Darwin Initiative Capability & Capacity Annual Report

To be completed with reference to the "Project Reporting Information Note":
(https://www.darwininitiative.org.uk/resources/information-notes/).

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes)

Submission Deadline: 30th April 2024

Submit to: BCF-Reports@niras.com including your project ref in the subject line

Darwin Initiative Project Information

Project reference	DARCC009
Project title	Strengthening conservation and management capacity in Tanzania through collaborative research
Country/ies	Tanzania
Lead Partner	Lion Landscapes
Project partner(s)	WildCRU (University of Oxford) Tanzania Wildlife Management Authority (TAWA) Frankfurt Zoological Society (FZS) Tanzania Southern Tanzania Elephant Program (STEP)
Darwin Initiative grant value	£199,941 (Y1: £98,314; Y2: 42,839, Y3: 58,788)
Start/end dates of project	April 2022 – December 2024
Reporting period (e.g. Apr 2023 – Mar 2024) and number (e.g. Annual Report 1, 2, 3)	Annual report 2 (April 2023 – March 2024)
Project Leader name	Dr Charlotte Searle
Project website/blog/social media	https://www.lionlandscapes.org/ https://twitter.com/lionlandscapes https://www.instagram.com/lionlandscapes/ https://www.facebook.com/lionlandscapes https://uk.linkedin.com/company/lion-landscapes
Report author(s) and date	Dr Charlotte Searle, 30 April 2024

1.   Project summary

Since 2017, Lion Landscapes has been involved in carrying out large carnivore assessments in two of Tanzania's most important wilderness areas, the Ruaha-Rungwa and Selous-Nyerere landscapes. Both are carnivore strongholds, with the latter believed to host Africa's largest population of endangered wild dog (Woodroffe et al., 2020). During these efforts, we developed close collaborations with protected area management authorities (TAWA, TANAPA), the Tanzania Wildlife Research Institute (TAWIRI), and the University of Dar es Salaam (UDSM). Through these partnerships, we have noted that knowledge and capacity gaps are especially significant with regards to large carnivore population research, conservation, and management. There is little knowledge on methods that can be employed to assess large carnivore populations, and understand their threats and management needs. We have also noted a lack of collaboration between the country's governmental research institutions and protected area management authorities, which further hinders effective conservation.

The identified capacity limitations are acknowledged by Tanzania's research and management institutions: TAWIRI identified problems arising from inadequate management as one of the most important factors affecting lion, leopard, wild dog, and cheetah conservation, and set strategic targets to establish capacity building programs for large carnivore conservation, where possible in tandem with research and monitoring (TAWIRI, 2009, 2016). The Government of Tanzania has therefore identified the need addressed by this project as a key national biodiversity conservation priority. If protected area management authorities are equipped with the requisite skills and resources, they will be able to assess and monitor species, implement actions to mitigate identified threats, and establish regular monitoring to evaluate interventions and identify emerging threats. Such evidence-based management is critical for efforts to halt population declines and range reductions (Sutherland et al. 2004).

If left unaddressed, these capacity gaps also pose a substantial threat to wider poverty reduction efforts. Large carnivores play a central role in regulating ecosystem structure and function (Atkins et al., 2019), and their loss can therefore have profound consequences for wider biodiversity and the provision of ecosystem services (Ripple et al., 2014). Furthermore, wildlife tourism is an important generator of income and livelihoods in Tanzania (Tanzaniainvest.com), and large carnivores are an important factor attracting international tourists to Africa (Okello, 2008; Macdonald et al. 2017). Population declines resulting from ineffective management of these species will therefore imperil an important source of income and livelihoods for the country.

