

The release and establishment of Mauritius fodies *Foudia rubra* on Ile aux Aigrettes, Mauritius

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SUMMARY

The Mauritius fody *Foudia rubra* is threatened by habitat loss and nest predation from introduced mammalian predators. The establishment of populations on predator-free smaller islands around ‘mainland’ Mauritius is one of the main conservation strategies for endangered Mauritian birds. Ninety-three Mauritius fodies were released on Ile aux Aigrettes in three breeding seasons between November 2003 and March 2006. The first fledglings were produced on the island during the 2004-05 breeding season, and by the following season sufficient numbers of juveniles were being produced on the island to render further releases unnecessary. The population has since increased to 47 breeding pairs and 142 individuals as of December 2008.

BACKGROUND

The Mauritius fody *Foudia rubra* (endemic to the oceanic island of Mauritius) is classified as critically endangered following a decline in numbers and range between 1975 and 1993 (Safford 1997). The mainland population has now stabilised at around 100 pairs but is increasingly dependent on exotic forestry plantations, which are believed to provide some level of protection from nest predation by introduced crab-eating macaques *Macaca fascicularis* and black rats *Rattus rattus* (Cristinacce *et al.* *in press*). Birds fitting the description of Mauritius fodies were recorded in the southeast of Mauritius by the first Dutch settlers around 1600 (Panyandee 2002) and habitat similar to the lowland forests they encountered is now available on several small offshore, predator-free islands.

A programme to establish a fody population on one of these islands, Ile aux Aigrettes, began in the 2002-03 breeding season with the harvesting

and captive hand-rearing of chicks from nests threatened by predation on the mainland. The success of captive breeding and rearing techniques (Cristinacce *et al.* 2008) enabled trial releases of Mauritius fodies to be initiated in the 2003-04 breeding season. This paper describes the methods used in the release process and the subsequent population growth.

ACTION

Ile aux Aigrettes: Ile aux Aigrettes is a 25 ha island in Mahebourg Bay, lying 625 m off the southeast coast of Mauritius. It contains one of the largest and best preserved lowland ebony forests remaining in Mauritius. It has been leased to the Mauritian Wildlife Foundation since 1985 and the woodcutting that previously threatened the forest has been stopped. An ongoing restoration project involves the weeding of exotic species and the planting of native trees. Rats were eradicated by 1992 and macaques have never been introduced, but all attempts to

remove Indian house shrews *Suncus murinus* (another non-native species) have failed; however, this shrew is primarily a ground foraging species not deemed to be a serious predator of nests located in bushes and trees. Pink pigeons *Columba mayeri* (also an endangered Mauritian endemic) have been released on the island and their current population is stable at around 80 individuals.

Aviaries: The release aviaries were originally designed to house sick pink pigeons, but had not been used for over a year when the first fodies were housed in them. They consisted of two adjacent iron-framed structures measuring approximately 4 m × 3.5 m × 3.5 m high, covered with 2.5 cm × 1.25 cm rectangular wire mesh (Fig. 1). Originally, the first aviary was entered through a single door and a further door lead to the adjacent aviary. A porch was built inside the first aviary to allow workers independent access to both aviaries whilst providing two doors between captive birds and the outside, minimising the chances of escape. Approximately one third of the back section of the roof was covered by a sheet of corrugated tin. The upper back and the upper back half of the sides of the aviaries were further sheltered with wooden boards extending down from the roof. Both aviaries had hatches at the front just under the roof, which could be opened to allow birds in and out. One aviary had a hatch measuring approximately 1 m x 0.3 m and the other had two hatches measuring approximately 0.6 m x 0.3 m wide, only one of which was used. Both hatches were covered with 2 x 2 inch (5 x 5 cm) square wire mesh soon after the first releases to prevent (non-native) Indian mynahs *Acridotheres tristis* entering whilst allowing the smaller fodies to freely pass through. The floor of the aviaries comprised the natural coralline substrate, covered with a 5 cm layer of gravel. A layer of leaf litter, rotting logs and stones (from Ile aux Aigrettes) were laid over the gravel, and perches were fixed at a range of heights.

One feeding platform was built in each aviary consisting of a wooden or wire table fixed on top of a 1 m long vertical plastic drainpipe, the lower end was secured into the floor. The smooth surface of the drainpipe prevented Indian house shrews from climbing up to the food bowls. Food was presented in ceramic dishes, which were placed in bowls of water to prevent ants reaching the food. When fodies were captive in the aviaries, a bowl of shallow water for bathing

was provided, and fresh branches from the island were placed in the aviaries every three to four days, and old ones removed. Branches were also readjusted from nearby bushes to abut the aviaries' hatches to allow released birds to walk/climb into nearby vegetation as fodies often move along branches and this could be less stressful than flying directly from the aviaries.



