmann 1972, Maclean 1990).

In temperate zones, most birds breed in a narrowly defined period of the year – spring, although some species may lay a little earlier and others a little later. In tropical regions where climatic conditions are more uniform throughout the year, there is a spread of breeding by different ecological groups of birds throughout much of the year. In arid tropical and subtropical regions such as Namibia, where rainfall is low and highly unpredictable yet there is clear rainfall seasonality, most birds have defined breeding seasons. These breeding seasons are over a more protracted period than those of temperate zone birds, and are less sharply defined in that there might be a clear peak in egg laying over a number of months, but there may also be some breeding throughout the year. The various breeding patterns are the result of specific environmental adaptations (Immelmann 1972).

The most important environmental determinant is food supply. Typically, birds adjust their breeding season to ensure that the most critical time of food requirement coincides with the time of greatest availability. For most species the critical time of food requirement is usually immediately after the breeding season when population density is at its highest and when young birds are newly independent (Immelmann 1972). However, there are other times in the breeding cycle when food requirements might be high, for example during eggs laying in species that lay large clutches and during the nestling period in altricial species. The mid-nestling period in some vulture species is critical as only one adult at a time can forage to provision a nestling that requires at least as much food as an adult; this period coincides with the time of highest wildlife mortality (Brown 1988, Komen & Brown 1993). It is not necessarily the maximum biomass of prey that is important, but its accessibility. For example, the biomass of reptiles may be highest in mid to late summer but, because of the vegetation cover, they may be less accessible to snake eagles than towards the end of the dry season (Brown 1971).

Other environmental determinants of breeding season may be competition, e.g. in cavity-nesting species where the availability of cavities is limiting and less-dominant species adjust their timing to

accommodate more dominant species; and nesting conditions, e.g. Rock Pratincoles *Glareola nuchalis* and African Skimmers *Rynchops flavirostris* have to wait for appropriate river conditions to expose their nesting sites – rocks and sandbanks respectively. However, it is likely that, where competition and nesting conditions play a role, the main environmental determinant remains food supply. Other factors may play a minor role in fine-tuning the timing.

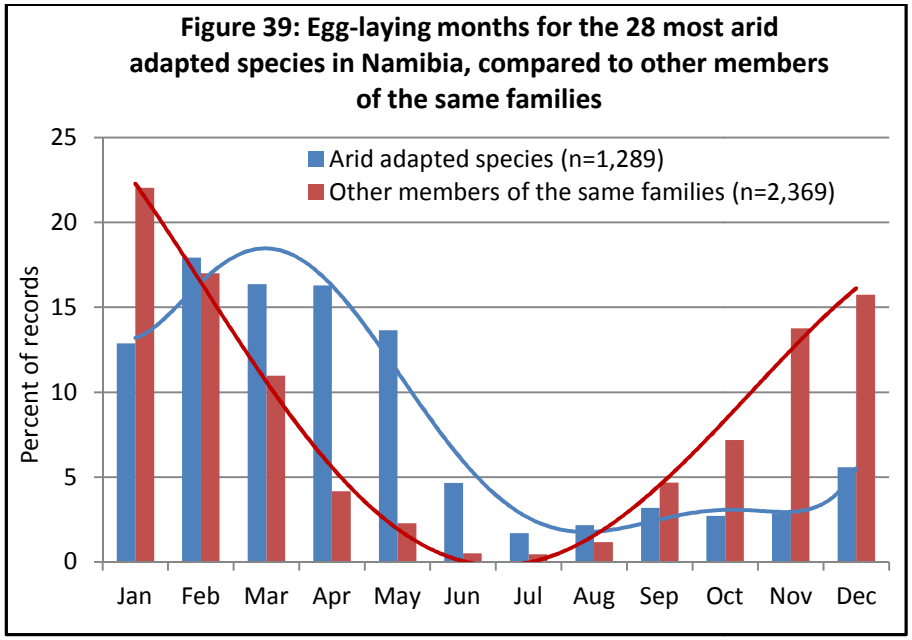
The timing of breeding is adjusted to synchronize environmental determinants such as food supply with critical stages well into the reproductive cycle, i.e. the mid-nestling period or the period when the young become independent, not with the start of the breeding season when gonads and hormones become active and nest-building and copulation take place. These environmental determinants are called "ultimate factors" The start of the reproductive cycle may occur well ahead of ideal conditions, particularly in larger species in which the breeding cycle can take six or more months. The evolution of the defined breeding season has led to the development of an information-based timing mechanism which triggers the necessary physiological and behavioural actions for breeding in advance of optimal environmental conditions (Immelmann 1971). This "trigger timing" mechanism is called a "proximate factor" or Zeitgeber. At high latitudes the most important Zeitgeber is changing day length. Maximum day-length change occurs in March and September. In these months at 55° latitude, day length changes by over 5 minutes per day; in Windhoek at 22° S, day length changes by about 55 seconds per day. Day length is therefore unlikely to be as important a Zeitgeber in arid tropical and semi-tropical environments as in temperate zones, also because the most productive time of the year, during and after the rains, typically occurs some 3-4 months after the maximum change in day length. By contract, in temperate zones, the most productive time of spring and early summer follows immediately from the maximum rate of increase in day length.

In those Namibian bird species breeding early in the summer before the rains, changing day length may be a contributing trigger to start breeding. However, there are other factors that may be as, or more, relevant, e.g. increasing temperature, plants coming into leaf and/or flower from early spring which results in an emergence of insects and, for species dependent of grass seeds and a second wave of insect emergence, the onset of rains. For coastal and marine species, the south-westerly winds in September may be the key trigger, causing upwellings that bring up nutrients and result in plankton blooms that attract pelagic fish close to the shoreline (Berry 1976a, 1976b). There has been little work on determining the proximate factors that trigger breeding in most tropical and subtropical birds, and it may well be a combination of a number of different factors for different ecological groups of birds.

The following section looks at the timing of egg laying in a number of different ecological bird groupings.

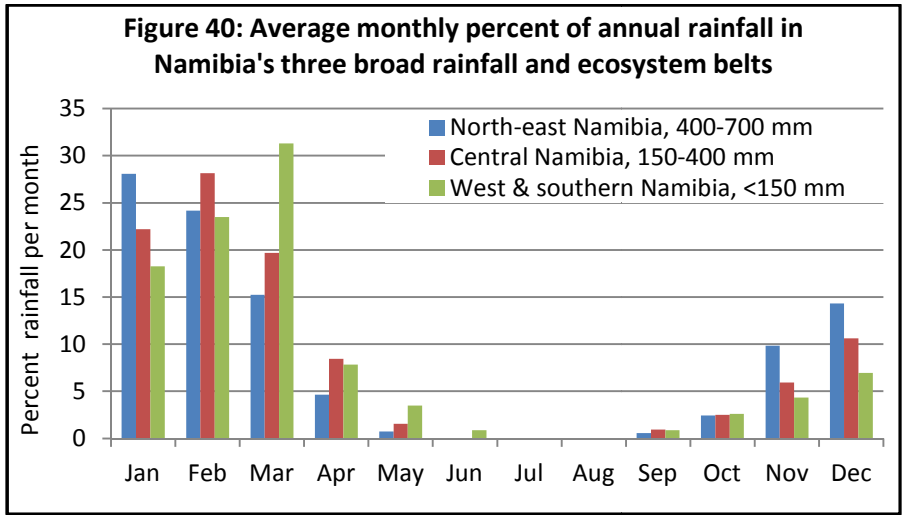
Arid adapted species

Egg-laying months of the 28 most arid adapted species in Namibia, from 14 families (Otididae, Glareolidae, Pteroclidae, Bucerotidae, Alaudidae, Ploceidae, Sylviidae, Cisticolidae, Paridae, Nectariniidae, Passeridae, Turdidae, Fringillidae and Emberizidae), were plotted against the other members of those families (Figure 39). The arid-adapted species typically start laying some two months later than other members of their families, from January compared to November, and continue laying for about two months longer, to May compared to March. Laying is also somewhat more likely in other non-peak months by arid adapted species, which are able, to a

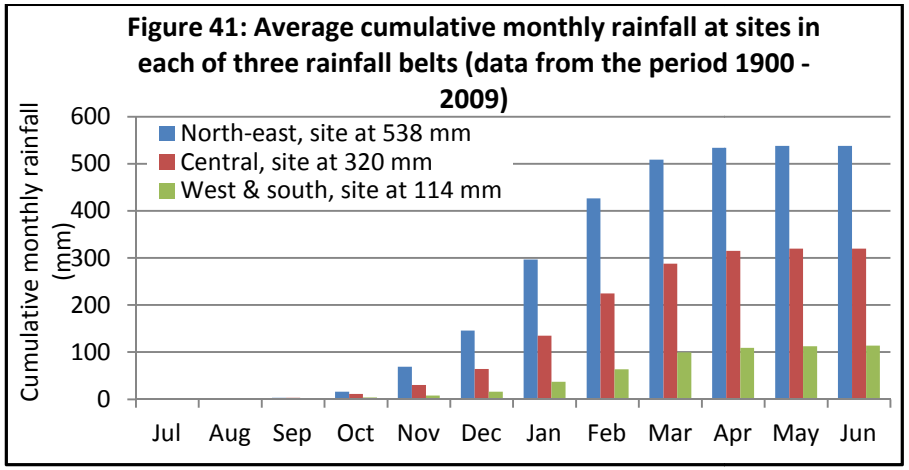


certain extent, to making use of appropriate breeding conditions when they arise, compared to other members of their families which do not breed in mid winter. However, the notion that xerophilous bird species in the Namib and arid Karoo have broken free of the rigidity of regular breeding seasons, as is the case in some species in the deserts of Australia, is clearly not true.

While rainfall is low and highly variable across Namibia, there are clear seasonal patterns which extend into the most arid regions. In the north-eastern sub-humid woodland savanna (covering about 20% of Namibia), rainfall ranges from about 400 to 700 mm per annum and falls mainly from November to March (91%) with January receiving on average the highest rainfall. In the central semi-arid thornveld savanna (about 60% of Namibia), rainfall ranges from about 150-400 mm and falls mainly from December to March (81%) with a peak in February. The western and southern arid to hyper-arid Namib and Karoo ecosystems (about 20% of Namibia) receive on average less than 150 mm per annum which falls mainly from January to March (72%) with a peak in March (Figure 40). The peak in rainfall in the most arid regions is some two months later than in the north-east of the country.



Another way to view seasonality in rainfall across Namibia is to look at cumulative rainfall in each of the three rainfall belts referred to above (Figure 41). Random sites were selected in each rainfall belt from the smoothed average monthly rainfall map for Namibia (covering the period 1900 to 2009, the World Bank Group's Climate Change Knowledge Portal). By December, the north-east site which has an annual average rainfall of 538 mm had received about 150 mm. The central site (annual average of 320 mm) had received about 60 mm while the Namib-Karoo site (annual average of 114 mm) had received just 16 mm, not enough for grass to germinate, grow and seed. Only by February to March on average

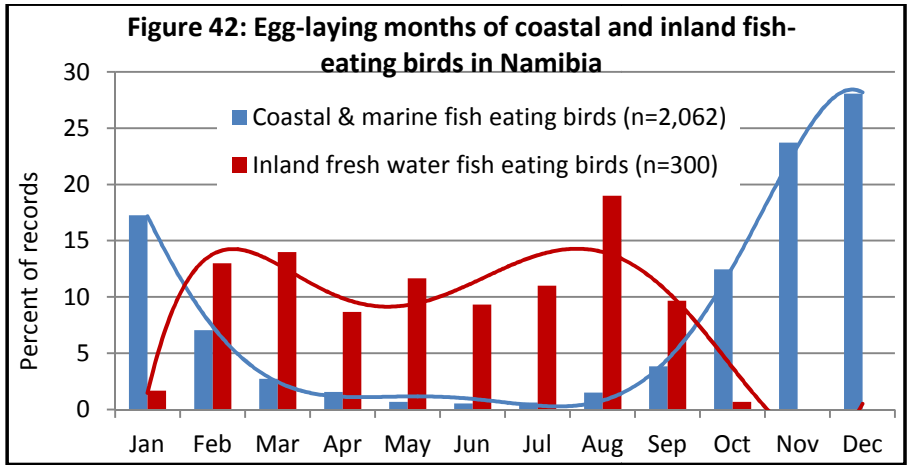


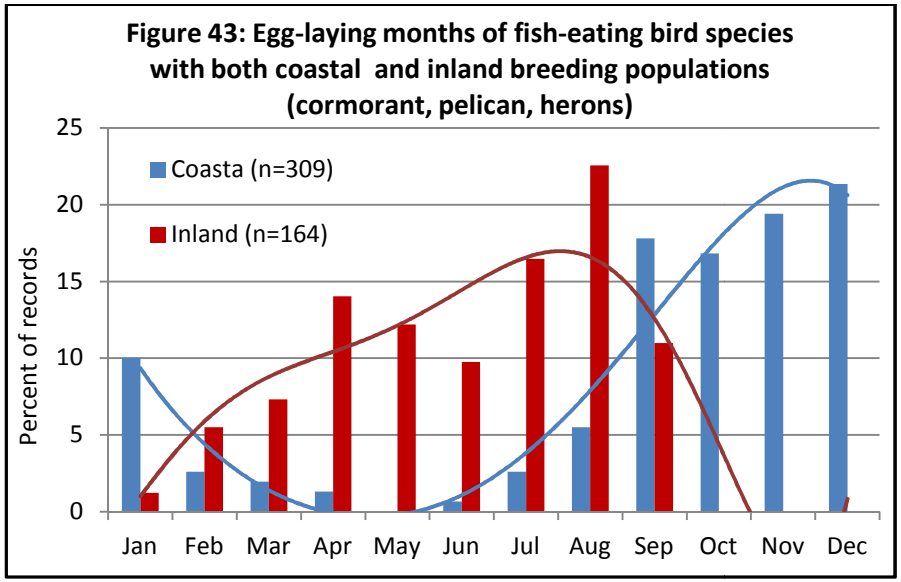
has sufficient rain fallen in this arid zone to be effective in terms of vegetation response. By contrast, this state had been achieved in the north-east and central regions by on average December and January respectively. This rainfall pattern, and the rainfall required to reach an effective threshold for vegetation to respond, is suggested as the reason for the arid adapted species starting to lay some two months later than other members of their families. In addition to key stages in the reproductive cycle (e.g. provisioning of nestlings and the independence stage of young birds) being synchronized with optimum food availability, is the suggestion that the food supply for breeding females immediately prior to the breeding season may limit their ability to form eggs (Perrins 1970). This suggestion comes from studies of temperate zone birds that experience harsh winters. The notion seems equally applicable to birds in hyper-arid tropical and subtropical zones that experience long harsh dry seasons. It is most likely that the timing of breeding in any region for any ecological group of birds and for any species is the outcome of an optimization process with many factors playing a greater or lesser role (Verhulst & Nilsson 2008).

Fish-eating species

Coastal and marine fish-eating birds lay mainly from October to January (82% of clutches) with a peak in November and December (Figure 42). This coincides with strong prevailing south-westerly winds in September that cause upwellings of deeper water and nutrients and result in plankton blooms that attract pelagic fish inshore where they are more accessible to piscivores. Inland fresh water fish-eating birds lay over an extended period mainly from February to September (96% of clutches) coinciding in the first period with rivers rising and spilling onto floodplains where many species of fish move to feed and breed, and then, later in the year, wetlands subsiding and fish becoming concentrated and more accessible.

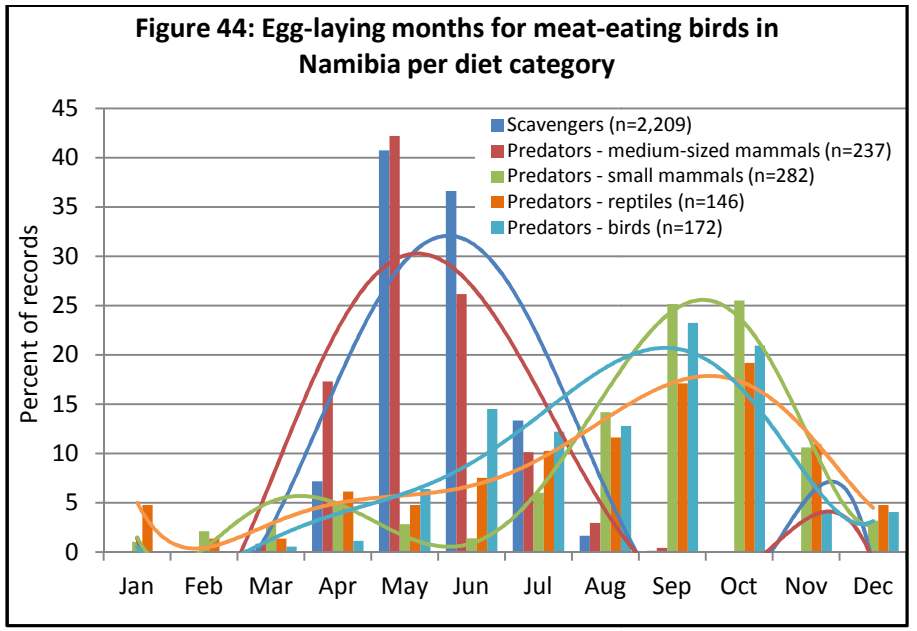
It is interesting to note that fish-eating species that have both coastal and inland breeding populations, e.g. Great White Pelican *Pelecanus onocrotalus*, White-breasted Cormorant *Phalacrocorax lucidus* and a number of heron species, show very similar trends to the larger data set of all coastal and inland breeding fish-eating birds (Figure 43).





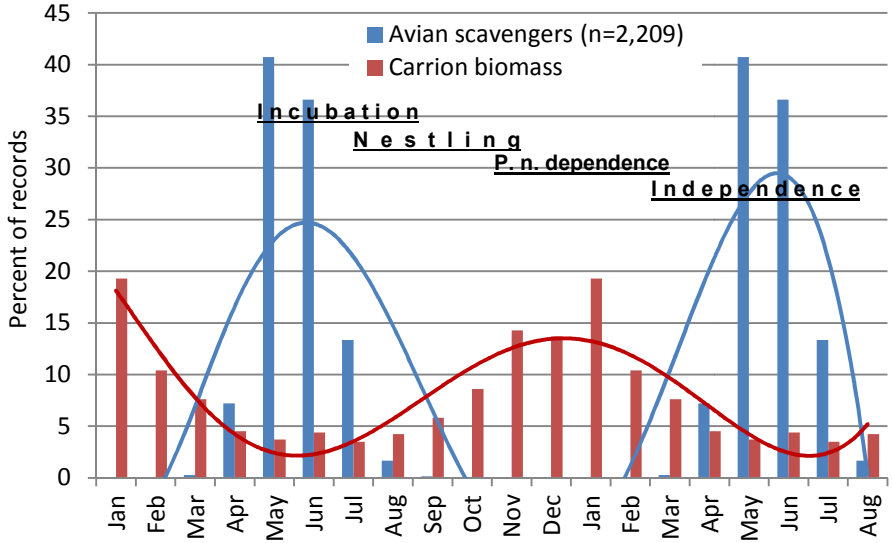
Birds of prey

Like most birds, birds of prey, including owls, breed during the time of year when food is most readily available (Newton 1979). Different species have different breeding seasons depending on their source of food (Figure 44). Scavenging birds lay mainly from May to July (91% of clutches). Large raptors such as eagles that prey mainly on medium-sized mammals show similar trends with 96% of clutches laid from April to July. Predators of small mammals, reptiles and birds have their period of peak laying in September and October. Large raptor species, which are either scavengers or predators of medium sized mammals, large reptiles and gamebirds, have longer breeding cycles than smaller species which generally feed on passerine and near-passerine birds, small mammals and small reptiles. Smaller raptors with shorted breeding cycles can usually fit most of their breeding cycle within the period when food is most available. By contrast, larger species with longer breeding cycles time their breeding to coincide the most critical period of food requirement with the period when food is most available. The timing of breeding within the different feeding groups of raptors is examined in more detail.