This project aims to build conservation, research, and protected area management capacity in Tanzania, while improving the management of two globally-important large carnivore populations in the Ruaha-Rungwa and Selous-Nyerere landscapes (Fig. 1). Through this project, we are providing practical training in large carnivore monitoring, wildlife corridor assessments, and wildlife veterinary best practice, coupled with academic mentoring, to Tanzanian nationals from protected area management authorities, governmental research institutions, and universities. The monitoring and conservation plans developed will contribute to long-term poverty reduction by helping promote tourism activities and preserving ecosystem function.
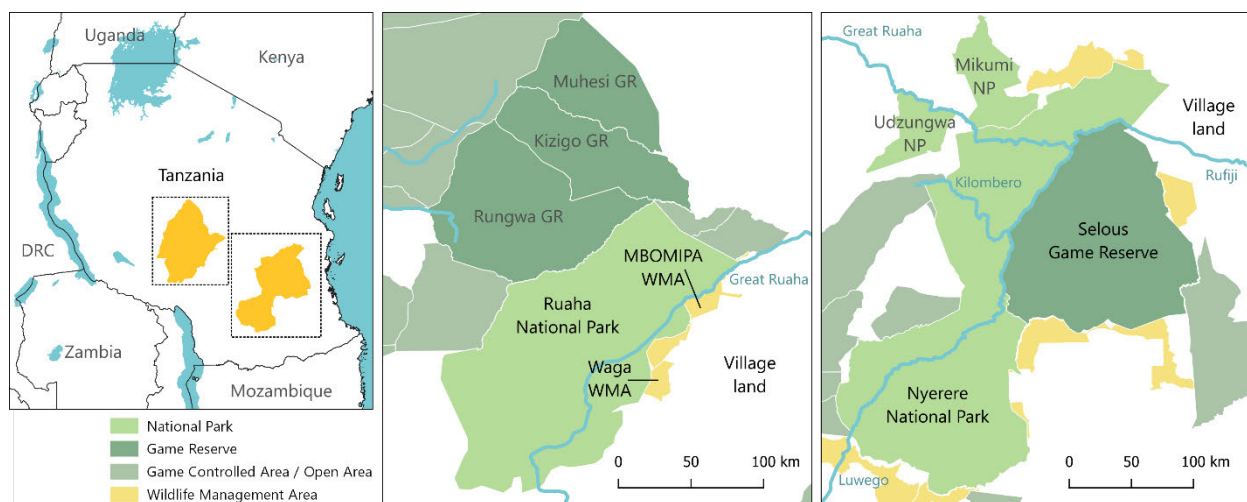

Fig. 1: The location of Ruaha-Rungwa landscape (middle) and Selous-Nyerere landscape (right) within Tanzania (left), where the project activities are taking place.

2.   Project stakeholders/ partners

Most activities in Y2 have been led by lead partner **Lion Landscapes (LL)** and partner **WildCRU**. Project leader Dr Charlotte Searle is employed through a postdoctoral research fellowship at WildCRU, but is an affiliated researcher at Lion Landscapes. The two organisations are closely linked and have been carrying out large carnivore research and conservation activities in southern Tanzania for multiple years; as a result, they are well known within the country and have established relationships with a number of key stakeholders. LL has provided institutional and logistical support throughout Y2, including by employing the project assistant, providing

existing assets for use by the project (vehicles and camera traps), managing project administration and finances, and offering ad hoc in-country support. WildCRU has provided the academic context for the work, which is critical for supervision of students and publication of papers through Oxford's Open Access Scheme (Output 3) [E01-03].

Frankfurt Zoological Society (FZS) Tanzania has provided logistical support for field training activities in Selous-Nyerere [D01], hosted an analytical training workshop at their office in in Dar es Salaam [B01-09], and facilitated meetings between the project leader and senior staff members within protected area management authorities.

The **Tanzania Wildlife Management Authority (TAWA)** is a partner on this project so they can use the training opportunities to upskill their staff and employ the outputs of project research activities to improve their conservation management plans, including implementing sustainable hunting quotas. Their involvement will expand in Y3 as we move towards the conservation strategy planning process (Output 3).

The **Southern Tanzania Elephant Program (STEP)** is a key project partner for the wildlife corridor connectivity assessments (Output 4), which build upon a previous Darwin Initiative grant held by the organisation (Round 25, project 26-007). In Y2, STEP led corridor assessment activities and training in the Kilombero Elephant Corridor (Selous-Nyerere – Udzungwa) [I01-02].

