seed madagascar
sustainable environment, education & development

SEED's Conservation Research Programme

ANNUAL REPORT 2025

December 2025

Executive Summary

This report summarises the activities of SEED Madagascar's (SEED) Conservation Research Programme (SCRP) throughout 2025. Since its establishment in 2010, SCRP has worked closely with SEED's Environment and Rural Livelihoods Department, the local Sainte Luce community, international institutions, and local authorities to understand the importance and use of the littoral forest and surrounding habitats and contribute towards its long-term protection.

In collaboration with the University of Antananarivo, represented by the l'Ecole Supérieure of Agronomic Science (ESSA), SCRP aims to expand scientific knowledge, support conservation of native fauna and flora, and highlight the importance of biodiversity and conservation in Sainte Luce through dissemination of learnings locally, regionally, and internationally.

Throughout 2025, SCRP has achieved success across multiple areas of the conservation programme. At the project level, SCRP completed 12 years of long-term lemur population monitoring, and seven years of long-term amphibian and reptile monitoring across four forest fragments. SCRP also continued the monitoring phase of Project Palms, which involved the successful in-situ planting of 1,009 seedlings across six species of threatened palms in 2024. Project Ala has seen the continued use of camera traps, with photographs of Thomas' dwarf lemur (*Cheirogaleus thomasi*) captured, and invertebrate and herpetofauna surveys to monitor the changing animal community as the corridors slowly establish. Botanical surveys that began in 2024 have continued within the Ala corridors to monitor the changes in the plant community. Additionally, SCRP has produced an interactive map (Figure 16) to look at how different conservation and livelihood aspects interact and overlap within Sainte Luce.

Project Phelsuma began in 2024 with the aim of studying the critically endangered *Phelsuma antanosy* in its last significant remaining habitat in the Sainte Luce littoral forest and inform a trial translocation of the geckos in 2025. In March 2025, the trial translocation of *P. antanosy* was successfully carried out, during which eleven individuals were moved from the community-resource S7 forest fragmented to the protected S9 forest fragment. The objective was to assess the feasibility of future translocations by monitoring survival and behaviour post-release. This information will be added to SCRP's analysis of population density and used to update the IUCN Red List threat status for the species.

This year SCRP welcomed 11 volunteers to Sainte Luce, providing integral support to the research programme, and delivered eight environmental education sessions to schools in the St Luce community.

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Introduction

SCRP's work is focused in the extreme southeast of Madagascar within the littoral forests of Sainte Luce, Anosy region (Figure 13). Covering approximately 1,500-1,600 hectares, Sainte Luce's littoral forest fragments are amongst the largest and most intact examples of this threatened habitat type remaining in Madagascar. Sainte Luce's littoral forests are believed to be naturally fragmented, however a variety of pressures including reliance on natural resources by local communities and climate change are further reducing the size and quality of the 17 remaining littoral forest fragments. In addition, proposed mining operations in the region by QIT Madagascar Minerals (QMM), a subsidiary of Anglo-Australian multinational mining company Rio Tinto, proposes to exploit large areas of land, with many forest fragments standing within the mining footprint. To mitigate some of the impacts caused by the proposed mining operations, QMM has created Conservation Zones (CZ) within which mining will not take place and it is illegal to harvest natural resources. The majority area of three (S8, S9, and S17) of the forest fragments are CZs and are protected, whilst the S6 and S7 fragments have been designated as Community Resource Zones (CRZ) and can be used to access natural resources (Figure 1). SCRP works in all five of these fragments, with transects used for long-term monitoring established in S6, S7, S8, S9, and S17. SCRP continues to regularly visit S6 to conduct population assessments of the Madagascar flying fox (*Pteropus rufus*) colony. In addition, SCRP has begun running roost dispersal surveys on the colony to supplement current population estimates based on roost counts.

In 2025, SCRP continued work on two main projects: the Ala Programme and Project Phelsuma, and has continued with long-term monitoring research. As departmental capacity has increased, SCRP has continued research on smaller research areas, including Project Varika and Project Rufus. SCRP has also assisted the SEED Madagascar Environment Programmes team with their field work and analysis when required, with the introduction of soil testing for the Ala Planting Project and establishing a vermiculture experiment to assess the effectiveness of manure and vermicompost as soil treatments. As always, SRCP collaborates continuously with local experts and local/regional forest management organisations (e.g. C.O.B.A.[1], F.I.M.P.I.A[2], and Policin'Ala[3]).

[1] C.O.B.A. – Communautés de Base – Forest Management Association
[2] F.I.M.P.I.A. - Fikambanan'ny Mpiaro ny Ala - Forestry Police Committee
[3] Policin'Ala – Local Forest Police

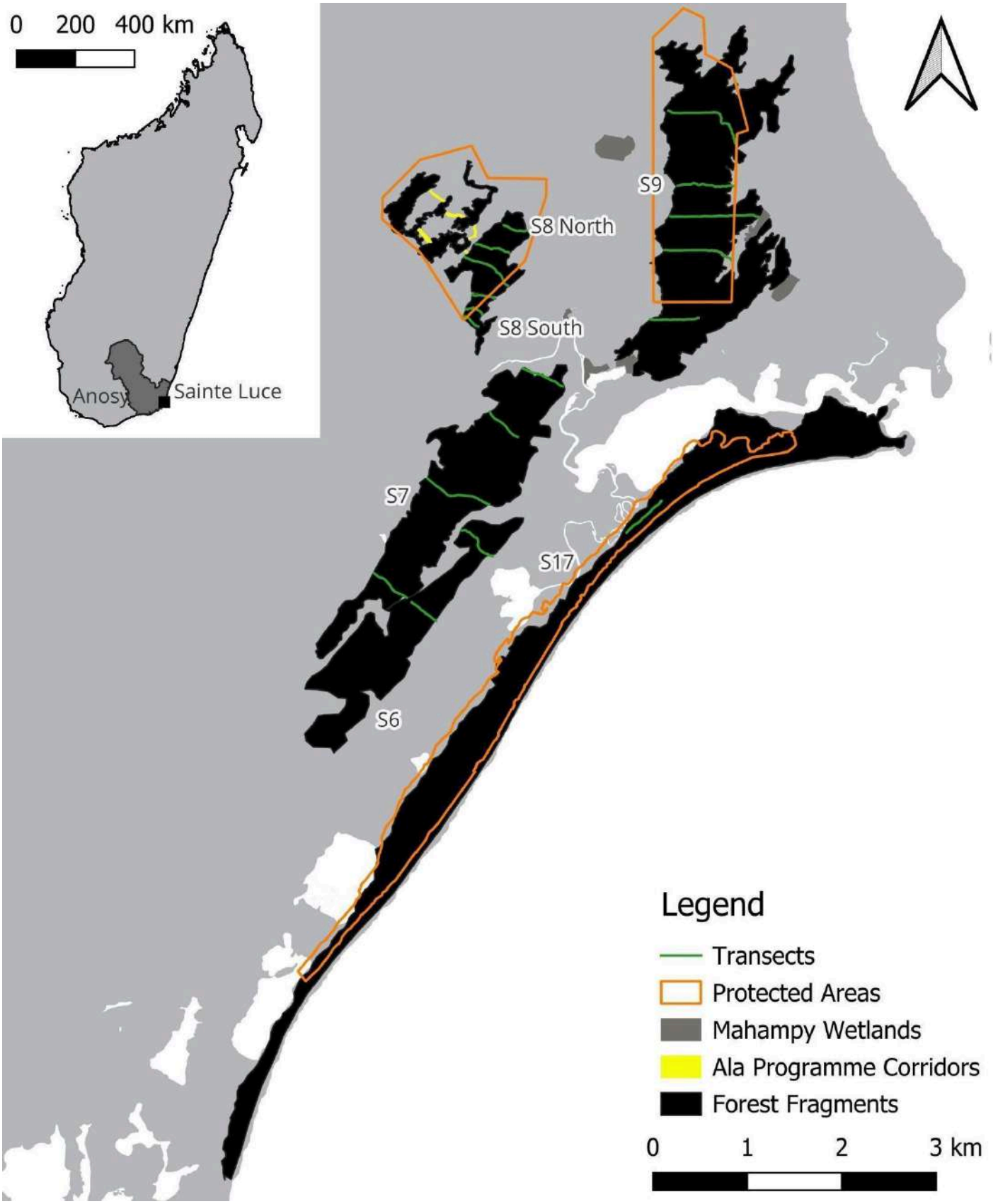

Figure 1: Map of Sainte Luce study site and the five largest and focal littoral forest fragments (S6, S7, S8 North, S8 South, S9 S17). The six Mahampy wetlands shown are the areas studied as part of Project Mahampy, and do not show the full extent of wetland habitats in Sainte Luce. The protected areas are QMM managed Category V Protected Areas.

Progress of Projects and Research

2.1 Long-term Monitoring of Nocturnal Lemur Species

In 2011 SCRP began visual encounter surveys (VES) along set transects (forest paths) recording sightings of three nocturnal lemur species in Sainte Luce: Anosy mouse lemur (*Microcebus tanosi*), Southern woolly lemur (*Avahi meridionalis*), and Thomas' dwarf lemur (*Cheirogaleus thomasi*). This study aims to compare population density and monitor changes in the population of each species in forest fragments over time. All three species are listed as Endangered by the IUCN Red List (Donati et al. 2020b, Donati et al. 2020c, Ganzhorn et al. 2020) and are only found in the southeast of Madagascar. Understanding the current population status and history of each of these keystone species[4] are important not only for the species' conservation, but because they are key indicators of the health of Sainte Luce's forests.

