

Population trends of Seychelles magpie-robins *Copsychus sechellarum* following translocation to Cousin Island, Seychelles

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SUMMARY

We report on the translocation of Seychelles magpie-robins *Copsychus sechellarum*, from the island of Frégate to the island of Cousin between 1994 and 1995. Prior to this translocation, the world population consisted of 47 individuals confined to Frégate. Five magpie-robins were translocated to Cousin and subsequently a new self-sustaining breeding population was established; this population increased almost 10-fold in less than 12 years to a high of 46 individuals in May 2006. It is now currently experiencing signs of regulation with a slight decrease in numbers with 31 birds recorded in June 2007. It is hoped that ongoing studies will identify the reasons for this decline, which at present are unclear.

BACKGROUND

The Seychelles magpie-robin *Copsychus sechellarum*, is a passerine bird endemic to the Seychelles archipelago in the Indian Ocean. The species inhabits closed canopy coastal forest and feeds predominantly on soil invertebrates (Komdeur 1996, Watson *et al.* 1992). Magpie-robins form social groups that defend a common territory of 1-12 ha (McCulloch 1996, and pers. obs.). Each group is comprised of a dominant pair and up to eight subordinates (typically one or two). Only the dominant pair is known to reproduce, producing a single egg per breeding attempt (Komdeur 1996, McCulloch 1996, Watson *et al.* 1992). Breeding occurs throughout the year, with most nests sited in artificial nest boxes; natural nest sites include tree cavities and coconut palm *Cocos nucifera* crowns (Komdeur 1996, Njoroge 2002, Watson *et al.* 1992).

Although the species is believed to have been common throughout the granitic Seychelles in the 18th century (Newton 1867, Vesey-Fitzgerald 1940), it suffered a severe decline being reduced to only 12-15 individuals in 1965, all of which were confined to the 210 ha island of Frégate (Penny

1968). The decline is attributable to habitat destruction through clearance for agricultural land and the introduction of alien predators such as rats *Rattus* spp. In 1978 and 1979 two failed attempts were made to reintroduce magpie-robins to the predator-free island of Aride (Watson *et al.* 1992). Over the next 15 years the single population very slowly increased but was still critically low with 23 individuals in 1990. In response to their critically endangered status, a Recovery Programme was initiated by BirdLife International in 1990 and taken over by Nature Seychelles in 1998; it included predator eradication, supplementary feeding, provisioning of nest boxes and habitat restoration. This resulted in a rapid increase in numbers (Norris & McCulloch 2003) and made possible new translocations of individuals to the islands of Cousin in 1994, Cousine in 1995 and Aride in 2002. The current world population is estimated to be around 190 individuals and the species was down-listed from Critically Endangered to Endangered in 2005 (IUCN 2006).

This report describes the 1994 translocation of Seychelles magpie-robins from Frégate to Cousin and the subsequent population trends on both the donor and receiver islands.

ACTION

Study site: The recipient island of Cousin is a small (27 ha) low lying wooded island (highest point 69 m a.m.s.l.) with vegetation dominated by a regenerated native forest of *Pisonia grandis* and *Morinda citrifolia*. A small area of *Avicennia* sp. mangrove also exists on its southern tip. Despite the lack of records of Seychelles magpie-robins on Cousin, it lies only 2 km off the island of Praslin, where the species has been historically documented (Vesey-Fitzgerald 1940). As well as Cousin's proximity to an island formerly known to support a population of magpie robins, the island was chosen for the translocation by BirdLife International and the Government of Seychelles because of (i) its nature reserve status, (ii) its lack of alien predators, (iii) its relatively large area of native forest and (iv) the evidence of good feeding conditions from preliminary soil invertebrate sampling (McCulloch 1996).

Translocated magpie-robins originated from Frégate Island, where the only remaining population of the species persisted at the time of this translocation in 1994. Frégate is 210 ha in area and has a maximum height of 125 m a.m.s.l. At the time of translocation, the vegetation on Frégate comprised a high proportion of exotic species and contained only two small patches of native woodland, both dominated by *Terminalia cattapa*.