The availability of carrion to scavenging birds, from both domestic stock and wildlife, was estimated per month based on mortality figures per district in Namibia obtained from the Directorate of Veterinary Services and from a questionnaire survey to freehold farmers (Brown 1988). The data from all districts were combined to give a national overview. There is a clear seasonal trend (Figure 45), with least carrion available from April to August which is when the birds lay, incubate and the early nestling period, increasing though September and October which coincides with the mid- to late nestling period to peak from November to February which coincides with the

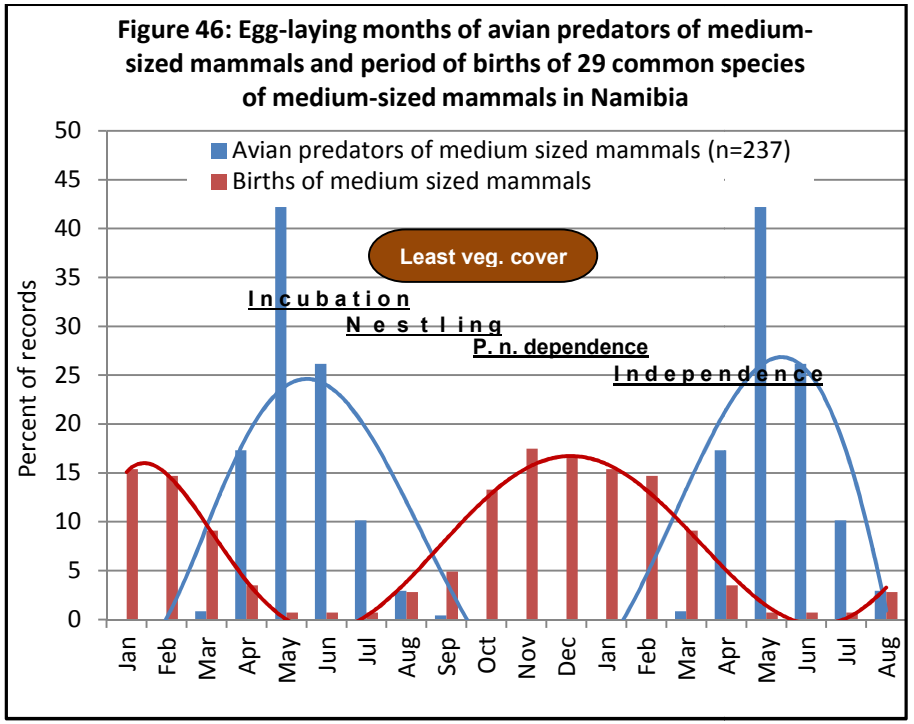
Figure 45: Egg-laying months of avian scavengers and average monthly relative abundance of carrion available to scavenging birds (annual average for Namibia = 5.6 kg/km²)

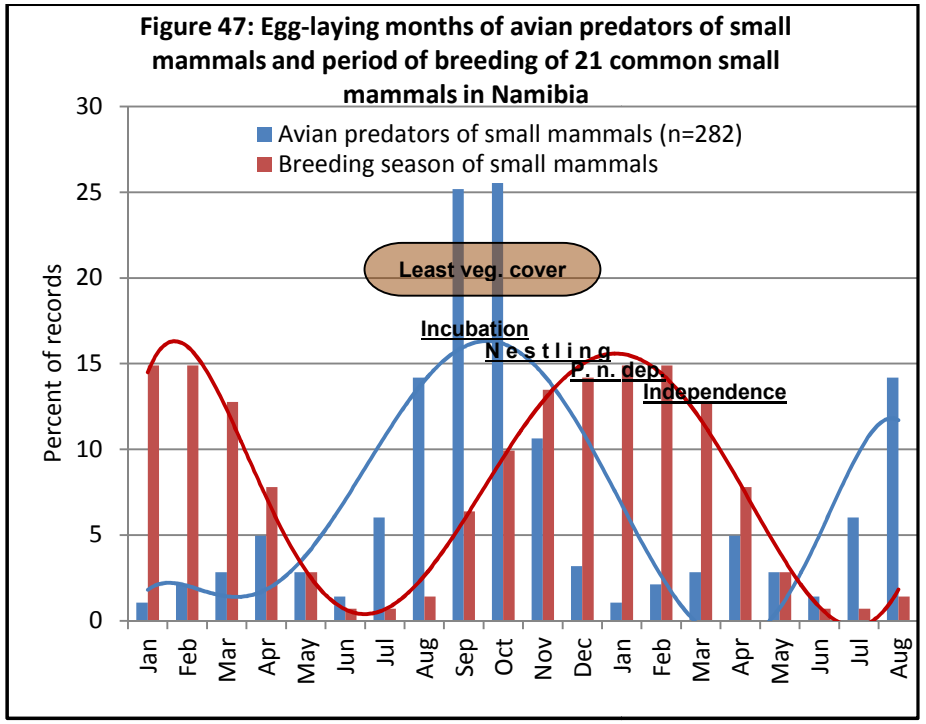


end of the late nestling period, the post-nestling dependence period (abbreviated to "p.n. dependence" in Figures 45-49) and the time when young birds starts to become independent. This suggests that the critical period for vultures in Namibia is towards the end of the nestling period, during the post-fledgling dependence period and the start of the independence period of young birds. Vultures have adjusted their time of breeding so that these stages in their reproductive cycle coincide with times when most food is available.

Two factors probably play a key role in the availability of medium sized mammals (e.g. hares, hyraxes, mongooses) to avian predators, the amount of vegetation cover and young mammals entering the population. There are few studies on the breeding season of medium-sized mammals in Namibia and information was drawn from the nearest studies in general reference works for southern Africa (Smithers 1983, Apps 2000). There is a clear seasonal trend in the time of births of medium sized mammals, which peaks from October to February. The period of least vegetation cover is from about July/August through to December/January (Figure 46). Egg laying takes place immediately following a time of food availability which allows the female to lay down fat reserves, but the incubation and early nestling periods coincide with a period of low food availability. Decreasing vegetation cover and increasing food supply coincide with the mid-to-end of the nestling period, the post-nestling dependence period and the time when young birds are becoming independent. The patterns of food availability and the breeding cycles are both very similar for scavengers and large raptors that prey on medium sized mammals.

Avian predators of small mammals are themselves smaller than avian scavengers and raptors preying on medium-sized mammals, and their breeding season is shorter (typically less than 120 days from egg-laying to the young becoming independent, versus usually 200 or more days for the larger species). The same two factors of vegetation cover and young small mammals joining the population are probably the main determinants of food availability to these raptors. The birth of small mammals (Smithers 1983, Apps 2000) coincides with the latter half of the period of low vegetation cover and extends into the late summer, from October to March (Figure 47). In good rainfall years small mammals can breed prolifically, raising multiple litters, resulting in rapid population increases. Egg-laying by raptors that prey on small mammals takes place at a time of low vegetation cover and before the young of small mammals enter the population. However, the end of the nestling period, the post-nestling

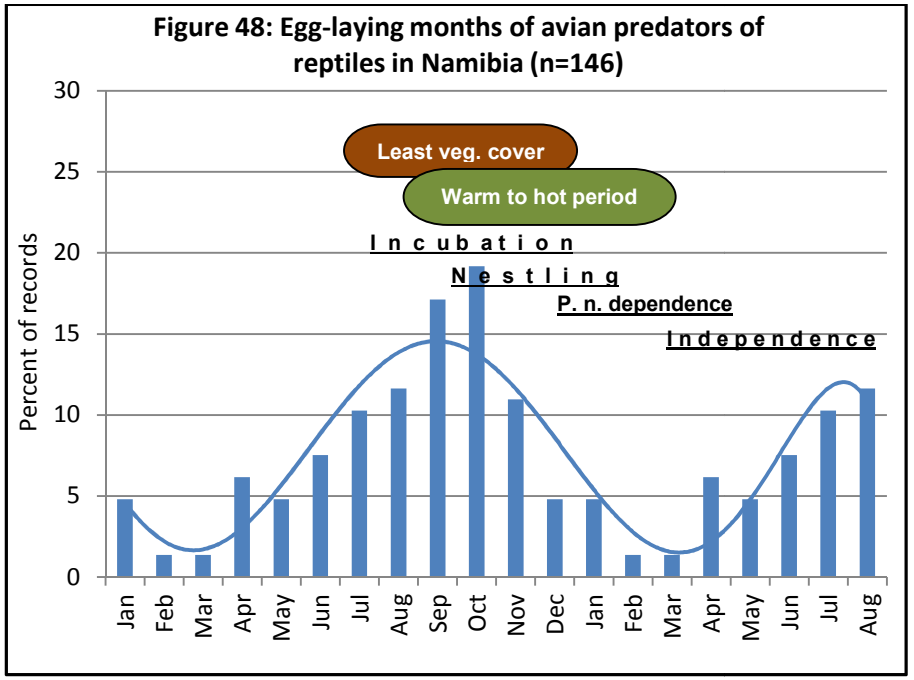


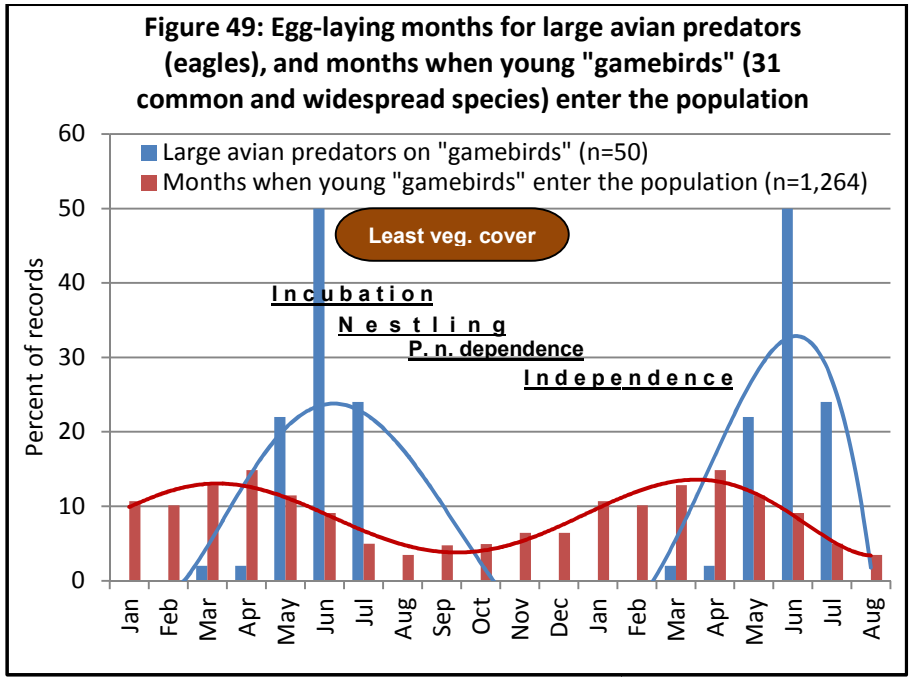


dependence period and the independence period all coincide with the peak birth season of small mammals and their recruitment to the population. These young raptors thus become independent at a time of maximum food supply of young, inexperienced mammals.

The availability of reptile prey is probably determined by a combination of vegetation cover and seasonal temperature, with reptiles being more active in the hot seasons. The breeding season of raptors that prey on reptiles, from egg-laying to independence of the young, coincides with both the period of least vegetation cover and the warm to hot seasons of the year (Figure 48).

There are two distinct laying patterns for raptors that feed on birds. Eagles feed mainly on gamebirds and lay in May to July (96% of records, Figure 49) whereas smaller raptors feed mainly on passerines and near-passerines and lay in August to October (80% of records, Figure 50). The eagles have a long breeding season of about 180 days, from laying to the end of the post-nestling dependence period, whereas the smaller raptors have a breeding season of about 110 days. The availability of gamebirds is probably related to vegetation cover and when young birds join the population. The eagles lay at a time when young gamebirds joining the population and presumably at a time of food abundance, so breeding adults should be in good condition with body fat reserves. The incubation and nesting periods coincide with decreasing vegetation





cover which should make prey more accessible. The end of the post-nestling dependence period and when young birds become independent coincides with the time that young gamebirds join the adult population. The relative importance of these factors in determining the timing of breeding requires more detailed research.

The time of peak food supply for small bird-feeding raptors is when young passerine and near passerine species leave the nest and become independent. This occurs from mainly December to April. However, Figure 50 looks just at the times when young passerines leave the nest, not at prey populations per se. A simple model was developed to understand bird prey populations better. The size of the adult passerine and near passerine population was taken to be 100, with an annual mortality rate of 20% spread evenly across all months. We assume that, on average, two young are produced per pair per year at the end of the nestling period and young birds have a mortality of 80% in their first year spread evenly across all months. In their 13th month out of the nest, surviving young birds join the adult population (Figure 51). The adult population, with its mortality and recruitment, fluctuates slightly around a stable population of 100. The young birds in the population create the population increases, from mainly December to April, confirming the validity of looking at breeding peaks (Figure 50). These inexperienced young birds fall prey more easily than do adult birds and illustrate the time of year when food is most readily available to bird-eating raptors. This period of maximum food availability coincides with the post-nestling dependence period and particularly with the start of the independence period of small bird-eating raptors.

Figure 50: Egg-laying months for smaller avian predators (falcons & sparrowhawks), and months when passerines and small near-passerines (105 common and widespread species) leave the nest

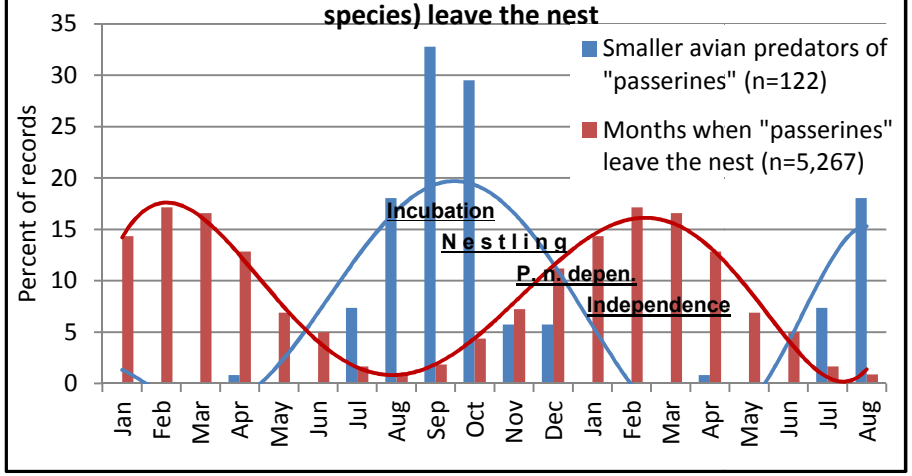
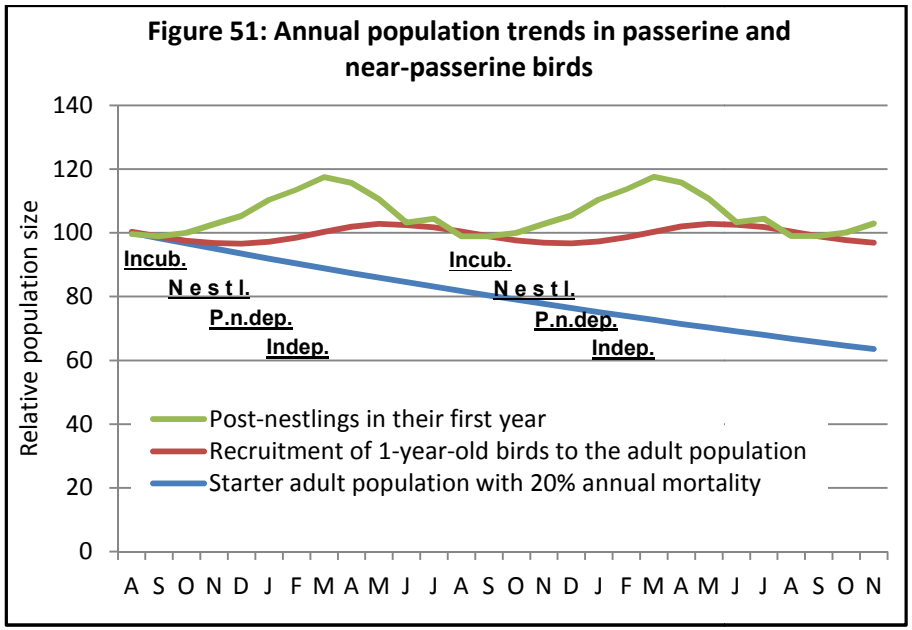


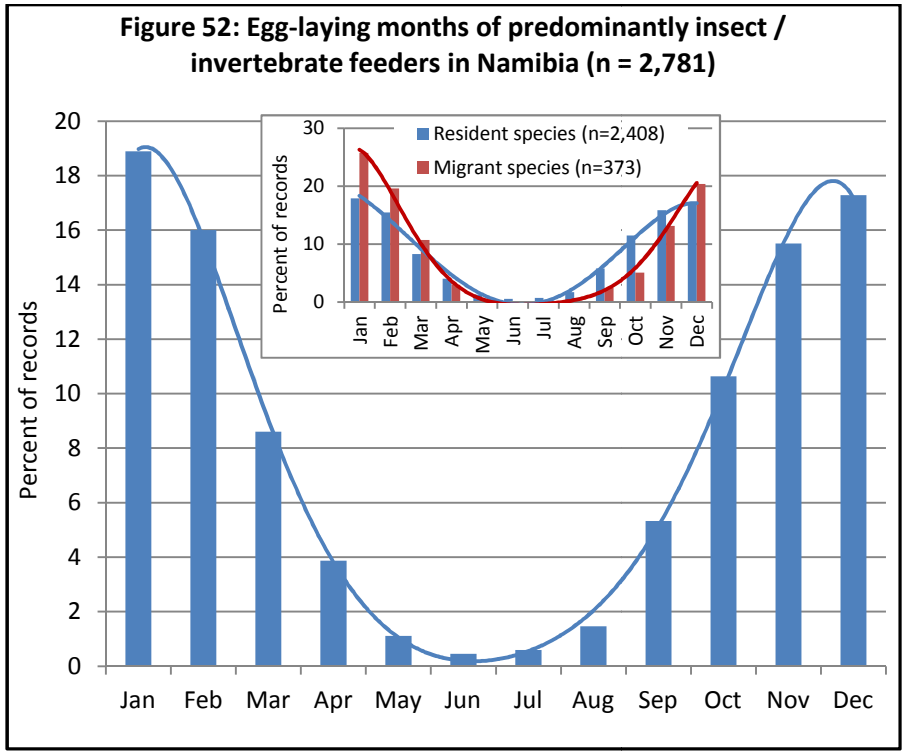
Figure 51: Annual population trends in passerine and near-passerine birds

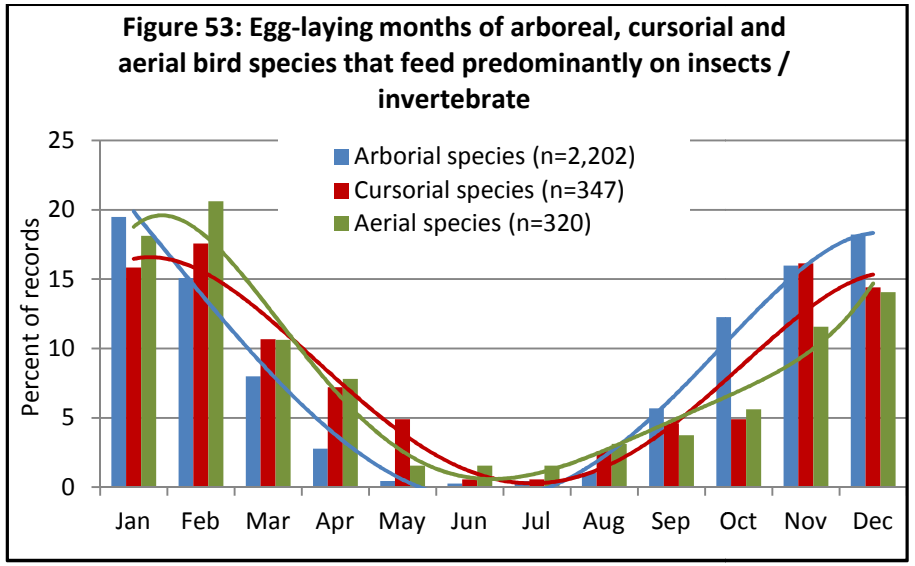


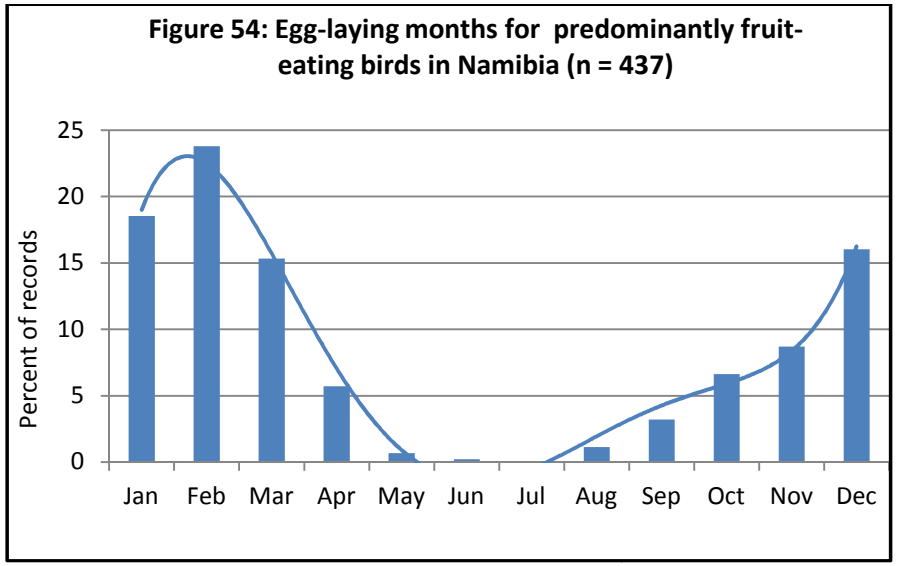
Invertebrate-feeding species

The invertebrate feeders (including insectivores) lay mainly from October to February (78% of clutches), some two months earlier than the arboreal seed-eaters and four months earlier than the cursorial seed-eaters (Figure 52). There is a slight difference between resident and migrant invertebrate feeders (Figure 52), with the resident birds starting to lay about one month earlier and having a more protracted breeding season than the migrants. There are also small differences between different foraging groups of invertebrate feeders (Figure 53). The laying period of predominantly arborial species starts and ends earlier (October to February) than those of cursorial and aerial feeders (both November to March).

