

Documenting status of the European Roller *Coracias garrulus* in western Cyprus

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Recent counts of birds in western Cyprus have included data on the European Roller *Coracias garrulus*. Each of several different methods of counting, some beginning in 2003, suggested a rapid decline in the number of breeding Rollers in recent years, averaging around 50%. The birds were most abundant in upland grassland areas, but this habitat showed the steepest rate of decline, whereas in uncultivated areas, such as machis, numbers remained quite high. A preliminary estimate of 3000 birds was made for the average numbers of Rollers in western Cyprus during this period.

INTRODUCTION AND METHODS

The European Roller *Coracias garrulus* (hereafter Roller) is widespread in southern Europe as a breeding species, arriving in Europe from tropical Africa in April and May, and leaving in September and October. The species has been declining since at least the 19th century (Cramp 1985). Various more recent reports indicate that this trend is widespread and continuing. Rollers are currently listed by IUCN as near threatened (www.iucnredlist.org, accessed 3 October 2012). Their European population was estimated by BirdLife International (2004) as between 100 000 and 220 000 individuals, with a global population of from 100 000–500 000, although it is not common enough to feature in the most recent trend analysis of European birds, by the Pan European Common Bird Monitoring Scheme (PECBMS 2012). Cyprus is at the southern fringe of its breeding range (Cramp 1985), which is probably moving northwards; but it is also contracting inwards at the northern fringes



Figure 1. Map of Cyprus showing places mentioned in the text. Large towns in capitals, villages in lower case and other named areas in white. The black dotted line indicates the study area in western Cyprus.

(Snow & Perrins 1998). A decline in Cyprus might be attributed to climate change, leading to global warming, and a drying of the climate, and could serve as an indicator as to what to expect further north.

Flint & Stewart (1992) reported the species in Cyprus as a “Scarce to fairly common migrant breeder...below c800 m in open, usually cultivated, lightly wooded country, nesting in holes in isolated, often ruined buildings, and in cliffs and banks. Apparently more numerous in the past: Lilford (1889) described it as breeding abundantly, and Wilson (1925) saw many breeding in holes in walls in Famagusta”. Thus the global decline has apparently applied to Cyprus for a good many years; in this paper, we attempt to document and quantify the recent decline.

Roller densities on Cyprus are generally low, but the birds are amongst the most conspicuous of species, being very easily seen as well as frequently heard. We used data based on three different methods to census this species in western Cyprus, one being part of our overall bird monitoring programme, in which breeding birds were censused 2006–2011 along 38 transects covering the full altitudinal range and main land-use types in western Cyprus (Pomeroy & Walsh 2006). The sites were scattered through Pafos administrative district, south to the northern outskirts of the Pafos conurbation, and east into part of Lemesos District as far north as the Omodos area, and south to Alektora (Figure 1). Each transect was c1 km long, and birds of all species were allocated to one of 13 distance bands for density estimates by the program Distance (Thomas *et al* 2010). Between one and three rounds were completed annually, with counts along each transect in April and May (see Table 1A), with counts at higher altitudes being made later. The majority of counts were made by the time that most pairs of Rollers were expected to have established territories, although some earlier counts may have been too soon for some pairs. Nevertheless, the method was the same each year, so that comparisons between years should be valid.

Secondly, since the species is sparsely distributed and numbers recorded on foot transects were relatively small, from 2003–2011 we undertook six road transects in the Akamas-Laona area, where sightings of Rollers are quite frequent. These transects covered a total distance of some 1500 km over nine years, and were intended to provide estimates of numbers of Common Kestrels *Falco tinnunculus* and Little Owls *Athene noctua*, as well as Rollers. Three of the routes regularly had Rollers, but they were only occasional on the other three. Again, perpendicular distances of the birds from the road were recorded in most years but we have not used these in this paper because the Rollers’ fondness of perching on wires biases the distance estimates. Several counts were made along each transect each year (to allow for the generally low numbers).