To date, monitoring has been conducted in six forest fragments: three in partially[5] protected zones (S8, S9 and S17), and two in community resource zones (S6 and S7). The protected zone of S8 is treated as two fragments (S8N and S8S) due a road which divides this fragment and impedes the natural movement of the lemurs. Two new transects were established in S6 in November 2024. Since its establishment, eight lemur surveys have been conducted in the new S6 transects. A distance sampling approach is employed to allow population estimates to be extrapolated. Additional habitat information is also recorded about the tree inhabited by the lemurs at time of observation, including species, trunk circumference, height, and canopy cover.

Between January and December 2025, 69 nocturnal observational surveys were completed in six forest fragments, with 126 individuals observed across 98 observations. The most frequently observed nocturnal species was *C. thomasi* with 58 observations. The second most frequently observed lemur was *A. meridionalis* with 43 observations, and the least observed was *M. tanosi* with 17 obs. All four lemur species were observed in both S9 and S8S, while only *M. tanosi* was observed in S6 (Figure 2). The greatest number of lemurs were observed in S9 (74 individuals) while the fewest were observed in S6 (6 individuals).

The end of 2025 marks the completion of 14 years of data collection for the long-term monitoring of nocturnal lemurs. The data have been analysed to investigate the changes in population densities for *C. thomasi, A. meridionalis,* and *M. tanosi*.

[4] Keystone species: a strongly interacting species that is disproportionately connected to more species in a food web (Mishra, Singh, and Shukla, 2019).

[5] The fragments are described as *partially* protected because the full mapped extent of the forest is not under the Category V recognized protection (see Figure 3).

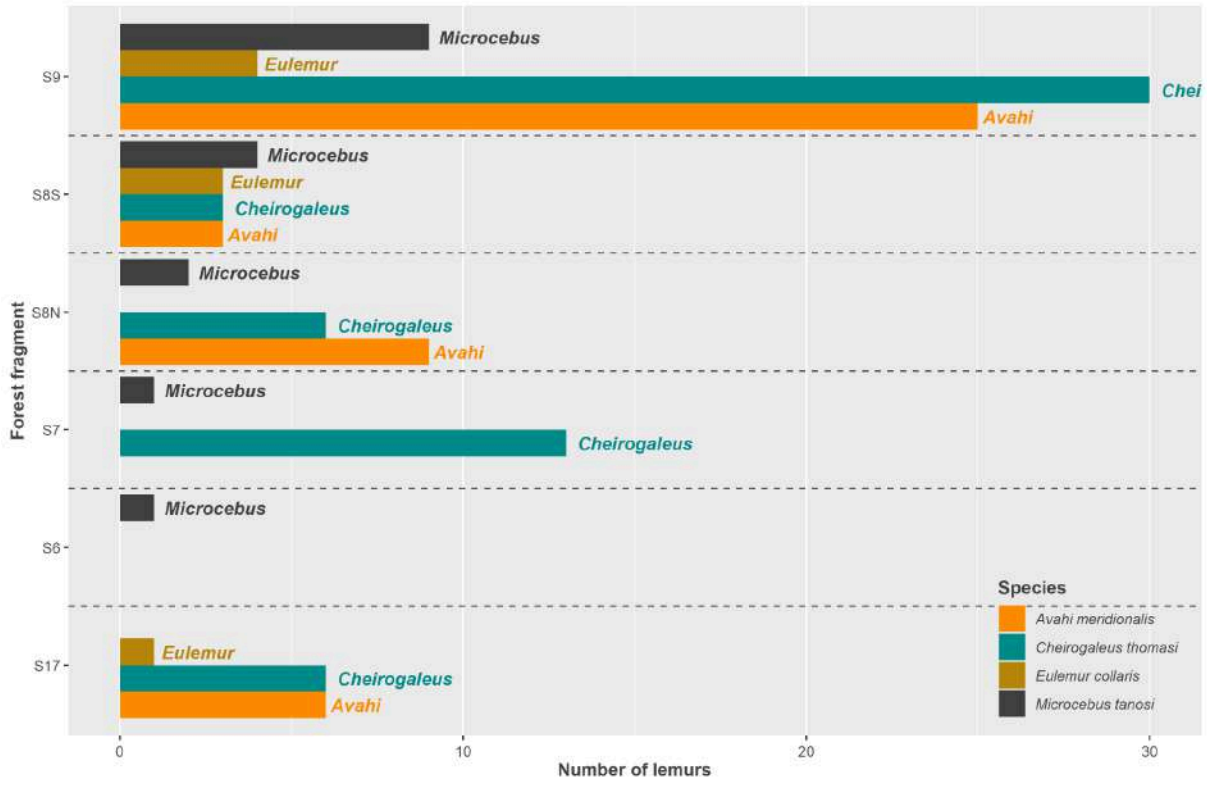

Figure 2: Number of lemurs from each species observed across forest fragments

2.2 Long-term Monitoring of Diurnal and Nocturnal Herpetofauna Species

Madagascar exhibits high levels of endemism and threats amongst herpetofauna (amphibians and reptiles) species, with the herpetological community of Sainte Luce being no exception. SCRP has conducted herpetological studies since 2010, including specimen collection, genetic barcoding, and population monitoring through distance sampling. Based on this research, SCRP confirmed that at least 22 distinct species of amphibian and 54 species of reptile are present in Sainte Luce (Hyde Roberts et al., 2025).

Since 2017, SCRP has conducted Visual Encounter Surveys (VES) of herpetofauna species using distance sampling methods with the objective of monitoring species abundance and distribution in the littoral forest fragments S7, S8N, S8S, S9, and S17 over time. Two transects in S6 were also established in November 2024. In total, 20 visual encounter surveys (10 diurnal and 10 nocturnal) have been conducted in S6 since its establishment.

Between January and December 2025, 146 herpetofauna surveys have been conducted across all six forest fragments; 75 nocturnal and 71 diurnal, during which 1313 observations of 37 species have been made. The most commonly observed species was *Guibemantis wattersoni* with 836 observations, followed by *Gephyromantis leucocephalus* with 390 observations, and *Palleon nasus* with 372 observations. The most commonly observed snake species was *Madagascarophis meridionalis* with 51 observations (Figure 3).

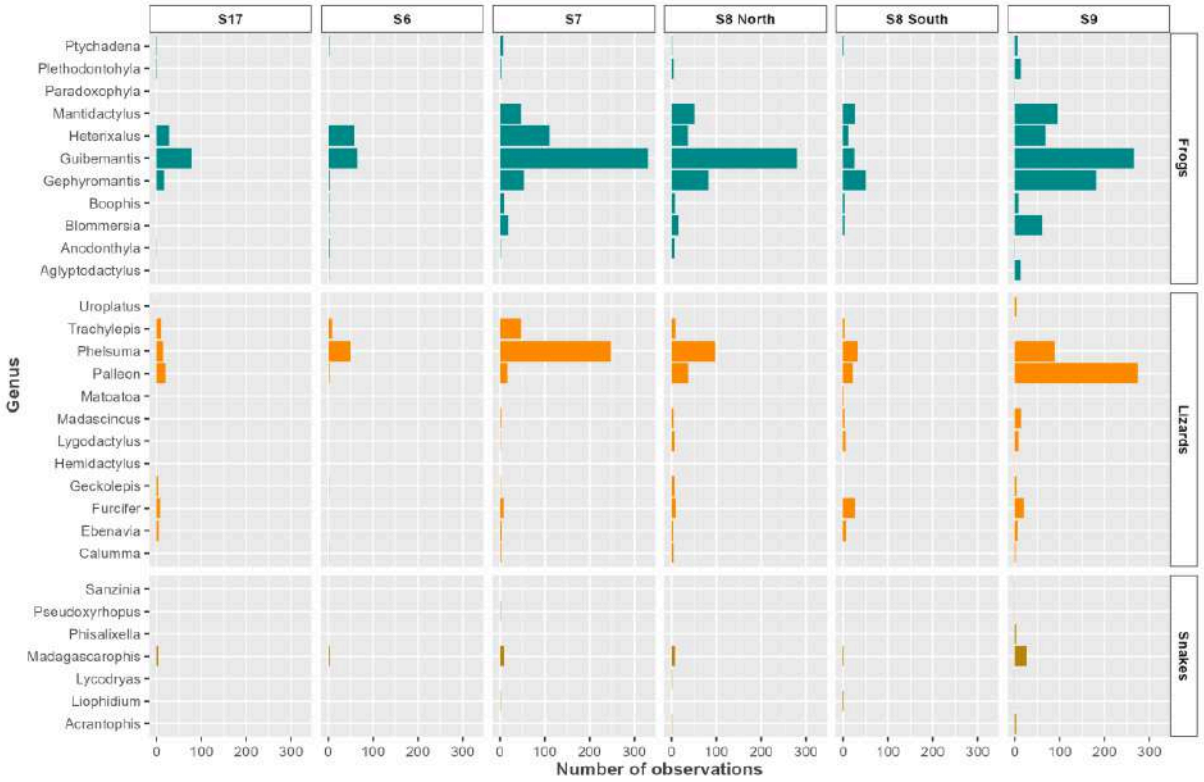

Figure 3: Number of herpetofauna observations in 2025 by genus in each of the forest fragments.

