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Eradication of the invasive common myna, *Acridotheres tristis*, from Fregate Island, Seychelles

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Abstract: The common myna (*Acridotheres tristis* Linnaeus, 1766) is considered a serious threat to the endemic and endangered Seychelles magpie robin (*Copsychus sechellarum* Newton, 1865) on Fregate Island and the complete eradication of mynas was seen as a priority in view of the importance of Fregate for the continued survival of the Seychelles magpie robin. These birds have never been completely eradicated, largely due to the failure to continue with eradication efforts after reduction of the population. A combination of new methods, as well as methods that were at least partially successful in the past, were implemented to ensure complete eradication. This was achieved in February 2011 and took approximately eight months of regular effort from June 2010. Capture methods were adapted and changed for individual birds that had, or that developed an aversion to a particular method. Cage trapping using a commercially available trap was by far the most effective method of capture. A total of 745 birds were destroyed, along with 42 eggs.

Keywords: threat, magpie robin, complete eradication, pest management

Introduction

The common myna *Acridotheres tristis* Linnaeus, 1766 was introduced to Mahé from Mauritius and has spread through the granitic islands of the Seychelles where it is common on the majority of the larger islands. They are common around human habitation where they congregate in large flocks at dusk (Skerrett *et al.* 2001). On Fregate they also gathered in large numbers at the dump site during the early morning hours when food waste was dumped. They are omnivorous and forage in a number of different habitats where they competed with the Seychelles magpie robin for food.

Biological invasion by non-native species is recognized as one of the major threats to native species and ecosystems and such invasions are contributing to biodiversity decline (Holzapfel *et al.* 2006). In 2000 The World Conservation Union declared the common myna as one of the 100 worst invasive alien species (Lowe *et al.* 2000) and they posed a threat to indigenous biodiversity on Fregate, through competition for food and nesting resources (Peacock *et al.* 2007; Millet *et al.* 2005). On Fregate they were observed making use of tree hollows, coconut palms (*Cocos nucifera)*, eaves of roofs and nesting boxes of Seychelles magpie robin for nesting sites. As a member of the Convention on Biological Diversity, the Seychelles has a responsibility to "prevent the introduction of, control, or eradicate those alien species which threaten ecosystems, habitats or species" (United Nations 1992) and the complete eradication of this bird from the island was seen as a priority.

Fregate is, at present, the most important island in the Seychelles for the

continued survival of the Seychelles magpie robin and any threats to their survival need to be eliminated. Between the 1950's and 1990's the entire population was restricted to Fregate and at times came very close to extinction (Bristol *et al.* 2005). These birds are present on five granitic islands with Fregate hosting at least 92 birds out of a total population of 209 individuals (Derand 2010). Whilst the status of the bird has been downlisted from Critically Endangered to Endangered it is still one of the worlds' rarest birds and requires conservation management (Birdlife International 2010); including the removal of alien species that threaten their survival. All introduced mammalian predators have been eradicated from Fregate. Cats and rats were eradicated in 1977 and 2000 respectively (Henriette Payet 2007). Common mynas were also seen as being a threat to the Endangered Seychelles white eye (*Zosterops modestus* Newton, 1867) population on Fregate (Henriette Payet 2007). They have also been observed predating on the eggs and chicks of the Critically Endangered Seychelles black paradise flycatcher on Denis Island (*Terpsiphone corvina* Newton, 1867) (Feare 2010b) and there is the possibility that this behaviour may occur with other native species. Possible future introductions of native and endemic species will only be successful if threats to their survival are eliminated. Extensive habitat alteration and degradation of the island as well as the availability of a constant food supply has meant that the common myna was able to thrive on the island.

Study area

The Seychelles islands lie approximately 1500km off the East coast of Africa. Fregate lies at 04°35´19´´S and 55°56´55´´E and is the most isolated of all the Seychelles granitic islands (Skerrett & Skerrett 1990). It lies 55km from Mahe and is 219 hectares in size.

