CEPF SMALL GRANT FINAL PROJECT COMPLETION REPORT

I. BASIC DATA

Organization Legal Name: BirdLife International

Project Title (as stated in the grant agreement): *Coordinated Monitoring of the Endangered Spotted Ground Thrush in the East African Breeding and Non-breeding Grounds*

Implementation Partners for This Project: Wildlife Conservation Society of Tanzania, Nature Kenya, A Rocha Kenya, individual contributors of basic data

Project Dates (as stated in the grant agreement): March 1, 2007 - December 31, 2008

Date of Report (month/year): February 2009

II. OPENING REMARKS

Provide any opening remarks that may assist in the review of this report.

Spotted Ground Thrush *Zoothera guttata* is an endemic resident and intra-African migrant bird species. The species is classified as Endangered. Although the species can be found in seven African countries (DRC, Kenya, Malawi, Mozambique, South Africa, Sudan, Tanzania), *Z. g. fischeri*, one of the five recognised races of the species, is confined to and migrates within the coastal forests of Kenya and Tanzania. Recent records from Rondo Plateau in the coastal forests of Lindi District in Tanzania indicate that *Z. g. fischeri* breeds in southern Tanzania coastal forests. It is known as a non-breeding visitor to forests on the Kenya coast and north-eastern Tanzania from Lamu to Pugu Hills.

Since the bird is a cross-border species it is particularly difficult to conserve and requires concerted action. In response to this challenge, BirdLife International developed an International Action Plan for the species and further translated it into the national contexts for Kenya and Tanzania using participative stakeholder workshops. In all the three action plans, it is recognised that limited knowledge about the species distribution, movement and population size is a critical problem hindering its conservation, especially in East Africa. Monitoring the bird can be made difficult by the fact that its habitat spread across the two East African countries. Therefore, a successful monitoring programme would call for concerted efforts. This project therefore involved collecting baseline information for coordinated monitoring of the East African sub-population of this enigmatic bird.

In CEPF's Investment Priorities identified in the Eastern Arc and Coastal Forests of Kenya and Tanzania ecosystem profile, this project fell under the small grants programme under Strategic Direction 4 (Establish a small grants program in the hotspot that focuses on critically endangered species and small-scale efforts to increase connectivity of biologically important habitat patches). It fits within conservation intentions spelt out within Investment Priority 4.2 (Support efforts to increase biological knowledge of the sites and to conserve critically endangered species).

III. NARRATIVE QUESTIONS

1. What was the initial objective of this project?
   - To gather baseline data for Spotted Ground Thrush population, habitat and threats status in East Africa

- To implement a monitoring system for the East African sub-population of Spotted Ground Thrush to cover the breeding, passage and non-breeding grounds and seasons of the species
- To monitor the East African sub-population of Spotted Ground Thrush in order to gather information that increases useful knowledge about the species which then feeds back to the stakeholders for conservation actions
- To build and strengthen a partnership network for coordinated and sustained monitoring and conservation of Spotted Ground Thrush and its forest habitat
- To use the outcomes from Spotted Ground Thrush monitoring as a tool for increasing awareness for conservation of Globally threatened species especially birds in the East African coastal forests

2. Did the objectives of your project change during implementation? If so, please explain why and how.

Yes – The project duration as proposed in the original LOI (4 years) reduced to two years due to unforeseen delays before a final decision could be made on funding this proposal, thereby reducing opportunities for collecting detailed data that could be considered sufficient for monitoring. However, baseline data (2007) and second set of data (2008) were collected and systems put in place for continued basic monitoring.

3. How was your project successful in achieving the expected objectives?

The project was able to collect detailed and basic monitoring data for the Spotted Ground Thrush (hereafter **SGT**) in 2007 and 2008. Initially the monitoring tools for collecting basic and detailed data were developed (see Annex 1 and 2).

Collection of Detailed Monitoring data
Detailed data as described in Annex 2 was collected for Arabuko-Sokoke Forest (non-breeding site for the species, in Kenya) and Rondo Plateau Forest (breeding site in Tanzania).

Detailed data was collected through focused searches along transects and mist-netting within suitable habitats. Habitat data was also collected. In Kenya, a total of 32 transects were surveyed totalling c.35km in length. The transects varied in length between 0.5-2.2km depending on the area of single habitat type available to survey. In addition, a total of 16,709 metre-hours of mist-netting was carried out over sixteen mornings in seven locations (one, Gede Ruins, was repeated so as to maintain the monitoring effort for SGT that has been carried out there over the past five years). Almost similar effort was spent to search for SGT in Rondo Plateau Forest Reserve in Tanzania. Mist-netting was conducted at two sites of the Rondo natural forest: Nangulugulu and Liganga, from 12th -18th December 2007. The two sites represented the less disturbed coastal forests of Rondo Forest Reserve with a good canopy cover and leaf litter, an ideal habitat for endangered Spotted Ground Thrush. At each site 10 mist/nets each 10 x 3m were erected for three days consecutively. The mist nets were opened at 6.00hrs and closed at 18.00hrs and were checked hourly.

Collection of basic monitoring data
SGT basic monitoring data was collected through disseminating a simple data collection form (Annex 2) to individual contact persons working at different sites where the species has been recorded before, or would be expected to be found. The particular contact persons were chosen on the basis of being able to identify the species positively. Most of them were researchers, tour guides, post-graduate students undertaking research in the sites and conservation workers in the respective sites. By filling the form, one would evaluate the Spotted Ground Thrush population and habitat in given site following the STATE-PRESSURE-RESPONSE model. Twelve (12) forms covering 10 sites in Kenya and one form covering one site in Tanzania (Table

1) had been filled and returned by the time of compiling this report. Three (3) forms disseminated in Tanzania to officers in Pande, Dondwe and Pugu had not been returned. SGT awareness materials (brochures and posters) and an international conservation action plan for the species that had been developed by a separate BirdLife project were disseminated together with the basic monitoring forms.