Although not formal project partners, we have engaged closely with the Tanzania Wildlife Research Institute (TAWIRI) and Tanzania National Parks (TANAPA), including by providing training to their staff [C01-09] and sharing research outputs with them to inform their activities [D03-06]. We have also engaged local community members in Selous-Nyerere through our work in the Kilombero Elephant Corridor. STEP held meetings in Swahili with the councils of the three villages the corridor passes through, to explain the project activities and highlight the potential value of the research for understanding animal movements in the area.

Training participants were identified by inviting participating organisations (TAWIRI, TAWA, TANAPA) to nominate individuals they believed would benefit most from the training, based on their own individual selection processes and equal opportunities criteria. Nevertheless, we encouraged these organisations to nominate early career researchers, practitioners with a direct role in wildlife monitoring, and eligible women.

3.   Project progress

Note that we have made some slight changes to our latest agreed logframe (shown as tracked changes in Annex 2); these include updating the timeframe of some indicators (as we forgot to do this when extending the project into a third year as part of our latest change request in December 2023) and adding new assumptions. These can be submitted as a change request if required.

3.1   Progress in carrying out project Activities

Activity 1.1 & 2.4: Training & establishment of large carnivore monitoring teams

Fig. 2: Members of the large carnivore monitoring team learning how to collect data on wild dog sightings from a Zambian Carnivore Program team member (left) and taking measurements from an immobilised wild dog (right).

In July 2023, members of the Selous-Nyerere and Ruaha-Rungwa large carnivore monitoring teams travelled to Zambia's South Luangwa National Park (NP) to visit the Zambian Carnivore Program (Fig. 2) [F02, H01]. This visit was an opportunity for the team to learn about collaring and focal monitoring of wild dog and lion from an organisation with a lot of experience in this area.

From August to October, the Selous-Nyerere large carnivore monitoring team established a guide sightings programme, set up a camera trap and acoustic survey grid, and deployed GPS collars on four lions in Nyerere NP (Fig. 3) [D01-02, F02-03]. In September, the Ruaha-Rungwa large carnivore monitoring team distributed devices to the tourism guides participating in the Ruaha NP guide sightings programme. All the data collected will be used to monitor the status and population trends of large carnivores in these important ecosystems and provide research opportunities for Tanzanian students and conservation practitioners.
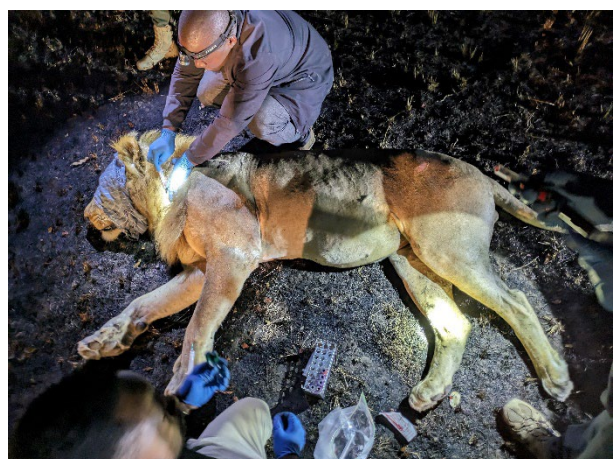
Fig. 3: The Selous-Nyerere carnivore monitoring team teaching guides participating in the guide sightings programme how to collect data (top left), setting up camera traps (top right), teaching TANAPA ecologists about acoustic surveys (bottom left), and fitting a GPS collar to a male lion (bottom right).

Alongside these activities, we have continued to process and analyse data collected through the 2020-2022 spoor and camera trap surveys in Selous Game Reserve (GR) and Nyerere NP. We prepared final density estimates for lion and leopard and have presented these to TAWIRI for approval [D03-04, H06, H08], after which we will publish the findings as scientific papers. We will arrange meetings with protected area management authorities in Y3 to present the results and discuss management recommendations highlighted from the research.