The Seychelles islands were part of the Gondwanaland supercontinent, with Fregate composed of granite overlying oceanic basalt. Deposits on the plateau are associated with guano; forming phosphate cemented sandstones and phosphatized granite. The low-lying areas were previously marshy and characterized by sediments of fine clay and quartz (Braithwaite 1984). It is a privately owned island that has the 125m high Mont Signal as its highest point. Although Fregate was once covered in lush vegetation, exotic species now dominate. It is used as a tourism destination and has a small hotel that caters to a low numbers of tourists at any time.

Rainfall records on the island are inconsistent and unreliable. Records from 1972–2001 from the Seychelles capital, Victoria, on Mahe, give an average annual rainfall of 2319.8mm (Seychelles National Meteorological Services, undated).

Methods

Previous attempts to eradicate the common myna from Fregate, using a police marksman to shoot the birds and nest box trapping, were unsuccessful as the lack of constant effort permitted the population to recover (Millet *et al.* 2005). Previous attempts, as well as information from eradication efforts on other Seychelles islands were taken into account in determining the best methods for eradication. Decoy traps were found to be successful on Denis Island (Feare 2010a) and it was decided that cage

trapping would be the most effective method; supplemented by nest trapping, shooting and elimination of eggs and pulli from known nests. A combination of methods ensured that individuals that developed trap aversion were still eliminated. Chemical control was not considered due to its non-selectivity and the possibility of affecting the Seychelles magpie robin population. Areas of high myna concentrations were targeted by cage trapping until these cages no longer trapped any birds for a period of two to three weeks. Individual birds or pairs were then targeted using different methods until all individuals were eradicated.

Mynas were heavily concentrated in areas of human habitation and usage. The highest concentrations of these birds were the island dumpsite, where food waste as well as other waste is disposed of and a tortoise pen where juvenile tortoises are raised before release onto the island. Other areas where successful cage trapping occurred included cultivated fields, manicured lawns and the commercial airstrip where these birds foraged. The initial phase of the programme used only cage traps in these areas of high concentration. Only once the population had been substantially reduced and the cages were no longer effective, were supplementary methods employed.

Shooting

Shooting as a primary method of eradication was determined not to be a viable option due to the size of the myna population and the high concentration of mynas in particular areas. Any shooting attempts in these areas would likely have lead to gun shyness in a very short period of time. Some of the population was also likely to be gun shy as a result of shooting in the past. This method was used only as the opportunity presented itself and was only used on individuals, not on pairs or groups. A Gamo CF-30 air-rifle was used with 5, 5 (22) calibre pellets.

Nest trapping (Fig. 1)

Nesting boxes have been provided for the Seychelles magpie robin as a conservation measure due to the limited availability of naturally occurring nesting sites. These nesting boxes were largely utilized by the mynas as nesting sites. Nylon nooses were placed in boxes known to be occupied by a pair of mynas. Three nooses were placed over the entrance holes of the nesting boxes, hanging from above. They overlapped one another to ensure successful capture. Two or three further nooses were placed in the central section of the box. The diameter of the nooses was approximately 5cm and they were held in place within the box by staples. This method was only used at one site after other methods failed to capture these particular birds.

Cage trapping (Fig. 2)

MiniMyna traps were used. These traps are manufactured by Myna Magnet Australia Pty Ltd. The trap consists of two parts, namely the holding cage and the feeding cage, in which the bait is placed. The feeding cage has two walk-ins that allow the birds to enter this section but not to leave due to the funnel shape of the walk-ins. A fuzzle valve leading from the feeding cage to the holding cage allows the mynas to enter the holding cage. The valve has springs attached that allow the bird to fly upwards but

Fig. 1. Nesting box showing nylon noose placement

not back down through the valve. The birds' only option once they finish feeding on the bait provided is to fly through the fuzzle valve and into the holding cage. These traps are live traps allowing for the release of any species unintentionally captured by this method. Cages with trapped mynas were placed in a waterproof, non-permeable bag and the birds were humanely euthanized with carbon monoxide from a petrol engine by means of a pipe attached to the exhaust pipe of the engine on one end and the other end placed in the bag.