Preliminary results

State
A total of 13 SGT observations were made through this project. Only four individual SGTs were recorded (two sightings) from the detailed surveys in the Arabuko-Sokoke Forest. One 1 play back response was recorded in Rondo Plateau Forest, but no sightings were recorded during the surveys. Four individuals (2 in Arabuko-Sokoke Forest, 2 in Rondo Plateau Forest) were capture by mist-nets. An additional four sightings (2 in Arabuko-Sokoke, 1 in Shimba Hills, 1 in Gede Ruins) of SGT had been made within 2007-2008 by observers who filled in the basic monitoring forms. Although final analysis to relate these observations to abundance of other bird species are yet to be completed, it is apparent from the amount of effort spent to search for the species that the species occurs in relatively very small numbers or is extremely secretive.

SGT is known to prefer undisturbed forest habitat characterized by deep shade and deep leaf litter. A quick assessment of SGT key sites indicated that some of the key sites (Arabuko-Sokoke, Rondo Plateau, Gede Ruins, Shimba Hills, Kaya Waa and Diani) were still composed of closed forest that offered deep shade. All the assessed sites had moderate to deep leaf litter. However disturbance and threat levels varied greatly across the sites, a factor that could have greatly contributed to few or no records for some sites.

Pressure (threats)
For respective site different threats on SGT's habitat were reported. The threat levels in repective sites were ranked as follows (starting with the highest): Diani, Shimoni, Kaya Gandini, Rondo Plateau, Kinango, Kwale, Kaya Waa, Arabuko-Sokoke, Gede Ruins, Mrima and Shimba Hills.
The following details regarding the recorded threats are worth noting:

- The following forms of disturbance were quite severe in the following sites: Kaya Waa (many human paths, grazing, access roads for collection of building materials); Diani (fencing off using concrete walls, dumping, noise from vehicles and entertainment facilities); Kwale (excessive firewood collection).
- The following key threats were observed in **Rondo Plateau Forest**, one of the sites that in known to be the breeding site for SGT: (1) the forest experiences incidences of fires in dry seasons of the year. Many woody plants especially in plots of Liganga and Mihima have thickened barks and scars from burning. There is evidence that these fires are started by locals when preparing farms when scaring animals during honey collection or hunting; Fire breaks have not been properly maintained by the forest staff. The breaks have been blocked by tall grass and falling trees making the efforts to control fires difficult; (2) Exotic plant species e.g. *Tectona grandis* and *Pinus caribaea, Lantana camara* could have altered the natural habitat of SGT (3) There was commercial harvesting of *T. grandis and P. Caribaea* very close to the natural habitat of the SGT; (4) Encroachment for land acquisition was observed as a result of increase in human population around the reserve; (5) Initially commercial logging of *Pterocarpous angolensis* (Mninga) and *Melicia excelsa* (Mvule) by the Steal Brothers company Limited and Tanzania Wood Industry (TWICO) had been ongoing in the forest.
- Kaya Waa is now a very small patch of forest (c. 4 ha) contrary to what is recorded in the Kenya Important Bird Areas Directory (20 ha)
- Quarrying of building materials (sand, blocks) is persistent in Kaya Waa.
- Cutting of poles for construction is a major threat to habitat in Kaya Gandini, Kaya Waa, Mrima

- Habitat in Diani Forest is particularly threatened by increasing development of tourism infrastructure
- Elephants could be causing disturbance to SGT and destroying habitat in Shimba Hills, Arabuko Sokoke and Rondo Plateau
- Shimoni forest is under severe threat since it has been subdivided among private developers. Some sections are being cleared for farming and construction of houses. Some are already fenced off using stone walls.
- In Arabuko Forest the elephant fence probably lead to greater intensity of elephant damage to habitat.
- In Gede Ruins, in the past archeologists have totally cleared the undergrowth. This may have had negative impact to SGT.

Response

- Actions related to biodiversity research and monitoring were the most frequent (in 10 of 11 assessed sites). A particular example is the Colobus Trust and Wakuluzu who undertake primate monitoring and research with their working providing useful recommendations for forest habitat conservation in south coast Kenya, especially Diani.
- Other conservation actions in place that could help in conserving the SGT included:
- Spreading of SGT awareness materials
- Planting of some indigenous trees by the Kenya Forest Service in a small section of Mrima Forest in an effort to restore an area that had been burnt
- Existence of local active conservation groups, e.g. MRIMADZO (concerned with conservation of Mrima, Marenje and Dzombo forests), Friends of Shimoni Forest, farming Committee in Kwale and Kinango, ASSETTS programme in Arabuko Sokoke
- Use of selected areas of some forests as shrines prevents them from being destroyed, e.g. Kaya Gandini, Kwale, Kinango
- Planting of woodlots by communities to ease pressure on forest habitat, e.g. around Mrima Forest.
- The presence of WWF implementing community livelihood projects in most of Kenya coast forests is likely to be making positive impact for SGT habitat.
- The National Environmental Management Authority (Kenya) made an intervention and questioned legality of actions that led to clearance of substantial forest in Diani for development.
- The council of elders in Kaya Gandini and Kwale assist in policing the forest but the management structure is currently facing problems in Kaya Gandini.
- In Shimoni Forest, Global Vision Institute (GVI) has initiated campaigns and formed a group named 'Friends of Shimoni Forest'. In collaboration with Kenya Wildlife Service and East African Wildlife Society, GVI Kenya is raising awareness on issues facing the forests.

Table 1: Summary of assessment made based of feedback received from returned basic monitoring forms.