Figure 52: Egg-laying months of predominantly insect / invertebrate feeders in Namibia (n = 2,781)



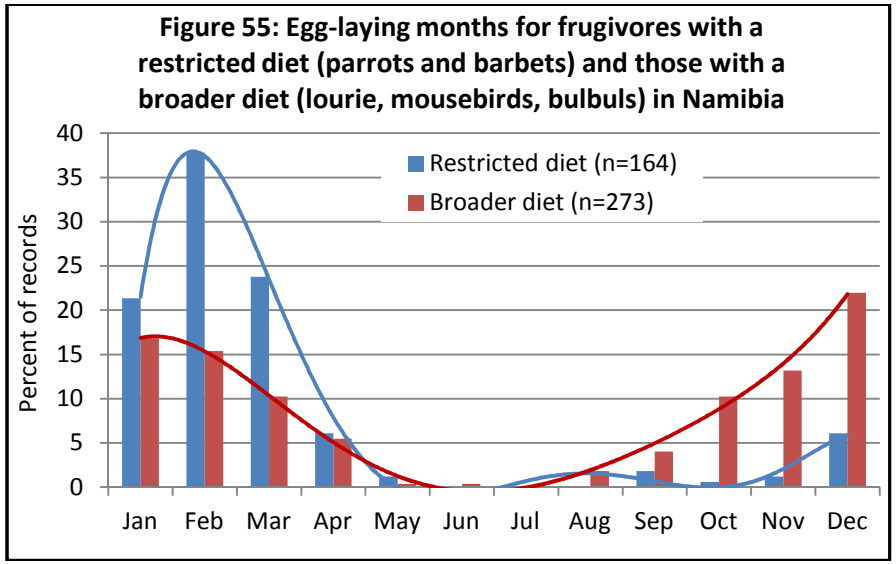


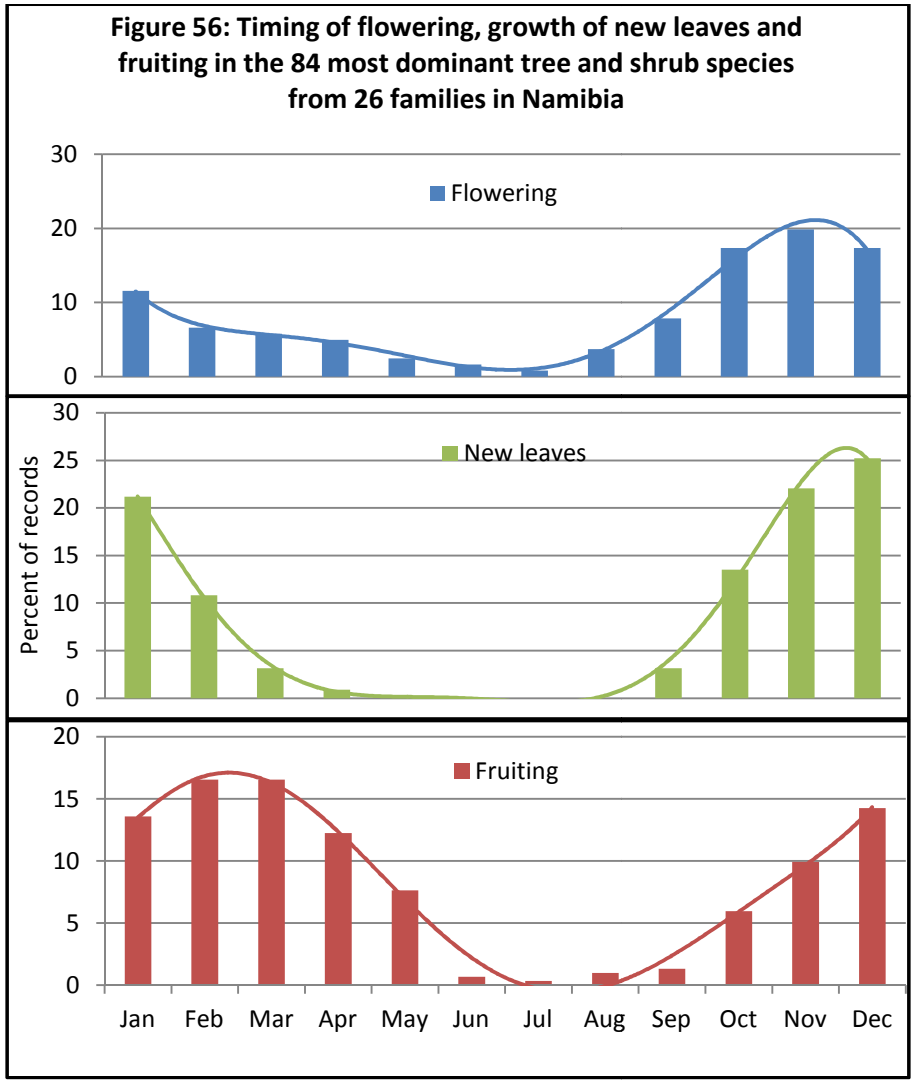


Fruit-eating species

The frugivores have a very well-defined laying season (Figure 54), from December to March (74% of clutches). Yet this camouflages some variation within the group between those species that have a more restricted and specialized diet of mainly fruit, nuts and seeds/pods that grow on trees and shrubs (as opposed to grass seeds, e.g. parrots and barbets), and those species that feed on a wide range of vegetable matter, including buds, flowers and leaves in addition to fruit (e.g. louries, mousebirds, bulbuls). The more specialized feeders have a narrow laying peak from January to March (83% of clutches) whereas the more generalist feeders have a much extended laying season that runs from October to March (Figure 55).

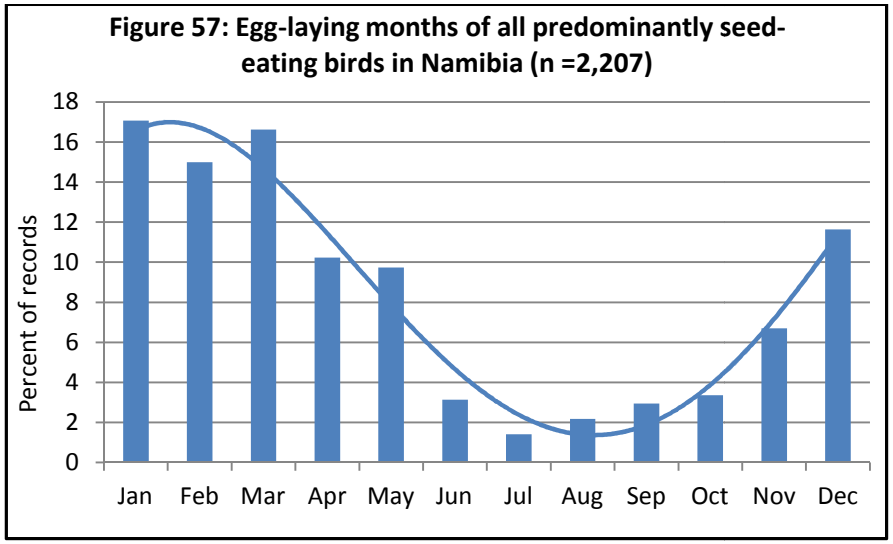
The time of year when the dominant trees and shrubs in Namibia flower, produce new leaves and fruit was extracted from the Tree Atlas of Namibia (Curtis & Mannheimer 2005). Flowering begins in September and peaks in October to January (Figure 56). This coincides with a first, pre-rains emergence of insects. The appearance of new leaves start in October and continues through to January. Fruiting takes place over a much more extensive period, from October-November through to April-May. The breeding of frugivores with a specialist diet closely correlates with the peak fruiting period while that of frugivores with a broader diet correlates with the combined periods of flowering, new leaves and fruiting of trees and shrubs.

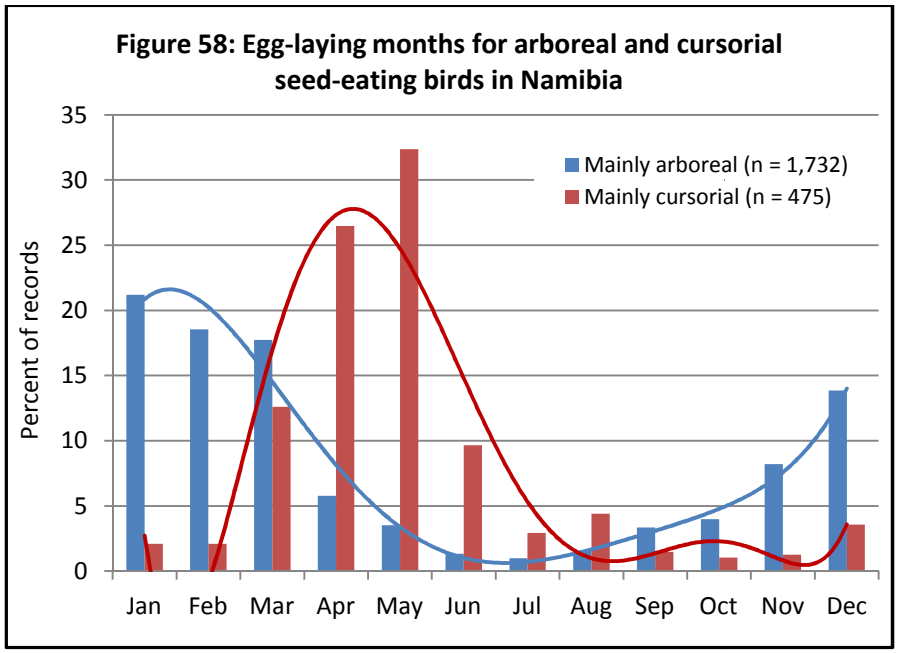




Seed-eating species

Granivores lay mainly from December through to May (Figure 57), to coincide with grass germination, growth and seeding across the country, starting usually November-December in the north-east and mainly in February-March in the south and west. An interesting pattern emerges when mainly arboreal, tree and shrub nesting species (e.g. doves, sparrows, weavers, finches, canaries) are plotted separate from mainly cursorial, ground-nesting species (e.g. sandgrouse, larks, bunting). The arboreal species lay mainly from December to March (71% of clutches) while the cursorial species lay mainly from March to May (72% of clutches) (Figure 58). This can be explained by the fact that the cursorial species generally live in the more arid regions where effective rain falls on average in mainly February and March.





General

Egg-laying in Namibia for many species peaks two or three months later than in other parts of southern Africa, particularly the more eastern areas (for example, see laying dates given by Tarboton 2011). This is because consolidated information on bird breeding in Namibia has not previously been accessible. Even within Namibia there is a one to two month difference between the north-east of the country compared to the south and west.

This study has begun to identify some of the ultimate factors that determine the timing of breeding, explored times of maximum food supply and which parts of the breeding cycle they coincide with. There is considerably more work to do. In particular we have little understanding of the proximate factors that trigger the onset of breeding in birds with long breeding cycles. There is considerable opportunity for more in depth studies on the ultimate and proximate factors determining breeding seasons in birds in Namibia, and the data are freely available at http://goo.gl/8MLbVw to all students and researchers who may be interested in pursuing this further.

Update on existing knowledge of colonial nesting species

Information on colony sizes (mean, range and sample size) for colonial nesting birds is provided in Annex 1. Where a species breeds both at the coast and inland, the data are kept separate. For a number of species the Namibia data provide new or expanded information. This is summarized in Table 14.

Table 14: New and expanded information from Namibia on colonial nesting bird species

Species	Current information (Tarboton 2011)	New or expanded information from Namibia
Crowned Cormorant	Nests in clusters of 5 - 30 nests (max 157 nests)	Mean colony size in Namibia is 70 (n=39) with maximum of 217 active nests in a colony
Great White Pelican	20 – 3 000 nesting pairs per colony	On Namibian coast colonies average 78 active nests (20-202, n=5). Inland colonies average 1,120 nests (n=11) with largest recorded colony of 5 000 active nests
Grey Heron	Colony size seldom >20 nests	On Namibian coast colonies average 2.6 nests (largest 8 nests, n=21). Inland colonies average 7 nests (n=51) with largest colony of 114 active nests
African Openbill	Up to 180 pairs per colony	A colony of at least 485 active nests on Chobe / Impalila rapids area (Brown 2012)
Pied Avocet	Usually in small colonies of 2 - 10 pairs (rarely >50)	All coastal records in Namibia are of solitary pairs; inland colonies average 89 nests (n=14), the largest being 616 active nests
Grey-headed Gull	A few pairs to >100 (rarely up to 300 pairs)	Average colony size in Namibia is 106 (n=5) with the largest about 500 active nests
African Skimmer	Small dispersed colonies, usually numbering <10 pairs (but up to 28 recorded)	Mean colony size in Namibia is 12 (n=10) with largest being 35 active nests
Bradfield's Swift	Nesting habits poorly known – nests solitarily or in small colonies	Mean colony size of 22 from small sample of just 3, range 15 - 30
Grey-rumped Swallow	Pairs nest solitarily, sometimes within 50-100 m of each other	Lose association of pairs within 10-30 m of each other on Okavango floodplain – with average of 7 pairs (n=3) and max 12 pairs
Sociable Weaver	Up to 500 birds per colony	Average of 44 nest chambers per nest structure in Namibia (range 5 – 196, n=95)
Southern Masked Weaver	Nests mainly in single male colony, occasionally 2-9 males per colony. Males are polygynous each with 2-5 females	Mean of 9.4 nests per colony in Namibia (range 1 – 105, n=138)
Chestnut Weaver	Colonial nesting in multiple colonies of 10 – 200 nests	Colonies measured as including all nesting trees in an area, i.e. not per tree. Average colony size is 226 active nests (range 10 – 6 000, n=75)
Red-billed Quelea	Nests erratically in vast colonies from 10s to 1,000s to millions of birds (average is about 300 000 nests per colony)	Mean no. nests per colony in Namibia is 411,800 (range 20 000 – 5 million, n=7)

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Finally, we wish to pay tribute to Warwick Tarboton and his excellent publication on the nests and eggs of southern African birds. His well-structured layout and clear presentation of information has greatly assisted in the preparation of this publication.

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ANNEX 1: EGG-LAYING MONTHS AND COLONY SIZES FOR BIRDS IN NAMIBIA

In solitary nesting species an active nest represents one breeding record. In colonial breeding species a record refers to the whole colony which might comprise many active nests. The mean size of colonies, minimum, maximum and sample size are given. As not all colonies were counted, the total number of nests for colonial species is a minimum number. A number of species breed both at the coast (C) and inland (I). The egg-laying data for the coastal and inland breeding birds have been kept separate as they breed at different times of year.

	Egg-laying month												Total records	Total nests
Family and Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**		
Struthionidae														
Common Ostrich	4	6	19	20	12	11	10	17	43	26	22	13	**203**	**203**
Struthio camelus														
Spheniscidae														
African (Jackass) Penguin **Island**	25	18	16	10	6	4	4	13	15	22	34	30	**197**	**180**
Spheniscus demersus														**27 986**
Island: mean = 346 (13-2 092) n=17	2	2	2	1	0	2	0	0	0	2	1	2	**14**	**9**
Mainland														
Mainland: mean = 16 (6-25) n=5														
Total	27	20	18	11	6	6	4	13	15	24	35	32		**78**
Podicipedidae														
Little Grebe (Dabchick)	16	29	52	12	9	2	1	2	6	7	3	2	**141**	**141**
Tachybaptus ruficollis														
Great Crested Grebe	1	3	1	0	1	0	0	0	0	0	2	3	**11**	**11**
Podiceps cristatus														
Black-necked Grebe	3	14	33	0	0	0	0	0	0	0	0	0	**50**	**0**
Podiceps nigricollis														**456**
Mean = 9.9 (1-46) n=46														
Sulidae														
Cape Gannet	8	3	0	0	0	0	0	0	2	11	16	12	**52**	**49**
Morus capensis														**94 146**
Mean = 5 230 (1 318-11 335) n=3														
Phalacrocoracidae														
White-breasted (Great) Cormorant **C**	11	6	6	4	0	0	0	12	50	45	41	26	**201**	**87**
Phalacrocorax carbo														**2 550**
Coastal: mean = 22 (1-79) n=114 **I**	0	0	3	15	11	5	11	15	9	0	0	0	**69**	**24**
Inland: mean = 13 (1-200) n=45														**569**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Cape Cormorant *Phalacrocorax capensis* Mean = 2 060 (2-10 000) n=44	32	15	1	0	0	1	1	1	2	12	26	25	**116**	**73** **90 598**
Bank Cormorant *Phalacrocorax neglectus* Mean = 311 (12-1 587) n=12	17	13	7	4	3	0	0	0	1	8	14	12	**79**	**67** **14 505**
Reed Cormorant *Phalacrocorax africanus* Mean = 10 (1-29) n=17	2	4	5	2	2	2	1	3	0	0	0	1	**22**	**5** **173**
Crowned Cormorant *Phalacrocorax coronatus* Mean = 70 (3-217) n=39	15	8	5	4	1	1	0	0	2	6	14	20	**76**	**38** **2 744**
Anhingidae														
African Darter *Anhinga rufa* Mean = 32 (1-250) n=23	7	8	7	0	0	1	2	5	4	2	3	0	**39**	**16** **734**
Pelecanidae														
Great White Pelican **C** *Pelecanus onocrotalus*	0	0	0	0	0	1	0	0	1	2	2	0	**6**	**1** **392**
Coastal: mean = 78 (20-202) n=5 **I** Inland: mean = 1,121 (7-5 000) n=11	0	1	0	3	5	8	7	2	0	0	0	0	**26**	**15** **12 328**
Pink-backed Pelican *Pelecanus rufescens* Mean = 26 (22-34) n=4	0	0	0	0	0	0	2	2	0	0	0	0	**4**	**102**
Ardeidae														
Little Bittern *Ixobrychus minutus*	0	1	2	0	0	0	0	0	0	0	0	0	**3**	**3**
Dwarf Bittern *Ixobrychus sturmii* Mean = 1.2 (1-4) n=21	5	15	20	0	0	0	0	0	0	0	0	0	**40**	**19** **25**
White-backed Night Heron *Gorsachius leuconotus*	0	0	1	1	0	0	0	0	0	0	0	0	**2**	**2**
Black-crowned Night Heron *Nycticorax nycticorax*	2	6	6	0	0	1	1	0	0	0	6	1	**23**	**23**

