



Parque Nacional
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Reintroduction of the Floreana Mockingbird *Mimus trifasciatus*

Interim report from the
Charles Darwin Foundation
Durrell Wildlife Conservation Trust
Galápagos National Park

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Summary



A ringed mockingbird. Gardner Islet. © Luis Ortiz-Catedral CDF

This report covers the period September 2010-April 2011. The main emphasis during this time has been to develop key aspects identified in the Floreana Mockingbird Reintroduction Plan (2007). Significant progress has been achieved. The official permits and related paper work needed to allow regular access to the remnant populations of Floreana Mockingbirds has been completed and this has allowed a total of 16 field trips to Champion and Gardner Islets with the support of local and international volunteers as well as personnel from CDF and GNPS. During these field trips valuable information on the breeding biology and pathogen load of the species has been collected and an updated population estimate for Champion and Gardner has been calculated. To April 2011, 61 mockingbirds have been found on Champion Islet and between 331 and 341 on Gardner Islet. The highlights of the fieldwork during this semester have been presented to the general public via a presentation to the Floreana Island community, press releases, blog entries to the DWCT website and regular updates on a Facebook page for the project. For the second semester, intense fieldwork on Champion and Gardner Islets will continue and greater emphasis will be put into potential release sites on Floreana Island and the management actions needed to facilitate a translocation of the species in the near future. Some requirements for the better progression of the project have been identified and are briefly discussed at the end of this document. Finally, a brief financial statement is presented.

Introduction

In September 2010, preliminary research and monitoring started for the critically endangered Floreana mockingbird (*Mimus trifasciatus*) as part of the “Floreana Mockingbird Reintroduction Plan” (Charles Darwin Foundation and Galapagos National Park 2007). This plan identified key aspects necessary to proceed with a reintroduction of a group of mockingbirds to Floreana Island within “Project Floreana”, a holistic, bi-institutional initiative between the Charles Darwin Foundation (CDF) and Galapagos National Park Service (GNPS). Since the species is critically endangered and restricted to two islets off the coast of Floreana Island, extensive paper work and numerous meetings were necessary to discuss the emphasis of field research and logistical support available from the GNP.

Meetings with authorities and other actors of the project

Between September-November, meetings with scientific advisors to the project were held. Valuable input was obtained from Paquita Hoeck (University of Zurich), Gustavo Jimenez-Uzcategui (CDF) and Glyn Young (DWCT), all of whom have been involved with mockingbird work in recent years. Also, meetings with personnel from GNP took place, and feedback from Washington Tapia, Galo Quezada, Marilyn Cruz and Sixto Naranjo was obtained. During these meetings, the need for a thorough health assessment of mockingbirds and the importance of an adequate monitoring scheme, particularly on Gardner Islet were common topics. Thus, at the end of November a research proposal was presented to GNP.

Goals of research proposal

The proposal presented to GNP had the following goals:

1. Carry out a count of individuals twice per year on Champion and Gardner Islets according to the methodology developed by Paquita Hoeck and Herbert Biebach (Hoeck 2010).
2. Obtain information about the breeding biology of the species on Champion and Gardner Islets.
3. Gather information on the food items used by mockingbirds.
4. Identify potential sites for an experimental release of a flock of mockingbirds on Floreana Island.

These goals were identified as crucial to make a diagnosis on the feasibility of an experimental translocation of mockingbirds and to identify a potential timeframe for such management action. Although great advances on the genetics (Hoeck 2010) and behaviour (Curry 1987) of mockingbirds in the Galápagos Islands have been achieved, the basic breeding biology and aspects of the diet of the mockingbird are scantily documented.

Field trips

In order to fulfil the goals outlined above, a total of 16 field trips to Champion and Gardner Islets have taken place. The duration of these has varied from one to five days. Every field trip is coordinated with GNP and follows the fieldwork regulations of CDF.

Access to Gardner and Champion Islets

Prior to any field trip, strict quarantine measures have been followed to prevent the introduction of cats, rats insects or seeds that might change the current habitat structure on the remnant locations where the mockingbirds are found. Also, only the minimum equipment necessary (including camping gear) is brought to field locations. Access to the study sites is by boat only.