Cages were baited and left open for approximately a week during the initial phase of the programme to allow the mynas to become habituated to the traps. It was determined through experimentation that cages placed within close proximity to one another (between one to two metres apart) were most effective at catching birds. Caller birds were kept in cages to attract other mynas to the cages. These birds were left overnight to attract mynas the following morning. They were watered and fed to prevent stress. It was found to be preferable to keep two caller birds in a cage rather than one as the mynas appeared less stressed this way.

The number of cages used at particular sites was determined by the concentration of mynas at the particular trapping site. The dumping site on the island had by far the highest concentration of mynas and nine cages were used at this site. This site attracted large numbers of mynas to readily and regularly available food. Food waste is dumped at this site twice a day; once in the morning and once late in the afternoon. Myna visits to this site coincided with dumping times and the setting up of the cages was timed

Fig. 2. MiniMyna trap showing feeding cage on left and holding cage on right.

to coincide with the dumping of food. During the eradication programme food waste was covered up so as to limit availability of food to the mynas and ensure that the only readily available food to the mynas was that used for bait.

Papaya was used as bait as it is readily available to the mynas on the island and they are often found feeding on wild growing papaya. Dog food was attempted as bait, however this proved to be unsuccessful and no mynas were trapped when this bait was used.

Walk-in trap (Fig. 3)

Aversion to mini-myna traps was inherent, or developed in some individuals and pairs. Individuals that could not be eliminated by nest trapping and shooting, due to their nests being inaccessible, were targeted using a walk-in trap. This trap was larger and more open to lure mynas. It was designed and constructed on the island and consisted of a framework of steel poles 1cm in diameter. The frame was 1,5m X 1,5m

Fig. 3. Walk-in trap

X 0,8m in height. A hinged door was attached to one side that swung up and out from the top of the frame. The entire framework was covered in fine shadecloth ensuring that bait was visible to the birds. The door was balanced on a pole that had a nylon fishing line attached. This fishing line was laid between 30-50 m away from the trap and was held by one person unseen to the mynas. Once a myna had entered the trap the line was pulled, dislodging the pole and causing it to fall closed and trap the bird. Once trapped, the bird was killed using an air rifle. Any non-target species trapped at the same time were released after the myna had been shot to prevent unintentional escape of mynas.

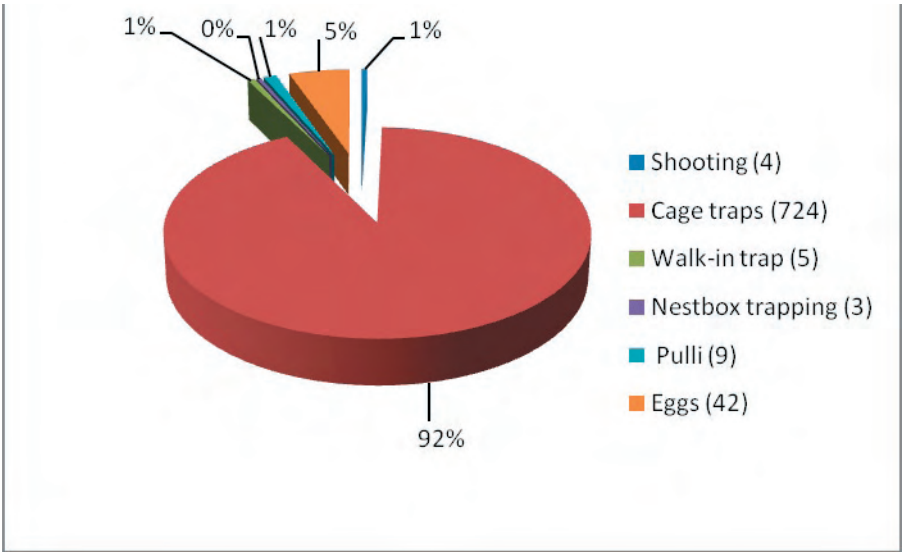
Pulli and egg eradication

Nesting boxes provided for Seychelles magpie robins were regularly used by mynas and during the monitoring of these boxes myna pulli or eggs that were found were destroyed along with nests. Myna nests with eggs and pulli found in the eaves of roofs were also destroyed.