As SCRP progresses into 2025 having completed the ninth year of data collection for this research area, we aim to conduct a more comprehensive analysis of the collected data and identify patterns in abundance and distribution of particularly rare and threatened species such as *Matoatoa spannringi*. Findings will be shared with local stakeholders, as well as informing regional, national, and international audiences about Sainte Luce's unique herpetofauna assemblage.

Figure 4: Furcifer verrucosus walking across the road near the research camp.

2.3 Project Varika

The Red-collared brown lemur (Eulemur collaris, known locally as Varika) is the only cathemeral lemur in Sainte Luce and is recognised as Endangered (Donati et al. 2020). The species is threatened throughout its range due to several pressures, including hunting for bushmeat, mining, and habitat loss. Red-collared brown lemurs play a key role in seed dispersal, pollination and maintaining forest health, while concurrently promoting regional tourism which provides supplementary income streams for the local community. In 2018, SCRP determined that this species had naturally recolonised S8, a protected forest fragment where they were previously absent from (Hyde Roberts, 2020b). This event prompted the need to evaluate the local populations of this species.

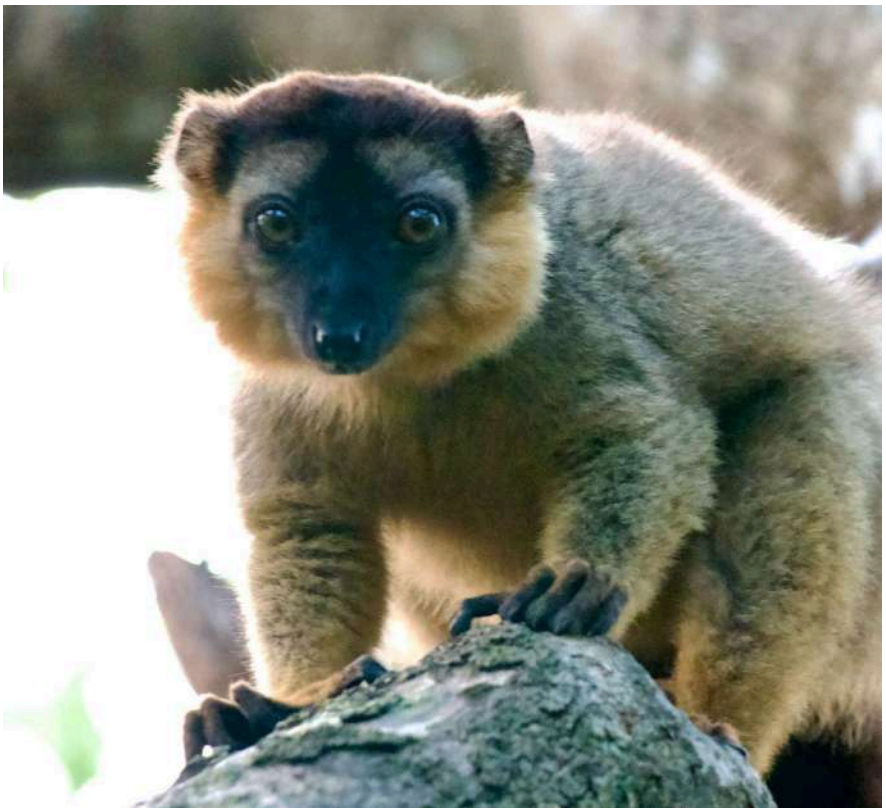

Figure 5: Male red-collared brown lemur (Eulemur collaris) seen in S9.

The original goal of Project Varika was to conduct an updated population assessment of *E. collaris* in the newly colonised S8 fragment to inform conservation efforts, such as corridor use. In combination with this aim, to better understand the remaining populations of *E. collaris* in S9 and S17, surveys were also conducted in these fragments. Daytime visual encounter surveys (VES) following established transects began in October 2021 and continued in 2025. Between January and December 2025, 46 surveys were conducted in S9 and S17. In total, 44 observations of *E. collaris* were made, and 186 individuals observed.

Due to the size of the S8 fragment and the small number of individuals within the colonising group, SCRP determined that transect-based VES was not appropriate for surveying this single group and instead opportunistic observations would be recorded. VES in S8 North and S8 South ended in June 2022. In 2025, Varika were opportunistically sighted twice in S8. On February 13th a group of unknown number was heard from S8R3, and on February 21 a group of six adults were seen in S8S from Transect 1. Before these observations, *E. collaris* in the S8 forest fragments were last seen in

May 2024 there were two opportunistic sightings of *E. collaris* in S8N. The first observation saw three individuals, two males and one female, in the southern part of S8N. The second observation was at the end of a nocturnal herpetofauna survey and saw the eyeshine of four individuals in a wetland on the western edge of S8N. These confirm the current presence of Varika across S8, both in the northern and southern sections, and their use of the Ala Programme's corridors.

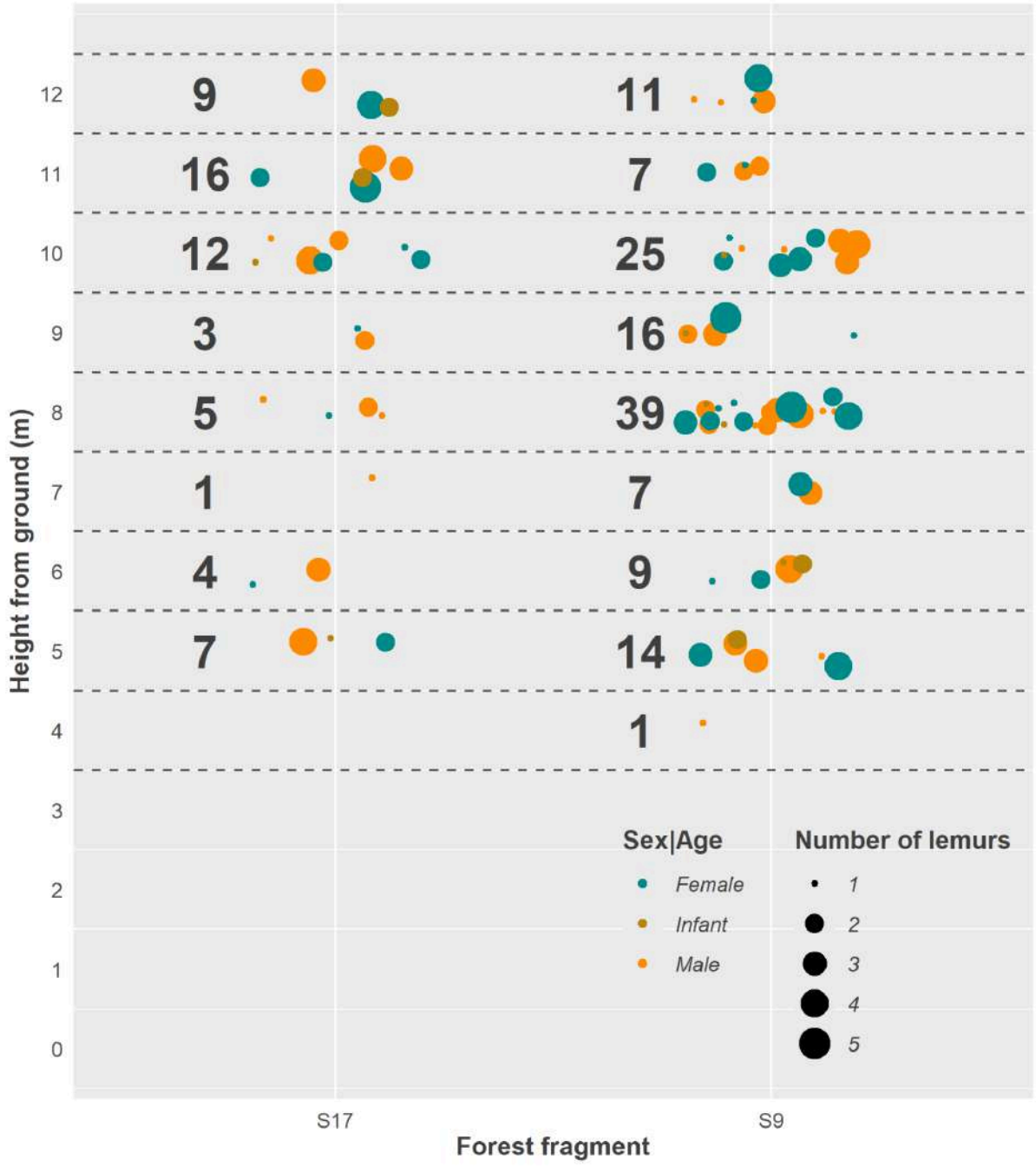

Figure 6: Lemur observations at different heights in S17 and S9, separated by sex and age. Each dot is an observation and the size of the dots represents the group size of the lemurs seen during the observation.