Champion Islet is relatively flat and easy to access. Field trips at this site have a duration of one day. Champion has a network of tracks used by GNP to control fire ants, which facilitates moving around the 9.5 hectares islet, c. 700 m off the coast of Floreana Island (**Fig. 1**).



Figure 1. Aerial view of Champion Islet. © Heidi Snell

Champion Islet is covered in *Opuntia* and *Jasminocereus* scrub growing among rocky outcrops (**Fig. 2**).



Figure 2. A rocky slope on Champion Islet with *Opuntia* and *Jasminocereus* cacti. © Luis Ortiz-Catedral.

Gardner Islet (**Fig. 3**) is a more rugged and distant islet, 8.6km off the coast of Floreana. Access to this site is via a steep cliff on the north side of the islet (**Fig. 4**). There is a flat area known as “The Plateau” (**Fig. 5**) with an approximate area of 13 hectares. The Plateau is the main area of study as the terrain is relatively level and easier to access than the slopes and the summit where mockingbirds have also been noticed. Visits to Gardner Islet have lasted from one to five days.



Figure 3. Gardner Islet. With an area of approximately 81 hectares, this site is roughly 8.5 times larger than Champion Islet.



Figure 4. Access to Gardner Islet. Assistant Francisco Moreno can be seen near the top right-hand side of the image. Photo by Luis Ortiz-Catedral.

Activities during field trips

On every field trip general notes about the status of the habitat were made. As can be seen in **Fig. 5**, the habitat changes drastically between the dry and rainy seasons. Since there is no meteorological station on either of the islets, field observations are used to document the progression from the dry to wet seasons.



Figure 5. The Plateau on Gardner Islet during the dry season (above) and rainy season (below). Photos by Luis Ortiz-Catedral

Champion and Gardner Islets have a number of ringed mockingbirds resulting from research done by Paquita Hoeck. On every visit to Champion and Gardner Islets, every individual sighted is identified and its position on the islets recorded in a hand-held GPS (around 620 entries). Also, whenever possible, observations on foraging behaviour or nest building are made. These observations are the basis for estimating home range size of breeding groups, a crucial piece of information to determine the approximate number of groups that can occupy a management area on Floreana Island. Due to the limited number of fixes for some individuals, thorough analysis of home range of breeding groups can not be completed at present. Over the next couple of months further fixes will be recorded in the field and an analysis completed.

Capture of Mockingbirds and number of banded individuals

Whenever an un-ringed mockingbird was noticed, efforts were made to capture it. The birds are captured using potter traps with lures. This has proven to be an efficient way of targeting individuals without unnecessary handling of ringed birds (**Fig. 6**). Once captured, birds are weighed and measured and every effort is made to minimize time of handling. All measurements and an overall examination of plumage can be completed within 10 minutes.



Figure 6. A mockingbird captured in a potter trap (above). Luis Ortiz-Catedral measuring a captured juvenile (below). Photos by Luis Ortiz-Catedral and Tony Nahrung.

To date, a total of 92 mockingbirds have been captured, weighed, measured and ringed with a metal ring and one to three plastic coloured rings. Such ringing effort has been useful to identify group membership of juveniles and previously un-ringed adults. The ringing has also been useful to carry out foraging observations and nest attendance during the breeding season.

Collection of samples and health examination of Mockingbirds

Starting in January 2011, feather and faecal samples have been collected on Champion and Gardner Islets in collaboration with Marylin Cruz (GNP) and Tony Nahrung, a volunteer vet who assisted in the field during three months. Fifty seven feather samples were collected after weighing and measuring of un-ringed mockingbirds on both islets and are currently being used for molecular determination of sex by Marylin Cruz. Mockingbirds appear monomorphic and monochromatic to the human eye and thus distinguishing sexes in the field can be difficult outside the breeding season (when parental roles can be easily identified). The sexing results will be useful to determine if a set of measurements or colour markings can be used to assign sex to individuals. This in turn will be a useful reference for a future experimental translocation as the sex composition of the flock could be known. The sexing results are expected in August 2011. After feather collection, an overall examination of every captured bird was conducted to look for signs of avian pox lesions. None has been detected so far.