	Arabuko Sokoke	**Gede Ruins**	**Shimba Hills**	**Kaya Waa**	**Mrima**	**Diani**	**Kaya Gandini**	**Shimoni**	**Kwale**	**Kinango**	**Rondo Plateau FR**
Date (month, year)	all 2007	all 2007	May; Oct 06	Sept 07 - Mar 08	Sept 07 - Mar 08	Sept 07 - Mar 08	Oct 07 Mar 08	Nov' 07	Jul' 08	Jul' 08	
SGT observed (Yes/No)	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	No	**Yes**
Observer	C.J; AB; Tour guides	C.J; AB; Tour guides	AMM; KN	BS	BS	BS	SM; JM	BS	JM	JM	WCST
Habitat - shade - (1- Low; 2- Med; 3-	3	3	3;2	3	2	3	2	2	2	2	3

	Arabuko Sokoke	Gede Ruins	Shimba Hills	Kaya Waa	Mrima	Diani	Kaya Gandini	Shimoni	Kwale	Kinango	Rondo Plateau FR
High)											
Habitat - litter (0-none; 1- low; 2 - med; 3 - high)	2	2	3	3	2	2	2	2	2	2	2
THREATS											
Disturbance (0-3)	2	2	1	3	2	3	3	3	3	3	1
Probable disturbance from elephants?	Yes	No	Yes	No	No	No	No	No	No	No	Yes
Abandonment/reduction of land management	B	B	N/A	A	B	A		A	C	C	U
Agricultural intensification/expansion	N/A	N/A	N/A	B	B	C	C	A	C	C	C
Burning of vegetation	N/A	N/A	C	C	C	B	C	A	U	U	B
Consequences of animal/plant introductions	B	U	N/A	U	U	U	U	U	C	C	A
Construction/impact of dyke/dam/barrage	N/A	N/A	N/A	N/A	U	U	N/A	B	N/A	N/A	N/A
Deforestation (commercial)	N/A	N/A	N/A	C	C	U	N/A	A	U	U	B
Disturbance to birds	L	L	B	A	B	A	A	A	A	A	A
Extraction industry	L	L	B	U	U	U	N/A	B	N/A	N/A	
Firewood collection	B	B	C	B	B	B	A	A	A	A	C
Forest grazing	N/A	N/A	N/A	B	C	U	C	C	C	C	N/A
Industrialization/urbanization/infrastructure/intensified forest management	B	B	C	N/A	N/A	A	N/A	A	N/A	N/A	A
Natural events	N/A	N/A	C	C	U	U	N/A	C			C
Recreation/tourism	U	L	B	C	N/A	A	N/A	B	U	U	N/A
Selective logging/cutting	B	B	N/A	B	C	B	A	A	A	A	B
Shifting agriculture	N/A	N/A	N/A	N/A	C	U	N/A	B	N/A	N/A	C
Unsustainable exploitation	U	U	N/A	B	B	A	A	A	A	A	N/A
RESPONSE/ACTION											
Development or implementation of a management plan for the site	Yes	No	Yes	No	Yes	No	No	No	Yes	Yes	Yes
Monitoring and Research	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Public awareness			Yes	Yes/ No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community Involvement	Yes	Yes		No	Yes	No	Yes	Yes	Yes	Yes	Yes
Active local conservation group	Yes	Yes		No	Yes	Yes		Yes	No	No	No
Number of projects operating in the site/locality	Yes	No	No	Yes	Yes	No	No	Yes	No	No	Yes

Observers: CJ – Colin Jackson; AB – Albert Baya; AMM - A.M. Mwayogwe; KN - K. Ngugi; BS – Bernard Soi; SM - S. Musila; JM - J. Mwachongo

Habitat (shade) ranking: 1 - Open with minimal (0-29%) shade; 2- Moderately open with moderate (30-59%) shade; 3 - Closed with deep (60-100%) shade.

Habitat (litter) ranking: 1 - Very light or no leaf litter; 2 - Moderate to light leaf litter depth (1-5 cm); 3 - Deep (>5 cm) leaf litter

Disturbance ranking: 0- Undisturbed; 1 - Slightly disturbed; 2 - Moderately disturbed; 3 - Very disturbed

Feeding back information to stakeholders
The first full feedback of information to stakeholders will be done only after final analysis of the data. Feedback will be done as part of compilation of a status and trends report (2009) for the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania that is being undertaken by BirdLife International.

Building and strengthening partnership network for coordinated and sustained monitoring and conservation of Spotted Ground Thrush and its forest habitat.
Data collection on the species and its habitat was largely done through the networks already established on the ground. The local NGOs involved in conservation work at the site level, the site managers, the Site Support Groups as well as various universities through their research activities were involved. It is envisaged that the same approach could be used in future. The next step is to invite all contributors to join an existing email discussion forum for SGT. In this way, they will continue to share information.

4. Did your team experience any disappointments or failures during implementation? If so, please explain and comment on how the team addressed these disappointments and/or failures.

In Tanzania, in the period of 2008, the team was disappointed by destruction of SGT habitat on part of the Rondo Forest Reserve as a result of commercial harvesting of exotic tree species such as Teak ***Tectona grandis*** within the SGT range. Use of powerful harvesting machines in the process of harvesting caused a lot of trampling, vegetation destruction, and noise pollution and disturbance to vegetation and other living organisms. There were signs of wild fires in areas within the SGT range especially in the forests of Liganga, and Mihima, though the Forest of Nangulugulu had no signs of human disturbance. The team consulted the Management of the Forest Reserve to encourage maintenance of firebreaks to control fires and removing fallen trees which block the firebreaks and make areas of the forest inaccessible.

The implementation of this project was largely a success in Kenya after data was acquired from all the targeted sites. While creating awareness about the species, it will be important to incorporate efforts to help stakeholders to identify and know more about the species.

5. Describe any positive or negative lessons learned from this project that would be useful to share with other organizations interested in implementing a similar project.

