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Monitoring and studying the Seychelles warbler

Fieldwork on Cousin Island
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As part of the Seychelles Warbler Research Group, a partnership between researchers at the Universities of East Anglia and Sheffield in the UK and the University of Groningen in the Netherlands, run in collaboration with Nature Seychelles. Lead by Profs. David S. Richardson^{3,4}, Terry Burke² and Jan Komdeur¹, and with Dr. Hannah Dugdale²

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Aims of this study:

- 1) Census the survival and condition of all Seychelles warblers on Cousin Island
- 2) Catch, ring and DNA sample any unringed warblers
- 3) Monitor all warbler breeding attempts on the island
- 4) Determine personality traits in individual warblers

Census and monitoring

A census of the Seychelles warbler, *Acrocephalus sechellensis*, population on Cousin was carried out between June-October 2014. Seychelles warblers are attracted and located by whistling and “pishing” approximately every 15 meters along the paths and within the forest. Birds are sometimes located by listening for their singing, or the snapping of their bills whilst foraging. The identity and previous breeding status of nearly all birds are known based on previous observations and specific individuals are recognizable by unique combination of three colour bands and a British Trust for Ornithology (BTO) metal ring (Table 1 and Appendix 1). Once located, birds are followed and interactions recorded to establish their current status within the territory. To determine dominance status and breeding stage, dominant males and, particularly, females are followed for at least 15 minutes each week in each territory. The status of any additional birds detected as present in the territory (e.g. helpers, non-helpers, recent fledglings, or intruders) is then based on observations during breeding attempts. The position of each territory was plotted on a map using the 50 by 50 meter grid system constructed by Nature Seychelles (the corner of each grid marked by a numbered pole). Over the breeding season each territory was checked weekly and the exact territory boundaries and sizes were determined.

Table 1. The colour of rings used on Cousin Island to recognize individual Seychelles warblers. Each Seychelles warbler has a unique combination of three colour rings and a BTO metal ring with a unique code. The metal ring is always positioned at the bottom of the right leg on Cousin, except when used in combination with the grey colour ring (Z), when the metal ring is positioned at the top of the right leg. Two-colour split rings are only used on the right leg in combination with the metal ring.

Colour	Abbreviation	Leg (left/right)
<i>Black</i>	N	L/R
<i>Dark blue</i>	B	L/R
<i>Dark green</i>	G	L/R
<i>White</i>	W	L/R
<i>Light Blue</i>	L	L/R
<i>Light Green</i>	E	L/R
<i>Orange</i>	O	L/R
<i>Red</i>	R	L/R
<i>Yellow</i>	Y	L/R
<i>Pink (discontinued to use)</i>	P	L/R
<i>Grey</i>	Z	R
<i>Split black-white</i>	M	R
<i>Split pink-black</i>	U	R
<i>Split red-white</i>	S	R
<i>Split yellow-blue</i>	A	R
<i>Split Yellow-green</i>	K	R
<i>BTO metal ring</i>	X	R

The number of Seychelles warbler territories on Cousin is relatively stable and normally oscillates around 110-115 territories (Komdeur & Pels 2005). At the end of the field season (October 2014) we observed 389 birds in 108 territories in total, compared to 102 territories in winter 2014 and 109 in summer 2013. The breeding males, breeding females and subordinates in these 108 territories are identified in Appendix 1.

Catching and ringing

A total of 196 individual Seychelles warblers were caught in mist nets. Of these, 93 birds were caught for the first time and thus unringed. Of these 16 were fledglings (still begging within their natal territory) and 66 were old fledglings (estimated to have fledged after February 2014 based on the grey iris colour that exists when <5 months). Eight were sub-adult individuals that were estimated to have hatched between September 2013 and February 2014 (based on the light brown iris eye colour that birds develop when they are approximately 5-10 months). The final three were adult individuals that were estimated to have hatched before September 2013 (based on the red brown iris colour that birds develop at approximately one year old (Komdeur 1991)). All unringed birds received a BTO-ring and a unique combination of three colour rings. Basic morphometric measurements were taken from all birds caught (wing length, tarsus-length, head length, cloaca size and body mass), for detailed assessment of their condition for the ongoing studies. In addition, the presence/absence of feather mites on the primary and secondary wing feathers was scored. A very small blood sample was taken from each individual for DNA analyses (sexing and genotyping; Richardson et al. 2001), and assessment of disease infection (e.g. Van Oers et al. 2010), which can vary season to season within an individual. Disease screening of these samples is now underway in the laboratory at UEA. In addition a small outer tail feather per individual was collected to measure the body condition of the bird during the time of feather growth (Bortolotti et al. 2002). Analysis of these tail feathers is now underway in the laboratory at the University of Groningen. No birds were harmed during the capture and processing procedures and all were released back in their resident territory. The removal of a single outer tail feather per individual didn't impair flight performance and health of the birds.