Approximately 100 faecal samples have been collected on Champion and Gardner Islets, from ringed individuals to prevent re-sampling. These samples are currently being examined by a local volunteer Denisse Cabrera in conjunction with 326 samples collected as part of the Floreana Biodiversity Assessment Project (see below). The analysis of these samples is important to identify food items consumed by the mockingbird. In addition to faecal samples, approximately 250 feeding bouts (**Fig. 7**) have been recorded providing a first overview of the diversity of food items consumed by mockingbirds. Such information will be later used as a proxy to assess food availability on the study sites. Completion of the analyses of samples is expected by September 2011.

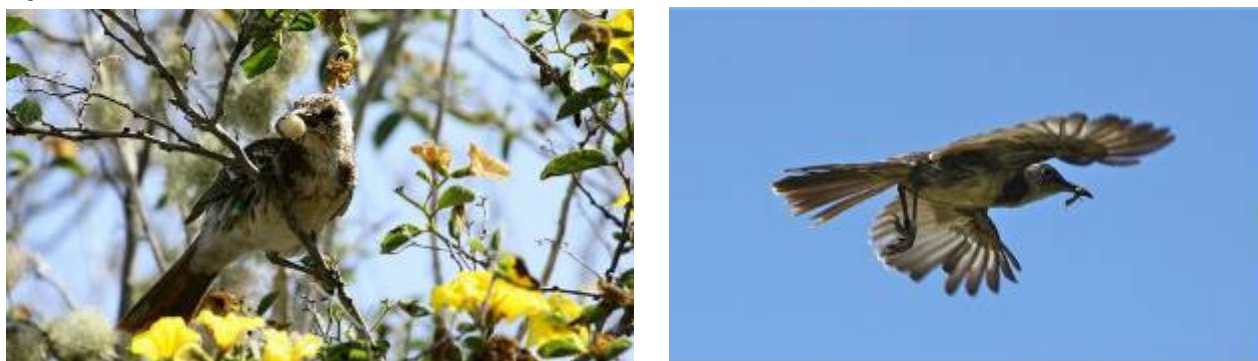


Figure 7. Examples of feeding bouts. A ringed mockingbird collecting a fruit of muyuyo (*Cordia* sp) (above) and another carrying a grasshopper to its nest, Gardner Islet (below). © Luis Ortiz-Catedral.

In addition, a photographic catalogue of mockingbirds is being developed. Between September 2010-April 2011 approximately 2,000 photographs of the birds have been taken, with the purpose of facilitating identification. It is likely that the spotting pattern in the chest of mockingbirds can be used to distinguish individuals, which can be helpful when dealing with un-ringed individuals. The “Friends of Galapagos, New Zealand” (www.galapagos.org.nz) have kindly provided a camera lens to improve the quality of the photographs taken.

Breeding biology

Nesting activities were first noticed in late February and intensive nest searches were conducted

during the month of March on both Islets. On Champion Islet, nesting appears to have started earlier than on Gardner as fledglings were found already out of the nest on Champion while the egg-laying was proceeding on Gardner. A total of eight fledglings belonging to five breeding groups were found, captured and ringed on Champion Islet between March and April. In addition three nests at the egg laying and incubation stage were found. These three nests failed within two weeks of being found, possibly due to predation by smooth-billed anis (*Crotophaga ani*). Nest-building continues at this site and it is expected that more nests will be found between May-June. On Gardner Islet, a total of 33 nests were found between March-April. Nests were found at various stages of the nesting cycle, from nest building and egg-laying to chick rearing (**Fig. 8**). The most common clutch size was three eggs ($n = 11$) although some nests had a clutch of four ($n = 3$). Ten nests were built and regularly visited by mockingbirds but no eggs laid.

Also, in two instances nests built by mockingbirds was taken over by Galápagos doves (*Zenaida galapagoensis*). Lastly, incomplete clutches were also found, five clutches of two eggs and four with a single egg.



Figure 8. A mockingbird nest (above) and an un-ringed mockingbird attending a brood of two (below); Gardner Islet. Photo by Luis Ortiz-Catedral.

Of the nests with complete clutches ($n = 14$), two produced two fledglings and one produced one, resulting in an apparent nest success of 21%. Of unsuccessful nests ($n = 11$) six (54.5%) failed during egg incubation and five (45.5%) during chick-rearing. In all cases of unsuccessful nesting attempts, predation is suspected as the main cause. Although no direct observations of predation events were recorded, there are a number of potential predators on Gardner such as anis, short-eared owl (*Asio flammeus*) and Floreana snakes (*Alsophis* spp.). Mockingbirds have been seen a number of times displaying intense agonistic behaviour toward these species, in one instance close to an active mockingbird nest.