Positive lessons:

- In Rondo Plateau FR, Tanzania, we learned that, it is very important to involve the local elderly people who live near forests inhabited by the SGT, in some aspects of project implementation. It was proved during implementation of this project that these people have a lot of knowledge on behaviour, habitat selection, and feeding. Apart from benefiting from the indigenous knowledge, their involvement makes the processes of implementation and awareness creation easy.
- The implementation of the project has increased our knowledge on the SGT to a large extent.
- sustaining the monitoring is possible if the local stakeholders will be involved
- There is need for continued follow up on monitoring to keep abreast with new developments at the site level now that preliminary results show that the species may be existing at very low populations

Negative lessons learnt from the project:

- SGT habitats are under pressure from increasing human population and demand for resources from communities around the Rondo Plateau FR. These cause conflict of interest between SGT feeding and habitat requirements, and conservation initiatives on one hand and human demand for land, sources of firewood, construction materials on

the other. It is therefore important for any interested organization to consider such challenges.

- In some cases, Managers and other staff of the Forest Reserves do not have deep knowledge on resources available within areas of their jurisdiction and the subsequent ecological and economical values they posses. As a result, there is inadequate emphasis on management of crucial areas that would minimize habitat destruction.
- There is lack of adequate knowledge on the part of the employees of the Ministry of Natural Resources and Tourism of Tanzania, particularly on SGT and its habitat. With our constant presence, the situation has improved.

6. Describe any follow-up activities related to this project.

In Tanzania, the Wildlife Conservation Society of Tanzania (WCST) will have regular communication with the Lindi and Kisarawe District Forest Officers who manage of the Rondo Plateau, Dondwe and Pugu Forest Reserves, on status and threats on the reserves and current and potential challenges in their management efforts. Communication will also be enhanced with other conservation organizations such WWF and Frontier Tanzania on progress of conservation efforts in these Forest Reserves.

In Kenya it is envisaged that efforts will continue to so that data continues to trickle in for analysis and dissemination. However, this may require some form of basic support.

7. Please provide any additional information to assist CEPF in understanding any other aspects of your completed project.

The outcomes of this project will contribute to the reporting on the status and trends of biodiversity in the region – in particular to the indicator on change in abundance of key species. The data from this project will be compared with those from previous studies and peer reviewed papers submitted to the *JEANHS* and *Scopus* within 2009.

IV. ADDITIONAL FUNDING

Provide details of any additional donors who supported this project and any funding secured for the project as a result of the CEPF grant or success of the project.

Donor	Type of Funding*	Amount	Notes
Conservation Safaris	Project co-financing	$500	For Raising Awareness on SGT

Additional funding should be reported using the following categories:

A *Project co-financing (Other donors contribute to the direct costs of this CEPF project)*

B *Complementary funding (Other donors contribute to partner organizations that are working on a project linked with this CEPF project*

C *Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF project.)*

D *Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)*

V. ADDITIONAL COMMENTS AND RECOMMENDATIONS

Comments:

- We are grateful to the CEPF for financial and technical support.
- The project has been so useful in understanding the ecology and status of SGT.

Recommendations:

- A series of awareness meetings on the SGT involving different stakeholders (Village, village leaders, District Forest Officers) may be carried out in areas known to be inhabited by the SGT.
- Increase collaborative measures between WCST and organizations such as WWF and Frontier Tanzania in searching for more SGT areas and sharing information in Tanzania.
- Further intensive surveys of SGT in more sites in Tanzania

VI. INFORMATION SHARING

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned and results. One way we do this is by making programmatic project documents available on our Web site, www.cepf.net, and by marketing these in our newsletter and other communications.

These documents are accessed frequently by other CEPF grantees, potential partners, and the wider conservation community.

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Annex 1: Detailed Spotted Ground Thrush monitoring report for Kenya (including detailed monitoring protocol)

Co-ordinated Monitoring of the Endangered Spotted Ground Thrush *Zoothera guttata* in the Arabuko-Sokoke Forest

TECHNICAL REPORT

Colin Jackson
A ROCHA KENYA

Introduction

The Spotted Ground Thrush *Zoothera guttata* is an endemic resident and intra-African migrant bird species. It is classified as Endangered since it has a very small and severely fragmented area of occupancy and its habitat continues to be degraded and destroyed. Its population is inferred to be undergoing a continuous decline and has been classed as 'rare' in the IUCN/ICBP Red Data Book. It is also listed in Appendix II of the Convention for Migratory Species (CMS). Although the species can be found in seven African countries (DRC, Kenya, Malawi, Mozambique, South Africa, Sudan, Tanzania), *Z. g. fischeri*, one of the five recognised races of the species, is confined to and migrates within the coastal forests of Kenya and Tanzania. Recent records from Rondo Plateau in the coastal forests of Lindi District in Tanzania indicate that *Z. g. fischeri* breeds in southern Tanzania coastal forests. It is known as a non-breeding visitor to forests on the Kenya coast and north-eastern Tanzania from Lamu to Pugu Hills.

Since the bird is a cross-border species it is particularly difficult to conserve and requires concerted action. In response to this challenge, BirdLife International developed an International Action Plan for the species and further translated it into the national contexts for Kenya and Tanzania. In all the three action plans, it is recognised that *limited knowledge* about the species' distribution, movement and population size is a critical problem hindering its conservation, especially in East Africa.

Focussed research and monitoring of this bird: (1) provides information that increases the knowledge about the species, (2) helps in detecting and acting on threats to the species in good time, (3) generates data that will provide ammunition for advocacy and information for designing further interventions, and (4) helps in assessing the effectiveness and progress in conservation efforts in place and those proposed in the action plans.

This report presents the data collected from surveys carried out in Arabuko-Sokoke Forest between September 2007 and December 2008 following set protocols.

METHODOLOGY

The Spotted Ground Thrush (SGT) is a species that (now) occurs in very low densities in Arabuko-Sokoke Forest making it very difficult to monitor. The methodologies used consisted of:

1) careful observation along transects to estimate the relative abundance and distribution of the species together with plots to measure quality, cover and disturbance of habitat and

2) mist-netting to 'fill in' where observations missed out as well as to obtain data on age structure and relative abundance.