At the end of the season (beginning of October 2014), 323 of the 335 (96%) independent (> 3 months old) Seychelles warblers that we observed on Cousin Island were colour ringed. This estimate does not include fledglings or nestlings from the current field season (as they are < 3 months old). When compared with winter 2014 and summer 2013 this field season has been exceptional for the number of new individuals that recruited into the population between March and June 2014. 67 unringed individuals were ringed in summer 2013, and 9 in winter 2014. During this last field season we ringed 93 individuals out of the 105 unringed individuals present in the island in June 2014.

Nesting and helping behaviour

We documented breeding activity in 105 out of the 108 observed territories (97%), ranging from nest-building to the provisioning of fledglings. Of these 105 territories, 89 produced one or more eggs (85% of active territories) and 63 produced chicks (60% of active territories). Of these, 54 individuals successfully fledged in 50 territories (51% of active territories); 4 territories produced two fledglings. Although these numbers seem to suggest that ca. 50% of breeding attempts result in successful fledging, the actual number is lower. This is because individuals can have multiple breeding attempts within a single season, and failed breeding attempts before the start of our field season are not taken into consideration.

Observations of nesting behaviour, including incubation and feeding, were carried out on all territories where subordinates hatched before June 2014 were present, to determine if these subordinates were helping or not. In total 43 out of 101 subordinate birds were observed to help within their territory, five individuals were not observed helping. Nine subordinate birds were recorded as “possible additional birds” because a lack of nesting activity or early nesting failure that meant the helping status of these individuals could not be ascertained. The remaining forty-four individuals were classified as “old fledglings” because their age was less than 5 months and they were not observed helping.

Personality

We conducted three tests to measure the behaviour of 34 caught Seychelles warblers.

1. First, we conducted ‘activity tests’: We recorded the number of seconds of movement of the bird in a cotton bird bag over a period of 60 seconds. This bag is the normal, approved way to hold birds with minimal stress prior to ringing and morphometric assessment. This activity measure was taken twice; straight after extracting the bird from the mist net, and after morphology measurements were taken.
2. After these activity tests, an ‘exploration test’ was conducted: We released the birds into a tent with three ‘artificial trees’ (outer dimension: L322 x W340 x H210 cm, placed in the shade) and observed them for five minutes to determine how quickly they explored this unfamiliar environment.
3. Additionally, upon release in their resident territory, we conducted a ‘release test’. We counted how many seconds the bird took to fly away after placing it in an open palm of the hand after taking it from the bird bag.

These three behavioural measurements were analysed to determine whether there are consistent behavioural differences between individuals (personality). These data will

allow us to ask whether the ‘personality’ of an individual bird is associated with their life-history decisions, such as helping and settlement in novel environments, e.g. does ‘personality’ determine how likely individuals are to disperse away from their natal territory. Preliminary analyses revealed that the ‘exploratory behaviour’ that we measured, differs consistently between the individuals that were tested more than once. This means that ‘exploratory behaviour’ in Seychelles warblers can indeed be seen as a consistent ‘personality trait’.

References

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Appendix 1. Status and colour codes (see Table 1) of all birds resident in the 107 territories on Cousin Island, at the beginning of October 2014.

Unringed individuals are denoted by a unique identifier starting with the letters UR followed by a sequence of five numbers (e.g UR14007). Abbreviations are as follows: Terr No is territory number, BrF is dominant breeding female, BrM is dominant breeding male, H is helping subordinate, AB non-helping subordinate, ABX is a subordinate for which the helping status is unknown, OFL is a fledgling from the previous breeding season (March 2014), FL is a fledgling from this breeding season (fledged between June-October 2014), Float is an individual without a territory, SEEN1 is a bird that was observed only once during the field season and for which another status could not be determined, TBRF is a female that lost her dominant position in the territory within the season, and TBRM is a male that lost his dominant position in the territory within the season.