Numerous fledglings have been noticed within The Plateau and in other areas of Gardner, indicating successful nesting attempts at this site. On the last field trip, nest-building activities were still noticed and more nests are expected for the period May-June. Efforts will be made to install monitoring cameras in a sample of nests to determine the cause of failure.

In accessible nests, the nest material and nestlings have been inspected for *Philornis*. To date, no evidence of *Philornis* larvae has been recorded either on Champion or Gardner Islets.

Population Estimates for Champion and Gardner

To date, two bird-count sessions have taken place on Champion and Gardner Islets. The first count took place towards the end of November. On Champion Islet, we identified 48 ringed mockingbirds and captured and ringed three un-ringed birds but failed to capture one un-ringed individual. Thus, at the end of November there was a total of 54 mockingbirds (53 ringed plus one un-ringed).

On Gardner Islet, there were 81 ringed mockingbirds by the end of June 2010 (Paquita Hoeck's data). Additionally, 48 individuals were captured and ringed towards the end of November giving a total of ringed birds on Gardner of 112. On two consecutive mornings we conducted counts of ringed vs un-ringed individuals and re-sighted between 42 ringed/8 un-ringed and 48 ringed/8 un-ringed mockingbirds. Assuming a 100% survival of mockingbirds, these numbers would give an approximate of 130-133 resident individuals in The Plateau and an approximate 392-400 on Gardner.

Towards the end of March and after ringing some fledglings from the current breeding season, a second count of mockingbirds was carried out on Champion and Gardner. On Champion, a total of 60 ringed individuals were identified plus one individual with a missing colour ring. In subsequent trips, this latter individual will be targeted for capture to determine its ring number and replace its colour rings. Thus, a minimum of 61 mockingbirds, including 8 fledglings from this year's breeding season, are present on Champion Islet. The estimate of population size for Gardner Islet is less accurate. On this island, By June 2010 a total of 178 mockingbirds had been ringed with a maximum of 81 (45%) re-sighted in the same month (Paquita Hoeck's data). Additionally, 73 mockingbirds have been captured and ringed between November 2010 and February 2011 giving a total of 251 ringed individuals. Of this total, a maximum of 86 individuals have been confirmed alive by March 2011 (35% of the total ringed). The counts of ringed vs un-ringed mockingbirds varied from 50 ringed/15 un-ringed to 56 ringed/19 un-ringed during two consecutive days of counts in March 2011. Thus, if we assume 35% as the true survival of ringed mockingbirds, the population estimate for the plateau area of Gardner would be 70-72 individuals and an approximate 210-216 for the whole islet (assuming The Plateau represents roughly 1/3 of suitable mockingbird habitat and the same density occurs in the other 2/3). However, it is unlikely that the survival rate on Gardner is as low as 35%. Numerous ringed mockingbirds have lost their colour rings or the colour of these has faded, making it difficult to identify the birds.

On Champion Islet, survival between June 2010 and March 2011 has been close to 100%, thus it

would not be unreasonable to assume a similar rate for Gardner. At this stage, a moderate estimate of survival of 65% on Gardner would give a total of 331-341 mockingbirds on Gardner Islet. Over the coming months, an intense trapping of mockingbirds on Gardner Islet will take place to re-apply missing colour rings to individuals and to ring juveniles for a better estimation of survival and actual population size on the islet.

Assistance in the field participation

Valuable assistance during field trips has been obtained from colleagues, local and international volunteers as well as members of the GNP (**Fig. 9**). In November 2010 we had the support of Glyn Young (DWCT) who helped with observations and registering re-sightings of mockingbirds during two visits on Champion Islet in addition of valuable input into the project during meetings with staff from CDF and GNP.