Family and Species		Egg-laying month												Total records	Total nests
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Squacco Heron		0	0	8	2	0	0	0	0	0	0	0	0	**10**	**6**
Ardeola ralloides															**12**
Mean = 2.3 (1-5) n=4															
Rufous-bellied Heron		0	0	1	1	0	0	0	0	1	0	0	0	**3**	**3**
Ardeola rufiventris															
Cattle Egret		0	0	1	1	1	0	0	0	0	0	0	1	**4**	**1**
Bubulcus ibis															**16**
Mean = 5 (2-9) n=3															
Green-backed (Striated) Heron		0	3	2	0	0	0	0	0	0	0	0	0	**5**	**5**
Butorides striata															
Black Heron		0	0	0	0	0	1	0	0	0	0	0	0	**1**	**1**
Egretta ardesiaca															
Slaty Egret		0	8	4	0	0	0	0	0	0	0	0	0	**12**	**5**
Egretta vinaceigula															**32**
Mean = 4.6 (1-23) n=7															
Little Egret		14	0	0	0	0	1	3	1	0	0	2	18	**39**	**20**
Egretta garzetta															**107**
Coastal: mean = 6 (1-46) n=19		0	1	3	1	0	0	0	0	0	0	0	0	**5**	**1**
Inland: mean = 6 (1-13) n=4															**23**
Yellow-billed (Intermediate) Egret		0	0	1	0	0	0	0	0	0	0	0	0	**1**	**1**
Egretta intermedia															
Great Egret		0	0	2	0	0	0	0	0	0	0	0	0	**2**	**2**
Egretta alba															
Purple Heron		0	0	2	0	0	0	0	0	0	0	0	0	**2**	**2**
Ardea purpurea															
Grey Heron	**C**	6	2	0	0	0	0	5	4	4	5	16	22	**64**	**43**
Ardea cinerea															**54**
Coastal: mean =2.6 (1-8) n=21	**I**	2	7	6	4	4	3	9	20	9	0	0	0	**64**	**13**
Inland: mean = 7 (1-114) n=51															**353**
Black-headed Heron		0	0	0	1	0	0	0	1	1	0	0	1	**4**	**4**
Ardea melanocephala															
(1-"many")															
Goliath Heron		1	0	0	0	0	2	1	1	1	0	0	2	**8**	**8**
Ardea goliath															

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Scopidae														
Hamerkop	0	0	3	1	0	0	0	1	2	1	0	0	**8**	**8**
Scopus umbretta														
Ciconiidae														
Yellow-billed Stork	0	0	0	0	0	0	0	2	1	0	0	0	**3**	**0**
Mycteria ibis Mean = 43 (38-48) n=3														**128**
African Openbill	0	3	6	0	0	0	0	0	2	0	0	0	**11**	**2**
Anastomus lamelligerus														**840**
Mean = 93 (1-485) n=9														
Black Stork	0	0	0	0	0	0	1	1	1	0	0	0	**3**	**3**
Ciconia nigra														
Saddle-billed Stork	0	0	0	1	0	2	2	1	0	0	0	0	**6**	**6**
Ephippiorhynchus senegalensis														
Marabou Stork	0	0	0	0	0	0	0	6	2	0	0	0	**8**	**2**
Leptoptilos crumeniferus														**107**
Mean = 18, n = 6														
Threskiornithidae														
Glossy Ibis	0	6	8	1	0	0	0	1	0	0	0	0	**16**	**9**
Plegadis falcinellus														**99**
Mean = 24 (2-81) n=7														
Hadeda Ibis	0	0	0	0	0	0	0	0	0	3	1	0	**4**	**4**
Bostrychia hagedash														
Sacred Ibis	0	1	2	0	0	0	1	1	0	0	0	0	**5**	**2**
Threskiornis aethiopicus														**210**
Mean = 70 (11-133) n=3														
African Spoonbill	0	3	5	4	2	0	1	1	3	1	0	0	**20**	**13**
Platalea alba														**229**
Mean = 33 (2-81) n=7														
Phoenicopteridae														
Greater Flamingo	0	3	3	1	1	0	0	0	0	0	0	0	**8**	**3**
Phoenicopterus ruber														**35 210**
Mean = 7,042 (2 080-14 000) n=5														

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lesser Flamingo *Phoeniconaias minor* Mean = 13 000 (1 500-30 000) n=4	0	0	0	0	4	1	0	0	0	0	0	0	**5**	**1** **52 000**
Anatidae														
Fulvous Whistling Duck *Dendrocygna bicolor*	0	1	4	0	0	0	0	0	0	0	0	0	**5**	**5**
White-backed Duck *Thalassornis leuconotus*	1	6	23	2	0	0	0	0	0	0	0	0	**32**	**32**
Egyptian Goose *Alopochen aegyptiaca*	5	10	8	1	6	4	8	6	5	4	2	7	**66**	**66**
South African Shelduck *Tadorna cana*	0	0	0	1	2	5	3	2	1	0	0	0	**14**	**14**
Spur-winged Goose *Plectropterus gambensis*	0	1	2	0	0	0	0	0	0	0	0	0	**3**	**3**
Knob-billed (Comb) Duck *Sarkidiornis melanotos*	1	3	0	0	0	0	1	0	0	0	0	0	**5**	**5**
African Pygmy Goose *Nettapus auritus*	0	2	6	0	0	0	0	0	0	0	0	0	**8**	**8**
Cape Teal *Anas capensis*	2	9	11	9	6	15	9	10	4	0	6	3	**84**	**84**
Yellow-billed Duck *Anas undulata*	1	2	0	0	0	0	0	0	0	0	0	0	**3**	**3**
African Black Duck *Anas sparsa*	0	0	0	0	0	0	0	1	0	0	0	0	**1**	**1**
Red-billed Teal *Anas erythrorhyncha*	3	4	15	7	3	1	0	0	1	1	0	4	**39**	**39**
Cape Shoveler *Anas smithii*	0	0	2	0	0	0	1	2	3	0	0	0	**8**	**8**
Southern Pochard *Netta erythrophthalma*	0	5	1	0	0	0	0	0	0	0	0	0	**6**	**6**
Maccoa Duck *Oxyura maccoa*	2	5	7	2	2	0	0	1	0	1	0	1	**21**	**21**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Accipitridae														
Black-shouldered Kite *Elanus caeruleus*	0	3	3	5	1	0	3	2	6	12	1	1	**37**	**37**
Yellow-billed Kite *Milvus parasitus*	0	0	0	0	0	0	0	0	1	6	1	0	**8**	**8**
African Fish Eagle *Haliaeetus vocifer*	0	0	0	0	15	9	3	0	1	0	0	0	**28**	**28**
Egyptian Vulture *Neophron percnopterus*	0	0	0	0	0	0	0	0	1	0	0	0	**1**	**1**
White-backed Vulture *Gyps africanus*	0	0	5	134	568	137	28	0	0	0	0	0	**872**	**872**
Cape Vulture *Gyps coprotheres*	0	0	0	0	32	32	2	3	0	0	0	0	**69**	**69**
Lappet-faced Vulture *Torgos tracheliotus*	0	0	1	25	307	643	269	28	1	0	0	0	**1 274**	**1 274**
White-headed Vulture *Trigonoceps occipitalis*	0	0	0	0	0	7	3	1	0	0	0	0	**11**	**11**
Black-chested Snake Eagle *Circaetus pectoralis*	0	1	0	8	6	9	12	16	21	5	0	0	**78**	**78**
Brown Snake Eagle *Circaetus cinereus*	0	0	0	1	1	1	3	0	0	2	1	0	**9**	**9**
Western Banded Snake Eagle *Circaetus cinerascens*	0	0	1	0	0	1	0	0	0	0	0	0	**2**	**2**
Bateleur *Terathopius ecaudatus*	3	4	8	5	1	2	2	0	0	0	1	2	**28**	**28**
Gabar Goshawk *Micronisus gabar*	0	0	0	0	0	0	0	0	7	28	7	6	**48**	**48**
Dark Chanting Goshawk *Melierax metabates*	0	0	0	0	0	0	0	0	0	1	0	0	**1**	**1**
Pale Chanting Goshawk *Melierax canorus*	0	0	0	0	0	0	11	25	49	32	12	4	**133**	**133**
Shikra *Accipiter badius*	2	0	0	0	0	0	0	0	2	6	1	0	**11**	**11**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Little Sparrowhawk *Accipiter minullus*	0	0	0	0	0	0	0	0	6	6	0	2	**14**	**14**
Lizard Buzzard *Kaupifalco monogrammicus*	0	0	0	0	0	0	0	0	0	2	0	0	**2**	**2**
Jackal Buzzard *Buteo rufofuscus*	0	0	0	0	0	0	0	0	0	1	1	0	**2**	**2**
Augur Buzzard *Buteo augur*	3	0	0	0	0	2	0	0	0	1	1	1	**8**	**8**
Verreaux's (Black) Eagle *Aquila verreauxii*	0	0	0	15	44	15	3	1	0	0	0	0	**78**	**78**
Tawny Eagle *Aquila rapax*	0	0	1	22	45	28	7	1	0	0	0	0	**104**	**104**
Wahlberg's Eagle *Aquila wahlbergi*	0	0	0	0	0	0	0	5	39	34	7	1	**86**	**86**
African Hawk-Eagle *Hieraaetus spilogaster*	0	0	1	1	12	24	12	0	0	0	0	0	**50**	**50**
Booted Eagle *Hieraaetus pennatus*	0	0	0	0	1	2	0	0	0	0	0	0	**3**	**3**
Ayres's Hawk-Eagle *Hieraaetus ayresii*	0	0	0	0	1	0	0	0	0	0	0	0	**1**	**1**
Long-crested Eagle *Lophaetus occipitalis*	0	0	0	0	0	0	0	0	1	1	0	0	**2**	**2**
Martial Eagle *Polemaetus bellicosus*	0	0	0	5	12	15	8	2	0	0	0	0	**42**	**42**
Sagittariidae														
Secretarybird *Sagittarius serpentarius*	10	8	10	6	6	3	1	1	3	2	1	2	**53**	**53**
Falconidae														
Pygmy Falcon *Polihierax semitorquatus*	2	1	1	0	0	0	0	2	7	12	14	6	**45**	**45**
Rock (Common) Kestrel *Falco tinnunculus*	0	0	0	0	0	0	0	3	11	8	8	1	**31**	**31**
Greater Kestrel *Falco rupicoloides*	2	1	0	0	0	4	7	17	41	44	7	5	**128**	**128**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Grey Kestrel *Falco ardosiaceus*	0	0	0	0	0	0	0	0	1	0	0	0	**1**	**1**
Dickinson's Kestrel *Falco dickinsoni*	0	0	0	0	0	0	0	0	1	1	0	0	**2**	**2**
Red-necked Falcon *Falco chicquera*	0	0	0	0	0	0	6	19	18	5	0	0	**48**	**48**
Lanner Falcon *Falco biarmicus*	0	0	0	1	0	0	3	5	9	1	0	0	**19**	**19**
Peregrine Falcon *Falco peregrinus*	0	0	0	0	0	0	0	1	5	1	0	0	**7**	**7**
Numididae														
Helmeted Guineafowl *Numida meleagris*	7	9	26	6	1	0	0	0	0	0	0	0	**49**	**49**
Phasianidae														
Common Quail *Coturnix coturnix*	0	3	3	0	0	0	0	0	0	0	0	0	**6**	**6**
Harlequin Quail *Coturnix delegorguei*	4	16	1	0	1	0	0	3	0	0	0	1	**26**	**26**
Orange River Francolin *Scleroptila levaillantoides*	2	4	1	2	1	1	0	0	0	0	1	1	**13**	**13**
Crested Francolin *Dendroperdix sephaena*	0	0	3	1	0	0	1	1	1	0	1	4	**12**	**12**
Hartlaub's Spurfowl *Pternistis hartlaubi*	0	0	2	7	14	9	6	0	1	0	0	0	**39**	**39**
Red-billed Spurfowl *Pternistis adspersus*	4	9	22	23	10	10	3	4	5	4	2	0	**96**	**96**
Swainson's Spurfowl *Pternistis swainsonii*	1	3	4	6	6	5	0	0	0	0	0	0	**25**	**25**
Red-necked Spurfowl *Pternistis afer*	0	0	0	0	1	0	0	0	0	0	0	0	**1**	**1**
Turnicidae														
Kurrichane Buttonquail *Turnix sylvaticus*	3	23	7	2	3	2	2	0	0	0	0	0	**42**	**42**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Blackrumped Buttonquail *Turnix hottentotta*	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**
Rallidae														
African Crake *Crex egregia*	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**1**
African Rail *Rallus caerulescens*	0	0	0	0	0	1	1	0	0	0	0	0	**2**	**2**
Striped Crake *Aenigmatolimnas marginalis*	0	2	2	0	0	0	0	0	0	0	0	0	**4**	**4**
Black Crake *Amaurornis flavirostra*	0	0	0	0	0	0	0	2	0	0	1	0	**3**	**3**
Allen's Gallinule *Porphyrio alleni*	4	5	5	0	0	0	0	0	0	0	0	0	**14**	**14**
Purple Swamphen (Gallinule) *Porphyrio porphyrio*	2	2	11	0	1	0	0	1	0	1	1	1	**20**	**20**
Common Moorhen *Gallinula chloropus*	2	17	42	6	2	0	1	1	2	1	5	2	**81**	**81**
Lesser Moorhen *Gallinula angulata*	17	96	50	0	0	0	0	0	1	0	0	0	**164**	**164**
Red-knobbed Coot *Fulica cristata*	10	74	58	29	7	3	2	4	5	8	2	9	**211**	**211**
Gruidae														
Wattled Crane *Bugeranus carunculatus*	0	0	0	0	0	4	3	5	2	0	0	0	**14**	**14**
Blue Crane *Anthropoides paradiseus*	15	14	2	0	0	0	0	0	0	0	0	17	**48**	**48**
Grey Crowned Crane *Balearica regulorum*	0	1	0	0	0	1	1	0	0	0	0	0	**3**	**3**
Heliornithidae														
African Finfoot *Podica senegalensis*	0	0	0	0	0	0	0	0	0	1	0	0	**1**	**1**
Otididae														
Ludwig's Bustard *Neotis ludwigii*	0	1	5	5	1	2	1	1	1	3	0	0	**20**	**20**

Family and Species		Egg-laying month												Total records	Total nests
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Kori Bustard		10	5	2	7	0	0	1	1	3	2	0	2	**33**	**33**
Ardeotis kori															
Red-crested Korhaan		5	7	7	2	0	0	0	0	1	4	5	4	**35**	**35**
Lophotis ruficrista															
Northern Black Korhaan		4	5	5	1	0	0	0	0	0	0	1	1	**17**	**17**
Afrotis afraoides															
Karoo Korhaan		0	2	3	2	0	0	0	0	1	0	0	0	**8**	**8**
Eupodotis vigorsii															
Rüppell's Korhaan		7	9	6	25	16	3	1	4	5	6	2	4	**88**	**88**
Eupodotis rueppellii															
Black-bellied Bustard		1	1	0	0	0	0	0	0	0	0	1	0	**3**	**3**
Lissotis melanogaster															
Jacanidae															
African Jacana		1	3	1	0	0	0	0	0	1	0	0	1	**7**	**7**
Actophilornis africanus															
Rostratulidae															
Greater Painted Snipe		1	7	9	0	0	0	0	0	0	0	0	0	**17**	**17**
Rostratula benghalensis															
Haematopodidae															
African Black Oystercatcher		3	2	3	4	5	0	0	0	0	0	0	0	**17**	**17**
Haematopus moquini															
Recurvirostridae															
Black-winged Stilt	**C**	0	0	0	0	7	2	1	1	1	0	0	0	**12**	**12**
Himantopus himantopus	**I**	17	19	15	3	3	1	0	0	0	0	0	1	**59**	**54**
Coast:all single nests															**35**
Inland: mean = 7 (5-12) n=5															
Pied Avocet	**C**	5	0	0	0	7	8	3	2	2	2	5	6	**40**	**40**
Recurvirostra avosetta	**I**	3	6	9	3	2	2	0	0	0	0	0	0	**25**	**11**
Coast:all single nests															**1 239**
Inland: mean = 89 (1-616) n=14															
Burhinidae															
Water Dikkop (Thick-knee)		1	0	0	0	0	0	0	0	1	2	1	0	**5**	**5**
Burhinus vermiculatus															

Family and Species		Egg-laying month												Total records	Total nests
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Spotted Dikkop (Thick-knee)		10	3	0	0	0	0	0	0	2	16	14	12	**57**	**57**
Burhinus capensis															
Glareolidae															
Burchell's Courser		2	4	2	7	3	2	5	2	1	2	0	0	**30**	**30**
Cursorius rufus															
Temminck's Courser		1	0	3	0	0	0	0	1	0	0	0	2	**7**	**7**
Cursorius temminckii															
Double-banded Courser		6	5	6	9	3	0	3	2	5	3	10	9	**61**	**61**
Rhinoptilus africanus															
Three-banded Courser		0	0	0	1	1	0	0	0	0	0	1	0	**3**	**3**
Rhinoptilus cinctus															
Bronze-winged Courser		0	0	0	0	0	1	0	0	0	0	3	0	**4**	**4**
Rhinoptilus chalcopterus															
Collared Pratincole		0	0	0	0	2	3	1	0	1	4	2	0	**13**	**13**
Glareola pratincola															
Rock Pratincole		0	0	0	0	0	0	0	0	0	2	9	5	**16**	**16**
Glareola nuchalis															
Charadriidae															
Kittlitz's Plover		14	6	8	9	6	16	17	7	3	2	7	10	**105**	**105**
Charadrius pecuarius															
Three-banded Plover		5	3	4	1	0	2	0	6	5	4	2	2	**34**	**34**
Charadrius tricollaris															
White-fronted Plover		65	48	31	20	15	15	9	8	23	47	52	74	**407**	**407**
Charadrius marginatus															
Chestnut-banded Plover	**C**	1	2	1	24	17	9	1	0	0	1	3	4	**63**	**63**
Charadrius pallidus	**I**	7	5	0	4	3	3	2	1	0	0	0	6	**31**	**31**
African Wattled Lapwing		0	0	0	0	0	0	0	1	0	0	1	0	**2**	**2**
Vanellus senegallus															
White-crowned Lapwing		0	0	0	0	0	0	0	0	1	2	0	0	**3**	**3**
Vanellus albiceps															
Blacksmith Lapwing		18	26	31	11	7	4	3	5	6	1	0	4	**116**	**116**
Vanellus armatus															
Crowned Lapwing		13	16	21	9	3	1	3	12	23	24	22	16	**163**	**163**
Vanellus coronatus															

Family and Species		Egg-laying month												Total records	Total nests
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Long-toed Lapwing		0	0	0	0	1	1	0	0	0	0	0	0	**2**	**2**
Vanellus crassirostris															
Scolopacidae															
African Snipe		0	0	0	0	2	0	0	0	0	0	0	0	**2**	**76**
Gallinago nigripennis															
Laridae															
Hartlaub's Gull		5	6	11	20	10	2	2	2	0	1	0	1	**60**	**23**
Larus hartlaubii															**7 586**
Mean = 205 (1-1 000) n=37															
Grey-headed Gull	C	0	0	2	2	3	1	0	0	0	0	0	0	**8**	**3**
Larus cirrocephalus															**530**
Mean = 106 (1-500) n=5	**I**	0	0	1	1	0	1	0	0	0	0	0	0	**3**	**3**
Kelp Gull		17	0	1	1	1	0	0	0	2	21	43	32	**118**	**69**
Larus dominicanus															**4 460**
Mean = 91 (1-556) n=49															
Caspian Tern		3	4	4	1	0	0	0	0	0	0	0	2	**14**	**4**
Sterna caspia															**115**
Mean = 12 (1-40) n=10															
Swift Tern		0	1	6	7	3	1	0	0	0	0	0	0	**18**	**5**
Sterna bergii															**4 451**
Mean = 342 (9-1,151) n=13															
Damara Tern		206	73	8	0	0	0	0	0	0	125	283	378	**1 073**	**1 073**
Sterna balaenarum															
Singly or lose colonies															
Whiskered Tern		8	27	21	0	0	0	0	0	0	0	0	0	**56**	**29**
Chlidonias hybrida															**307**
Mean = 11 (1-37) n=27															
Rynchopidae															
African Skimmer		0	0	0	0	0	0	1	9	2	1	0	0	**13**	**3**
Rynchops flavirostris															**118**
Mean = 12 (5-35) n=10															
Pteroclidae															
Namaqua Sandgrouse		9	5	14	29	27	20	7	11	5	3	4	9	**143**	**143**
Pterocles namaqua															