Terr No	BrF	BrM	H	H	H	AB	AB	ABX	ABX	OFL	OFL	OFL	FL	FL	SEEN1	TBRF	TBRM
1	YLKX	ERMX	OOOX										UR14001				
1.1	VOOX	BBLX	VWWX							VVLX							
1.2	REKX	ONEX															
2	ELBX	OOKX	NLUX							BYSX	GLOX		UR14050				
5	OOMX	NWBX	BBXZ					OBLX									
6	VVAX	NRKX											OYZZ				
6.5	VVVX	BEKX															
7	EWVX	OEUX															
8	YYUX	GGXZ						EGKX	VVUX	GOBX	BYEX						
9	VWXZ	YLNK															
10	RRKX	BBAX	ROGX							GRVX			UR14051	UR14052			
11	YYYY	WLYX															
15	ELWX	OLMX				YRUX							NGWX				
18	GRKX	BEOX								SAKX	KLBX		UR14053				
20	WBUX	VGGX								OOLX					NVAX		
21	GOGX	ENGX													LNGX		
22	ONBX	WNUX	LGWX							YYOX			UR14058				
23	LBKX	GVVX											UR14002				
24	OYLX	WLLX						YNRX									
25	BWRX	GKX											UR14006				
25.1	RYBX	YYBX															
26	VRRX	WLNX	RLOX										UR14041				
26.5	OGNX	RLKX	YYMX										UR14054				
27.1	EVAX	ORKX								LVVX							
28.1	GLNX	LLGX	RVRX										UR14040				
29	LGOX	RVXZ															
30	BOBX	NBUX															
30.2	OYKX	EGKX															
32	VVGX	VBXZ													LRUX + GVEX + ORNK		
32.5	ONYX	YWAX	OOEX	WNBX													
33	WGKX	VBXZ	NYUX									UR14004	UR14003				
33.1	WYGX	LYNX											UR14055				
34.5	EWEX	LVRX	GWKX										UR14005				
35	WYUX	LYNX						UR14006									
35.1	NBYX	YNBX								RBBX							
37	ELGX	WWBX											UR14049				
39	EWKX	WBKX	GOEX														
41	VBYX	YWVZ	BRKX							VVOX	YERX	OREX	UR14008	YYSX			
41.1	YBUX	NVNX											OEEX				
42	WBLX	NWKX											OWOX				
43	NEAX	NNUX															
45	LROX	NVGX											OYWX				
46	LGNX	NLKX	GGGX	BWOX	OWBX								UR14033	UR14009			
47	VNAX	WNEX											EOGX				ONXZ
47.1	VRLX	LWNX	ROMX										UR14010				
47.2	YBLX	YRBX															
49	BWMX	BNNX											UR14011				
50	YEXZ	GWEX	GBUX							LLOX			LBWX	UR14012			
50.1	VOUX	RBKX						GERX									
51.2	RYUX	YWYX	RNXZ											UR14056			
52.1	NLGX	EKX	WNRX	BBOX									ONLX				
53	VGNX	VRWX	OLEX										RYXZ				
53.1	OWUX	YYLX						RRLX							YWKX		EYUX
54	OYUX	LORX													LRLX		
55	VGBX	VNUX						OWKX							NYRX		

Terr No	BrF	BrM	H	H	H	AB	AB	ABX	ABX	OFL	OFL	OFL	FL	FL	SEEN1	TBRF	TBRM
56	YEKX	LRRX													YNWX +		
57.1	ROKX	EVWX													EYYX		
58	BYUX	ELYX															
59.1	ROYX	VYAX								BWWX			UR14014				
59.2	OOWX	WLKX															
60.1	NWXZ	NVOX								EVRX	RNNX						
62	VRMX	NBBX								OYRX	YLBX						
63	ELRX	YVXZ	UR14059	BOKX									UR14015		RRWX		
64	LBOX	YLLX															
65	BLUX	VBAX								UR14042			UR14043				
66	OLSX	VLMX															
67	BEEY	BLSX															
68	BLKX	GLUX											RRMX				
69	WOGX	VYWX	ROZX							BRWX					RRWX		
76	WVYX	GROX															
77	VGOX	EBUX	YGRX										UR14016				
77.1	OVNX	RWUX	YRGX	EEBX													
78	EBKX	OORX	NVRX			RYLX							UR14045		YWKX		
81	WNKX	LRWX								NOWX							
82.1	GLXZ	RBSX								UR14037							
83	YBXZ	VLOX															
84	KXGY	YGKX											UR14046				
85	VGLX	RYAX								REWX			RWOX		NEXZ		
86	VBWX	RBUX								NORX							
87	OBXZ	RRRX						NVKX					LOEX				
87.1	LVOX	YGXZ	EEEX	GYLX		YBWX	WLOX						UR14017				
88	YBBX	LENX								RNRX	YRZX						
92	BBUX	WVUX								YVWX	RNLX						
92.1	NNKX	NWUX								UR14018							
93	NELX	LONX													VORX		
94	OLOX	YOXZ	VGUX										UR14019				
94.2	NEUX	LGSX															
101	BNUX	RNAX															
101.1	YNXZ	WRLX															
102	GVWX	VVNX											UR14020				
103.1	RERX	EGUX	NVYX	GGLX									UR14021				
104	LVNX	GYUX								UR14022			RWXZ				
108	YRKX	NBGX								OGEX							
111	BROX	VNNX								ENRX							
112	GNBX	LLRX															
116	GYGX	VVKX															
117	YVEX	BVAX								UR14023			UR14024				
120	EWUX	VNKX	UR14026										WGWX				
121	OLUX	LEGX								UR14025							
122	YVBX	BNXZ								EEWX			NRLX			ONXZ	
123	NYLX	GWRX								UR14027							
126	VOKX	BEXZ	GNYX										UR14044				
127	ONKX	WEKX						NYKX		ROEX	BVWX						
129	VEGX	WGXZ	BYRX														
130	GOUX	WYXZ								OGWX			UR14029				
131	VOMX	LOMX	YGNX	ROBX									UR14039				
133	YVKX	YWUX	NVLX	RVKX									UR14048				
136	OVWX	NGEX								UR14030			UR14031		EOLX		
	FLOAT	OBLX															EYUX
	FLOAT	OLKX															
	FLOAT	LNNX															
	FLOAT	OWLX															
	FLOAT	NGNX															
	FLOAT	NWWX															
	FLOAT	RRBX															