Volunteers to the project include:

1. Ruben Heleno-Portugal (International Postdoc fellow at CDF): assisted with bird counts and recordings on Champion in November 2010
2. Milton Hugh-Ecuador (Ranger GNP): assisted with counts of mockingbirds on Champion in November 2010.
3. Francisco Moreno-Ecuador (CDF-Galapagos-born CDF staff): assisted with bird captures and counts of mockingbirds on Gardner in November-December 2010
4. Tony Nahrung-Australia (International volunteer at CDF): helped during January-March 2011 with capture, health assessment and sample collection of mockingbirds on Champion and Gardner.
5. Denisse Barrera-Ecuador (Local volunteer at CDF): currently helps with processing of invertebrate samples as part of the analysis of diet for the mockingbirds.
6. Giovanni Chagno-Ecuador (Local volunteer GNP): helped with mockingbird counts on Gardner in March 2011.
7. Alex Baker, Katharine McGowan and Angela Smith-United Kingdom (International volunteers at CDF): helped with collection of scat samples on Champion in February 2011.
8. Mark E. Hauber-Hungary (Volunteer from Hunter College NY): helped with capture and ringing of mockingbirds on Champion and Gardner in March 2011.
9. Bruno Randolph-Austria (International volunteer): helped with nest observations on Gardner in April 2011.
10. Francesca Cunninghame-New Zealand (CDF/DWCT Staff): in early May Francesca will assist with fieldwork on Gardner Islet.
11. Tracey Dearlove-New Zealand (International volunteer at CDF): starting in May 2011, Tracey will assist with fieldwork and database updating for the project.



Figure 9a. Volunteer participation: Denisse Cabrera analyses invertebrate samples at the invertebrate lab, CDF. Photos by Luis Ortiz-Catedral.



Figure 9b. Volunteer participation: Tony Nahrung examines a mockingbird for pox lesions on Gardner Islet. Photos by Luis Ortiz-Catedral.

Other activities

In addition to work with mockingbirds, opportunities arose within CDF and GNP to participate and

other projects including:

1. Biodiversity assessment of Floreana

Starting on the 10th of January, a 17 day visit to 40 plots on Floreana Islands took place with the aim of developing an inventory of all plant, bird, lichens, mammals and reptiles. Also, descriptions of vegetation structure and soil samples were taken. All the information gathered forms the basis of a project aimed at evaluating the biodiversity of Floreana Island according to the type and age of lava flows across the island. This project also aims to produce a list of sites, which given their habitat characteristics and species composition might serve as release sites for the Floreana mockingbird. The data collected during this trip is currently being analysed as part of a GIS workshop at CDF.

2. Rat eradication monitoring on Rábida and Pinzon Islands

An eight-day visit to monitoring points on Rábida and Pinzon took place in early February. The aim of these visits was to evaluate changes in the abundance of birds (including Galápagos mockingbirds *M. parva*), lizards and snails following a poison drop to eradicate rats. During this trip, CDF staff provided support in the field to GNP personnel.

3. Visit to the south eastern coast of Isabela in search of mangrove finches (*Camarhynchus heliobates*)

A three day visit to a site near Bahía Cartago on the coast of Isabela took place at the end of April with the aim of confirming the presence of mangrove finches. The trip was coordinated by Francesca Cunninghame and provided a useful opportunity to learn field techniques used elsewhere in Galápagos with another critically endangered species.

Media releases

The highlights of the Floreana Mockingbird Reintroduction Project have been presented to a general audience in different ways including:

1. A presentation to the community of Puerto Velasco Ibarra (Floreana Island).

At the end of January 2011, a 40 min presentation to the community was prepared including photographs taken during the Floreana Biodiversity Assessment Project. The emphasis of the talk was the current state of Floreana Island and the potential ecological and conservation benefits of restoration projects including rat and cat eradications, removal of invasive plants etc. The second half of the talk was devoted to present the case of the Floreana Mockingbird, a once common species now restricted to two remnant sites and critically endangered.

2. Blog entries to DWCT website

Three blog entries to the blog section of DWCT website have been uploaded (<http://blog.durrell.org/index.cfm/Galapagos>). The emphasis on these blogs is to describe in general terms what the project is about and information about the progress and upcoming events. The text is accompanied by photographs taken in the field as part of the project.

3. Press releases

To date, two press releases from CDF have been made about the project and can be seen at:

<http://www.darwinfoundation.org/english/pages/noticias.php?txtCodiCate=1&txtCodiNoti=71>
about the start of the project in September 2010

and

<http://www.darwinfoundation.org/english/pages/noticias.php?txtCodiCate=1&txtCodiNoti=94> about the recent findings during the breeding season of the mockingbirds.