Activity 1.2: Analytical training workshop

In June 2023, LL and WildCRU held a lion density analysis & interpretation workshop in Dar es Salaam, in partnership with partner FZS (Fig. 4) [B01-09, F01]. Participants in the Selous-Nyerere carnivore assessment and training were invited to attend the workshop [B01]. The workshop was attended by three TAWA ecologists, two TANAPA ecologists, one TAWIRI researcher, one LL research assistant, and two FZS staff members [B04, B07]. Participants were taught how to estimate lion population density from camera trap data via spatially explicit capture-recapture (SECR) modelling [B05-06]. The group then discussed and interpreted the results, and identified management recommendations. The points raised in this discussion were used to collaboratively write a report summarising the findings and conservation recommendations for TAWIRI, which will form the basis of scientific papers and reports to management authorities in Y3 [D03]. This workshop was also used as an opportunity for FZS to lead a discussion about the Selous-Nyerere Ecosystem Monitoring Framework, which will be drafted in Y3 and will incorporate the findings of research carried out under this project.
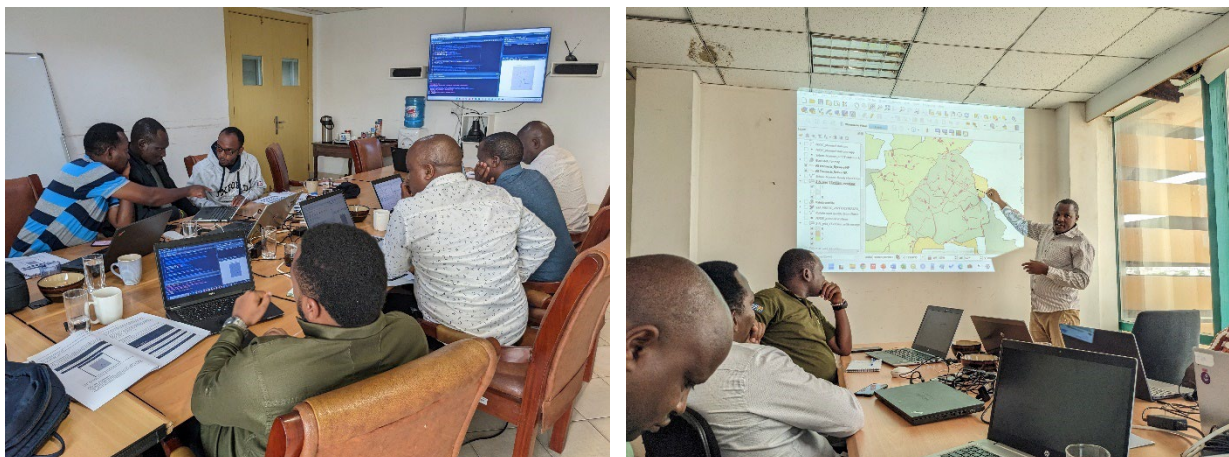

Fig. 4: Participants in the lion density analysis & interpretation workshop carrying out SECR analyses (left) and discussing how to interpret the lion density results based on their knowledge of the landscape (right).

Also in June, project leader Dr Charlotte Searle participated as a speaker and mentor at the Women in Conservation Technology course organised by WILDLABS, Fauna & Flora, and the Grumeti Fund [A03] (Fig. 5). Charlotte presented the carnivore population monitoring work in Ruaha-Rungwa and Selous-Nyerere as a case study of how camera traps can be used for conservation and research [H02], led training on the use of camera traps [H03], and took part in group discussions on navigating conservation and academia as a woman.

Fig. 5: Project leader Charlotte delivering training on camera traps (left) and participants setting up a camera trap (right) as part of the Grumeti Women in Conservation Technology course.