Selected individuals and capture: Two male and two female magpie-robins were identified for translocation to Cousin. All four birds were subordinates that had not bred before and originated from four territories within which no breeding attempts had occurred. Although individuals were targeted to maximize genetic diversity and minimize co-ancestry, this was not always possible (Table 1). Individuals were captured using a walk-in trap on the afternoon of 12 November 1994. All individuals were weighed and biometrics taken. Captured birds were kept in individual holding aviaries that were out of sight of resident magpie-robins, to avoid any harassment of aviary held birds. They were provided with water, and fed 10

cockroaches (Blattidae) and a small amount of grated cheese 3-times a day until the day of the translocation (14 November 1994). Birds appeared healthy, despite loosing an average of 2.5 g during the two days that they were held in the aviaries (McCulloch 1994).

On 15 March 1995 a new female, also a subordinate and never before paired, was captured and translocated using the same procedure. This was done to replace a female that died on Cousin on 24 February 1995 after a severe storm (Le Maitre 1995).

Translocation and release: Birds were caught from the aviaries, weighed and placed in travelling boxes on the morning of 14 November 1994, 3 hours after their last feed. They were then transferred by helicopter to the island of Praslin and completed the two remaining kilometres to Cousin by motor launch (Le Maitre 1994, McCulloch 1994). The total journey took 40 minutes.

On arrival on Cousin, transferred individuals were placed in aviaries for 3 hours before their release into the forest. There were two holding aviaries situated in different wooded areas of the island, each of them with a male and a female separated by a wire partition to avoid fighting. This was done in an attempt to encourage pair bonding, and territory settlement and establishment (Le Maitre 1994, McCulloch 1994).

Monitoring: As part of its management programme (Rands & Komdeur 1989), the entire population of magpie-robins has been individually colour-ringed and monitored since June 1988. There is monthly data on territory occupation, behaviour, social status and breeding of all individuals on Frégate prior to the translocation and following the translocation up until March 2000 (Millet & Shah 2000). The same data has been collected on Cousin from the time of the translocation to date. All new recruits on Cousin have been ringed either as nestlings or soon after fledging. Further details on monitoring protocols are detailed in Bristol *et al.* (2005).

Table 1. Degree of co-ancestry between individuals translocated to Cousin Island, based on the reconstructed social pedigree. Note that co-ancestry in diploid organisms is equivalent to half their relatedness (e.g. siblings have a co-ancestry of 0.25). Bold indicates couples that bred successfully on Cousin. Female 1 was replaced by Female 3 after the death of Female 1.

	Male 1	Male 2	Female 1 †	Female 2	Female 3
Male 1	0.500000				
Male 2	0.062500	0.500000			
Female 1 †	0.031250	0.125000	0.500000		
Female 2	0.031250	0.125000	0.250000	0.500000	
Female 3	0.000000	0.031250	0.109375	0.109375	0.500000

CONSEQUENCES

Status of the Frégate magpie-robin population after translocation: At the time of the 1994 translocation to Cousin, Frégate supported 47 Seychelles magpie-robins distributed in 11 distinct territories (i.e. 11 breeding pairs, the remaining individuals being non-breeding subordinates). The population had been increasing since the implementation of the Recovery Programme in 1990 that favoured an increase in reproduction and juvenile survival (Norris & McCulloch 2003).

Population growth on Frégate decreased after the 1994 translocation, seemingly coinciding with the translocation, however, as the few translocated individuals were all subordinates, there was no decrease in the number of breeding pairs present on Frégate. It was therefore difficult to attribute the translocation to this observed decrease; the appearance of brown rats *Rattus norvegicus* on the island in July 1995 (Thorsen *et al.* 2000) seems a more likely cause of decline.

In September 1995, after two additional translocations of a total of nine magpie-robins to Aride and Cousine, the population on Frégate comprised 49 individuals, distributed in 14 breeding territories. However, over the following 20 months the detrimental impact of rats became apparent; breeding success declined and the population decreased until in May 1997, only 35 individuals were present. At this time a rat eradication was undertaken (Thorsen *et al.* 2000) but this was not successful. Also, one magpie-robin died of secondary rodenticide poisoning and the same fate was suspected for three unaccountably missing individuals. Subsequently a successful rat eradication programme took place in June-July 2000 using a refined baiting technique to preclude magpie-robins from the bait (Shah 2001) and in response the population had increased to 43 individuals by 2000. Since then, the population has recovered further, both as a result of the rat eradication and further habitat restoration, and in July 2006 consisted of 82 individuals in 22 territories.

Status of the magpie-robin population on Cousin: Figure 1 shows the evolution of the magpie-robin population on Cousin from the initial translocation in November 1994 up to June 2007.