2.4 Project Ala

The Ala Programme aims to re-connect isolated populations of three nocturnal lemur species in small forest remnants with a larger protected forest fragment (S8) through the establishment of forest corridors. Due to their arboreal nature, Sainte Luce's nocturnal lemur species are very reluctant to cross open ground to disperse into novel habitat, meaning that populations currently exist in isolated forest remnants surrounding S8 (Figure 7). Uniting forest remnants with each other, and with S8, will enable isolated subpopulations to merge, and increase viable habitat as well as facilitate genetic exchange. The Ala Programme planted five corridors (referred to as C1 through C5) (Figure 7). Three corridors were planted in 2019, C1, C3 and C4, one in 2020, C2, and one in 2022, C5. The corridors were initially planted with *Acacia magnium* seedlings, with the aim that this introduced plant will help native seedlings establish through the provision of shelter and shade, and improved soil fertility. Phase II of project Ala was completed in June of 2024, and Phase III of the project commenced in August 2024. In August 2025, a technical research report was produced for the first year of Phase III.

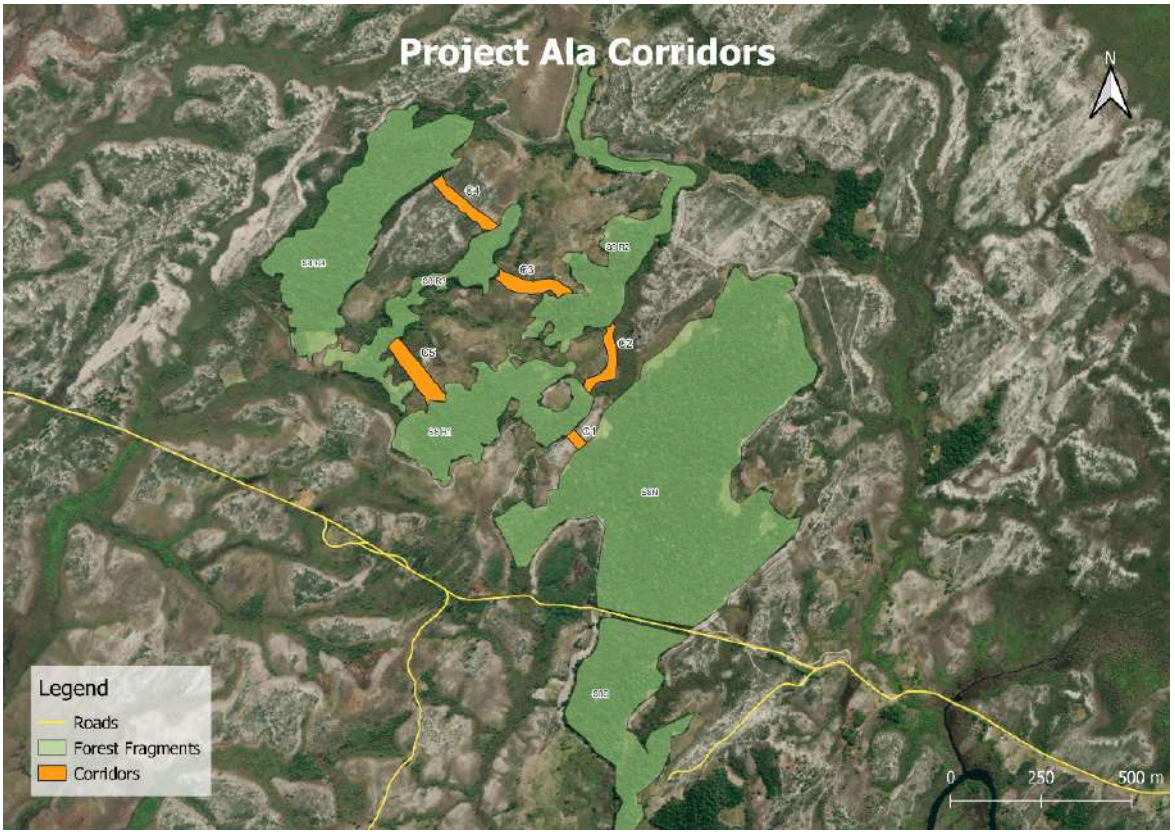

Figure 7: A map of the forest fragments of S8 and the corridors planted as part of the Ala Programme

During 2025, faunal biodiversity was assessed using camera traps and VES across C1, C2, C3 and C4, (C5 is still too new to commence meaningful faunal monitoring). SCRP has continued to play a key role in monitoring the survival and growth of all planted seedlings, with 12 assessments of the native seedlings within set quadrats in each of the programme's five corridors taking place in 2025. At the end of 2023 the *Acacia* trees were deemed established and SCRP halted the monitoring of the species. Monitoring of survival and growth of native seedlings has continued in 2025, and the data will continue to be collected by the SCRP team and used in the yearly analysis of survival and growth.

2.4.1 Camera Trap Surveys

From October 2023 there were three camera traps deployed in each of the four corridors. In July 2024 this was reduced to two cameras, one on each corridor edge. There were no sightings of lemurs during previous monitoring. Focusing the cameras on the edges means that any interest shown from lemurs at the edge of the forest, or any movement into the corridors, should be captured.

Cameras were deployed for a total of 122 days on the edges of corridors 1, 2, 3, and 4 between April and December 2025. The camera traps were not deployed during the first scheme of the year (January to March) due to fires in the corridors making it unsafe to place camera traps. Three images of a nocturnal Thomas' dwarf lemur (*Cheirogaleus thomasi*) were captured in C2 on the southern edge next to Remnant 1. The images were taken on the 8th of April 2025 at 02:37 am (Figure 8). Additionally, a *Microcebus antanosy* was captured on the same edge of C2 on May 12th, and Eulemur collaris have been captured in C1, C3, and C4. These findings support Project Ala's aim to reconnect the isolated forest fragments around S8 to increase connectivity for nocturnal lemur species through the establishment of forest corridors. As the corridors continue to develop, Project Ala expects to capture more images of nocturnal lemurs on the camera traps.

Figure 8: Thomas' dwarf lemur (Cheirogaleus thomasi) in C2 near R1.

2.4.2 Herpetofauna Monitoring

Monitoring of amphibian and reptile biodiversity with transect-based Visual Encounter Surveys within corridors continued in 2025, with 19 diurnal and 15 nocturnal surveys in four corridors. During 2025, 69 observations of eight herpetofauna species were made. The most commonly observed species in the corridors was *Heterixalus boettgeri* with 35 observations, followed by *Furcifer verrucosus* with 24 observations, and *Trachylepis elegans* with 24 sightings. C2 and C3 had the highest number of herpetofauna observations, with 18, while C4 had the fewest, with 9. Species richness was highest in C1, with 6 species observed, and lowest in C2 and C4 where only 3 species were observed. In 2025, three herpetofauna species were found in the corridors for the first time (*Ebevania sp. aff. inunguis, Hemidactylus mercatorius, and Aglyptodactylus inguinalis*).

2.4.3 Invertebrate Monitoring

Invertebrate biodiversity surveys have continued in 2025, with 96 surveys completed across four corridors this year. Since the beginning of the project in August 2019, 490 invertebrate biodiversity surveys have been conducted in total. Across all study locations (quadrats in C1 to C4, R1 to R4, and S8N), a total of 8,127 invertebrates of 20 known taxonomic orders have been observed. To date, the highest number of invertebrates has been observed in the quadrats in and adjacent to C1 (n=2,705), with the fewest observations made in the quadrats in and adjacent to C3 (n=1,732). One new quadrat in the external heather scrubland, parallel to each corridor was established in August 2024. The aim of the new quadrat is to gain an inventory of invertebrate species that would have been found in the footprint of the corridors before they were planted, since a baseline invertebrate study was not carried out.

Between January and December 2025, 931 invertebrates of 10 orders were observed within the corridors, 675 invertebrates of 14 orders were observed within the forest remnants, and 102 invertebrates of 7 orders were found in the external quadrats. Of these observations, 127 morpho-species were identified, with 14 new morphospecies added to the ID guide. Arachnida were the most species-rich order overall with 46 morphospecies, followed by Orthoptera with 38 morphospecies and Hymenoptera with 13 morphospecies. Arachnida were the most diverse order in the corridors, with 52 morphospecies observed, as well as in the forest remnants, with 61 species observed. The most diverse order in the external quadrats were the Orthoptera, with 19 morphospecies observed (Figure 9).

With invertebrate research continuing in 2026, SCRP hopes to begin seeing similarities between invertebrate community assemblages in the corridors and forest remnants as time progresses.