4. Webpages

The Floreana Mockingbird was featured on the birding blogsite “10,000 birds” and a series of photographs from Champion birds was included <http://10000birds.com/floreana-mockingbird-a-critically-endangered-bird.htm>

Lastly, a Facebook page for a pet bird of the project “Chirpy Cucuve” was uploaded. In this webpage, regular updates of the project and photographs of the study sites are included. The page can be found at: <http://www.facebook.com/people/Chirpy-Cucuve/100002220106280>

Potential sites for an experimental release of a flock of mockingbirds on Floreana Island.

The causes that led to the extinction of the Floreana mockingbird on Floreana Island are not clear, although it is likely that the introduction of rats and cats might have played a significant role (Curry 1986). Floreana mockingbirds spend a significant amount of time foraging on the ground and often nests are located close to the ground. Thus, it is reasonable to assume cats and rats might prey on chicks as these often leave the nest before able to fly properly and chirp repeatedly to attract their parents (pers. obs.). Even if cats and rats might not cause too much trouble in a large, established population they are likely to increase mortality rates in a translocated population, given the small size of the founder flock compared to a large population. Neither Champion nor Gardner Islets have rats or cats. For these reasons, it is considered that potential release sites should be free of cats and rats.

Two sites known locally as *La Lobería* and *La Lobería de la Olla* (**Fig. 10**) have been identified as potential sites for an experimental release of mockingbirds in coming months. These sites have in common an apparent high density of *Opuntia* cacti and the fact that these remain isolated from Floreana during high tide (hence effectively isolating the area at least temporarily).



Figure 10. The site known as *La Lobería de la Olla* during high tide, a temporary “island” is formed. This site has *Opuntia* cacti and an ongoing cat and rat poisoning plan.

Personnel of the GNP currently carry out regular poisoning of potential predators of mockingbirds such as cats and rats at *La Lobería de la Olla*. Such poisoning is aimed at improving the nesting success of resident seabirds. In the coming months, a visit to this site will take place during a poison operation to learn how the baits are placed and to measure the effects of poisons on non-target fauna. While the current poisoning might effectively remove cats and rats, it is not clear whether or not the method of application might affect mockingbirds if released in the area. The poison application and subsequent monitoring is entirely coordinated by the direction of the GNP. After a visit to the site to learn the application techniques, suggestions (if necessary) will be made about the design, regularity etc. to minimize the risk of mockingbirds taking the bait in case they are released at this site. The exact area of this site is not known, but will be determined on high tide during the next poison application round.

The site known as *La Lobería* currently has no poisoning programme in place, although rats and cats have been recorded in the area. Over the coming months, meetings with personnel from GNP will be organized to address this point and determine the feasibility of starting a poisoning programme.

Another site which has the potential for an experimental release of mockingbirds is the peninsula *Punta Cormoran*. This peninsula is close to Gardner and there are anecdotal reports of mockingbirds occasionally being seen there. *Punta Cormoran* is a heavily visited area in Floreana as a lagoon with Flamingos and a snorkelling spot close by. *Punta Cormoran* has no *Opuntia* cacti but appears to have a greater cover of shrubby vegetation. This site will also be discussed with personnel from GNP in coming months to explore the possibility of using it as a release site. *Punta Cormoran* currently has a small scale poison operation in place to target rats.

Work plan for next six months

1. Habitat characterization on Champion, Gardner and Floreana

In the following months and upon completion of the breeding season, the current habitat used by mockingbirds will be characterized and a parallel study will be carried out on Floreana at *La Lobería* and *La Lobería de la Olla* sites to determine if these potential release sites share habitat characteristics with Champion and Gardner.

2. Spatio-temporal variation of food items and their distribution on remnant populations of mockingbirds.

The availability of food types used by mockingbirds will be assessed by counting fruit density on focal plants on Champion, Gardner and sites on Floreana Island. Further, the bi-monthly availability of invertebrates will be assessed using pitfall traps for invertebrates on Champion, Gardner and sites on Floreana Island. This information is necessary to determine if likely release sites offer the same or similar diversity of food items subject to the same variability as on the remnant populations.

3. End of year bird count

Around September-October, a count of birds will take place on Champion and Gardner to update the population estimate currently available. It is expected that by then, a more accurate estimate of survival will be available as intense capture and ringing will take place between May-July.

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