Figure 1. Mauritius fody release aviaries on Ile aux Aigrettes.

Release process: Mauritius fodies were transferred to Ile aux Aigrettes from the Gerald Durrell Endemic Wildlife Sanctuary in Black River on the west coast of Mauritius, where they had been reared. They were transported in groups of four or fewer in a small cage with wooden back and sides, and a 0.5 x 0.5 inch (c.1.25 cm) wire mesh front. The front of the cage was covered with a cloth during the jeep and boat journey, which took around 1½ hours. Recently fledged, hand-reared birds were put into a 0.6 m x 0.5 m x 0.5 m wire mesh cage within the aviaries and were released into an aviary the following day by leaving the door open. Fodies that had previously been kept in larger aviaries at the Gerald Durrell Endemic Wildlife Sanctuary were liberated directly into the Ile aux Aigrettes aviaries.

The food given to Mauritius fodies consisted of chopped fruit (apple, banana, mango and papaya), grated boiled eggs, grated carrot, insectivorous mix (Witte Molen Universal Food) and whole oats. Food was freshly prepared each day and kept refrigerated after preparation. Feeding bowls were changed every time the food was replaced and soaked in Virkon S virucidal disinfectant (DuPont Animal Health Solutions,

Sudbury, UK) solution in between feeds. The water in bowls was replaced at every feed and water bowls were washed in Virkon S solution weekly and scrubbed at each feed. The food in the aviaries was changed three times a day (at dawn, 10:00 h and 14:00 h). If the birds ate all the food before they were due to be changed, then additional food was provided. Avesnectar (Avesproduct, Netherlands) was offered in plastic hoppers fixed to the sides of the aviaries between dawn and midday, and pieces of watermelon and papaya, when available, were spiked on branches in the aviaries at dawn each morning.

Fodies were kept in the aviaries for at least seven days before being released. The amount of time they spent in the aviaries depended upon whether other fodies were being brought to Ile aux Aigrettes before the seven days had elapsed (so that they could be released together in a larger group) and the availability of suitable days (weather dependent) for release. Releases were postponed if there was a possibility of heavy rain or excessive wind. Juveniles were released in cohorts of between two and nine birds (mean = 4.78, SE = 1.33, n = 18; four to six juveniles was aimed for). Adults were released singly or in groups of two after spending at least 30 days in the release aviaries (in the hope that they had become to some extent, habituated and would therefore not fly directly off the island upon release). Fodies were released by opening the hatch at the front of the aviaries and allowing them to exit of their own accord. The hatch was opened around 08:00 h as this allowed the fodies to feed on the supplementary food provided in the aviary prior to the release and also gave plenty of time for them to return to the aviaries to gain access to food before the end of the day. The aviaries were observed from a distance of 3 m to record use of supplementary food by any returning fodies; each individual was recognisable as they had been ringed with a unique metal ID ring and combination of colour rings.

The first release was a group of four juveniles on the 28 November 2003. Between this date and the 30 December 2003, a further 11 juveniles were released in three cohorts. Six of the 15 released birds were still on the island in August 2004 (when the first post-release breeding season was due to start), but as these all appeared to be displaying behaviour characteristic of males, two females (sex confirmed by DNA analysis) were

released in September 2004. A further 52 juveniles were released between October 2004 and April 2005. Two males and a female that had been used in a captive breeding programme were released between June and September 2005. Between November 2005 and March 2006, 13 juveniles were released after being harvested from territories on the mainland that were not represented in the Ile aux Aigrettes population in an attempt to increase the genetic diversity. The final pair from the captive breeding programme were also released along with three of their fledglings, and three fledglings that had been abandoned as eggs on Ile aux Aigrettes and subsequently hand-reared in captivity.

Post-release management: Supplementary food was (and continues to be) supplied to the Mauritius fodies; there is always at least one aviary open to birds to access the food. As the population increased additional feeding platforms were constructed in the aviaries and the provision of supplementary food became less labour intensive. From April 2004, food was changed twice a day (at dawn and midday) until April 2005, when it began to be changed once a day (at dawn). From May 2006 the supplementary food was changed to a mixture of duck starter-crumbs, liquidised prunes, mixed small seed and honey, which was blended to a suitable consistency and mixed in a 1:1 ratio with insectivorous mix. This is prepared once a fortnight and supplementary feeding bowls are filled as necessary.

Ongoing monitoring: The presence of each Mauritius fody on the island is monitored daily, usually by watching for visits to the release aviaries for supplementary food (found to be used by all Mauritius fodies) on the island. Territories are mapped and nesting attempts are monitored, and all fledglings are ringed in the nest or after being caught in the aviaries.