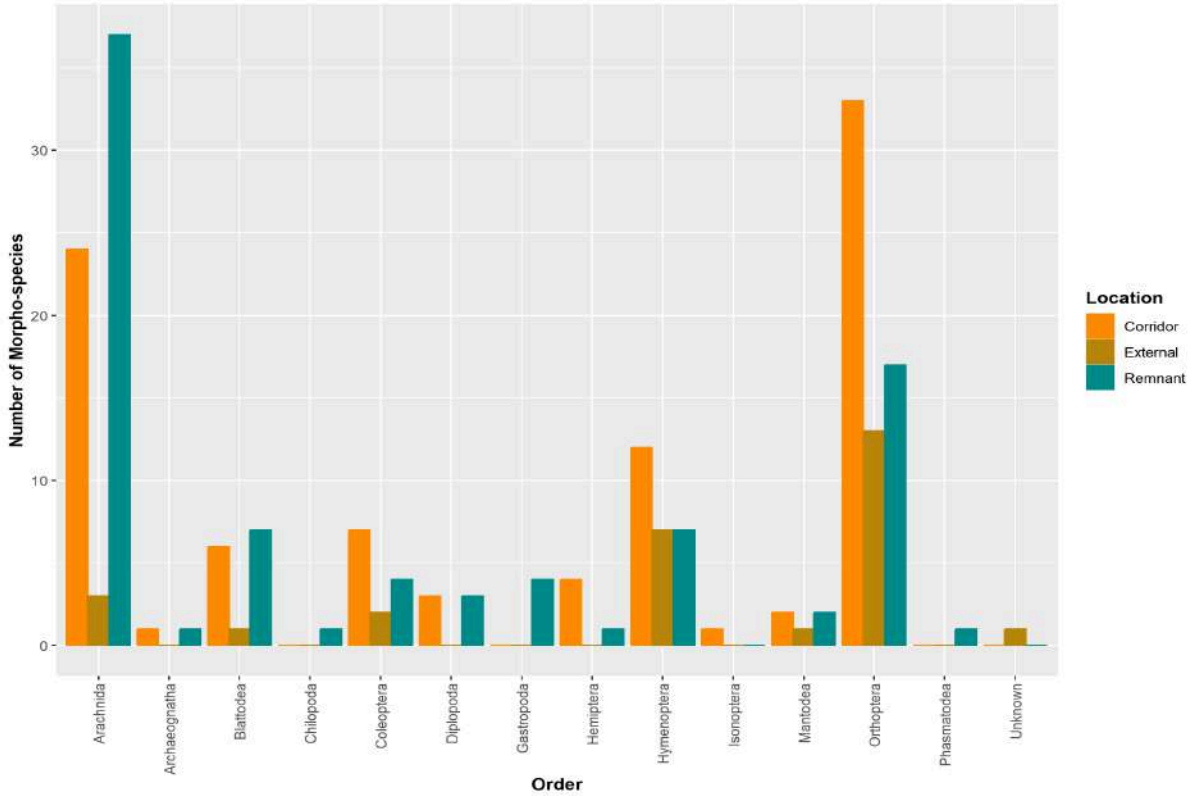

Figure 9: Number of invertebrate species observed per quadrat within C1 to C4, the surrounding forest fragments, and the external patches between January and December 2025.

2.4.4 Botanical Surveys

To understand the natural changes in vegetation within the corridors, a new botanical survey was implemented in October-November 2024 and continued quarterly throughout 2025. The survey monitors six 2 x 2 m quadrats spaced evenly throughout each of the five corridors. During each survey, all identifiable plant species within the quadrats were recorded, alongside their estimated cover percentage and height tier. Each quadrat was additionally assessed for biotic and abiotic ground cover.

Across the 2025 surveys, 53 unique plant species were recorded. Of these, 27 species could be confidently assigned a growth form, including 15 tree species, 5 grasses, 3 herbs, and one species each of shrub, vine, fern, and palm. The remaining 26 species could not be classified due to insufficient available information on their growth forms or the absence of identification criteria in the field.

2.4.5 Vermiculture Experiment

To evaluate the effectiveness of the vermicompost in the nursery, a randomized complete block design pot experiment was implemented in August 2025. Ninety seedlings from five species (Harandrato, Vopaky, Zora, Sagnira, and Kalavelo) were planted under three soil treatments: vermicompost-based soil, manure-based soil, and untreated soil for the control. Seedling growth was measured for height, leaf number, condition, and survival over a two-month period.

Due to high mortality among the seedlings, the trial was not able to confirm the efficacy of the vermicompost. However, the experiment provided insight into improvement for soil preparation and watering regimes for future trials in 2026.

2.4.6 Soil Testing

To better understand the environmental factors influencing seedling establishment and growth for the Ala Planting Project, set to commence in early 2026, soil physicochemical parameters were measured across corridor extensions 1, 3, and 5. Composite samples, 0-30 cm depth, were collected following a stratified sampling design, with multiple points per corridor to capture site variability. Each composite sample represented homogenized subsamples taken from 5 x 5 m plots, with GPS coordinates recorded for future monitoring.

Laboratory analyses were conducted to determine soil pH, organic carbon, total nitrogen, available phosphorus, and C:N (carbon to nitrogen) ratio. These indicators provide a baseline understanding of soil fertility and nutrient balance within each corridor extension. The results (Figure 10) show the values for key soil properties among the corridors, highlighting variation in nutrient status. This data will be used as a reference point for future comparisons and will assist in analysing seedling performance once planting begins in 2026.

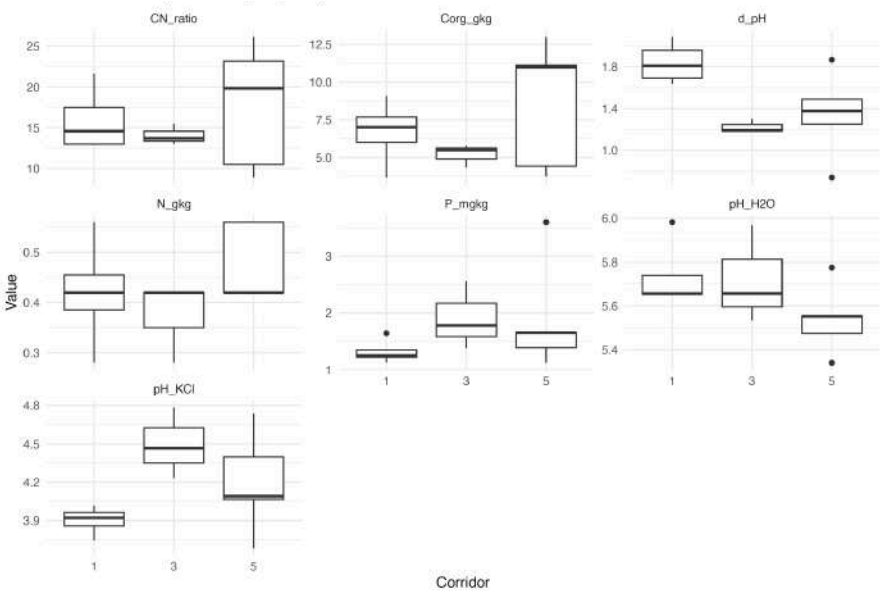

Figure 10: Comparative results of soil physicochemical properties measured in corridor extensions 1, 3, and 5.

2.5 Project Phelsuma

For more details on this project, please see this progress report.

Sainte Luce is the largest and one of the last remaining strongholds for *Phelsuma antanosy* (Figure 11), a species of gecko endemic to southeastern Madagascar, listed by the IUCN as critically endangered (Jenkins, 2011). The other remaining habitat is in the forests of Ambatotsirongorongo southwest of Sainte Luce. Within the forests of Sainte Luce, *P. antanosy* are found predominantly in S7 and less frequently in S9 and S8. Declines in the remaining populations of *P. antanosy* have in the past been attributed to deforestation and habitat fragmentation. The population in Sainte Luce is threatened by the proposed mining operations that would occur in S7 and elsewhere. If the clearing of the forest in S7 goes ahead, 80% of the world's population of *P. antanosy* would be extirpated (Pointer et al., 2024). *P. antanosy* are particularly host-plant-specific, mostly encountered on *Pandanus longistylus*, a species of screw pine found in the southeast of Madagascar (Lehtinen, 2002).

Figure 11: Adult male Phelsuma antanosy in S7.

Phase I of Project Phelsuma began in 2024 and ran through to April 2025. This project aimed to study the ecology of the species and use the results to inform the trial translocation of individuals from S7 to S9 in early 2025. Alongside research into the gecko's ecology, a pilot transplantation of *P. longistylus* took place in S9 to increase the availability of habitat for *P. antanosy*. The results from the data will be used to inform a reassessment of the species' IUCN Red List threat category. Principal funding for the project has been provided by National Geographic. Phase II began in May 2025 and will continue through March 2026, in which a five-year conservation plan and publications on *P. antanosy* behaviour, spatial distribution, and learnings on their translocation will be produced.

2.5.1 Long Term Population Monitoring

Since 2017, data have been collected on all reptile and amphibian species found in Sainte Luce as part of the SEED Herpetofauna Long-Term Monitoring programme. SCRP have collected non-invasive data (via distance sampling) along 18 established transects in six littoral fragments (S6, S7, S8N, S8S, S9, and S17) as part of the programme. As of December 2025, 785 transect surveys have been conducted, with a total of 414 observations of *P. antanosy* since 2017. These data provide population estimates for *P. antanosy* in each of the forest fragments.

2.5.2 Behavioural and Spatial Density surveys

Behavioural and spatial density surveys were conducted in both S7 and S9. For each encountered *P. antanosy*, the maturity class, sex, GPS location, height of gecko within the plant, and height and species of the plant itself were recorded. Behavioural observations monitored the geckos over a 20-minute interval. Spatial density information was obtained by measuring the distance between geckos sighted on the same day, and by tracking movements of individuals across multiple days, confirmed through photographic comparisons. Under Project Phelsuma, SCRP has been studying the

species since February 2024, during which 318 individuals across four *Phelsuma* species have been recorded, the majority belonging to *P. antanosy*.

Studies of *P. antanosy* will continue into 2026, and findings from Phase I and Phase II will be shared with local stakeholders, and communicated to regional, national, and international audiences about *P. antanosy*.