Results

Trapping was started in June 2010 and the last birds were eradicated in mid February 2011. A total of 745 birds of all age classes were destroyed, along with 42 eggs (Figs 4-5).

Fig. 4. Eradication methods and number of birds killed per method



Shooting

Shooting only accounted for four birds, excluding those killed by shooting in the walk-in trap. This method would have accounted for more birds had it been used more regularly and consistently but it was found not to be necessary and the effort required in relation to the number of birds killed made this method inefficient.

Cage Trapping

Trapping was used as the primary method of eradication. 92% of all birds eradicated were as a result of their capture in traps. A total of 724 mynas were caught in these traps. Bycatch of non-target species occurred with the vast majority of these birds being released unharmed. Up to nine mynas were trapped in a single cage. Newly fledged birds would enter the traps in the presence of their parents even when their parents would not do so.

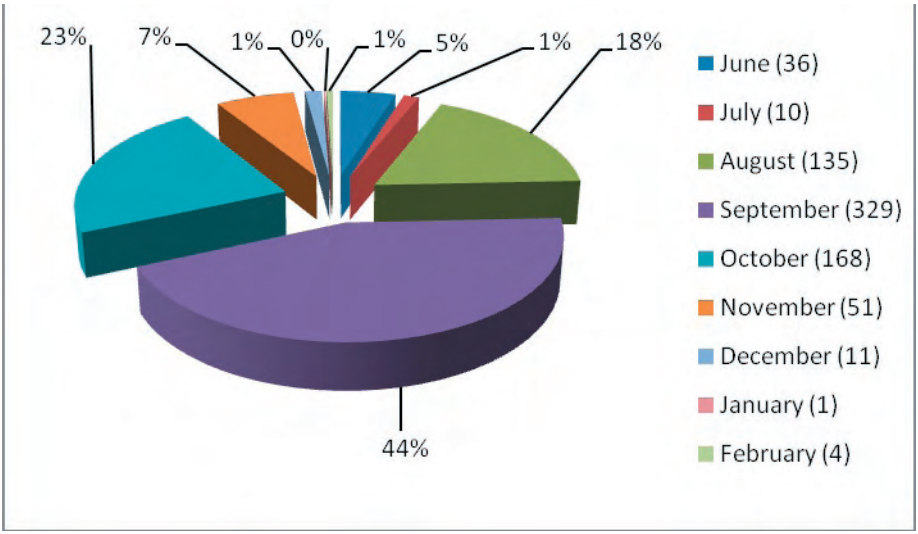
Walk-in trap

This method accounted for five birds and was only implemented after an aversion to cage trapping had developed. Three individuals were caught at the dump site and two on the airstrip.

Nest box trapping

One individual was caught within three hours of setting these nooses. A pair of was caught in the same nesting box the following day. This method would probably have accounted for more mynas had it been used more regularly.

Fig. 5. Monthly eradication figures



Pulli and egg eradication

This method was used during regular monitoring of Seychelles magpie robin nesting boxes. It proved an effective way of destroying known myna nesting sites. During the initial phase of the programme all mynas nests were removed from the nesting boxes. At the latter stages a nest was left in the nesting box to ensure a return to the nesting box by the resident myna pair and nooses were placed in the nesting box.