Activity 1.4: TAWIRI carnivore density monitoring course

In March 2024, LL and WildCRU delivered a training workshop on how to estimate large carnivore population density from camera trap surveys at the TAWIRI headquarters in Arusha (Fig. 6) [C01-09]. This training was specifically requested by TAWIRI, and was incorporated into the project logframe as part of a change request in December 2023. The workshop was attended by 18 TAWIRI research officers, research assistants, and field assistants and one LL research assistant, including 6 women (32%) [C03]. The workshop included presentations and practical sessions covering survey design, data collection, data management & processing, SECR analysis, and reporting & interpretation of results [C05]. The project leader also presented results from the large carnivore surveys in Ruaha-Rungwa and Selous-Nyerere to workshop participants and members of the TAWIRI Board of Directors, to illustrate the kinds of research outputs that can be produced using the skills taught during the workshop [H07-08]. Booklets with step-by-step instructions for carrying out camera trap surveys for SECR analysis were prepared and given to attendees, equipping them with the tools required to monitor carnivore populations independently in the future [C04].
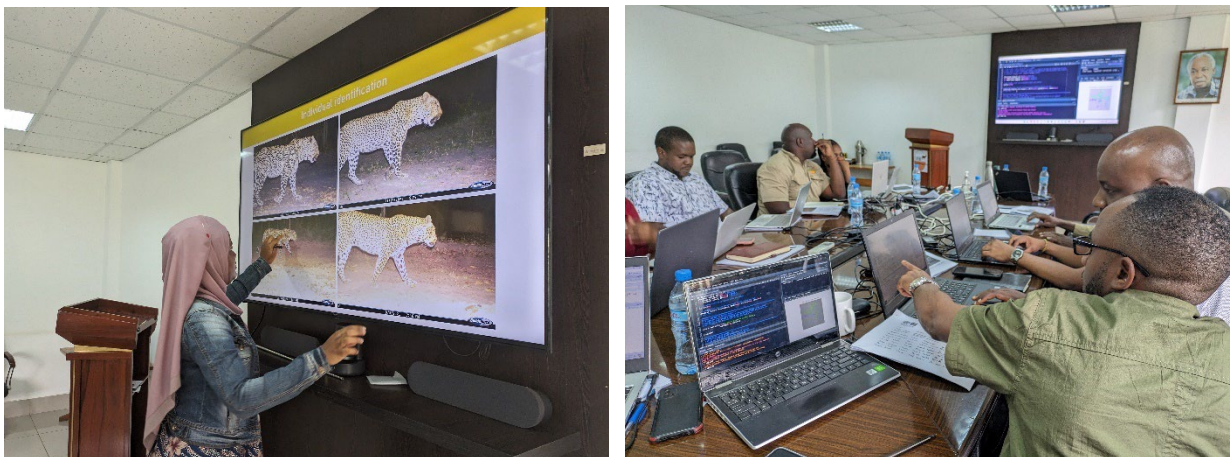

Fig. 6: Participants in the TAWIRI large carnivore population density workshop identifying individual leopards from camera trap photos based on their unique spot patterns (left) and carrying out SECR analyses (right).

Activity 1.5 & 3.1: Dissemination of research findings

Since the start of the project, we have shared regular reports with government wildlife authorities to provide them with updates on the project's activities and progress [D02]. We have also shared more detailed reports with TANAPA in Nyerere NP [D01] and TAWIRI [D03].

In June 2023, the project leader attended the second workshop to revise the Tanzania Lion and Leopard Action Plan and presented information on lion and leopard abundance in Ruaha-Rungwa and Selous-Nyerere, which will be incorporated into national population estimates for both species [D03, D05-06, F01].

In December 2023, the project leader and project participants from TAWA (3), TANAPA (2), TAWIRI (1) and LL (1) attended the TAWIRI Scientific Conference, to present some of the key findings of the collaborative data collection and analysis. This included presentations on wild dog status in Selous-Nyerere [H04], and carnivore population trends in MBOMIPA WMA [H05], and lion & leopard population density in Selous-Nyerere [H04].

Fig. 7: Project participants Leonard (TAWIRI; left) and Nasri & Singira (TAWA; right) delivering presentations on large carnivores in Selous-Nyerere at the TAWIRI Scientific Conference.