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Double-banded Sandgrouse *Pterocles bicinctus*	0	0	1	0	11	0	1	3	0	2	1	6	**25**	**25**
Yellow-throated Sandgrouse *Pterocles gutturalis*	0	0	0	0	0	0	0	0	1	0	0	0	**1**	**1**
Burchell's Sandgrouse *Pterocles burchelli*	1	0	0	0	1	2	2	6	0	0	0	0	**12**	**12**
Columbidae														
African Green Pigeon *Treron calvus*	0	0	0	1	0	0	0	1	0	0	1	1	**4**	**4**
Emerald-spotted Wood Dove *Turtur chalcospilos*	0	0	1	1	1	0	0	1	0	0	0	0	**4**	**4**
Namaqua Dove *Oena capensis*	5	5	4	3	0	0	2	1	4	3	2	8	**37**	**37**
Speckled (Rock) Pigeon *Columba guinea*	3	6	8	2	2	3	2	5	1	1	0	8	**41**	**41**
Feral (Common) Pigeon *Columba livia*	15	5	0	0	0	0	0	0	0	0	0	18	**38**	**38**
Red-eyed Dove *Streptopelia semitorquata*	0	0	0	0	1	0	0	0	1	1	0	1	**4**	**4**
African Mourning Dove *Streptopelia decipiens*	1	0	0	0	0	0	0	1	0	0	0	0	**2**	**2**
Cape Turtle-Dove *Streptopelia capicola*	5	6	29	11	10	7	9	9	7	5	2	7	**107**	**107**
Laughing Dove *Streptopelia senegalensis*	34	33	38	15	12	3	1	5	5	8	18	38	**210**	**210**
Psittacidae														
Grey-headed (Brown-necked) Parrot *Poicephalus fuscicollis*	0	1	2	1	1	0	0	0	0	0	0	0	**5**	**5**
Meyer's Parrot *Poicephalus meyeri*	1	1	3	2	1	1	0	0	0	0	0	0	**9**	**9**
Rüppell's Parrot *Poicephalus rueppellii*	1	7	2	0	0	0	0	0	0	0	0	0	**10**	**10**
Rosy-faced Lovebird *Agapornis roseicollis*	0	12	12	4	1	0	0	0	0	1	0	0	**30**	**30**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Musophagidae														
Schalow's Turaco *Tauraco schalowi*	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**1**
Grey Lourie (Go-away Bird) *Corythaixoides concolor*	16	14	13	9	0	1	0	2	3	3	6	10	**77**	**77**
Cuculidae														
Jacobin Cuckoo *Clamator jacobinus*	1	1	1	2	0	0	0	0	0	0	1	9	**15**	**15**
Levaillant's Cuckoo *Clamator levaillantii*	2	1	0	0	0	0	0	0	0	0	0	2	**5**	**5**
Great Spotted Cuckoo *Clamator glandarius*	10	23	22	3	0	0	0	0	0	0	0	0	**58**	**58**
Black Cuckoo *Cuculus clamosus*	8	11	3	0	0	0	0	0	0	0	0	1	**23**	**23**
African Cuckoo *Cuculus gularis*	1	0	0	0	0	0	0	0	0	0	3	4	**8**	**8**
Klaas's Cuckoo *Chrysococcyx klaas*	6	3	4	5	0	0	0	0	0	0	1	3	**22**	**22**
Diederik (Diderick) Cuckoo *Chrysococcyx caprius*	29	21	7	1	0	0	0	0	0	1	0	10	**69**	**69**
Senegal Coucal *Centropus senegalensis*	0	0	0	0	0	0	0	0	0	0	0	2	**2**	**2**
Tytonidae														
Western Barn Owl *Tyto alba*	0	1	5	11	7	4	5	6	1	9	2	0	**51**	**51**
Strigidae														
African Scops Owl *Otus senegalensis*	0	1	0	0	0	0	0	0	6	10	0	0	**17**	**17**
Southern White-faced Owl *Ptilopsis granti*	3	2	0	0	0	0	1	5	8	12	7	3	**41**	**41**
Cape Eagle-Owl *Bubo capensis*	0	0	0	0	0	2	3	0	0	0	0	0	**5**	**5**
Spotted Eagle-Owl *Bubo africanus*	1	0	0	2	1	2	2	6	27	21	6	2	**70**	**70**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Verreaux's Eagle-Owl *Bubo lacteus*	0	0	1	0	2	3	4	3	1	0	0	0	**14**	**14**
Pel's Fishing Owl *Scotopelia peli*	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**1**
Pearl-spotted Owlet *Glaucidium perlatum*	0	0	0	0	0	0	0	0	8	25	10	0	**43**	**43**
African Barred Owlet *Glaucidium capense*	0	0	0	0	0	0	0	0	1	1	0	0	**2**	**2**
African Wood Owl *Strix woodfordii*	0	0	0	0	0	0	0	0	3	2	0	0	**5**	**5**
Marsh Owl *Asio capensis*	0	2	2	3	1	0	0	0	0	0	2	0	**10**	**10**
Caprimulgidae														
Square-tailed Nightjar *Caprimulgus fossii*	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**1**
Fiery-necked Nightjar *Caprimulgus pectoralis*	0	0	0	0	0	0	0	0	0	1	4	3	**8**	**8**
Freckled Nightjar *Caprimulgus tristigma*	0	1	0	0	0	0	0	0	1	0	1	2	**5**	**5**
Rufous-cheeked Nightjar *Caprimulgus rufigena*	1	0	0	0	0	0	0	0	0	4	14	9	**28**	**28**
Apodidae														
Böhm's Spinetail *Neafrapus boehmi*	4	0	0	0	0	0	0	0	0	0	0	4	**8**	**8**
African Palm Swift *Cypsiurus parvus*	3	1	0	0	0	0	0	0	2	0	4	6	**16**	**16**
Bradfield's Swift *Apus bradfieldi* Mean = 22 (15-30) n = 3	2	5	6	6	0	0	0	0	0	4	12	6	**41**	**41**
White-rumped Swift *Apus caffer*	3	2	0	0	0	0	0	0	0	0	7	5	**17**	**17**
Horus Swift *Apus horus* [1 colony, 4 active nests]	0	0	4	0	0	0	0	0	0	0	0	0	**4**	**4**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Little Swift *Apus affinis* Mean = 26 (5-108) n=7	7	5	0	1	1	1	0	0	0	0	1	4	**20**	**20**
Coliidae														
Red-faced Mousebird *Urocolius indicus*	1	3	5	1	1	0	0	0	4	2	3	4	**24**	**24**
White-backed Mousebird *Colius colius*	8	0	1	0	0	0	0	3	3	13	17	15	**60**	**60**
Alcedinidae														
Grey-headed Kingfisher *Halcyon leucocephala*	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**1**
Woodland Kingfisher *Halcyon senegalensis*	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**1**
Striped Kingfisher *Halcyon chelicuti*	0	0	0	0	0	0	0	0	0	1	1	1	**3**	**3**
Malachite Kingfisher *Alcedo cristata*	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**1**
Giant Kingfisher *Megaceryle maxima*	0	0	0	0	0	0	0	1	0	1	0	0	**2**	**2**
Pied Kingfisher *Ceryle rudis*	0	0	0	1	0	0	0	0	0	0	0	0	**1**	**1**
Meropidae														
Little Bee-eater *Merops pusillus*	0	0	0	0	0	0	0	0	1	3	0	0	**4**	**4**
Swallow-tailed Bee-eater *Merops hirundineus*	2	1	0	0	0	0	0	0	2	6	8	4	**23**	**23**
White-fronted Bee-eater *Merops bullockoides* One colony, 6 active nests	0	0	0	0	0	0	0	0	5	1	0	0	**6**	**5** **6**
Olive (Madagascar) Bee-eater *Merops superciliosus*	4	0	0	0	0	0	0	0	1	1	3	7	**16**	**16**
European Bee-eater *Merops apiaster*	0	0	0	0	0	0	0	0	1	1	0	0	**2**	**2**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Southern Carmine Bee-eater *Merops nubicoides*	0	0	0	0	0	0	0	0	1	4	1	0	**6**	**6**
Coraciidae														
Purple Roller *Coracias naevius*	1	4	6	2	0	0	0	0	1	1	8	5	**28**	**28**
Lilac-breasted Roller *Coracias caudatus*	0	0	0	0	0	0	0	0	1	7	4	1	**13**	**13**
Racket-tailed Roller *Coracias spatulatus*	0	0	0	0	0	0	0	0	0	4	4	1	**9**	**9**
Broad-billed Roller *Eurystomus glaucurus*	1	0	1	0	0	0	0	0	0	2	1	1	**6**	**6**
Phoeniculidae														
Green Woodhoopoe *Phoeniculus purpureus*	2	5	3	1	0	0	0	0	0	3	2	2	**18**	**18**
Violet Woodhoopoe *Phoeniculus damarensis*	0	7	4	0	0	0	0	0	0	0	0	0	11	11
Common Scimitarbill *Rhinopomastus cyanomelas*	0	1	4	0	0	0	0	0	1	6	1	2	**15**	**15**
Upupidae														
African Hoopoe *Upupa epops*	3	2	1	1	0	0	0	0	7	11	8	3	**36**	**36**
Bucerotidae														
Southern Ground Hornbill *Bucorvus leadbeateri*	0	0	0	0	0	0	0	0	1	0	0	0	**1**	**1**
Monteiro's Hornbill *Tockus monteiri*	31	48	56	10	0	0	0	0	0	0	2	1	**148**	**148**
Southern Red-billed Hornbill *Tockus erythrorhynchus*	2	1	1	0	0	0	0	0	0	0	0	0	**4**	**4**
Damara Hornbill *Tockus damarensis*	4	14	17	0	0	0	0	0	2	0	1	2	**40**	**40**
Southern Yellow-billed Hornbill *Tockus leucomelas*	14	21	10	2	0	0	0	2	1	8	10	16	**84**	**84**
Bradfield's Hornbill *Tockus bradfieldi*	0	2	0	0	0	0	0	0	0	0	4	2	**8**	**8**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
African Grey Hornbill *Tockus nasutus*	55	9	5	1	0	0	0	0	0	5	10	21	**106**	**106**
Capitonidae														
Yellow-fronted Tinkerbird *Pogoniulus chrysoconus*	0	0	0	0	0	0	0	0	1	0	0	0	**1**	**1**
Acacia Pied Barbet *Tricholaema leucomelas*	33	43	23	5	0	0	0	0	0	0	1	11	**116**	**116**
Black-collared Barbet *Lybius torquatus*	0	0	0	0	0	0	0	0	2	0	0	0	**2**	**2**
Crested Barbet *Trachyphonus vaillantii*	0	0	0	0	0	0	0	0	0	0	1	1	**2**	**2**
Indicatoridae														
Lesser Honeyguide *Indicator minor*	2	6	3	0	0	0	0	0	0	0	0	1	**12**	**12**
Picidae														
Bennett's Woodpecker *Campethera bennettii*	0	0	0	0	0	1	0	0	0	2	0	1	**4**	**4**
Golden-tailed Woodpecker *Campethera abingoni*	0	0	0	0	0	0	0	0	0	2	2	1	**5**	**5**
Cardinal Woodpecker *Dendropicos fuscescens*	1	0	0	1	0	0	0	0	1	9	3	6	**21**	**21**
Bearded Woodpecker *Dendropicos namaquus*	0	0	0	0	0	1	4	1	1	1	2	1	**11**	**11**
Alaudidae														
Monotonous Lark *Mirafra passerina*	11	14	3	0	3	0	0	0	0	0	4	12	**47**	**47**
Rufous-naped Lark *Mirafra africana*	0	1	0	0	1	0	0	0	0	0	1	4	**7**	**7**
Eastern Clapper Lark *Mirafra fasciolata*	1	1	0	0	0	0	0	0	0	0	1	2	**5**	**5**
Fawn-coloured Lark *Calendulauda africanoides*	1	2	4	0	0	0	0	0	0	0	1	2	**10**	**10**
Sabota Lark *Calendulauda sabota*	15	16	3	4	1	0	0	0	0	0	21	7	**67**	**67**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Dune Lark *Calendulauda erythrochlamys*	12	11	5	4	1	2	0	3	4	0	0	2	**44**	**44**
Barlow's Lark *Calendulauda barlowi*	0	0	0	0	0	0	0	1	3	8	1	0	**13**	**13**
Karoo Long-billed Lark *Certhilauda subcoronata*	1	2	3	3	0	0	0	1	0	0	0	0	**10**	**10**
Benguela Long-billed Lark *Certhilauda benguelensis*	0	0	0	4	1	0	0	0	0	0	0	0	**5**	**5**
Spike-heeled Lark *Chersomanes albofasciata*	2	4	7	6	4	0	0	0	0	0	0	0	**23**	**23**
Gray's Lark *Ammomanopsis grayi*	0	3	3	14	18	5	1	0	1	0	0	2	**47**	**47**
Red-capped Lark *Calandrella cinerea*	0	0	2	8	1	0	1	1	0	0	1	2	**16**	**16**
Pink-billed Lark *Spizocorys conirostris*	0	1	3	1	0	0	0	0	0	0	0	0	**5**	**5**
Sclater's Lark *Spizocorys sclateri*	0	0	2	1	0	0	1	0	0	0	0	0	**4**	**4**
Stark's Lark *Spizocorys starki*	0	2	5	21	15	0	1	0	0	0	0	1	**45**	**45**
Black-eared Sparrow-Lark *Eremopterix australis*	0	0	0	8	0	0	0	0	0	0	0	0	**8**	**8**
Chestnut-backed Sparrow-Lark *Eremopterix leucotis*	0	0	1	0	0	1	0	0	0	0	0	0	**2**	**2**
Grey-backed Sparrow-Lark *Eremopterix verticalis*	0	1	8	28	44	10	0	2	0	0	0	0	**93**	**93**
Hirundinidae														
Brown-throated Martin *Riparia paludicola*	0	0	0	1	0	0	0	1	1	0	0	0	**3**	**3**
Banded Martin *Riparia cincta*	0	0	0	0	0	0	0	0	0	1	2	2	**5**	**5**
Grey-rumped Swallow *Pseudhirundo griseopyga* Mean = 7 (1-12) n = 3	0	0	0	0	0	2	2	1	0	0	0	0	**5**	**2** **21**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Red-breasted Swallow *Cecropis semirufa*	2	0	0	0	0	0	0	0	1	0	1	0	**4**	**4**
Mosque Swallow *Cecropis senegalensis*	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**1**
Lesser Striped Swallow *Cecropis abyssinica*	3	1	0	0	0	0	0	0	2	1	2	4	**13**	**13**
Greater Striped Swallow *Cecropis cucullata*	8	3	0	0	0	0	0	0	0	0	2	8	**21**	**21**
South African Cliff Swallow *Petrochelidon spilodera* Mean = 153 (3-497) n = 15	10	3	1	0	0	0	0	0	0	1	1	4	**20**	**5** **2 302**
Rock Martin *Ptyonoprogne fuligula*	23	53	26	17	5	3	4	7	6	11	2	8	**165**	**165**
Common House Martin *Delichon urbicum*	0	1	1	0	0	0	0	0	0	0	0	0	**2**	**2**
Wire-tailed Swallow *Hirundo smithii*	0	2	0	0	0	0	0	2	0	1	0	0	**5**	**5**
Pearl-breasted Swallow *Hirundo dimidiata*	1	1	2	0	0	0	0	0	0	0	2	0	**6**	**6**
White-throated Swallow *Hirundo albigularis*	0	3	1	0	0	0	0	0	0	0	0	0	**4**	**4**
Motacillidae														
Cape Wagtail *Motacilla capensis*	8	4	6	4	6	0	1	5	7	7	4	5	**57**	**57**
African Pied Wagtail *Motacilla aguimp*	0	0	0	0	0	0	0	0	1	0	0	0	**1**	**1**
African Pipit *Anthus cinnamomeus*	4	6	7	1	0	0	0	1	3	3	3	5	**33**	**33**
Long-billed Pipit *Anthus similis*	0	1	0	0	0	0	0	0	0	2	0	0	**3**	**3**
Buffy Pipit *Anthus vaalensis*	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**1**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Campephagidae														
Black Cuckoo-Shrike *Campephaga flava*	1	0	0	0	0	0	0	0	0	0	0	1	**2**	**2**
Pycnonotidae														
Yellow-bellied Greenbul *Chlorocichla flaviventris*	0	3	0	0	0	0	0	0	0	0	0	0	**3**	**3**
Dark-capped (Black-eyed) Bulbul *Pycnonotus tricolor*	2	2	0	0	0	0	0	0	1	3	3	7	**18**	**18**
African Red-eyed Bulbul *Pycnonotus nigricans*	22	22	9	5	0	0	0	0	1	10	8	30	**107**	**107**
Turdidae														
Cape Robin-Chat *Cossypha caffra*	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**1**
Heuglin's (White-browed) Robin-Chat *Cossypha heuglini*	0	0	0	0	0	0	0	0	0	1	2	2	**5**	**5**
Rufous-tailed Palm Thrush *Cichladusa ruficauda*	0	2	3	0	0	0	0	0	0	0	0	2	**7**	**7**
White-browed Scrub Robin *Cercotrichas leucophrys*	1	1	0	0	0	0	0	0	0	1	3	3	**9**	**9**
Kalahari Scrub Robin *Cercotrichas paena*	7	9	3	0	0	0	0	0	0	2	9	7	**37**	**37**
Karoo Scrub Robin *Cercotrichas coryphaeus*	4	5	0	0	0	0	0	1	2	6	13	11	**42**	**42**
Herero Chat *Namibornis herero*	0	3	5	1	0	0	0	0	0	0	0	0	**9**	**9**
African Stonechat *Saxicola torquatus*	0	0	0	0	0	0	0	0	1	1	0	0	**2**	**2**
Mountain Wheatear *Oenanthe monticola*	22	13	10	5	1	1	0	2	6	6	8	13	**87**	**87**
Capped Wheatear *Oenanthe pileata*	0	0	0	0	0	0	0	0	0	1	4	3	**8**	**8**
Karoo Chat *Cercomela schlegelii*	1	1	0	0	1	0	2	0	0	0	2	1	**8**	**8**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Tractrac Chat *Cercomela tractrac*	0	0	0	2	0	0	0	3	5	3	0	0	**13**	**13**
Familiar Chat *Cercomela familiaris*	16	15	5	1	1	1	0	3	4	8	16	18	**88**	**88**
Ant-eating Chat *Myrmecocichla formicivora*	5	0	0	0	0	0	0	1	0	0	4	2	**12**	**12**
Arnot's Chat *Myrmecocichla arnotti*	2	0	0	0	0	0	0	0	2	1	0	0	**5**	**5**
Short-toed Rock Thrush *Monticola brevipes*	3	2	2	0	0	0	0	0	0	1	5	6	**19**	**19**
Groundscraper Thrush *Psophocichla litsitsirupa*	15	9	1	0	0	0	0	0	3	7	6	21	**62**	**62**
Karoo Thrush *Turdus smithi*	0	0	0	0	0	0	0	0	0	0	0	2	**2**	**2**
Kurrichane Thrush *Turdus libonyanus*	0	0	0	0	0	0	0	0	1	2	1	0	**4**	**4**
Sylviidae														
African Reed Warbler *Acrocephalus baeticatus*	27	3	0	0	0	0	0	0	23	36	32	28	**149**	**149**
Greater Swamp Warbler *Acrocephalus rufescens*	1	1	1	2	0	0	0	0	0	0	2	3	**10**	**10**
Lesser Swamp Warbler *Acrocephalus gracilirostris*	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**1**
Yellow-bellied Eremomela *Eremomela icteropygialis*	8	7	3	1	0	0	0	0	2	11	12	6	**50**	**50**
Karoo Eremomela *Eremomela gregalis*	0	0	0	0	0	1	0	0	0	0	0	0	**1**	**1**
Burnt-necked Eremomela *Eremomela usticollis*	1	1	0	0	0	0	0	0	0	0	0	1	**3**	**3**
Long-billed Crombec *Sylvietta rufescens*	16	8	5	0	0	0	0	0	8	11	18	16	**82**	**82**
Layard's Titbabbler *Parisoma layardi*	0	0	0	0	0	0	0	0	0	1	1	2	**4**	**4**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Chestnut-vented Titbabbler *Parisoma subcaeruleum*	11	11	8	4	0	0	0	1	7	12	11	15	**80**	**80**
Cisticolidae														
Rattling Cisticola *Cisticola chiniana*	16	7	3	0	0	0	0	0	0	0	8	11	**45**	**45**
Tinkling Cisticola *Cisticola rufilatus*	3	3	1	0	0	0	0	0	0	0	0	0	**7**	**7**
Grey-backed Cisticola *Cisticola subruficapilla*	1	2	0	0	0	0	0	0	0	0	0	2	**5**	**5**
Luapula Cisticola *Cisticola luapula*	0	0	1	0	0	0	0	0	0	0	2	0	**3**	**3**
Chirping Cisticola *Cisticola pipiens*	0	1	0	0	0	0	0	0	0	0	0	0	**1**	**1**
Neddicky *Cisticola fulvicapilla*	0	0	0	0	0	0	0	0	0	0	1	2	**3**	**3**
Zitting Cisticola *Cisticola juncidis*	2	0	2	1	0	0	0	0	0	0	0	1	**6**	**6**
Desert Cisticola *Cisticola aridulus*	1	6	1	2	1	0	0	0	1	0	1	2	**15**	**15**
Tawny-flanked Prinia *Prinia subflava*	7	2	2	0	0	0	0	0	0	0	0	4	**15**	**15**
Black-chested Prinia *Prinia flavicans*	21	36	13	4	1	0	0	1	5	4	10	14	**109**	**109**
Karoo Prinia *Prinia maculosa*	1	0	0	0	0	0	0	0	1	1	0	0	**3**	**3**
Rufous-eared Warbler *Malcorus pectoralis*	0	5	1	2	0	0	0	0	0	0	0	0	**8**	**8**
Grey-backed Camaroptera *Camaroptera brevicaudata*	6	4	1	2	0	0	0	0	0	7	8	7	**35**	**35**
Barred Wren-Warbler *Calamonastes fasciolatus*	8	7	0	0	0	0	0	0	0	0	0	2	**17**	**17**
Muscicapidae														
Southern Black Flycatcher *Melaenornis pammelaina*	0	0	0	0	0	0	0	0	1	0	0	0	**1**	**1**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Pale Flycatcher *Bradornis pallidus*	0	0	0	0	0	0	0	1	0	0	0	0	**1**	**1**
Chat Flycatcher *Bradornis infuscatus*	1	0	2	0	1	0	0	0	1	5	4	2	**16**	**16**
Marico Flycatcher *Bradornis mariquensis*	15	12	8	1	1	0	1	2	2	12	21	19	**94**	**94**
Ashy Flycatcher *Muscicapa caerulescens*	0	0	0	0	0	0	0	0	0	2	0	0	**2**	**2**
Grey Tit-Flycatcher *Myioparus plumbeus*	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**1**
Fairy Flycatcher *Stenostira scita*	0	2	0	0	0	0	0	0	0	0	1	0	**3**	**3**
Monarchidae														
African Paradise Flycatcher *Terpsiphone viridis*	16	6	0	0	0	0	0	0	0	3	10	15	**50**	**50**
Platysteiridae														
Pririt Batis *Batis pririt*	14	14	6	3	0	0	0	0	10	17	19	19	**102**	**102**
White-tailed Shrike *Lanioturdus torquatus*	10	14	8	6	0	0	0	0	1	5	8	8	**60**	**60**
Timaliidae														
Arrow-marked Babbler *Turdoides jardineii*	0	0	0	0	0	0	0	0	0	1	2	0	**3**	**3**
Hartlaub's Babbler *Turdoides hartlaubii*	1	0	0	0	0	0	0	0	0	3	0	1	**5**	**5**
Black-faced Babbler *Turdoides melanops*	0	0	0	0	0	0	0	0	0	1	2	1	**4**	**4**
Southern Pied Babbler *Turdoides bicolor*	5	4	1	1	0	0	0	0	0	2	5	5	**23**	**23**
Bare-cheeked Babbler *Turdoides gymnogenys*	3	0	1	1	2	0	2	0	1	2	1	1	**14**	**14**
Macrosphenidae														
Rockrunner *Achaetops pycnopygius*	5	12	8	1	0	0	0	0	0	0	2	3	**31**	**31**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Paridae														
Ashy Tit *Parus cinerascens*	0	4	0	0	0	0	0	0	0	0	3	2	**9**	**9**
Grey Tit *Parus afer*	1	0	1	0	0	0	0	0	0	0	1	1	**4**	**4**
Rufous-bellied Tit *Parus rufiventris*	0	0	0	0	0	0	0	0	1	2	4	1	**8**	**8**
Carp's Tit *Parus carpi*	1	4	5	2	0	0	0	0	0	0	0	0	**12**	**12**
Southern Black Tit *Parus niger*	0	0	0	0	0	0	0	0	0	0	3	3	**6**	**6**
Remizidae														
Grey Penduline Tit *Anthoscopus caroli*	3	2	1	1	0	0	0	0	1	1	1	0	**10**	**10**
Cape Penduline Tit *Anthoscopus minutus*	10	8	9	1	0	0	0	0	1	2	4	8	**43**	**43**
Nectariniidae														
Scarlet-chested Sunbird *Chalcomitra senegalensis*	17	12	2	0	0	0	0	0	1	2	5	7	**46**	**46**
Collared Sunbird *Hedydipna collaris*	0	0	0	0	0	0	0	0	0	0	2	0	**2**	**2**
Shelley's Sunbird *Cinnyris shelleyi*	0	1	0	0	0	0	0	0	0	0	0	0	**1**	**1**
Marico Sunbird *Cinnyris mariquensis*	9	2	0	0	0	0	0	0	2	3	4	7	**27**	**27**
Purple-banded Sunbird *Cinnyris bifasciatus*	0	1	0	0	0	0	0	0	0	0	0	0	**1**	**1**
White-bellied Sunbird *Cinnyris talatala*	1	2	2	0	0	0	0	0	1	0	0	0	**6**	**6**
Dusky Sunbird *Cinnyris fuscus*	6	27	15	12	4	4	2	2	4	3	3	5	**87**	**87**
Copper Sunbird *Cinnyris cupreus*	2	0	0	0	0	0	0	0	0	0	0	0	**2**	**2**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Zosteropidae														
Orange River White-eye *Zosterops pallidus*	0	1	1	0	0	0	0	0	1	2	2	0	**7**	**7**
Laniidae														
Common Fiscal *Lanius collaris*	12	6	4	2	1	0	1	6	2	5	8	9	**56**	**56**
Souza's Shrike *Lanius souzae*	0	0	0	0	0	0	0	0	0	3	3	1	**7**	**7**
Magpie Shrike *Urolestes melanoleucus*	0	0	0	0	0	0	0	0	1	1	0	1	**3**	**3**
Southern White-crowned Shrike *Eurocephalus anguitimens*	6	5	4	4	0	0	0	0	0	2	5	6	**32**	**32**
Malaconotidae														
Bokmakierie *Telophorus zeylonus*	1	1	0	0	1	1	0	0	1	0	1	2	**8**	**8**
Brown-crowned Tchagra *Tchagra australis*	5	6	3	0	0	0	0	0	0	1	3	3	**21**	**21**
Black-crowned Tchagra *Tchagra senegalus*	1	1	0	0	0	0	0	0	0	0	2	1	**5**	**5**
Black-backed Puffback *Dryoscopus cubla*	4	4	2	0	0	0	0	0	1	1	4	2	**18**	**18**
Tropical Boubou *Laniarius aethiopicus*	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**1**
Swamp Boubou *Laniarius bicolor*	0	0	0	0	0	0	0	0	0	0	2	1	**3**	**3**
Crimson-breasted Shrike *Laniarius atrococcineus*	17	10	8	3	0	0	0	0	1	10	11	24	**84**	**84**
Brubru *Nilaus afer*	2	1	0	0	0	0	0	1	1	2	5	3	**15**	**15**
Prionopidae														
White Helmetshrike *Prionops plumatus*	2	1	0	1	0	0	0	0	3	5	3	5	**20**	**20**
Retz's Helmetshrike *Prionops retzii*	1	0	0	0	0	0	0	0	0	0	0	1	**2**	**2**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Dicruridae														
Fork-tailed Drongo *Dicrurus adsimilis*	11	0	0	0	0	0	0	1	8	24	31	29	**104**	**104**
Corvidae														
Cape (Black) Crow *Corvus capensis*	14	14	10	4	1	3	1	1	5	38	22	15	**128**	**128**
Pied Crow *Corvus albus*	20	14	7	0	0	0	0	0	2	6	6	30	**85**	**85**
Pale-winged Starling *Onychognathus nabouroup*	3	8	8	6	0	0	0	0	0	0	2	2	**29**	**29**
Cape Glossy Starling *Lamprotornis nitens*	6	14	18	0	0	0	0	0	0	0	6	9	**53**	**53**
Greater Blue-eared Starling *Lamprotornis chalybaeus*	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**
Sharp-tailed Starling *Lamprotornis acuticaudus*	0	0	0	0	0	0	0	0	0	1	3	3	**7**	**7**
Meves' (Long-tailed) Starling *Lamprotornis mevesii*	1	4	11	3	0	0	0	0	0	0	0	0	**19**	**19**
Burchell's Starling *Lamprotornis australis*	5	10	10	0	0	0	0	0	0	0	1	2	**28**	**28**
Violet-backed (Plum-coloured) Starling *Cinnyricinclus leucogaster*	3	6	4	1	0	0	0	0	0	3	3	4	**24**	**24**
Wattled Starling *Creatophora cinerea* Mean = 434 (28-2 000) n=8	1	8	5	0	0	0	0	0	0	0	0	1	**15**	**7** **3 474**
Yellow-billed Oxpecker *Buphagus africanus*	0	0	0	0	0	0	0	0	0	0	2	1	**3**	**3**
Red-billed Oxpecker *Buphagus erythrorhynchus*	3	0	1	0	0	0	0	0	0	0	0	1	**5**	**5**
Passeridae														
Southern Grey-headed Sparrow *Passer diffusus*	28	33	34	14	5	0	0	0	0	0	2	13	**129**	**129**
Great Sparrow *Passer motitensis*	16	25	17	5	0	0	0	0	0	0	1	4	**68**	**68**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Cape Sparrow *Passer melanurus*	11	10	7	2	2	1	0	0	3	7	5	12	**60**	**60**
House Sparrow *Passer domesticus*	11	2	5	2	0	0	0	0	4	5	4	6	**39**	**39**
Ploceidae Red-billed Buffalo Weaver *Bubalornis niger* Mean = 1.9 nest masses per lose colony (1-4) n=13 (and each nest mass has typically 2-6 nest chambers)	19	18	13	2	0	0	0	0	0	0	0	1	**53**	**40** **26**
White-browed Sparrow-Weaver *Plocepasser mahali* Mean = 10.3 (1-25) n=69	50	29	7	2	2	0	0	1	1	5	35	42	**174**	**105** **708**
Scaly-feathered Finch *Sporopipes squamifrons*	4	10	13	15	7	4	2	1	7	6	6	13	**88**	**88**
Sociable Weaver *Philetairus socius* Mean = 44 nest chambers per nest structure (5-196) n=95	15	11	6	3	1	1	0	0	0	0	5	9	**51**	**17** **4 181**
Red-headed Weaver *Anaplectes rubriceps*	0	0	0	0	0	0	0	0	1	2	4	2	**9**	**9**
Spectacled Weaver *Ploceus ocularis*	0	1	2	0	0	0	0	0	0	0	1	3	**7**	**7**
Golden Weaver *Ploceus xanthops*	1	0	1	1	0	0	0	0	0	0	0	0	**3**	**3**
Southern Brown-throated Weaver *Ploceus xanthopterus*	0	1	0	0	0	0	1	0	0	0	0	1	**3**	**3**
Lesser Masked Weaver *Ploceus intermedius* Mean = 30 (1-80) n=6	1	2	2	1	0	0	0	0	0	1	0	2	**9**	**3** **181**
Southern Masked Weaver *Ploceus velatus* Mean = 9.4 (1-105) n=138	83	35	20	2	0	0	0	0	18	21	60	56	**295**	**157** **1 302**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Village (Spotted-backed) Weaver *Ploceus cucullatus* Mean = 132 (1-400) n=12	13	13	12	0	0	0	0	0	0	0	1	3	**42**	**30** **1 490**
Chestnut Weaver *Ploceus rubiginosus* Mean = 226 (10-6 000) n=75	46	52	31	6	2	0	0	0	0	0	0	8	**145**	**70** **16 945**
Thick-billed Weaver *Amblyospiza albifrons*	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**1**
Red-billed Quelea *Quelea quelea* Mean = 411,793 (20 000-5 000 000) n=7	0	4	5	0	0	1	0	0	0	0	0	0	**10**	**3** **2 882 550**
Southern Red Bishop *Euplectes orix*	6	9	11	6	4	0	0	0	0	0	0	5	**41**	**41**
Yellow-crowned (Golden) Bishop *Euplectes afer*	2	6	18	1	1	0	0	0	0	0	0	1	**29**	**29**
Estrildidae														
Common Waxbill *Estrilda astrild*	2	1	0	2	0	0	0	0	0	1	1	3	**10**	**10**
Black-faced Waxbill *Estrilda erythronotos*	7	10	3	0	1	0	0	0	0	0	0	0	**21**	**21**
Blue Waxbill *Uraeginthus angolensis*	1	3	2	0	1	0	0	0	0	0	1	2	**10**	**10**
Violet-eared Waxbill *Uraeginthus granatinus*	5	2	5	0	3	2	0	1	0	0	0	0	**18**	**18**
Green-winged Pytilia *Pytilia melba*	2	4	5	5	4	1	0	1	1	0	0	0	**23**	**23**
Red-billed Firefinch *Lagonosticta senegala*	2	6	4	4	1	0	0	1	0	1	0	1	**20**	**20**
Brown Firefinch *Lagonosticta nitidula*	0	2	0	0	0	0	0	0	0	0	0	0	**2**	**2**
Red-headed Finch *Amadina erythrocephala*	2	4	21	7	5	2	2	0	4	3	3	1	**54**	**54**
African Quailfinch *Ortygospiza fuscocrissa*	0	0	0	0	1	0	0	0	0	0	0	0	**1**	**1**