Finally, we used a territory-mapping method based on the Common Bird Census of the British Trust for Ornithology (Marchant 1983). In an area of c4.5 km² around the village of Kritou Terra, Pafos District, where at least one of us was living in each breeding season 2003–2011, all records of Rollers, visual and auditory, were registered on large scale maps. Territories were delineated as in the CBC. As the data were not as comprehensive as those usually available to the CBC, results were expressed as estimates of the maximum and minimum numbers of breeding pairs in each season.

As well as our own data, we had access to two other sets of data. The first was the preliminary analyses of Cyprus data by PECBMS for 2006–2010, courtesy of Jana Škorpilová, using two sets of transect data (ours, above, combined with additional counts from other parts of the island provided by Birdlife Cyprus). Secondly CR, BirdLife Cyprus bird recorder and editor of the annual Cyprus Bird Reports, extracted spring data for our area from contributors for 2005–2011 (Richardson 2006–2011). These come from an average

Table 1. Roller *Coracias garrulus* count data for western Cyprus. The methods used for each data set are described in the text. Fieldwork in 2003 and 2011 was for a shorter period than in other years, so results may be less reliable. Data set B is from the whole island, whilst the others are from western Cyprus only. Counts in brackets were made fairly early, before 5 May, and could therefore have been under-estimates.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	
A FOOT TRANSECTS - numbers of birds per round counted, arranged by land-use type (as described by Pomeroy & Walsh 2006)										
Forest				0	0	0	0	0	0	
Uncultivated				5.0	3.3	2.7	2.5	3.5	(1.5)	
Grass/phrygana ^a				3.5	4.0	2.0	1.0	0.5	(0.0)	
Arable				4.5	7.0	1.7	2.5	1.5	(1.0)	
Permanent crops				1.5	1.3	1.0	1.0	1.5	(0.0)	
Built-up				1.0	1.3	2.0	2.5	1.0	(1.5)	
Number of rounds				2	3	3	2	2	1	
Total per round				15.5	16.9	9.4	9.5	8.0	(4.0)	
B PECBMS INDEX (includes data from A)										
Index (2006 = 100)				100	80	68	71	65	-	
SE				-	19	14	16	15	-	
C ROAD TRANSECTS - number of birds counted from a slow-moving vehicle										
R01	Terra	17	36	18	15	23	11	7	11	3
R02	Ay Katerina	17	24	20	10	14	14	4	3	1
R03	Akamas	13	12	13	8	6	5	3	3	1
R04	Lara	-	1	0	1	0	2	0	0	1
R05	Akoursos	-	4	0	2	1	0	1	0	0
R06	Kato Akourdhalia	-	19	9	2	8	7	0	5	1
Totals	- birds	(47)	96	60	38	52	39	15	22	7
	- km	125	225	198	198	198	198	99	198	99
Bird/100 km ^b		(0.38)	0.43	0.30	0.19	0.26	0.20	0.16	0.11	0.07
D KRITOU TERRA VILLAGE - estimated number of breeding pairs										
	Minimum	9	9	10	9	9	6	4	4	(2)
	Maximum	12	12	12	11	11	7	7	6	(4)
E BIRDLIFE CYPRUS RECORDS^c										
	Numbers of birds at breeding sites			33	34	24	24	22	23	
	Number of migrant birds counted			32	34	50	41	56	28	

^a phrygana consists largely of low spiny plants

^b based on the 3 highest-scoring routes

^c as extracted by CR from records submitted to BirdLife Cyprus, for the months of April and May. Data are 3-point running means of numbers of individuals considered to be breeding, and passage migrants, respectively

of c40 contributors per year (less in 2005) who recorded sites where Rollers were present. These records were then divided into passage migrants and breeding birds after analysing behaviour, circumstances and locations of birds, relative to previously used nest sites and territories known by CR.

Table 2. Population estimates for Rollers *Coracias garrulus* in Pafos District, averaged over the period 2006–2011, based upon the data in Table 1A. Transect length is the combined total for all transects in their land-use type (n = number of transects in that type).