Project participants collaboratively wrote open-access papers on spotted hyaena status in Ruaha-Rungwa, published in *Journal of Zoology* in October 2023 [E01], and cheetah status in Selous-Nyerere, published in *Oryx* in December 2023 [E02]. A field record of a strawberry leopard in Selous GR is currently under review [E03].

Papers on lion and leopard population densities in Selous-Nyerere and trends in MBOMIPA WMA have been drafted, but their publication has been delayed due to the need to receive government approval of the estimates before publication. Both sets of results were presented at the TAWIRI conference in December 2023 [H05-06] and the Selous-Nyerere estimates were submitted as a formal report in January 2024 [D03-04], but we are still awaiting formal approval to proceed with publication despite regularly following up on this. As a result, these outputs will be disseminated in Y3.

Activity 2.1: MSc and PhD students

Throughout Y2, MSc student Janeth (F) has been continuing her research at the University of Dar es Salaam. She is using lion sightings data to estimate population density and investigate the value of citizen science for carnivore monitoring [G01]. She is now in the final stages of preparing her thesis, and will be supported to publish two papers from her research in Y3.

MSc student Singira (M) enrolled on his MSc programme at the Nelson Mandela Institution of Science and Technology (NM-AIST) at the start of Y2. Singira is Head Ecologist for TAWA in Selous GR and a leading member of the carnivore monitoring team in Selous-Nyerere, and is using data collected through this project to study wild dog ecology and threats [G02]. He is currently working on a paper about wild dog population density.

An MSc student at the Dar es Salaam University College of Education, Anitha (F), will be carrying out a research project on the population density of spotted hyena in Selous-Nyerere in Y3 [G03].

Diploma student Nyasatu (F), a former research assistant at LL, completed the Recanati-Kaplan Centre Postgraduate Diploma in International Wildlife Conservation Practice with WildCRU at the University of Oxford in Y2 [G04]. She secured a scholarship to publish her research project on caracal in Ruaha-Rungwa with the support of the project leader, and is currently finalising the manuscript [G05].

The project supported a participant from TAWIRI, Leonard (M), to secure scholarship funding to start his PhD at NM-AIST in 2024. However, he has not yet enrolled as an opportunity has arisen to potentially secure a funded PhD opportunity overseas, which we are supporting him to pursue. This student is a leading member of the Selous-Nyerere carnivore monitoring team, and his research will focus on spatial ecology and conservation genetics of lion and wild dog [G06].

Activity 4.2: Selous-Nyerere – Udzungwa corridor assessment

Fig. 8: STEP team members setting up camera traps in the Kilombero Elephant Corridor (left); African clawless otters photographed at one of the corridor camera trap stations (right).

Project partner STEP and a new collaborator, the Udzungwa Ecological Monitoring Centre, partnered with village game scouts and local village council members to deploy camera traps in the Kilombero Elephant Corridor (Selous-Nyerere – Udzungwa) in November 2023 (Fig. 8) [I01-02]. The goal of these cameras was to monitor the extent to which elephants, large carnivores, and other mammals use the newly-gazetted corridor; they were checked every 2-4 weeks and taken down in March 2024 ahead of the heavy rains. This pilot will form the basis of longer-term connectivity monitoring, which will be expanded to include other taxa.

Other activities:

One challenge in Y2 was a major delay to our fieldwork schedule, which resulted in us needing to apply for a six-month no-cost extension to change the project end date from March 2024 to December 2024. This delay meant that the university training course (**activity 2.3**), which was originally planned for Y2, will now take place in Y3.

The Ruaha-Rungwa – Udzungwa corridor assessment (**activity 4.1**) will also take place in Y3, as heavier than usual rains due to El Niño meant that it was not feasible to complete the assessment in February Y2 as originally planned. We will survey endpoints of the Ruaha-Udzungwa corridor for wildlife presence using a combination of walking transects and key informant interviews, which will be coordinated by STEP and carried out in collaboration with District and Local government. Additional data on human-elephant conflict and elephant movement in the corridor is being collected by a Tanzanian MSc student from the University of Dar es Salaam that STEP has been in communication with.