Family and Species	Egg-laying month												Total records	Total nests
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Viduidae														
Long-tailed Paradise Whydah *Vidua paradisaea*	0	0	0	1	0	0	0	0	0	0	0	0	**1**	**1**
Shaft-tailed Whydah *Vidua regia*	0	0	0	1	0	0	0	0	0	0	0	0	**1**	**1**
Village Indigobird *Vidua chalybeata*	0	0	0	2	0	0	0	0	0	0	1	0	**3**	**3**
Fringillidae														
Black-throated Canary *Serinus atrogularis*	3	8	5	1	1	0	0	0	2	0	2	1	**23**	**23**
Yellow Canary *Serinus flaviventris*	2	1	1	0	0	0	0	2	3	2	0	3	**14**	**14**
White-throated Canary	1	2	3	1	1	0	1	0	1	2	3	2	**17**	**17**
Serinus albogularis														
Black-headed (+ Damara) Canary	0	0	3	1	0	0	0	0	0	0	0	0	**4**	**4**
Serinus alario & S. leucolaemus														
Emberizidae														
Golden-breasted Bunting *Emberiza flaviventris*	7	5	6	0	0	0	0	0	1	0	0	2	**21**	**21**
Cinnamon-breasted Bunting *Emberiza tahapisi*	2	3	3	2	0	0	0	0	0	0	0	0	**10**	**10**
Cape Bunting *Emberiza capensis*	0	2	3	1	9	4	0	0	1	0	0	0	**20**	**20**
Lark-like Bunting *Emberiza impetuani*	0	0	32	35	39	12	1	2	0	0	0	0	**121**	**121**
Total records													**16 399**	
Total nests														**3 284 194**

ANNEX 2: CLUTCH SIZES OF BIRDS IN NAMIBIA

The number of records of each clutch size (i.e. number of eggs per clutch) per species is shown on the right and summarised on the left (minimum, mean, maximum and sample size (n)). For species where the clutch size exceeds 10 eggs the clutch sizes are shown on the next line (i.e. Cl 11, Cl 12, etc). In the case of the Common Ostrich which can have clutches of 30 or more eggs, the clutch sizes are lumped into Cl <11, Cl 11-20, Cl 21-30 & Cl 30+. Ostrich clutches may be laid by 1 to 5 females in the same nest, each female typically laying 5-8 eggs. In parasitic species such as cuckoos, whydahs and indigobirds the "clutch size" refers to the number of eggs in one host nest. They may lay 20-30 eggs in a season, spread between different host nests. It should be noted that, as most of the data come from one or a few visits per nest, not from detailed studies, incidents of egg loss to, for example, predation, or egg dumping by a females into another bird's nest cannot be ruled out; the few 2 egg clutches in Lappet-faced Vultures (1.6%) and Damara Terns (0.4%) may not have been laid by the same female.