Observation surveys

32 transects were selected in a stratified random way within the Arabuko-Sokoke Forest (ASF) ranging from 1– 2km in length where possible but where small patches of habitat exist that might hold SGTs the transect was shorter. The main focus of the survey was on the Mixed Forest habitat in ASF as this is where from previous opportunistic observations, the SGT is known to mostly occur. Only a handful of records exist of it occurring in the other forest habitats. Transects were carried out along existing trails to minimise disturbance of birds during the survey and thus maximise being able to observe them.

Protocol for Arabuko-Sokoke Forest:
An initial protocol focussed on point counts and Distance Sampling, but after trialling this it was realised that given the very low density of the species, these methods would not be viable. The best method selected therefore was as follows:

- A single experienced observer (to minimise disturbance) walks along the transect starting at dawn when the bird is active.
- At start of transect, record time and GPS location.
- Walk along trail quietly and 'dead slow', looking and listening for signs of the birds (usually just the flicking of leaves as it is foraging – there are only two reported instances of SGT vocalising in Kenya).
- Initial methods included carrying out a point count at 200m intervals. This was later abandoned due to the very low density of SGTs making it pointless (excuse the pun).
- At the end of every 100m along transect estimate the distance that can be effectively 'searched' for visible sightings of the SGT either side of the transect. This will be averaged to give an idea of area covered by transect.
- After completing the transect, the transect was walked back along with the Tracking Function of the GPS activated so as to record the actual line walked for mapping purposes.
- On the return journey, all points where birds were seen as well as two point count locations (those at 300m and 800m for transects of 1km and over) had habitat variables measured (see below for details).

<u>For every siting of an SGT the following data were taken:</u>

- GPS location
- time
- the number of birds seen
- the perpendicular distance from the transect (using range finder)
- a note of the behaviour/activity observed (e.g. feeding, perched, preening etc.)
- mark the spot where the bird was seen with a permanent marker such as a plastic tag so that it can be easily re-found for habitat assessment.

While carrying out SGT survey, to add value to the survey but not detract too much from the focus on the thrush, other bird species are recorded on a simple 'Timed Species Count' methodology:

A total species list was recorded for the transect of all birds seen or heard within and outside of a 25m band each side of the transect, the list being compiled in 10 minute blocks. Given the nature of ASF as a coastal forest, bird activity is very intense for the first 30-50 minutes of

daylight and then falls very rapidly away to very little. For this reason the TSC was started at first light at the start of the SGT transect rather than waiting (as suggested by Bennun in Davies 2002) till the main activity has decreased.

For those transects where point counts were carried out for the SGT, a list of forest birds was maintained for each point also.

Habitat variables protocol
At each Habitat Plot, measure for a 11.3 m radius plot (giving an area equivalent to 20x20m quadrat):

Definition of plot:
A 22.6m long length of rope was used with a stake / peg tied half-way to measure out radius (11.3m) of the plot along the track of the transect and perpendicular to it. Obvious markers were placed at the limits for all four points " " to assist in assessing the limits of the plot.

The plot was thus divided into four sections: Left Behind (LB), Left Ahead (LA), Right Behind (RB) and Right Ahead (RA) – see figure 1. These form the basis for a number of measurements.

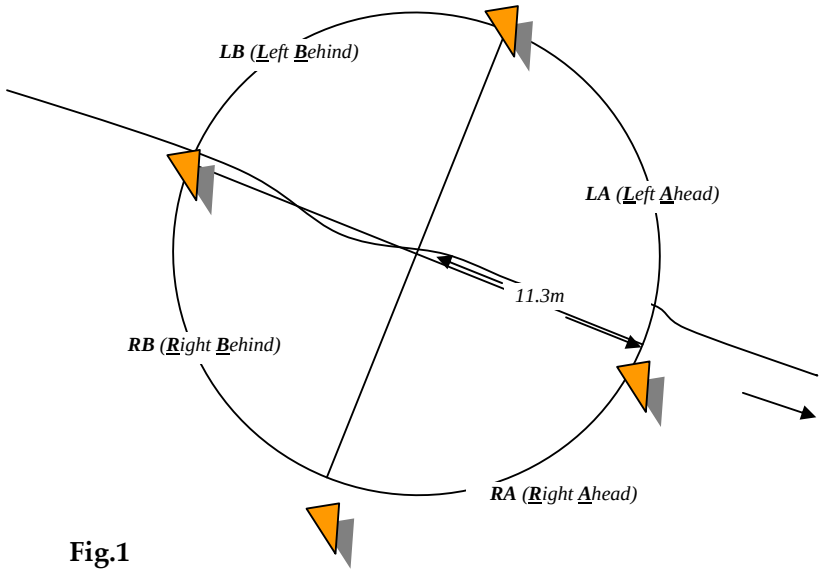

Fig.1

1. Habitat Quality and Cover:

Within the plot the following habitat variables are assessed:
1) For the **plot as a whole**:

a) slope estimated on a 0-3 scale (0 = flat, 1 = gently sloping, 2 = strong slope, 3 = steeply sloping);
b) canopy height to the nearest 1 m (ignore outlying individual emergent trees and give the general height);
c) presence or absence of footpaths within the plot;

2) For **each quarter section**:

d) percentage grass or herbal / low vegetation cover at ground level (0 – 1 m height)

e) shrubs (all plants 1 – 3 m in height)
f) low trees (woody plants 3 – 8 m in height)
g) high trees (woody plants >8 m in height)

[for these, the best method was found to be to take each 'layer' and imagine that all other layers and vegetation are removed, then estimate the percentage of ground that would be covered by the foliage left for that level as if looked from above. With practice this can become relatively easy]

h) Number of stems >20cm DBH
i) the occurrence of undergrowth tangle estimated on a 0-3 scale (0 = no tangling [no criss-crossing of stems, open habitat]; 1 = slight tangling [a few stems / creepers present & crossing over]; 2 = moderate tangling; 3 = densely tangled [a medium-sized bird such as SGT would probably find it hard to fly at speed through this]).