Land-use type (n)	Transect data			Mean count (Table 1A)	Density (birds km ⁻²)	Area in Pafos District ^c (km ²)	Population estimate
	Length (km)	ESW ^a (m)	Area ^b (km ²)				
Uncultivated (9)	9.90	61.6	1.22	3.1	2.54	345	877
Grass/phrygana (7)	6.05	44.0	0.532	1.8	3.38	475	1605
Arable (8)	9.11	67.1	1.22	3.0	2.46	101	248
Permanent crops (6)	6.41	(47.8) ^d	0.61	1.1	1.80	107	193
Built-up (4)	7.14	(47.8) ^d	0.68	1.6	2.35	40	94
TOTALS	38.61	–	–	–	–	1068 ^e	3017

^a estimated strip width (ie area within which birds were detected)

^b length × (ESW × 2)

^c from Pomeroy & Walsh (2006)

^d overall strip width, as sample is small

^e excluding forest (328 km²) where Rollers are absent

RESULTS AND DISCUSSION

Table 1 summarizes our main findings for the period 2003–2011, using the methods described above, and which includes one nationwide data set (Table 1B). It is clear that all methods showed similar trends, with the population falling by a third or more between the earlier counts and 2011 (Table 1A–D), although the BirdLife Cyprus data (Table 1E) show a smaller decline in the numbers of breeding records than the other methods. In contrast, records of migrants are more notable for considerable year-to-year variations, perhaps reflecting weather patterns as much as actual numbers.

In Table 2, we estimate the average numbers of Rollers in each land-use type (Table 1A) and thus suggest an average of c3000 for Pafos District as a whole 2006–2011. If our observations on the rate of decline are correct, these numbers will now be substantially lower. In any case, our estimates are approximate and Roller numbers need further study. For example, the numbers in built-up areas are likely to be below the estimate given here, which largely derives from our observations in Kritou Terra village, where Rollers nested every year of our study; but they are not common in villages, and are absent from larger towns.

If we accept that there has been a decline, perhaps a steep one, in the breeding population of Rollers in Cyprus, particularly in the western parts of the island, where all of our more detailed studies were made, then what might be the cause? Cyprus has experienced many environmental changes in this time, particularly in coastal areas, but much less so in our study areas which were predominantly inland and rural. Even there, new houses have appeared on hill tops in recent years. However, these will have affected less than 1% of Roller territories and since, in Kritou Terra, two pairs are known to have nested in buildings (which, although abandoned, lie beside a narrow, regularly-used, village road), on which they often perched, buildings *per se* were not necessarily ‘bad’. We noted a number of nesting sites; apart from abandoned dwellings, a church, tree holes, and especially holes in roadside banks and chalk cliffs. In southern Spain, nesting sites are in short supply, as shown by the beneficial effects of providing boxes (Rodriguez *et al* 2011), but there is no evidence of a shortage of natural sites in the area where we worked. In the spring of 2011 there was an ongoing severe drought in East and Central Africa, which

caused unusual movements of many late spring passage migrants. Although several species of chat, warbler and shrike were affected negatively there appears to have been minimal effect on both migrant and breeding Roller populations in Cyprus (Richardson 2006–2011).

Although the reasons for the species' decline are currently unknown, Rollers are sometimes shot in Cyprus (illegally: *M Hellicar pers comm*); and hunting has been suggested by Flint (2011) as being a factor in the wintering areas of trans-Saharan migrants; however, in East Africa, where the species is mainly a passage migrant, birds are less often killed for food than they used to be, according to an authority on bush meat (*W Olupot pers comm*). There are less data from the main wintering areas in southern Africa. Flint (2011) also documents drying of the Cyprus climate, which must reduce plant growth and therefore reduce the food of the insects on which Rollers and many other Cyprus birds feed. Clearly this is a subject about which we currently lack information and, at present, can only speculate.

It is evident from Table 1A that the declines have been greatest in grass/phrygana and arable areas, which are the most open habitats. Land-use changes in these places may have been important, although these are not thought to have been great during our study period. The uncultivated areas, mainly machis and similar types, now seem to be the most important for Rollers. About a quarter of Pafos District belongs to this category (Pomeroy & Walsh 2006) and with an average density of *c*2.5 birds per square kilometre (see above), would have supported over 800 during our study period.

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