	Summary				Clutch size									
Species	**Min**	**Mean**	**Max**	**n**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
					Cl <11		Cl 11-20		Cl 21-30		Cl 31+			
Common Ostrich	4	15.6	34	114	29		63		15		7			
African (Jackass) Penguin	1	1.8	3	2 797	629	2 166	2							
Little Grebe (Dabchick)	1	3.9	8	91	5	19	16	19	15	8	7	2		
Great Crested Grebe	1	1.7	2	7	2	5								
Black-necked Grebe	1	3.2	8	429	44	88	111	131	42	8	2	3		
Cape Gannet	1	1.0	2	639	638	1								
White-breasted Cormorant	1	2.6	4	291	23	100	147	21						
Cape Cormorant	1	2.5	5	1,019	177	328	383	116	15					
Bank Cormorant	1	2.1	3	95	21	46	28							
Reed Cormorant	1	2.7	5	111	21	25	36	25	4					
Crowned Cormorant	1	2.3	3	72	11	25	36							
African Darter	2	3.2	6	203	0	48	84	54	15	2				
Great White Pelican	1	2.0	4	590	103	412	73	2						
Pink-backed Pelican	2	2.3	4	15	0	11	3	1						
Little Bittern	2	2.0	2	3	0	3								
Dwarf Bittern	3	3.5	5	37	0	7	6	22	2					
White-backed Night Heron	2	2.5	3	2	0	1	1							
Black-crowned Night Heron	2	2.7	4	19	0	7	10	2						
Squacco Heron	1	2.4	3	14	3	3	8							
Rufous-bellied Heron	4	4.0	4	2	0	0	0	2						
Cattle Egret	3	3.4	4	9	0	0	5	4						
Green-backed (Striated) Heron	2	2.7	3	3	0	1	2							
Slaty Egret	1	2.6	3	22	3	3	16							

	Summary				Clutch size									
Species	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Little Egret	1	2.7	6	78	11	20	32	12	2	1				
Purple Heron	2	2.0	2	2	0	2								
Grey Heron	1	2.9	5	295	18	99	97	54	27					
Black-headed Heron	2	2.5	3	4	0	2	2							
Goliath Heron	1	2.1	4	7	2	3	1	1						
Hamerkop	4	5.5	7	2	0	0	0	1	0	0	1			
Yellow-billed Stork	1	2.6	4	14	1	5	7	1						
African Openbill	1	2.8	5	231	2	87	94	46	2					
Black Stork	1	2.4	3	5	1	1	3							
Saddle-billed Stork	1	3.3	4	4	1	0	0	3						
Marabou Stork	2	2.7	4	29	0	12	14	3						
Glossy Ibis	1	1.8	4	27	9	16	0	2						
Hadeda Ibis	2	2.3	3	3	0	2	1							
African Spoonbill	1	2.1	3	35	2	26	7							
Greater Flamingo	1	1.0	1	27 000	27 000									
Lesser Flamingo	1	1.0	1	50 500	50 500									
Fulvous Whistling Duck	6	10.3	19	3	0	0	0	0	0	2				
					Cl 19									
					1									
White-backed Duck	3	7.6	12	8	0	0	2	0	1	0	1	0	1	1
					Cl 12									
					2									
Egyptian Goose	1	5.6	11	49	4	4	3	5	9	3	9	6	1	3
					Cl 11									
					2									
South African Shelduck	4	7.0	8	9	0	0	0	1	0	2	1	5		
Spur-winged Goose	4	9.7	13	3	0	0	0	1	0	0	0	0	0	0
					Cl 12	Cl 13								
					1	1								
Knob-billed (Comb) Duck	4	7.8	13	4	0	0	0	1	1	0	0	0	1	0
					Cl 13									
					1									
African Pygmy Goose	5	5.7	7	7	0	0	0	0	4	1	2			

	Summary				Clutch size									
Species	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Cape Teal	3	6.4	11	67	0	0	4	9	10	15	9	7	8	3
					Cl 11									
					2									
Yellow-billed Duck	5	5.0	5	2	0	0	0	0	2					
African Black Duck	8	8.0	1	1	0	0	0	0	0	0	0	1		
Red-billed Teal	4	8.7	19	32	0	0	0	3	1	6	4	1	4	8
					Cl 12	Cl 15	Cl 19							
					2	2	1							
Cape Shoveler	6	9.4	15	7	0	0	0	0	0	1	2	2	0	0
					Cl 15									
					2									
Southern Pochard	7	8.0	9	4	0	0	0	0	0	0	1	2	1	
Maccoa Duck	3	5.0	7	10	0	0	2	1	3	3	1			
Black-shouldered Kite	1	3.2	4	35	1	6	13	15						
Yellow-billed Kite	1	2.0	3	7	1	5	1							
African Fish Eagle	1	2.0	4	25	5	17	2	1						
White-backed Vulture	1	1.0	2	118	115	3								
Cape Vulture	1	1.0	1	49	49									
Lappet-faced Vulture	1	1.0	2	1,069	1054	15								
White-headed Vulture	1	1.0	1	11	11									
Black-chested Snake Eagle	1	1.0	1	63	63									
Brown Snake Eagle	1	1.0	1	8	8									
Western Banded Snake Eagle	1	1.0	1	2	2									
Bateleur	1	1.0	1	23	23									
Gabar Goshawk	2	2.5	4	46	0	25	18	3						
Pale Chanting Goshawk	1	1.5	2	100	46	54								
Shikra	3	2.7	3	6	0	2	4							
Little Sparrowhawk	2	2.0	2	5	0	5								
Lizard Buzzard	2	2.0	2	2	0	2								
Jackal Buzzard	1	1.0	1	1	1									
Augur Buzzard	1	1.7	2	7	2	5								
Verreaux's (Black) Eagle	1	1.6	2	47	17	30								
Tawny Eagle	1	1.7	2	69	23	46								
Wahlberg's Eagle	1	1.0	2	37	36	1								

	Summary				Clutch size									
Species	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
African Hawk-Eagle	1	1.6	2	40	16	24								
Martial Eagle	1	1.0	1	28	28									
Secretarybird	1	1.7	3	42	15	26	1							
Pygmy Falcon	2	3.1	4	39	0	4	28	7						
Rock (Common) Kestrel	3	4.0	5	27	0	0	8	12	7					
Greater Kestrel	1	3.2	5	104	2	23	38	39	2					
Grey Kestrel	4	4.0	4	1				1						
Red-necked Falcon	1	3.0	4	42	3	6	23	10						
Lanner Falcon	2	3.3	4	12	0	2	4	6						
Peregrine Falcon	2	3.2	4	6	0	1	3	2						
Helmeted Guineafowl	6	10.3	18	38	0	0	0	0	0	4	0	4	4	6
Common Quail	4	5.7	9	6	0	0	0	4	0	0	0	0	2	
Harlequin Quail	4	6.2	9	11	0	0	0	2	1	4	2	1	1	
Orange River Francolin	2	3.9	5	7	0	1	1	3	2					
Crested Francolin	2	4.3	6	3	0	1	0	0	1	1				
Hartlaub's Spurfowl	1	2.7	3	23	1	6	16							
Red-billed Spurfowl	2	5.5	10	65	0	2	9	11	12	10	12	5	1	3
Swainson's Spurfowl	4	5.5	9	13	0	0	0	4	4	2	2	0	1	
Kurrichane Buttonquail	2	3.6	4	25	0	3	3	19						
Blackrumped Buttonquail	2	2.0	2	2	0	2								
African Crake	4	4.0	4	1	0	0	0	1						
Striped Crake	2	3.0	4	4	0	2	0	2						
Black Crake	3	3.0	3	2			2							
Allen's Gallinule	3	4.5	6	8	0	0	2	2	2	2				
Purple Swamphen	2	3.2	5	20	0	5	9	3	3					
Common Moorhen	3	5.6	12	60	0	0	11	9	10	16	5	3	2	3
					Cl 12									
					1									
Lesser Moorhen	3	5.6	11	145	0	1	17	26	28	32	18	16	3	3
					Cl 11									
					1									
Red-knobbed Coot	2	5.6	14	156	0	8	14	11	13	21	24	16	13	17
					Cl 11	Cl 12	Cl 13	Cl 14						
					9	4	4	2						

Species	Summary				Clutch size									
	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Wattled Crane	1	1.6	2	11	4	7								
Blue Crane	1	1.8	2	26	5	21								
Grey Crowned Crane	1	1.0	1	1	1									
African Finfoot	2	2.0	2	1	0	1								
Ludwig's Bustard	1	1.8	2	12	2	10								
Kori Bustard	1	1.7	2	26	8	18								
Red-crested Korhaan	1	1.6	2	29	11	18								
Northern Black Korhaan	1	1.8	2	13	5	6	2							
Karoo Korhaan	1	1.3	2	6	4	2								
Rüppell's Korhaan	1	1.4	3	84	57	24	3							
Black-bellied Bustard	1	1.0	1	1	1									
African Jacana	2	3.0	3	4	0	1	2	1						
Greater Painted Snipe	2	3.6	4	12	0	1	3	8						
African Black Oystercatcher	1	2.0	3	14	2	10	2							
Black-winged Stilt	3	3.7	5	60	1	3	10	45	1					
Pied Avocet	1	3.3	6	602	79	65	124	288	43	3				
Water Dikkop (Thick-knee)	2	2.0	2	3	0	3								
Spotted Dikkop (Thick-knee)	2	2.1	4	41	4	28	8	1						
Burchell's Courser	1	1.8	2	20	5	15								
Temminck's Courser	2	2.5	3	4	0	2	2							
Double-banded Courser	1	1.1	2	41	38	3								
Three-banded Courser	2	2.0	2	2	0	2								
Bronze-winged Courser	1	1.0	1	1	1									
Collared Pratincole	1	1.8	2	8	2	6								
Rock Pratincole	1	1.8	2	15	3	12								
Kittlitz's Plover	1	1.9	3	56	7	47	2							
Three-banded Plover	1	1.8	2	32	6	26								
White-fronted Plover	1	1.8	3	298	80	211	7							
Chestnut-banded Plover	1	1.8	2	81	15	65	1							
African Wattled Lapwing	1	1.0	1	1	1									
White-crowned Lapwing	2	3.5	4	2	0	0	1	1						
Blacksmith Lapwing	1	2.8	5	95	8	29	34	23	1					
Crowned Lapwing	1	2.5	4	140	10	58	70	2						

Species	Summary				Clutch size									
	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
African Snipe	1	1.5	2	2	1	1								
Hartlaub's Gull	1	2.0	4	1,104	118	833	149	4						
Grey-headed Gull	2	2.5	3	8	0	4	4							
Kelp Gull	1	2.5	4	361	25	143	191	2						
Caspian Tern	2	2.1	3	15	3	8	4							
Swift Tern	1	1.2	2	906	741	165								
Damara Tern	1	1.0	2	1 012	1 008	4								
Whiskered Tern	1	2.3	3	246	34	94	117	1						
African Skimmer	2	2.4	4	37	0	23	13	1						
Namaqua Sandgrouse	1	2.8	4	104	2	20	81	1						
Double-banded Sandgrouse	2	2.5	3	18	0	9	9							
Burchell's Sandgrouse	2	2.7	3	10	0	3	7							
African Green Pigeon	1	1.0	1	3	3									
Namaqua Dove	2	2.0	2	29	1	27	1							
Speckled (Rock) Pigeon	1	2.0	2	20	1	19								
Feral (Common) Pigeon	2	2.7	4	21	0	9	9	3						
Red-eyed Dove	2	2.0	2	3	0	3								
Cape Turtle-Dove	1	1.9	2	100	15	85								
Laughing Dove	1	1.8	3	178	30	147	1							
Rüppell's Parrot	2	2.8	3	4	0	1	3							
Rosy-faced Lovebird	3	4.5	6	8	0	0	2	2	2	2				
Grey Lourie (Go-away Bird)	1	2.5	3	50	3	19	28							
Jacobin Cuckoo	1	1.4	2	5	3	2								
Levaillant's Cuckoo	1	1.0	1	4	4									
Great Spotted Cuckoo	1	1.4	4	28	21	4	2	1						
Black Cuckoo	1	1.3	2	17	12	5								
African Cuckoo	2	1.7	2	3	1	2								
Klaas's Cuckoo	1	1.0	1	6	6									
Diederik (Diderick) Cuckoo	1	1.1	2	56	53	3								
Senegal Coucal	2	2.0	2	2	0	2								
Western Barn Owl	2	4.5	8	32	0	3	5	8	7	8	0	1		
African Scops Owl	2	3.2	4	13	0	3	4	6						
Southern White-faced Owl	1	2.4	4	31	5	12	10	4						
Cape Eagle-Owl	1	1.6	2	5	2	3								

Species	Summary				Clutch size									
	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Spotted Eagle-Owl	2	2.2	3	51	0	40	11							
Verreaux's Eagle-Owl	1	1.5	2	11	6	5								
Pearl-spotted Owlet	1	2.7	4	30	2	9	15	4						
African Barred Owlet	2	2.0	2	1	0	1								
African Wood Owl	2	2.0	2	4	0	4								
Marsh Owl	2	2.3	3	7	1	3	3							
Freckled Nightjar	2	2.0	2	2	0	2								
Rufous-cheeked Nightjar	1	1.7	2	10	3	7								
African Palm Swift	2	2.0	2	2	0	2								
Bradfield's Swift	1	1.6	2	7	3	4								
White-rumped Swift	1	1.7	2	3	1	2								
Little Swift	2	2.0	2	4	0	4								
Red-faced Mousebird	1	2.3	3	18	2	8	8							
White-backed Mousebird	1	2.8	4	48	2	13	25	8						
Striped Kingfisher	3	3.0	3	1	0	0	1							
Little Bee-eater	4	4.0	4	1	0	0	0	1						
Swallow-tailed Bee-eater	1	2.9	4	18	0	6	8	4						
White-fronted Bee-eater	2	2.6	4	13	0	6	6	1						
Olive (Madagascar) Bee-eater	4	4.0	4	1	0	0	0	1						
Southern Carmine Bee-eater	4	4.0	4	1	0	0	0	1						
Purple Roller	2	3.0	4	21	0	4	13	4						
Lilac-breasted Roller	2	3.0	4	9	0	2	5	2						
Racket-tailed Roller	2	2.0	2	4	0	4								
Broad-billed Roller	2	2.0	2	1		1								
Green Woodhoopoe	2	4.0	5	4	0	1	0	1	2					
Violet Woodhoopoe	3	4.1	5	9	0	0	2	4	3					
Common Scimitarbill	2	2.5	3	8	0	4	4							
African Hoopoe	2	4.7	6	24	0	1	4	3	10	6				
Monteiro's Hornbill	2	4.4	7	92	0	2	15	31	31	11	2			
Southern Red-billed Hornbill	2	2.0	2	2	0	2								
Damara Hornbill	2	3.7	5	33	0	2	11	15	5					
Southern Yellow-billed Hornbill	2	3.5	6	40	0	3	19	13	4	1				

Species	Summary				Clutch size									
	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Bradfield's Hornbill	2	2.5	3	4	0	2	2							
African Grey Hornbill	2	3.8	5	47	0	4	14	18	10	1				
Acacia Pied Barbet	1	2.8	4	35	1	10	19	5						
Lesser Honeyguide	1	1.0	1	7	7									
Bennett's Woodpecker	3	3.0	3	2	0	0	2							
Golden-tailed Woodpecker	2	2.0	2	3	0	3								
Cardinal Woodpecker	2	1.3	2	14	10	4								
Bearded Woodpecker	2	1.4	2	7	4	3								
Monotonous Lark	3	2.9	4	12	0	2	9	1						
Rufous-naped Lark	2	2.3	3	3	0	2	1							
Eastern Clapper Lark	2	2.0	2	1	0	1								
Fawn-coloured Lark	2	1.8	2	4	1	3								
Sabota Lark	1	2.8	4	35	1	6	27	1						
Dune Lark	1	1.8	2	29	6	23								
Barlow's Lark	2	2.0	2	8	0	8								
Karoo Long-billed Lark	2	2.7	3	6	0	2	4							
Benguela Long-billed Lark	2	2.5	3	4	0	2	2							
Spike-heeled Lark	2	2.2	3	11	0	9	2							
Dusky Lark	2	2.3	3	3	0	2	1							
Gray's Lark	2	2.3	3	28	0	20	8							
Red-capped Lark	1	2.3	3	15	1	9	5							
Pink-billed Lark	2	2.0	2	2	0	2								
Sclater's Lark	1	1.0	1	2	2									
Stark's Lark	1	2.5	4	44	3	19	19	3						
Black-eared Sparrow-Lark	1	1.5	2	8	4	4								
Grey-backed Sparrow-Lark	2	2.2	4	74	3	56	14	1						
Banded Martin	3	3.0	3	1	0	0	1							
Red-breasted Swallow	3	3.0	3	2	0	0	2							
Lesser Striped Swallow	2	2.0	2	1	0	1								
Greater Striped Swallow	2	2.7	3	3	0	1	2							
South African Cliff Swallow	1	2.0	3	147	36	75	36							
Rock Martin	1	2.7	7	131	4	50	62	11	3	0	1			
Wire-tailed Swallow	3	2.3	3	4	0	3	1							
Pearl-breasted Swallow	2	2.4	3	5	0	3	2							

	Summary				Clutch size									
Species	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Cape Wagtail	1	2.5	4	46	4	16	25	1						
African Pipit	2	2.7	4	19	0	8	9	2						
Long-billed Pipit	3	3.0	3	1	0	0	1							
Buffy Pipit	3	3.0	3	1	0	0	1							
Black Cuckoo-Shrike	2	2.0	2	2	0	2								
Dark-capped Bulbul	2	2.7	3	7	0	2	5							
African Red-eyed Bulbul	1	2.6	4	67	2	28	31	6						
Cape Robin-Chat	2	2.0	2	1	0	1								
Heuglin's Robin-Chat	2	2.2	3	5	0	4	1							
Rufous-tailed Palm Thrush	2	2.0	2	2	0	2								
White-browed Scrub Robin	2	3.0	4	5	0	1	3	1						
Kalahari Scrub Robin	2	2.4	4	29	0	20	7	2						
Karoo Scrub Robin	1	2.0	3	38	5	29	4							
Herero Chat	1	2.0	3	7	2	3	2							
African Stonechat	4	4.0	4	1	0	0	0	1						
Mountain Wheatear	2	2.6	5	60	0	27	29	3	1					
Capped Wheatear	2	2.5	3	2	0	1	1							
Karoo Chat	2	2.5	3	6	0	3	3							
Tractrac Chat	2	2.4	3	13	0	8	5							
Familiar Chat	2	2.6	4	67	3	29	30	5						
Ant-eating Chat	2	2.8	3	4	0	1	3							
Short-toed Rock Thrush	2	3.2	4	9	0	1	5	3						
Groundscraper Thrush	2	2.7	5	37	0	15	19	1	2					
Karoo Thrush	2	2.0	2	1	0	1								
Kurrichane Thrush	3	3.0	3	2	0	0	2							
African Reed Warbler	1	2.2	3	147	12	97	38							
Greater Swamp Warbler	2	2.4	3	5	0	3	2							
Yellow-bellied Eremomela	1	2.2	3	40	1	29	10							
Karoo Eremomela	3	3.0	3	1	0	0	1							
Long-billed Crombec	1	1.9	3	69	9	58	2							
Layard's Titbabbler	2	2.5	3	2	0	1	1							
Chestnut-vented Titbabbler	2	2.5	4	68	0	40	25	3						
Rattling Cisticola	2	2.9	4	33	0	6	25	2						
Tinkling Cisticola	3	3.5	4	2	0	0	1	1						

Species	Summary				Clutch size									
	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Luapula Cisticola	3	3.0	3	1	0	0	1							
Desert Cisticola	2	3.7	5	10	0	1	3	4	2					
Namaqua Warbler	?			0										
Tawny-flanked Prinia	3	3.0	3	7	0	0	7							
Black-chested Prinia	2	3.5	6	77	1	7	36	23	9	1				
Rufous-eared Warbler	3	3.7	5	6	0	0	4	0	2					
Grey-backed Camaroptera	2	2.5	4	30	1	14	14	1						
Barred Wren-Warbler	2	2.7	4	16	0	6	9	1						
Chat Flycatcher	2	2.6	3	5	0	2	3							
Marico Flycatcher	2	2.5	3	87	0	40	47							
Fairy Flycatcher	3	3.0	3	2	0	0	2							
African Paradise Flycatcher	2	2.5	3	33	0	17	16							
Pririt Batis	1	1.8	2	78	13	65								
White-tailed Shrike	1	2.2	3	37	3	23	11							
Arrow-marked Babbler	6	6.0	6	2	0	0	0	0	0	2				
Hartlaub's Babbler	1	2.6	3	5	1	0	4							
Black-faced Babbler	2	2.0	2	1	0	1								
Southern Pied Babbler	2	2.8	4	16	0	5	9	2						
Bare-cheeked Babbler	2	2.5	3	11	0	6	5							
Rockrunner	1	2.5	3	17	2	5	10							
Ashy Tit	3	3.1	4	7	0	0	6	1						
Rufous-bellied Tit	2	2.0	2	2	0	2								
Carp's Tit	4	4.0	4	2	0	0	0	2						
Grey Penduline Tit	2	6.0	8	3	0	0	0	1	0	1	0	1		
Cape Penduline Tit	3	4.6	9	38	0	0	5	17	10	3	1	1	1	
Scarlet-chested Sunbird	1	2.1	3	29	2	23	4							
Marico Sunbird	1	2.0	3	12	1	10	1							
White-bellied Sunbird	2	3.2	5	5	0	3	0	0	2					
Dusky Sunbird	2	2.6	4	67	0	30	36	1						
Copper (Coppery) Sunbird	3	3.0	3	2	0	0	2							
Orange River White-eye	2	2.0	2	2	0	2								
Common Fiscal	1	3.2	5	46	1	9	19	12	5					
Souza's Shrike	3	3.0	3	5	0	0	5							
Magpie Shrike	3	3.0	3	1	0	0	1							