3) At **5m from centre of plot** along perpendicular axis on both sides of transect (Left and Right):

j) entire canopy cover (portion covered by canopy of all plants >2 m in height) – estimated using the 'toilet roll' method.
k) litter depth to the nearest 1 cm
l) relative vertical density of low vegetation estimated based on the number of 10 x 10 cm black and white squares on a 50 x 50 cm chequered board (held with base of board at 1.0m height above ground) which are covered at all for the observer, even by a single twig. Repeat this for 10m from the observer who stands at the central point and should look at the board from a height of 1.25m (use string or stick of this length to ensure this).

2. Forest type

Record the type of forest habitat the plot falls into (e.g. Cynometra, Brachystegia, Mixed Forest, other).

3. Disturbance

a) number of all cut stems by:
    a. Size: small (<15cm) and Large: (>15cm);
    b. Age: recent (cut wood still freshly white) / old (clearly not recent) / very old (rotten or nearly so)
b) elephant trampling score 0-3 (0 = no elephant impact; 3 = high and intense elephant activity evident)

Mist-netting Survey

The aim of the mist-net surveys was to survey those areas where: 1) there was thought to be a good chance of finding the SGT using mist-nets both those sites where the thrush was known to occur to try and ascertain numbers better or 2) sites where experienced observers felt the habitat was conducive to the SGT and there was a chance that mist-netting would record the species where observation had not.

Netting locations were located in areas of habitat which were deemed 'probably good for SGTs'. Nets were set in lines of 18-72m in length with a minimum of 150m and a maximum of 272m over an area c.2-400m across. Net positions were chosen that were considered optimal for catching SGTs.

For each netting site, the following data were recorded:

- Date & name of location
- Number of mist-netting hours (start & end times)
- length of net used
- GPS position for the centre of each net
- Major habitat type
- Weather conditions

For each bird captured, the following data were collected:

- Ring number
- If new or retrap
- Age & sex
- Wing length (maximum chord)
- Bill + skull
- Tarsus (except for species with short tarsi)
- Mass
- Moult & condition for all remiges
- Net number & time of capture (within 30 mins)
- Ringer's initials
- Breeding status where relevant

RESULTS

Observation surveys

A total of 32 transects were surveyed varying totalling c.35km in length. The transects varied in length between 0.5-2.2km depending on the area of single habitat type available to survey. These were carried out in the following proportion according to habitat type:

Habitat	No. of transects
Mixed Forest	23
Brachystegia	4
Cynometra	5

Spotted Ground Thrush records

Only **three** Spotted Ground Thrushes were observed *during* the surveys in just two observation events (the first involved two birds together). A further **two** were reported from outside of surveys in different sites:

- one was heard singing and traced down and observed along a transect on the return walk after finishing the actual survey; it thus does not qualify for inclusion in any calculations of density from the surveys.
- another was seen by a forest guide when with tourists in ** part of forest

Spotted Ground Thrush observations

Date	Location	Easting	Northing	Activity
09/11/2007	Gede Nature Trail	0609373	9635446	2 birds feeding on trail together
24/05/2008	Kararacha Camp Site	0599258	9621789	Single bird feeding
26/06/2008	Nyari Track before Brachy.	0603911	9632018	Single bird observed singing & preening for c.40 mins in one spot before observers had to move due to approaching elephants
(Data still with guide – to be added)	**	**	**	Single bird observed by guide & tourists

Ringing surveys

A total of 16,709 metre-hours of mist-netting was carried out over sixteen mornings in seven locations (one, Gede Ruins, was repeated so as to maintain the monitoring effort for SGT that has been carried out there over the past five years). 7,918 m.hrs were carried out in July during the middle of the non-breeding season and 8,791 m.hrs in October when birds are thought to be starting to migrate and there is a chance of catching passage birds from further north (assuming there are populations as yet undiscovered to the north).

A total of 286 new birds were ringed of 26 species; 52 were retrapped of 13 species (c.f. Ringing Totals – Fig 3). The most 'productive' site was the Kararacha Camp Site in the southern end of the forest with a catch rate of 0.015 birds per metre-hour of catching; the least productive is Gede Ruins with a maximum of 0.004 birds / m.hr in October (c.f. fig 1).

The most species rich site was the Mixed Forest at Arabuko-Swamp; the least rich was again Gede Ruins (c.f. fig 2)

All of the main forest sites were considerably more productive and species rich than Gede Ruins suggesting the Ruins forest is probably either a lot more degraded or the isolation factor of the site from other larger fragments of forest has reduced the species richness and density of birds.

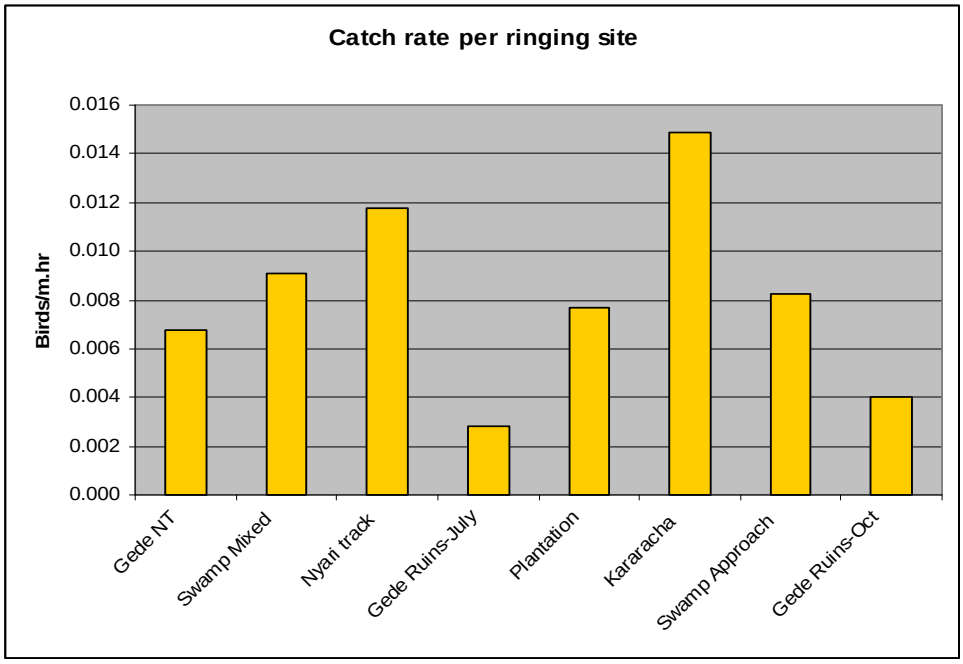

Fig. 1 Catch rate per site (total no. of birds / metre-hours)