The collaborative development of carnivore monitoring strategies (**activities 1.3 & 3.2**) will also take place in Y3, as it is taking longer than anticipated for us to receive government approval from TAWIRI for the lion and leopard population density estimates from Selous-Nyerere. Once we have received this, we will arrange meetings with TAWA and TANAPA to discuss the results and recommendations. This updated timeline will allow this process to feed into the development of the Selous-Nyerere Ecosystem Monitoring Framework, which is planned for Y3Q1-Q2.

The wildlife capture and immobilisation course (**activity 5.2**) will be carried out in Y3.

3.2 Progress towards project Outputs

<u>Output 1</u>: **Improved skills and knowledge among Tanzanian PA management authorities, research institutions, and NGOs to assess and monitor large carnivore populations, including through the ability to carry out wildlife corridor assessments**

This project builds upon capacity-building training that was initiated by project partners in 2020 through the 2020-2022 Selous-Nyerere large carnivore assessment. As such, although ecologists from management authorities in the study area lacked the skills and knowledge to effectively monitor large carnivores using the most up to date techniques prior to 2020, we had begun to make inroads in improving this situation by the start of the Darwin project, having delivered training to 23 people. During Y1 we expanded this impact by delivering in-depth training in spoor and camera trap surveys to a total of 43 researchers and conservationists, and analytical training to 6 researchers and protected area ecologists.

In Y2, we continued to deliver training on the use of camera traps, both for SECR surveys and to monitor corridors, and incorporated new training on GPS collaring and acoustic surveys. In total, field skills training was delivered to 43 people in Y2, 11 of which were women (26%) [A01] (see 3.1). Theoretical training was delivered across two workshops to a combined total of 26 people, 8 of which were women (31%) [A02] (see 3.1).

The first workshop was held to finalise the lion & leopard population density estimates for Selous-Nyerere, with researchers and ecologists who participated in collecting the data [B01-09]. This included a discussion of what participants thought could explain the densities observed and what conservation and management actions they recommend in light of the findings; two of the participants then jointly wrote a report with the project leader summarising the results and discussion to share with the government [D03]. One participant is also now using the skills from this workshop to carry out a study of wild dog density in Selous [G02].

The second workshop sought to teach early-career researchers from the government wildlife research institute how to estimate population density, a key metric for monitoring large carnivores (see 3.1) [C01-09]. One participant from TAWIRI is now applying this training to help design and plan carnivore surveys in Burigi-Chato NP, in northwest Tanzania, while one participant from LL will travel to Kenya in June to train LL Kenya staff in how to conduct camera trap surveys to monitor carnivores. This application of the skills learnt demonstrates the capabilities training participants have been able to build through this project.

In self-evaluation questionnaires completed before and after these workshops, all respondents reported having increased confidence in the skills on which they received training, with improvements reported for an average of 100% and 89% of the trained skills, respectively. All respondents also rated the workshops highly, giving them an average score of 5 and 4.9 out of 5 [B08-09, C07-09].

Nine training participants have contributed to published papers on the status of cheetah and spotted hyaena in southern Tanzania [E01-02] and a submitted record of a rare phenotype leopard [E03]; these are the first scientific publications for five of these participants.

We are confident that we will achieve this output by the end of the project – we have made good progress in Y1 and Y2, and will continue to improve carnivore research capacity in Y3 by supporting training participants to apply their new skills elsewhere and contribute to studies and publications using the data collected through the project. To meet our SMART indicators in Y3, we need to provide analytical training to at least five Lion Landscapes/STEP research assistants. We also need to carry out meetings with TAWA and TANAPA protected area managers to make them aware of how the project findings can be used to inform management, and host a training course for students and staff at UDSM.