2.5.3 *Phelsuma antanosy* Translocation

The trial translocation of *Phelsuma antanosy* was successfully conducted on the 27th and 28th of March 2025. Eleven geckos were translocated from the community-resource designated S7 forest fragment to the protected S9 forest fragment. A CAFF CORE representative from the Ministry of Environment who approved the original permits came for two weeks to oversee the translocation methodology. A 20-minute behavioural survey was carried out on all eleven individuals immediately after release. Subsequent monitoring was conducted twice weekly during March, April, June, and the first weeks of August. From October to November, *P. antanosy* monitoring was undertaken once per week.

Monitoring consists of systematic searches for *P. antanosy* within the release site and its immediate surroundings. When a released individual is located, a 20-minute behavioural observation is performed. Some success was achieved in relocating translocated individuals shortly after release; however, since April, no *P. antanosy* have been recorded at the release site. In June, the monitoring approach was modified to include a broader area of the surrounding forest rather than focusing solely on the release site, in order to capture the wider habitat use of the geckos. Monitoring concluded in November 2025, as no *P. antanosy* have been observed since April 2025.

Looking to 2026, the SCRP team will prepare two scientific papers based on the findings of this trial translocation. The first will be a behavioural note focused on the post-release behaviours of *P. antanosy,* planned for the end of March 2026. The second will be a translocation paper, which will discuss the results, challenges, and learnings throughout the trial translocation. This paper is also expected to be finalized by the end of March 2026. These publications will help contribute to conservation literature of this critically endangered species.

2.6 Project Palms

The littoral forests of Sainte Luce support a variety of endemic and threatened species, including some of the last remaining populations of a variety of endangered palm species. Despite their importance for both biodiversity and local livelihoods, the palm species in Sainte Luce remain relatively understudied. To address these challenges, Project Palms aims to utilise research and conservation action to understand and improve the population status of six palm species identified by the IUCN Red List as Threatened, including: *Beccariophoenix madagascariensis* (Status: Vulnerable), *Chrysalidocarpus prestonianus* (Status: Vulnerable), *Chrysalidocarpus psammophilus* (Status: Endangered), *Chrysalidocarpus saintelucei* (Status: Endangered), *Dypsis brevicaulis* (Status: Critically Endangered), and *Dypsis scottiana* (Status: Vulnerable) (Rakotoarinivo and Dransfield, 2012 a; b; c; d; e; f).

In February of 2023, 66 *C. saintelucei* seedlings were planted at five sites within protected fragment S9. These were monitored for growth and condition at 1, 3, 6, and 12 months, and once every year since. These were monitored again in March of 2025. In February and April 2024 in-situ planting of

1,009 palm seedlings was completed in forest fragments S8, S9 and S17, and monitoring continued through 2025. In February, March, and April of 2025, 15 individuals of each of the six species (a total of 90 palm seedlings) were planted in Corridor 1, S8, S9, and S17. SCRP plans to continue monitoring all three of these cohorts of palms yearly for height and condition until 2029. Of the 66 trees planted in 2023, 57 (86.4%) survived two years after planting. Of the trees planted in 2024, *C. psammophilus* had the lowest survival rate after one year at 40%, while *B. madagascariensis* had the highest at 91.1% (Figure 12).

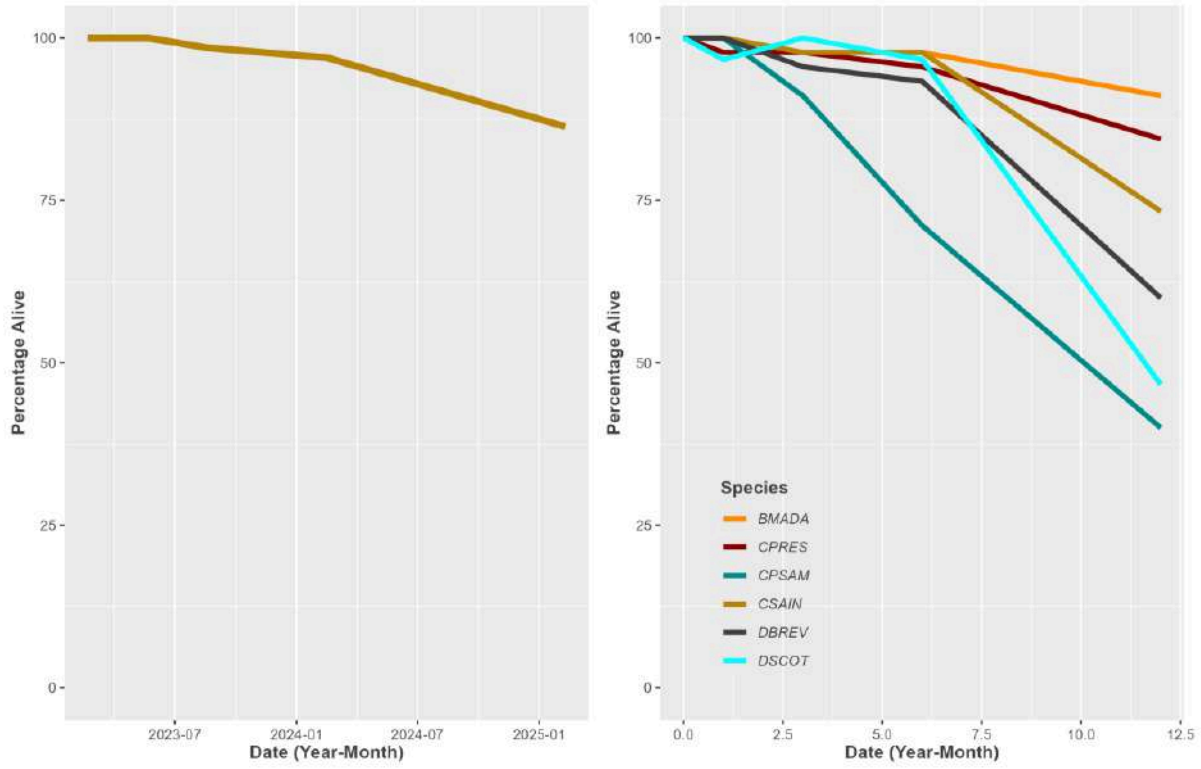

Figure 12: Survival rate of palms planted in 2023 (Left) and 2024 (Right) over time

In 2022, a census was conducted for the palm species *Chrysalidocarpus saintelucei*, *Beccariophoenix madagascariensis*, and *Chrysalidocarpus prestonianus* across the forest fragments S6, S17 South, S17 North, Remnants 2, 3, and 4, S9 South, S9 North, S7, and S8 South and North. The location of each adult individual was recorded using GPS.

Beginning in July 2025, the SCRP team revisited all adult palms using the GPS coordinates collected during the 2022 census. Each of the surviving individuals was relocated and marked with anti-logging signage (Figure 13), and its survival status was recorded.

Figure 13: Anti-logging signage being posted to a surviving Beccariophoenix madagascariensis palm

Of the revisited palms, *B. madagascariensis* had the highest rate of survival, with 27 out of the 38 total palms (71.1%) surviving the three years between surveys. *C. saintelucei* had the lowest survival rate, with only 5 out of 39 individuals (12.8%) surviving to 2025. Of the forest fragments where the trees were censused, S8S had the highest rate of survival with 8 out of 8 trees surviving (100%), followed by S8N with 11 out of 12 trees surviving (91.7%). R3 (5 trees) and R4 (1 tree) had the lowest survival rate at 0%, followed by S7 with 5 out of 31 trees surviving (16.1%) (Figure 14). Both the remnants and S7 were significantly affected by the fires and cyclone earlier in the year, which contributed to the low survival rates in these fragments.