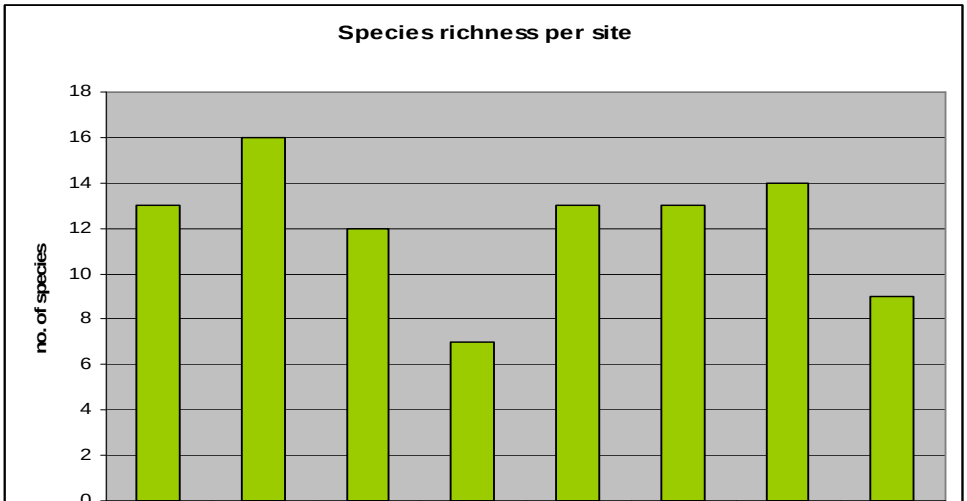

Fig. 2 Species richness per ringing site

Spotted Ground Thrush ringing records

Of the 286 birds caught only 2 were Spotted Ground Thrushes. The first was caught on 5th July at the Nyari Track cutline site and the second on 14th October at the Gede Plantation Edge site. The July bird was aged as a Full adult whilst the October bird as a Sub-adult (meaning still in its first year and retaining some juvenile characteristics). The data collected for each bird is given in Table 1.

Table 1. Ringing data and biometrics of Spotted Ground Thrushes, Arabuko-Sokoke Forest, 2008

Ring #	Age	Sex	Wing	Head	Tarsus	Mass	Tail	PP Moult	SS Moult	Tail Mlt	Body Mlt	Date
BB1894	F	-	120	47.9	34.2	57.0	-	Unworn (new)	Unworn (new)	Unworn (new)	0	05/07/2008
AB0108	S	-	113	47.2	32.6	61.1	80	Unworn (new)	Unworn (new)	Unworn (new)	0	14/10/2008

Given the number of net-hours carried out during this survey exercise, this represents a catch rate for the species of 0.00012 birds / m.hr, or put another way, it would require 116 x 18m nets to be open for 4 hours (the mean length of a single ringing session) in order to catch just one SGT.

No birds were caught or observed in Gede Ruins.

This represents a very low density for the species and is of particular concern given that Arabuko-Sokoke Forest and Gede Ruins are considered the Kenyan strong-hold sites for birds on their non-breeding grounds. From superficial assessment of habitat, there has not been any obvious change in habitat condition over the past 10-15 years and yet the number of birds being recorded has dropped very seriously (Ndang'ang'a et al 2008). The suggestion is that the population that spends the non-breeding season on the Kenya coast is likely to be suffering significant mortality either on its breeding grounds in southern Tanzania or at passage stop-over points along its migration route.

Fig. 3 Ringing Totals - A Rocha Kenya, Spotted Ground Thrush Surveys, Arabuko-Sokoke Forest 2008