CONSEQUENCES

Post-release survival and breeding success: The growth of the Mauritian fody population on Ile aux Aigrettes and the number of releases is shown in Figure 2. Initial increases during the first two breeding seasons were due mainly to releases of more birds but by the 2005-06, there were considered sufficient fledglings being produced in the wild to sustain the population without the need for further releases. Survival to

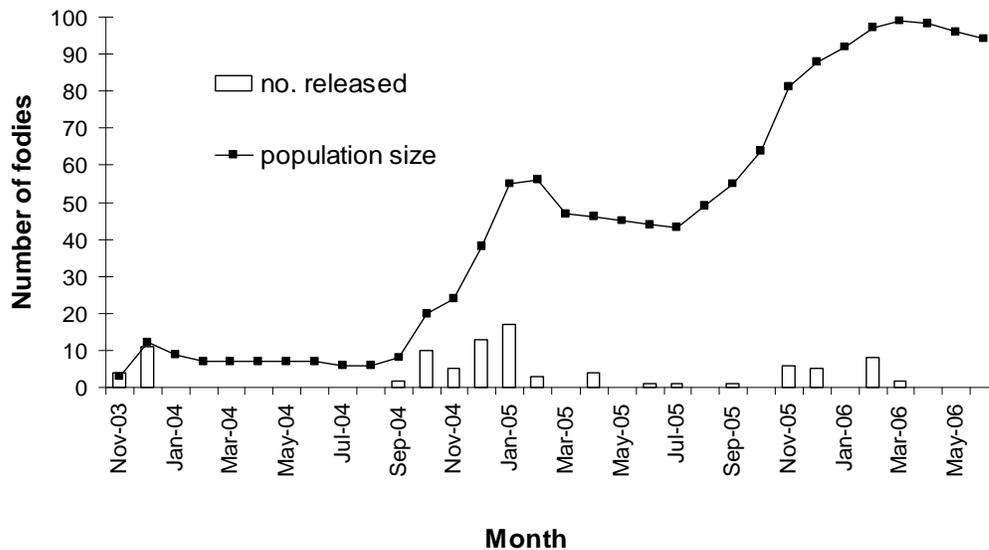


Figure 2. Population growth of Mauritius fodies on Ile aux Aigrettes and number of individuals released each month, November 2003-June 2006.

one year for released birds was 33% in 2003-04, 61% in 2004-05 and 75% in 2005-06. The increases each season may be, in part at least, due to recently released birds copying the behaviour of older, established birds on the island as release techniques did not change. Five fledglings were produced from two adult females in 2004-05, 40 from 19 females in 2005-06 and 47 from 38 females in 2006-07. The decreases in fecundity are thought to be due to the higher densities as the island reaches carrying capacity. The survival of fledglings to one year of age on Ile aux Aigrettes was 60% in 2004-05 and 88% in 2005-06.

Post-release dispersal: Released birds and their offspring have spread throughout the suitable wooded habitat on Ile aux Aigrettes. One adult male and one adult female have been found on the mainland and there may be other Mauritius fodies that have likewise left Ile aux Aigrettes.

Mortality, disease and nest parasites: The only observed cause of death on the island was attributable to avian pox. Many fodies had lesions on their feet caused by this virus and at least six died when lesions on the tongue prevented adequate feeding and appeared to restrict breathing. Casual observations indicated

a much lower level of pox in the 2006-07 breeding season, which could account for the slightly higher survival rates although no quantitative data was collected.

Following the death of a brood infested with nest parasites in captivity, a mixture of 95% talcum powder and 5% of the insecticide carbaryl is now routinely rubbed into the lining of accessible nests around the time eggs are laid and again around the time they are expected to hatch.

Territorial song: Of concern in the island population is the territorial song of the males, which is different to that of their mainland counterparts. It was thought that the Mauritius fodies on Ile aux Aigrettes could have picked up elements of the song of the non-native Madagascar fody *Foudia madagascariensis*, which also occurs on Ile aux Aigrettes, but preliminary sonogram analysis showed the song of the island Mauritius fodies to be a simpler version of the mainland population's song (Lumley 2008). Future captive rearing of Mauritius fodies (and indeed other passerines) should include exposure to the songs and calls of the wild population, either through a suitable captive adult or a taped recording, during the rearing procedure.

Outlook: The population on Ile aux Aigrettes has continued to rise and currently (December 2008) stands at 142 individuals and 47 pairs. Future proposed work will involve using the Ile aux Aigrettes population as a source for releases on to other predator-free islands. If, after less intensively managed populations (due to inherent resource limitations) are established, the support provided to Mauritius fodies on Ile aux Aigrettes may be reduced.

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