Bycatch (Table 1)

Non-target species were caught in all areas where cages and the walk-in trap were set, with the majority being caught at the dump site, where these species also fed on food waste. The majority of these individuals were released unharmed from the cage traps and all individuals were released unharmed from the walk-in trap. Four bird species were unintentionally caught, three of which were alien species.

Species unintentionally trapped were Madagascar turtle dove (*Nesoenas picturata* Temminck, 1813), barred ground dove (*Geopelia striata* Linnaeus, 1766) Madagascar fody (*Foudia madagascariensis* Linnaeus, 1766) and the indigenous common moorhen (*Gallinula chloropus* Linnaeus, 1768). Terrestrial hermit crabs of the genus *Coenobita* were trapped in the cages placed on the airstrip on the side closest to the beach. Mynas would not enter cages that had these crabs in them, regardless of the number of crabs in the cages. Cages set on the side of the airstrip furthest from the beach that did not trap crabs, were successful in the trapping of mynas.

Madagascar turtle doves are found on the island in high concentrations and most of those found dead in the traps had their heads caught between the bars of the cage. The majority of Madagascar fodies were able to find their way out of the trap once

Table 1. Bycatch

Method	Species	Number caught	Number dead
Cage trapping	Common moorhen	10	0
	Madagascar turtle dove	77	11
	Barred ground dove	14	1
	Madagascar fody	1	0
	Terrestrial hermit crabs	239	0
Walk-in trap	Madagascar turtle dove	9	0

they had entered and fed on the bait, with only one that became trapped and was unable to escape.

Discussion

Personal observations and anecdotal evidence would indicate that the eradication of the common myna has resulted in a noticeable increase in the number of Seychelles magpie robins that have fledged, as well as an increase in the use of nesting boxes by Seychelles magpie robin. In areas where there were previously high concentrations of mynas, there has been a dispersal of Seychelles magpie robins into these areas. Further monitoring of the magpie robin population will determine to what extent the eradication of the myna has benefitted this species and to verify observations.

After previous eradication attempts the myna population was allowed to grow to substantial numbers. According to Millet *et al.* (2005) the population estimate of mynas on Fregate in November 2002 was 8 individuals, although they do concede that population numbers are extremely difficult to estimate. Figures from 2011 show a substantial increase from 2002 and it is possible that there was some reinvasion from other islands during this period. Personal communications with long term residents of the island indicate that the population had indeed expanded enormously over the last few years. Traps are avoided by mynas if they have previously managed to escape, indicating a degree of learned response. Different capture methods ensure that this learned response is countered. The continuous and regular setting of traps and targeting of these birds ensured that eradication was successful. These birds must not be given an opportunity to increase in numbers once they have been reduced.

Fregate experienced unusually low rainfall during the time that the programme was implemented and it is possible that a shortage of other readily available food encouraged the birds to enter the traps for easily available food. Birds that were habituated to the presence of humans enter the traps readily and were not dissuaded from entering the traps even when they observed the setting up and removal of traps. The use of caller birds appears to increase the success of capture, particularly in those areas where mynas are not as habituated to the presence of humans. This correlates with data from Denis Island (Feare 2010a). The use of caller birds only, without the provision

of bait was not attempted on Fregate. Mynas readily accepted bait that they are familiar with, whilst unfamiliar bait proved unsuccessful.

The common myna specializes in the invasion of woodland, especially those areas modified by the activities of man (Tidemann undated). On Fregate, all mynas were trapped in these modified habitats, with very few birds being found in areas of native woodland. Native woodland had one of the lowest densities of mynas during weekly bird counts over all habitat types found on the island. The vegetation of Fregate has been extensively altered by the activities of man and the majority of the island is covered in alien species. Along with a regular food supply, this is conducive to future reinvasion. Habitat restoration may me a factor in reducing reinvasion and reestablishment of a population and the disposal of food waste in a different manner may help reduce future invasions of this species. The fact that these birds do not have a high rate of mobility means they are slow to spread (Tidemann 2005) and reinvasions may be controlled before the population increases substantially.