Species		ASF Gede Nature Trail 1-2/7/08		Arabuko Swamp Mixed 3-4/7/08		SGT Cutline Nyari track 5, 8/7/08		Gede Ruins 9-10/7/08		Plantation Edge North 14-15/10/08		Kararacha Camp Site 16-17/10/08		Arabuko Approach 18, 20/10/08		Gede Ruins 28-29/10/08		Total	
		New	*Retraps*	*New*	*Retraps*	*New*	*Retraps*	*New*	*Retraps*	*New*	*Retraps*	*New*	*Retraps*	*New*	*Retraps*	*New*	*Retraps*	*New*	*Retraps*
African Goshawk	*Accipiter tachiro*			1												1		2	0
Tambourine Dove	*Turtur tympanistria*							1								2		3	0
African Wood Owl	*Strix woodfordii*			1				1										2	0
Narina Trogon	*Apaloderma narina*			1						1								2	0
Mangrove Kingfisher	*Halcyon senegaloides*															1		1	0
African Pygmy Kingfisher	*Ceyx pictus*	5		2		2		3		2	1							14	1
Sokoke Pipit	*Anthus sokokensis*	1																1	0
Fischer's Greenbul	*Phyllastrephus fischeri*	2		6		1	1			2	1	8	2	4	2			23	6
Northern Brownbul	*P. strepitans*																	0	0
Terrestrial Brownbul	*P. terrestris*	4	1	3	2	4						2		2				15	3
Tiny Greenbul	*P. debilis*		2	6	1	3						6		6	3			21	6
Yellow-bellied Greenbul	*Chlorocichla flaviventris*			3		1				1		2		2		1		10	0
Eastern Nicator	*Nicator gularis*		1					1	1	2		1		2		2		8	2
East Coast Akalat	*Sheppardia gunningi*	1	1	1	1	9				2	1	3		3				19	3
Red-capped Robin-Chat	*Cossypha natalensis*	4	2	5		14	2	7	4	8		25	2	6		5	8	74	18
Red-tailed Ant Thrush	*Neocossyphus rufus*		2			7				2		1		3				13	2
Eastern Bearded Scrub Robin	*Circotrichas quadrivirgata*	2		3		4			1	2		7		3		4	1	25	2
Spotted Ground Thrush	***Zoothera guttata***					**1**				**1**								**2**	**0**
Grey-backed Camaroptera	*Camaroptera brachyura*	1	1									1		1				3	1
Blue-mantled Crested Flycatcher	*Trochocercus cyanomelos*			2								2	1	1				5	1
African Paradise Flycatcher	*Terpsiphone viridis*	1		1				1										3	0
Forest Batis	*Batis mixta*	2	1			4				2		6	2	1				15	3
Tropical Boubou	*Laniarius aethiopicus*			3														3	0
Plain-backed Sunbird	*Anthreptes reichenowi*											1						1	0
Olive Sunbird	*Cyanomitra olivacea*	1	2	2		1				2	1			3		2	1	11	4
Peter's Twinspot	*Hypargos niveoguttatus*			1														1	0
Green-backed Twinspot	*Mandingoa nitidula*									1				3		1		5	0
No. of Species:		**11**	9	**16**	3	**12**	2	**6**	3	**13**	4	**13**	4	**14**	2	**9**	3	**26**	**13**
Total ringed:		**24**	13	**41**	4	**51**	3	**14**	6	**28**	4	**65**	7	**40**	5	**19**	10	**282**	**52**

References

Bennun, L.A, Dranzoa, C, and Pomeroy D, 1996, *The Forest Birds of Kenya and Uganda*, Journal of East African Natural History, Article: pp. 23–48

Ndang'ang'a, P.K, Mulwa, R and Jackson C, 2008, *Status of the endangered Spotted Ground Thrush Zoothera guttata fischeri in coastal Kenya forests*, Scopus 27:19-31

Annex 2: Form used by stakeholders for basic monitoring of Spotted Ground Thrush and its habitat

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Monitoring the Spotted Ground-thrush *Zoothera guttata*

Spotted Ground-thrush *Zoothera guttata* *Identification*: Medium-sized, terrestrial forest thrush. Brownish upperparts. Heavily spotted underparts. Black, vertical stripe down face. Two white wing-bars. Flesh-pink legs. At all times difficult to observe, being silent, shy and well-camouflaged, freezing motionless for minutes when disturbed. It feeds on invertebrates, seeds and fruit. *Habitat*: Occurs in deep shade in a variety of forest types with deep leaf-litter	

Date:

Name & contacts of assessor: ……...

Are you resident at the site/locality? (a) Yes (b) No .

If (b) — what was the date and duration of the visit(s) you are reporting on?

Locality/site name and coordinates (if known):

Status

I) Has the Spotted Ground-thrush been recorded in this locality within the past one year? – Fill in relevant option below:

How?	Yes/No	Give details, e.g. numbers, frequency (if possible)
sighted opportunistically		
sighted when bird watching		
sighted when doing research on other taxa		
captured in mistnet when doing research on birds		

sighted when doing research on birds		
Others – describe		

II) Has the species shown any signs of breeding in this locality for the past year? – Yes/No.

If yes, fill in relevant option below:

Breeding information	**Yes/No**	**Give details (optional)**
Young bird		
Nest		
Captured with brood patch		
Feeding young		
Carrying nesting material		
Other - describe		

Threats

III) Spotted Ground Thrush occurs in forest habitat characterized by deep shade and deep leaf litter. How would you generally describe the current status of forest habitat in this locality? - Tick relevant choice(s) below:

Closed with deep (60-100%) shade		Moderately open with moderate (30-59%) shade		Open with minimal (0-29%) shade	

Deep (>5 cm) leaf litter		Moderate to light leaf litter depth (1-5 cm)		Very light or no leaf litter	

IV) Spotted Ground Thrush is known to avoid disturbance prone areas. What is the current level of disturbance of this locality in terms of e.g. human activities (access, noise, tourism and other economic activities), introduced species etc?

Undisturbed		Slightly disturbed		Moderately disturbed		Very disturbed	

Describe the form of disturbance observed.

Does the locality have Elephants? - Yes/No

Is there any evidence of significant habitat disturbance or destruction due to elephant presence? – Yes/ No

Other threats

Please assess the intensity of other threats and give details or comments to explain your assessment. Give quantitative information as far as possible. The threats of chief concern are those that may affect the bird species in the site/locality and are listed. You may rank the intensity of threats as: A- High, B – Medium, C – Low, U-Unknown or N/A- Not Applicable..

Threat class	Intensity	Explanation/details
Abandonment/reduction of land management		
Agricultural intensification/expansion		
Burning of vegetation		
Consequences of animal/plant introductions		
Construction/impact of dyke/dam/barrage		
Deforestation (commercial)		
Disturbance to birds		
Extraction industry		
Firewood collection		
Forest grazing		
Industrialization/urbanization/infrastructure/intensified forest management		
Natural events		
Recreation/tourism		
Selective logging/cutting		
Shifting agriculture		
Unsustainable exploitation		
Other (please specify)		

Action

Currently, or in the past one year, what action are being taken in this locality to either conserve the forest habitat or the Spotted Ground-thrush itself? Fill in relevant options below:

Activity	Yes/No	Give details/Notes
Development or implementation of a management plan for the site		
Monitoring and Research		
Public awareness		
Community Involvement		
Active local conservation group		
Number of projects operating in the site/locality		
Other		

Notes

Please write any other relevant comments here.