By the end of 1998 the entire forested area of the island was occupied by six magpie-robin territories, holding a total of 19 individuals. The sequence of territory occupancy indicates a preference for habitat supporting high densities of soil invertebrates, with later territories being occupied in areas of lower invertebrate densities (Njoroge 2002). The population continued to increase, with the number of territories also increasing through the splitting of the original territories. The number of territories reached its current number of 11 by the end of 2005. The magpie-robin population on Cousin reached a maximum of 46 individuals in May 2006, after which it suffered a sharp decline. As of June 2007, the population on Cousin was 31 individuals although the number of occupied territories (11) remained unchanged. The reasons for this decline are unclear; since the founder population was low (comprising five individuals of which only four contributed to the present population) the levels of inbreeding on Cousin are high. It is difficult to know whether the recent observed population decrease is due to any cumulative effects of inbreeding, or any other environmental and demographic processes. The effects of such inbreeding are yet to be studied in this species. Magpie-robins also have a tendency to move between islands in certain conditions and birds recorded as “disappeared” may have flown to Praslin or elsewhere (Shah & Parr 1999).

Conclusions: The translocation of Seychelles magpie-robins to Cousin can be considered a success. Stemming from the small founder population (five individuals) and despite the high levels of inbreeding resulting from it, the population on Cousin reached a high of 45 individuals in less than 12 years, with 11 territories occupying the entire woodland. Since May 2006 there has been a decline in the number of individuals (but not territories), and in June 2007 the population on Cousin stood at 31. The reasons for this decline are unclear, but it is hoped that ongoing studies will identify them.

This translocation, in conjunction with those to the islands of Aride and Cousine, has allowed the world population of Seychelles magpie-robins to increase to around a total of 190 individuals on four islands, and the species was down listed from Critically Endangered to Endangered in 2005 (IUCN 2006) as a consequence of this.

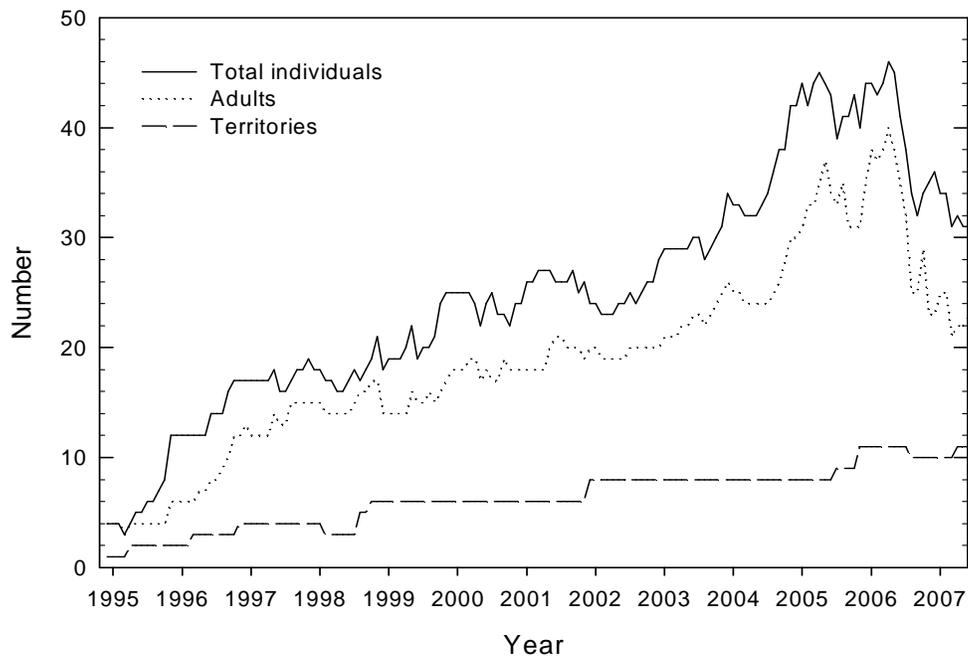


Figure 1. Evolution of the Cousin Island population of Seychelles magpie-robins after translocation (November 1994: 2 males, 2 females; March 1995: 1 female to replace a female that died) until June 2007. Numbers are shown for the total population size (solid) as well as for the number of adults (dotted) and the number of breeding territories (dashed).

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