It is important to adhere to guidelines to ensure the successful eradication of this species. These guidelines include proper planning, commitment to complete, putting the entire population of the species at risk, removing them faster than they can reproduce and preventing reinvasions (Veitch & Clout 2002). Failure to completely eradicate the species in the past was as a result of not adhering to the above guidelines.

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References

Birdlife International. 2010. The world's rarest [online]. Available from: http://www.theworldsrarestbirds.com/en/component/content/article/76.html [Accessed: 2010-12-23].

Braithwaite, C.J.R. 1984. Geology of the Seychelles. In: Stoddart, D.R. (ed.). *Biogeography and Ecology of the Seychelles.* The Hague: Dr. W. Junk Publishers: 17-79

Bristol, R., Millett, J. & Shah, N.J. 2005. *Best Practice Handbook for a Critically Endangered Species: The Seychelles Magpie Robin.* Victoria: Nature Seychelles.

Derand, G. 2010. *Newsletter of the Seychelles Magpie Robin Recovery Team*. No. 17 May – Oct 2010:2.

Feare, C.J. 2010a. [Online]. Eradication of Common Mynas from Denis Island, Seychelles, 2010. Available from: http://denisisland.blogspot.com

Feare, C.J. 2010b. The use of starlicide in preliminary trials to control invasive common myna *Acridotheres tristis* populations on St. Helena and Ascension Islands, Atlantic Ocean. *Conservation Evidence* **7**: 52-61.

Henriette Payet, E. 2007. *The introduced Seychelles White-eye (*Zosterops modestus*) population of Fregate Island, Seychelles: Territories and aspects of population dynamics, biology and ecology.* M.Sc. thesis, Saint Denis, University of Reunion.

Holzapfel, C., Levin, N., Hatzofe, O. & Kark, S. 2006. Colonisation of the Middle East by the invasive Common Myna *Acridotheres tristis* L.*,* with special reference to Israel. *Sandgrouse* **28**(1): 44-51

Lowe, S., Browne, M., Boudjelas, S. & De Poorter, M. 2000. *100 of the World's worst Invasive Alien Species A selection from the Global Invasive Species Database*. The Invasive Species Specialist Group (ISSG) a specialist group of the Species Survival Commission (SSC) of the World Conservation Union (IUCN).

Millett, J., Climo, G. & Shah, N.J. 2005. Eradication of Common Mynah *Arcidotheres tristis* population in the granitic Seychelles: Successes, failures and lessons learned. *Adv.verteb. pest manage* **3**: 169-183

Peacock, D.S., Van Rensburg, D.J. & Robertson, M.P. 2007. The distribution and spread of the invasive alien common myna, *Arcidotheres tristis* L. (Aves:Sturnidae), in Southern Africa. *S. Afr. J. Sci* **103**: 465-473

Skerrett, A., Bullock, I. & Disley, T. 2001. *Birds of Seychelles*. London: Christopher Helm Ltd.

Skerrett, A. & Skerrett, J. (eds.). 1990. Spectrum Guide To Seychelles. Nairobi: Camerapix

Seychelles National Meteorological Services (undated). *30 year statistical averages.* Seychelles National Meteorological Services. Available from: http://www.pps.gov.sc/meteostatistics.htm

Tidemann, C.R. 2005. Indian mynas – Can the problems be controlled ? In: *Urban Animal Management Conference Proceedings.*

Tidemann, C.R. (undated) *Mitigation of the impact of mynas on biodiversity and public amenity*. Australian National University, School of Resources, Environment and Society.

United Nations.1992. *Convention on Biological Diversity*: 8 (h)

Veitch, C.R. & Clout, M.N. (eds.). 2002. *Turning the tide: the eradication of invasive species.* IUCN SSC Invasive Species Specialist Group. IUCN, Gland, Switzerland and Cambridge, U.K. viii + 414pp.