Species	Summary				Clutch size									
	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Southern White-crowned Shrike	2	3.1	5	17	0	3	11	2	1					
Bokmakierie	2	2.5	3	4	0	2	2							
Brown-crowned Tchagra	1	2.3	3	16	2	8	6							
Black-backed Puffback	2	2.4	3	7	0	4	3							
Tropical Boubou	2	2.0	2	1	0	1								
Swamp Boubou	2	2.7	3	3	0	1	2							
Crimson-breasted Shrike	2	2.4	3	66	1	40	25							
Brubru	1	1.9	2	8	1	7								
White Helmetshrike	2	3.1	4	16	0	5	5	6						
Retz's Helmetshrike	1	1.5	2	2	1	1								
Fork-tailed Drongo	2	2.5	3	78	0	37	41							
Cape (Black) Crow	1	3.0	5	92	7	22	34	20	9					
Pied Crow	1	4.0	9	82	1	19	17	12	13	14	4	1	1	
Pale-winged Starling	2	2.8	4	9	0	3	5	1						
Cape Glossy Starling	2	3.1	4	40	0	9	20	11						
Meves' (Long-tailed) Starling	2	2.3	3	6	0	4	2							
Burchell's Starling	2	3.2	4	20	0	4	10	5	1					
Violet-backed Starling	2	2.7	4	7	0	3	3	1						
Wattled Starling	1	3.2	5	655	21	127	231	228	48					
Red-billed Oxpecker	3	3.0	3	2	0	0	2							
Southern Grey-headed Sparrow	2	3.8	6	94	0	9	29	35	15	6				
Great Sparrow	2	4.0	6	44	0	4	9	20	5	6				
Cape Sparrow	2	2.9	4	31	0	10	13	8						
House Sparrow	3	3.4	4	9	0	0	5	4						
Red-billed Buffalo Weaver	3	3.3	4	13	0	0	9	4						
White-browed Sparrow-Weaver	1	2.2	3	116	12	72	32							
Scaly-feathered Finch	2	3.7	6	63	0	11	14	23	12	3				
Sociable Weaver	2	2.5	3	12	0	6	6							
Red-headed Weaver	2	2.4	3	5	0	3	2							
Lesser Masked Weaver	2	3.0	4	5	0	1	3	1						
Southern Masked Weaver	1	2.5	4	295	17	114	151	13						
Village Weaver	2	2.7	4	67	0	24	40	3						

Species	Summary				Clutch size									
	Min	Mean	Max	n	1	2	3	4	5	6	7	8	9	10
Chestnut Weaver	1	2.9	6	149	9	16	107	11	5	1				
Red-billed Quelea	1	2.9	5	773	3	109	596	57	8					
Southern Red Bishop	2	2.9	4	23	0	5	16	2						
Yellow-crowned (Golden) Bishop	3	4.3	9	24	0	0	7	9	6	0	1	0	1	
Common Waxbill	4	5.0	6	5	0	0	0	1	3	1				
Black-faced Waxbill	3	3.8	6	13	0	0	5	6	1	1				
Blue Waxbill	3	3.8	5	6	0	1	1	2	2					
Violet-eared Waxbill	3	4.6	6	16	0	1	2	3	6	4				
Green-winged Pytilia	2	3.5	5	17	0	4	4	6	3					
Red-billed Firefinch	3	3.5	5	13	0	0	8	4	1					
Red-headed Finch	2	4.1	9	37	0	6	8	12	5	3	1	1	1	
Long-tailed Paradise Whydah	1	1.0	1	1	1									
Shaft-tailed Whydah	1	1.0	1	1	1									
Village Indigobird	1	1.0	1	2	2									
Black-throated Canary	2	2.9	4	13	0	3	8	2						
Yellow Canary	2	2.5	3	8	0	4	4							
White-throated Canary	2	3.3	5	13	0	2	6	4	1					
Black-headed Canary	3	3.0	3	4	0	0	4							
Golden-breasted Bunting	2	2.3	3	16	0	11	5							
Cinnamon-breasted Bunting	2	2.8	3	6	0	1	5							
Cape Bunting	2	2.8	4	17	0	7	7	3						
Lark-like Bunting	1	3.3	4	115	1	13	53	48						
Total clutches				**99 669**										

ANNEX 3: EGG SIZES OF BIRDS IN NAMIBIA

Egg measurements presented here are from nest record cards, notebooks and correspondence, i.e. from non-published sources and not from collections. They are captured and presented here so that the data will not be lost

	Length (mm)			Width (mm)				Mass (g)			
Species	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Max**	**n**	**Min**	**Mean**	**Max**	**n**
Common Ostrich	141.0	153.3	160.0	117.0	122.0	125.0	3	-	-	-	-
African Penguin	68.5	68.5	68.5	49.6	49.6	49.6	1	-	-	-	-
Little Grebe (Dabchick)	34.0	35.0	36.1	24.0	24.6	25.2	6	-	-	-	-
Cape Cormorant	50.3	54.9	59.6	36.2	37.1	38.7	8	-	-	-	-
Little Egret	45.8	46.1	46.3	32.8	32.9	33.0	3	-	-	-	-
Grey Heron	58.2	60.7	65.1	41.3	43.1	44.6	16	-	-	-	-
White-backed Duck	59.2	59.6	60.0	47.0	47.2	47.4	2	-	-	-	-
Egyptian Goose	62.3	64.3	65.2	45.3	46.5	47.3	7	-	-	-	-
Maccoa Duck	65.3	67.1	68.7	50.1	51.4	52.9	7	-	-	-	-
Black-shouldered Kite	37.0	38.5	40.1	29.7	30.4	31.0	8	-	-	-	-
White-backed Vulture	86.0	88.0	90.0	65.0	67.7	72.0	3	-	-	-	-
Lappet-faced Vulture	88.3	93.9	98.0	65.5	70.6	78.0	24	-	-	-	-
Black-chested Snake Eagle	72.0	72.0	72.0	60.0	60.0	60.0	1	-	-	-	-
Bateleur	76.7	76.7	76.7	60.0	60.0	60.0	1	-	-	-	-
Gabar Goshawk	35.6	39.2	40.2	30.5	31.3	32.1	9	17.0	19.8	21.5	9
Pale Chanting Goshawk	52.6	55.4	56.9	41.0	43.2	44.7	3	47.5	53.3	56.5	3
Verreaux's (Black) Eagle	71.5	72.8	74.0	56.0	57.3	58.5	2	-	-	-	-
Wahlberg's Eagle	60.5	66.9	75.2	46.8	51.8	55.8	11	70.5	70.5	70.5	1
African Hawk-Eagle	62.0	66.2	70.0	49.9	52.0	54.0	9	-	-	-	-
Martial Eagle	89.0	89.0	89.0	63.0	63.0	63.0	1	-	-	-	-
Pygmy Falcon	27.0	27.7	28.6	22.0	22.3	22.6	4	-	-	-	-
Greater Kestrel	39.1	41.6	44.0	31.8	33.4	35.4	16	25.0	25.9	26.5	4
Red-necked Falcon	41.0	42.4	43.2	32.4	32.5	32.6	3	-	-	-	-
Hartlaub's Spurfowl	39.4	39.7	40.0	28.7	29.1	29.5	2	-	-	-	-
Red-billed Spurfowl	40.9	42.3	44.4	32.5	33.4	34.9	13	-	-	-	-
Common Moorhen	42.0	42.0	42.0	30.8	30.8	30.8	1	-	-	-	-
Red-knobbed Coot	49.0	54.1	56.7	33.9	37.1	38.9	19	-	-	-	-
Blue Crane	88.5	91.3	94.1	59.2	59.5	59.8	2	140.0	147.5	155.0	2
Rüppell's Korhaan	56.0	58.3	60.7	39.8	41.7	43.3	4	-	-	-	-

	Length (mm)			Width (mm)				Mass (g)			
Species	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Max**	**n**	**Min**	**Mean**	**Max**	**n**
African Black Oystercatcher	58.0	58.2	58.4	39.9	40.9	42.1	4	-	-	-	-
Black-winged Stilt	41.4	44.0	47.9	30.0	31.5	33.3	19	-	-	-	-
Pied Avocet	45.8	50.9	56.0	34.0	35.4	36.7	8	-	-	-	-
Spotted Dikkop (Thick-knee)	34.0	47.3	53.3	36.2	38.0	52.1	20	33.0	35.3	37.0	4
Burchell's Courser	29.1	29.4	29.6	24.3	25.1	26.5	3	-	-	-	-
Double-banded Courser	28.5	30.9	32.5	24.0	24.8	25.6	7	-	-	-	-
Kittlitz's Plover	29.1	30.6	32.5	21.5	22.3	23.2	10	-	-	-	-
Three-banded Plover	28.8	29.8	31.1	21.5	22.2	22.7	7	-	-	-	-
White-fronted Plover	30.8	34.3	40.0	23.5	23.8	24.0	4	-	-	-	-
Chestnut-banded Plover	29.1	31.9	34.6	22.5	23.1	24.6	13	-	-	-	-
White-crowned Lapwing	37.3	39.9	41.3	27.6	30.3	38.2	12	-	-	-	-
Blacksmith Lapwing	36.3	39.4	41.4	27.7	29.0	31.6	18	-	-	-	-
Crowned Lapwing	36.7	38.9	42.7	26.2	28.2	29.1	13	-	-	-	-
Kelp Gull	61.1	71.9	78.0	41.2	49.2	52.7	26	-	-	-	-
Damara Tern	29.3	32.5	35.2	21.0	23.3	25.4	80	7.0	9.0	10.5	80
Namaqua Sandgrouse	32.0	35.9	39.0	24.2	25.1	25.7	15	-	-	-	-
Speckled (Rock) Pigeon	37.2	37.9	38.6	29.1	29.1	29.1	2	-	-	-	-
Cape Turtle-Dove	25.8	27.2	28.6	21.3	21.5	21.7	2	-	-	-	-
Grey Lourie (Go-away Bird)	43.6	44.3	45.0	32.8	33.2	33.5	3	-	-	-	-
Jacobin Cuckoo	24.0	25.0	25.6	19.0	20.3	21.1	3	6.7	6.7	6.7	1
Great Spotted Cuckoo	29.3	31.3	34.2	21.3	22.7	24.6	15	-	-	-	-
Black Cuckoo	23.6	25.2	27.3	17.5	18.1	19.1	8	-	-	-	-
African Cuckoo	23.6	23.6	23.6	18.8	18.8	18.8	1	-	-	-	-
Dideric Cuckoo	19.6	21.9	22.9	13.5	14.5	15.4	11	-	-	-	-
Southern White-faced Owl	39.0	39.0	39.0	32.7	32.7	32.7	1	-	-	-	-
Spotted Eagle-Owl	46.6	48.2	49.7	40.0	40.3	40.5	2	-	-	-	-
White-rumped Swift	22.4	22.5	22.6	14.9	14.9	14.9	2	-	-	-	-
White-backed Mousebird	19.7	19.9	20.0	15.2	15.8	16.7	4	-	-	-	-
European Bee-eater	24.6	24.8	25.1	20.9	21.4	21.8	4	-	-	-	-
Monteiro's Hornbill	39.9	41.1	43.0	26.5	27.2	28.3	4	-	-	-	-
Southern Yellow-billed Hornbill	37.5	38.3	39.0	26.0	27.1	28.0	8	-	-	-	-
African Grey Hornbill	26.5	26.5	26.5	24.5	24.5	24.5	1	-	-	-	-
Acacia Pied Barbet	19.0	19.6	20.1	15.1	15.2	15.3	2	-	-	-	-

	Length (mm)			Width (mm)				Mass (g)			
Species	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Max**	**n**	**Min**	**Mean**	**Max**	**n**
Lesser Honeyguide	20.2	20.2	20.2	15.9	15.9	15.9	1	-	-	-	-
Golden-tailed Woodpecker	24.8	24.9	24.9	18.2	18.4	18.5	2	-	-	-	-
Bearded Woodpecker	27.5	27.5	27.5	20.0	20.0	20.0	1	-	-	-	-
Monotonous Lark	17.7	19.4	21.3	13.5	13.9	14.6	5	-	-	-	-
Rufous-naped Lark	21.9	22.2	22.4	15.8	16.0	16.1	3	-	-	-	-
Sabota Lark	19.9	20.9	21.8	14.8	15.2	15.7	11	-	-	-	-
Spike-heeled Lark	18.7	19.4	20.0	13.8	14.1	14.6	5	-	-	-	-
Gray's Lark	19.8	21.1	22.4	14.6	15.4	16.0	18	-	-	-	-
Stark's Lark	17.2	18.4	19.6	12.0	13.9	14.9	23	-	-	-	-
Chestnut-backed Sparrow-Lark	19.1	19.1	19.1	14.4	14.4	14.4	1	-	-	-	-
Grey-backed Sparrow-Lark	18.2	19.7	21.4	13.1	14.3	16.4	52	-	-	-	-
Red-breasted Swallow	20.9	21.2	21.4	15.0	15.4	15.6	3	-	-	-	-
Greater Striped Swallow	20.8	20.8	20.8	14.3	14.3	14.3	1	-	-	-	-
Rock Martin	18.2	20.4	22.0	13.5	14.4	15.0	25	-	-	-	-
Pearl-breasted Swallow	17.3	17.7	18.5	12.6	13.0	13.2	4	-	-	-	-
Cape Wagtail	21.1	21.2	21.4	14.8	14.9	15.0	3	-	-	-	-
African Pipit	19.0	19.7	20.6	14.9	15.1	15.5	6	-	-	-	-
Long-billed Pipit	20.5	21.2	21.9	14.5	14.7	14.9	3	-	-	-	-
Buffy Pipit	20.9	21.3	21.7	15.3	15.5	15.7	3	-	-	-	-
African Red-eyed Bulbul	21.0	21.5	21.9	15.0	15.7	16.2	7	-	-	-	-
Kalahari Scrub Robin	19.1	19.4	19.6	13.9	14.3	14.6	4	-	-	-	-
Herero Chat	21.1	21.7	23.1	16.4	16.5	16.6	8	-	-	-	-
Mountain Wheatear	19.1	20.8	22.8	13.9	14.8	16.4	5	-	-	-	-
Karoo Chat	21.9	22.0	22.2	15.1	15.2	15.3	3	-	-	-	-
Tractrac Chat	21.2	21.5	21.8	16.1	16.3	16.4	3	-	-	-	-
Familiar Chat	19.2	20.0	21.0	14.6	14.8	15.0	5	-	-	-	-
Anteater Chat	21.9	21.9	21.9	16.5	16.5	16.5	1	-	-	-	-
Short-toed Rock Thrush	21.6	22.0	22.3	16.9	17.1	17.3	3	-	-	-	-
Groundscraper Thrush	26.9	27.5	28.5	20.6	20.9	21.5	7	-	-	-	-
African Reed Warbler	17.5	17.7	17.8	13.3	13.4	13.4	2	-	-	-	-
Yellow-bellied Eremomela	14.0	14.9	15.3	11.2	11.5	12.0	5	-	-	-	-
Long-billed Crombec	18.3	18.7	19.6	12.2	12.6	13.0	6	-	-	-	-
Layard's Titbabbler	18.9	19.1	19.2	14.1	14.1	14.1	2	-	-	-	-

	Length (mm)			Width (mm)				Mass (g)			
Species	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Max**	**n**	**Min**	**Mean**	**Max**	**n**
Chestnut-vented Titbabbler	17.0	17.9	18.7	13.4	13.7	14.0	7	-	-	-	-
Rattling Cisticola	17.0	17.3	17.7	12.5	12.8	13.1	3	-	-	-	-
Tinkling Cisticola	16.7	17.1	17.3	12.7	12.8	13.0	4	-	-	-	-
Desert Cisticola	14.5	14.6	14.7	11.2	11.3	11.4	4	-	-	-	-
Black-chested Prinia	15.2	16.0	19.4	11.1	11.5	11.9	18	-	-	-	-
Rufous-eared Warbler	16.2	16.3	16.5	11.1	11.3	11.4	3	-	-	-	-
Barred Wren-Warbler	16.6	17.6	18.3	11.6	11.9	12.3	6	-	-	-	-
Marico Flycatcher	19.4	20.2	22.4	14.1	14.9	15.3	6	-	-	-	-
Pririt Batis	15.9	16.6	18.1	12.0	12.7	13.2	18	-	-	-	-
White-tailed Shrike	20.2	21.6	23.5	15.4	16.1	16.8	5	-	-	-	-
Southern Pied Babbler	25.9	25.9	25.9	19.5	19.5	19.5	1	-	-	-	-
Bare-cheeked Babbler	26.4	26.5	26.6	20.2	20.2	20.2	2	-	-	-	-
Rockrunner	21.8	22.3	22.7	16.1	16.2	16.3	2	-	-	-	-
Ashy Tit	17.3	17.8	18.1	13.0	13.3	13.5	3	-	-	-	-
Carp's Tit	16.8	17.4	18.0	13.0	13.5	13.7	4	-	-	-	-
Grey Penduline Tit	13.2	14.5	15.2	9.5	9.8	10.1	8	-	-	-	-
Cape Penduline Tit	13.8	14.0	14.3	9.7	9.8	9.9	4	-	-	-	-
Scarlet-chested Sunbird	21.1	21.2	21.3	13.1	13.2	13.2	2	-	-	-	-
Marico Sunbird	17.4	17.5	17.5	11.9	11.9	11.9	2	-	-	-	-
White-bellied Sunbird	16.2	16.3	16.3	10.6	10.7	10.8	2	-	-	-	-
Dusky Sunbird	13.5	14.8	15.6	9.2	10.8	11.8	9	-	-	-	-
Southern White-crowned Shrike	26.0	27.0	28.8	20.4	20.7	21.0	5	-	-	-	-
Brown-crowned Tchagra	21.6	22.2	22.8	15.2	16.0	16.9	4	-	-	-	-
Black-crowned Tchagra	23.4	25.0	26.2	17.8	18.1	18.5	3	-	-	-	-
Swamp Boubou	23.9	23.9	23.9	18.0	18.0	18.0	1	-	-	-	-
Crimson-breasted Shrike	22.0	23.6	24.9	16.6	17.5	18.2	21	-	-	-	-
Fork-tailed Drongo	23.6	23.7	23.8	18.0	18.4	18.8	3	-	-	-	-
Cape (Black) Crow	42.2	45.0	49.9	27.6	30.0	31.4	29	-	-	-	-
Pied Crow	40.2	43.8	48.6	28.4	29.9	31.7	34	-	-	-	-
Pale-winged Starling	31.1	31.2	31.4	20.4	20.8	21.0	3	-	-	-	-
Cape Glossy Starling	27.5	28.9	30.5	19.2	19.8	20.0	7	-	-	-	-
Burchell's Starling	28.3	30.0	32.4	21.2	21.9	22.5	17	-	-	-	-
Great Sparrow	18.5	20.4	22.7	14.0	14.6	15.1	14	-	-	-	-

	Length (mm)			Width (mm)				Mass (g)			
Species	**Min**	**Mean**	**Max**	**Min**	**Mean**	**Max**	**n**	**Min**	**Mean**	**Max**	**n**
Cape Sparrow	18.0	19.2	20.5	12.9	13.9	14.5	11	-	-	-	-
Red-billed Buffalo Weaver	27.2	28.0	29.7	19.0	19.7	20.2	7	-	-	-	-
White-browed Sparrow-Weaver	20.5	23.6	25.7	14.1	15.9	17.3	59	1	2.8	4.5	57
Scaly-feathered Finch	14.5	15.5	16.9	10.8	11.2	11.9	37	-	-	-	-
Lesser Masked Weaver	21.8	21.8	21.8	14.6	14.6	14.6	2	-	-	-	-
Southern Masked Weaver	18.2	20.6	23.3	13.2	14.2	18.8	29	-	-	-	-
Chestnut Weaver	19.3	22.0	23.7	13.8	15.4	16.5	18	-	-	-	-
Black-faced Waxbill	14.6	14.6	14.6	11.0	11.0	11.0	1	-	-	-	-
Violet-eared Waxbill	14.8	16.0	17.3	12.0	12.4	13.0	4	-	-	-	-
Green-winged Pytilia	15.5	16.7	18.0	12.3	12.7	13.2	9	-	-	-	-
Red-headed Finch	17.0	19.8	22.1	13.8	14.5	15.4	19	-	-	-	-
Black-throated Canary	16.0	16.7	17.1	11.0	11.7	12.8	4	-	-	-	-
White-throated Canary	18.3	19.0	20.0	14.7	14.8	14.9	4	-	-	-	-
Golden-breasted Bunting	18.8	19.3	19.9	14.0	14.1	14.2	4	1.6	1.8	2.0	2
Cape Bunting	20.1	20.3	20.6	14.6	14.8	14.9	3	-	-	-	-
Lark-like Bunting	14.1	16.8	18.5	10.8	12.0	15.1	31	-	-	-	-
Total eggs							**1 248**				**163**