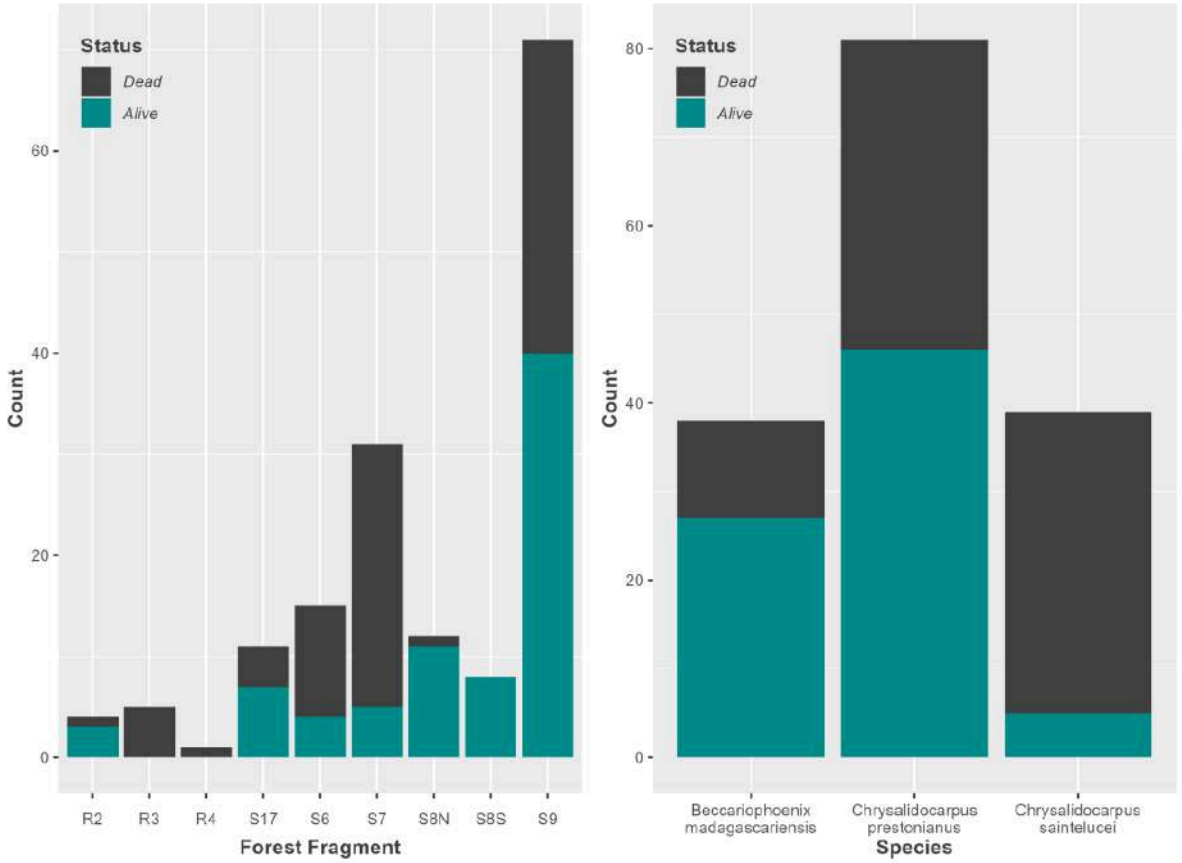

Figure 14: Number of adult palms from the 2022 census that survived to the 2025 census, separated by forest fragment (Left) and species (Right)

2.7 Project Rufus

Project Rufus focuses on the *in-situ* conservation of *Pteropus rufus* (Madagascan flying fox) through community engagement and scientific research. Declines in national *P. rufus* populations in the past have been attributed to hunting, disturbance and deforestation, with the species listed by the IUCN Red List as Vulnerable (Racey, 2016). A *P. rufus* colony exists within a botanically diverse littoral forest fragment in Sainte Luce, S6, which also faces significant environmental pressures, including deforestation and future local mining operations.

In 2016, the Sainte Luce colony was estimated to contain 130 individuals (Hyde Roberts et al. 2016), a decline from an estimated 300-350 individuals in 2000 (Bollen and Elsacker, 2002). SCRP has been collecting *P. rufus* population data since 2016, when a logging and hunting exclusion zone of 18.8 hectares was established around the base of the roost in collaboration with local community members (Figure 15). Members from the nearby Fokontany, Tsiharoa North, have continued to monitor and manage the integrity of the exclusion zone in 2025, including marking the edge of the zone with painted trees. Despite this, several instances of logging were recorded within the exclusion zone in 2025 (Figure 18). SCRP will continue to work with community members to ensure the safety of the roost.

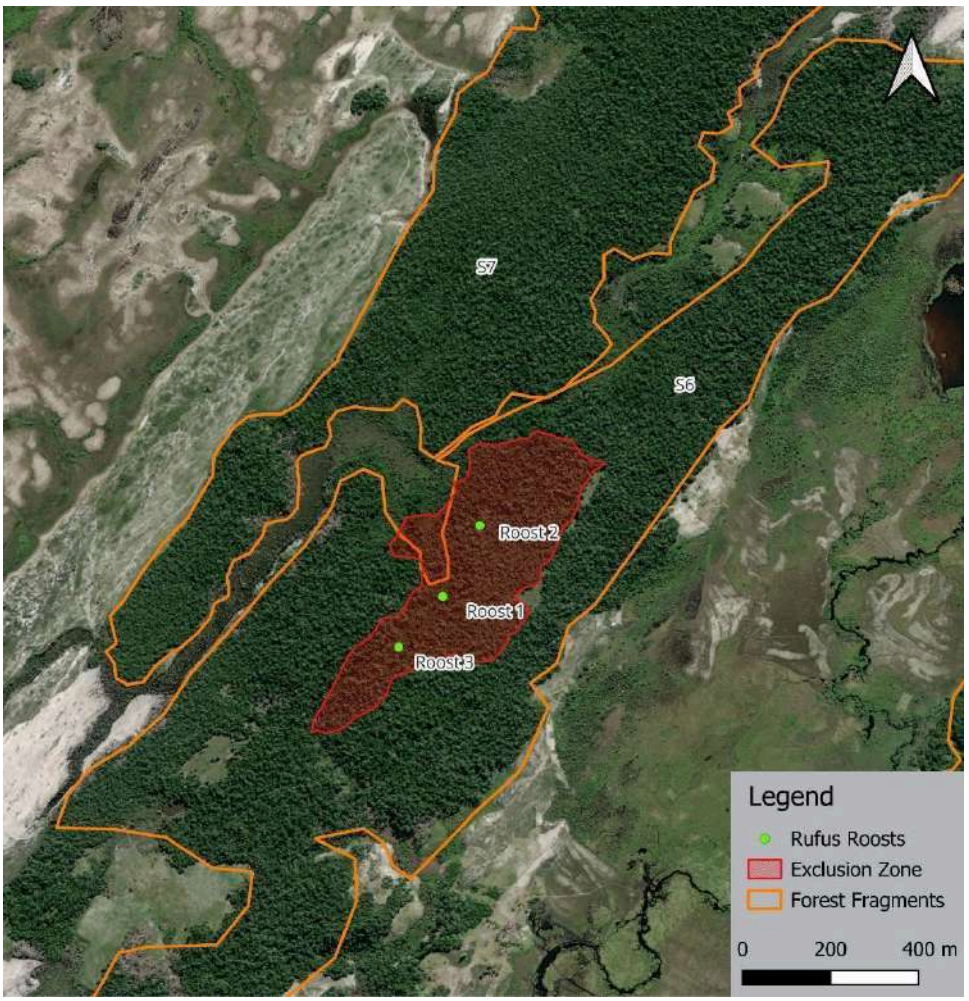

Figure 15: Map of the Exclusion Zone and Pteropus rufus roosts within S6.

SCRP conducted four surveys at the roost sites in the S6 fragment (Figure 15) in 2025. Due to the forest's dense nature and the colony roosting across multiple trees, accurate colony counts are extremely challenging. In 2025, the SCRP team added additional flight surveys to improve estimates of P. rufus. These surveys aim to provide a more accurate understanding of population size and distribution. From roost and flying counts of *P. rufus* during 2025 surveys, it is estimated that the current colony population is between 300-600 individuals.

With significant variation in quarterly population estimates, increasing dependence on natural resources by local communities, and future pressures from mining activities, it is important that monitoring of the colony continues in 2026. SCRP continues to raise awareness of *P. rufus* and the important ecological role they play in Sainte Luce with local community members.

Interactive Sainte Luce Map

During 2025, SCRP completed and launched an interactive map, available here, which allows all projects in Sainte Luce, including SCRP's work and the wider Conservation and Rural Livelihoods projects, to be visualised together. The map was developed using spatial layers produced in QGIS and integrated into a Leaflet interactive map by the SCRP remote intern. This map allows users to add and remove different layers to explore our projects and research simultaneously. For example, Figure 16 displays the density of *A. meridionalis*, the different *Mahampy* wetlands, forest fragments, Protected Areas boundaries, Long Term Monitoring transects, and Ala Programme corridors. This tool will continue to be updated as projects progress, improving analysis of how different conservation and livelihood aspects interact and change over time within Sainte Luce.

Figure 16: A screenshot of the interactive projects map of St Luce, now published on the SEED Madagascar website

Community Engagement and Volunteer Programme

4.1 Quarterly Environmental Education Sessions

In 2025, SCRP returned to the primary schools in Ambandrika and Manafiafy villages to deliver focused and interactive environmental education sessions on a range of locally important topics. Attendance was between 60 and 80 students present for each school session. SCRP delivered eight educational sessions in 2025, four in each primary school, covering the following areas:

- **Plastic Pollution** – What is plastic pollution and where does it come from? How does it degrade the environment, and what impact has it had on Sainte Luce? What action can be taken to reduce plastic pollution?
- **Wetlands** – What are wetlands, and what functions do they serve in Madagascar? What factors are leading to wetland degradation and what can be done to ensure they remain in Sainte Luce?

- **Sharks** – What are sharks, and what ecological function do they play in marine ecosystems in Madagascar and globally? What threats are contributing to shark population declines, and what can be implemented to improve their conservation?
- **Coral Reefs** – What are corals, and what ecological and economic roles do coral reefs play in Madagascar and across the world? What major threats are driving their decline, and what action can be taken to protect coral reef populations?

At each school, two sessions were run simultaneously; one for younger students (4-8 years old) where they could develop fine motor skills (by colouring in an informative picture about the focus species); and the other session was for older students (9+ years old) and featured a presentation on the species or environmental concept. This was presented by volunteers and international and national staff. After both the sessions were completed, everyone gathered outside to play an active game featuring the topic the children learnt about. SCRP looks forward to running more sessions in 2026, raising awareness of further areas of the Sainte Luce environment affecting the lives of people across Sainte Luce, as well as the importance of ecosystem conservation.

Figure 17: Hoby (far left), Conservation Programme Team Leader and environmental education session lead, with young students from Ambandrika Primary School, showing off the pictures they coloured of coral reef fish.

4.2 Volunteering Programme

SCRP welcomed 11 volunteers to the Sainte Luce research camp in 2025. Volunteers bring much-needed capacity to the research that takes place, particularly the long-term monitoring programmes for lemur and herpetofauna species, as well as Project Phelsuma activities. Alongside contributing to primary data collection, volunteers also play a pivotal role in the implementation of the educational sessions; the children who attend the sessions enjoy the chance to interact with, and learn from, volunteers.

Of the 11 volunteers who supported SCRP's research in Sainte Luce throughout 2025, three were British, two were from the USA, two were Australians, one was German, one was Dutch, one was Irish and one was Austrian. The ages of the volunteers ranged from 20-45. Two volunteers were students doing a course related to natural or environmental sciences, three were working (at the time of their visit) in an environmental science-related field or had backgrounds in ecology and six people were working in unrelated fields. As the programme moves into 2026, SCRP is excited to welcome more volunteers onto the programme.

Illegal activity sightings

In 2025, SCRP witnessed evidence of illegal activities in Conservation Zones S8, S9, and S17. Although these have at times been exacerbated by restricted access to the Community Resource Zone (the ferry for crossing the river was either sunk or stolen at different times), evidence of illegal activity is still regularly seen. These activities primarily consist of the logging of large trees and saplings (Figure 18), with individuals being seen actively chopping trees during surveys (in S8N on July 11 and 16, for example). Additionally, snare traps for wildlife such as lemurs or crested ibis have been found in S9. In several cases, team members could hear chopping taking place in the forest and had to call out to try to deter the loggers. At the end of 2024, SCRP staff formed a WhatsApp group with Hygiene and Environmental Advisor Christophe Rambolamanana at QIT Madagascar Minerals (QMM). All instances of illegal activity occurring in the QMM-designated protected zones within S8 and S9 were reported immediately via this WhatsApp group. SCRP also remains in close communication with the Chef Fokontany (commune mayor) and the various forest police organisations to work collaboratively towards reducing the presence of illegal activity within the conservation zones.

Figure 18: Illegal logging in S6 near the P. rufus roosting sites.

Publications

Hyde Roberts, S., Sannolo, M., Tsimijaly, H., Clark, R., Jhaveri, L., Gonçalo, R., Cocca, W., Andreone, F., & Crottini, A. (2025). A littoral treasure trove: A comprehensive assessment of the herpetofauna of Sainte Luce, southeastern Madagascar. *Systematics and Biodiversity*, 23(1). doi: 10.1080/14772000.2025.2513472.

Hyde Roberts, S., Evans, N., Kramer, L., Jhaveri, L., Duffell, J., Parker, Q., Bradley, G., & Tsimijaly Longosoa, H. (2025). A population assessment of six threatened palm species in Sainte Luce, southeast Madagascar: A glimmer of hope? *Palms*, 69 (1).

Jhaveri, L., Duffell, J., Evans, N., Kramer, L., Randianasolo, M., Tsimijaly, H., & Hyde Roberts, S. (in prep). Rooted in diversity: Threatened endemic palm species in southeastern Madagascar are not defined by their microhabitats. *Madagascar Conservation and Development*.

Sam Hyde Roberts, Leo Jhaveri (in prep). The future of the world's rarest gecko, *Phelsuma antanosy*: Action or oblivion? *Oryx*

Future Directions

In 2025, SCRP continued to design, organise, and complete high-quality research across a range of complex subject areas. In 2026, skill sharing between national and international staff and local stakeholders will form a central pillar of SCRP's approach. 2025 has proven to be a productive and successful year. With completion of 12 years' worth of lemur population monitoring, comprehensive soil testing and analysis, careful planning for the Ala Planting Project, closer communication and collaboration with key local stakeholders and expert knowledge holders, and continued commitment to SCRP's education and outreach strategy. The SCRP team also made progress in the writing and preparation of scientific articles on *Phelsuma antanosy* behaviour, translocation outcomes, and population and conservation status. SCRP hopes to take these successes and learnings into 2026, continuing to develop and improve the programme across all aspects.

With localised environmental pressures mounting, SCRP is keen to evaluate its approach and identify future critical research areas helping to protect the ecosystem at large. SCRP is committed to analysing the significant quantity of data accumulated over previous years and disseminating findings to local communities as well as across national and international channels. In doing this, SCRP hopes to evaluate the effectiveness of its strategy and approach to produce even more impactful, conservation-focussed research and action in the future.

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References

Bollen, A., & Van Elsacker, L. (2002). Feeding ecology of Pteropus rufus (Pteropodidae) in the littoral forest of Sainte Luce, SE Madagascar. *Acta Chiropterologica*, 4(1), 33-47.

Donati, G., Balestri, M., Campera, M., Hyde Roberts, S., Račevska, E., Ramanamanjato, J.-B. & Ravoahangy, A. (2020a). *Eulemur collaris*. The IUCN Red List of Threatened Species 2020: e.T8206A115562262. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T8206A115562262.en. [Accessed October 2021].

Donati, G., Balestri, M., Campera, M., Norscia, I. & Ravoahangy, A. (2020b). *Avahi meridionalis*. The IUCN Red List of Threatened Species 2020: e.T136369A115582568. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T136369A115582568.en. [Accessed October 2021].

Donati, G., Balestri, M., Campera, M., Ganzhorn, J., Hyde Roberts, S., Rakotondranary, S.J., Ramanamanjato, J.-B. & Rasoloarison, R.M. (2020c). *Microcebus tanosi*. The IUCN Red List of Threatened Species 2020: e.T163024481A163024490. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T163024481A163024490.en. [Accessed October 2021].

Ganzhorn, J., Donati, G., Eppley, T.M., Lahann, P., Rakotondranary, S.J., Ramanamanjato, J.-B. & Randriantafika, F.M. (2020). *Cheirogaleus thomasi*. The IUCN Red List of Threatened Species 2020: e.T163022885A163312222. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T163022885A163312222.en. [Accessed October 2021]

Hogg, F., Funnell, S., Shrum, M., Ellis, E.R. and Tsimijaly, L.H. (2013). The useful palms of Sainte Luce: Implications for local resource availability and conservation. *Palms*, 57(3), pp.133-144.

Hyde Roberts, S., Harris, S., Strang, K., Guy, J. A., Rossizela, R. J., & Chmurova, L. (2020). Palms on the Brink: Conservation Status of the Threatened Palms Dypsis saintelucei and Beccariophoenix madagascariensis in the Littoral Forests of Sainte Luce, Southeastern Madagascar. *Palms*, *64*(4), 177-190.

Hyde Roberts, S., Sannolo, M., Tsimijaly, H., Clark, R., Jhaveri, L., Gonçalo, R., Cocca, W., Andreone, F., & Crottini, A. (2025). A littoral treasure trove: A comprehensive assessment of the herpetofauna of Sainte Luce, southeastern Madagascar. Systematics and Biodiversity, 23(1). doi: 10.1080/14772000.2025.2513472.

Jenkins, R., Randrianantoandro, C., & Ramanamanjato, J. B. (2011). *Phelsuma antanosy*: The IUCN Red List of Threatened Species. [online]. Available: https://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T63658A12704038.en.

Lehtinen R., 2002. – The use of screw pines (*Pandanus* spp.) by amphibians and reptiles in Madagascar. Herpetological Bulletin, 82: 20-25

Miller, D. L., Rexstad, E., Thomas, L., Marshall, L., & Laake, J. L. (2019). Distance Sampling in R. *Journal of Statistical Software*, *89*(1), 1–28. https://doi.org/10.18637/jss.v089.i0

Pointer, M., Tsimilajay, H., Hyde Roberts, S., Gill, J. & Spurgin, L. (2024) Habitat use of the micro-endemic day gecko *Phelsuma antanosy* in Sainte Luce, Madagascar, and the case for translocation. Endangered Species Research, 54, 457–468. https://doi.org/10.3354/esr01353

Racey, P.A. (2016). *Pteropus rufus*. The IUCN Red List of Threatened Species 2016: e.T18756A22087230. https://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T18756A22087230.en. Downloaded on 01 December 2021.

Rakotoarinivo, M. & Dransfield, J. (2012a). *Beccariophoenix madagascariensis*. *The IUCN Red List of Threatened Species* 2012:e.T38448A2869148. https://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T38448A2869148.en. Accessed on 22/11/22.

Rakotoarinivo, M. & Dransfield, J. (2012b). Dypsis brevicaulis. *The IUCN Red List of Threatened Species* 2012: e.T195948A2435374. http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T195948A2435374.en. Accessed on 22/11/22.

Rakotoarinivo, M. & Dransfield, J. (2012c). *Dypsis prestoniana*. *The IUCN Red List of Threatened Species* 2012: e.T38557A2878373. https://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T38557A2878373.en. Accessed on 22/11/22.

Rakotoarinivo, M. & Dransfield, J. (2012d). *Dypsis psammophila*. *The IUCN Red List of Threatened Species* 2012: e.T38559A2878571. https://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T38559A2878571.en. Accessed on 22/11/22.

Rakotoarinivo, M. & Dransfield, J. (2012e). *Dypsis saintelucei*. *The IUCN Red List of Threatened Species* 2012: e.T38562A2879456. https://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T38562A2879456.en. Accessed on 22/11/22.

Rakotoarinivo, M. & Dransfield, J. (2012f). *Dypsis scottiana*. *The IUCN Red List of Threatened Species* 2012:

e.T38563A2879553. https://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T38563A2879553.en. Accessed on 22/11/22.