Output 2: Improved skills and knowledge among young Tanzanian academic researchers on how to study, monitor, and secure large carnivore populations in Tanzania

In Y1 we have supported 3 MSc students (2F, 1M), one international Diploma student (F), and one prospective PhD student (M) [G01-06] (see 3.1). One MSc student is nearing completion of her project, and has learnt how to carry out a literature review, assess the demographic structure of a carnivore population, estimate population density, and critically evaluate research methods [G01]. Another MSc student is learning how to develop a database of wild dog packs, estimate population density using both individual-level and group-level SECR models, carry out a land use change analysis using remote sensing data, and investigate human attitudes towards wild dogs [G02]. The third MSc student will learn how to assess spotted hyaena population status using camera trap data and AI tools [G03]. The Diploma student has learnt how to study caracal distribution and habitat use via occupancy modelling, and is now preparing a paper for publication [G05].

We have also helped the prospective PhD student – who has been a participant in this project since 2021 – connect with a researcher at the University of Wyoming in the US, who is now fundraising for him to enrol in Spring 2025. This international PhD opportunity would be a significant opportunity for the student to access high quality teaching and supervision.

To achieve this output by the end of Y3, we will continue to provide supervision and support to the above students, including by funding and supervising data collection and analyses.

Output 3: **Improved knowledge on the status of, and threats to, large carnivore populations in two globally-important conservation areas is available to the scientific and conservation community and is employed to improve their management**

Throughout the research and training activities, we have shared regular reports to update project partners and key stakeholders, including government entities, on our activities and progress [D01-06]. In Y2, we collaboratively produced a report summarising the lion & leopard population status findings for Selous-Nyerere with training participants from the government research institute and protected area management authorities [D03]. This approach allowed us to build capacity in interpreting scientific research to produce management recommendations while also ensuring the recommendations delivered are realistic and appropriate. The report has been submitted to TAWIRI for official acceptance of the results; once this is complete (end of Y2 or start of Y3), we will arrange meetings with the management authorities to present the results. These meetings will be led by training participants from those management authorities. The findings of the research will also feed into the Selous-Nyerere Ecosystem Monitoring Framework, which is a formal management planning process being facilitated by project partner FZS in Y3.

STEP team members delivered a presentation to village committees in advance of starting fieldwork and training activities in the Kilombero Elephant Corridor, to ensure they understood the purpose of the research. These meetings were conducted in Swahili to ensure the information would be understood by the audience, as the majority of committee members speak little to no English [I01-02].

Training participants delivered three presentations on the project research activities at the TAWIRI Scientific Conference [H04-06]. We have continued to contribute population data to the review of the National Action Plan for Lion and Leopard in Tanzania by providing population estimates for Ruaha-Rungwa and Selous-Nyerere [D05-06, F01], which will feed into national policy. We have also begun publishing collaborative papers in open access journals to disseminate the outputs of the research to the global scientific community [E01-03], and will continue to do so in Y3.

In Y3, we will achieve this output by continuing to provide regular reports to partners and stakeholders, collaboratively writing and submitting at least three more scientific papers for publication, and presenting the outputs of the project on an ad hoc basis at meetings and workshops. We will also organise meetings where we will work with training participants to present conservation recommendations to senior officials at each authority and draft large carnivore conservation strategies.

Output 4: Improved knowledge by all relevant stakeholders of the status, threats to, and functional connectivity of corridors linking these landscapes

In Y2, we have carried out a collaborative corridor assessment in the Kilombero Elephant Corridor (Selous-Nyerere – Udzungwa) to understand the extent to which elephants, mammals, and other mammal species are moving through this newly-gazetted corridor. Our preliminary data analysis has revealed that the cameras recorded 317 capture events of 19 mammal species over five months. As the cameras only came down in late March, a report on this activity will be disseminated to partners and stakeholders in early Y3.

The assessment of the Ruaha-Rungwa – Udzungwa corridor originally planned for Y2 was delayed due to abnormally heavy rains in February 2024 as a result of El Niño. The assessment is now planned to take place at the start of the 2024 dry season (July). We will survey endpoints of the Ruaha-Udzungwa corridor for wildlife presence using a combination of walking transects and key informant interviews. This survey will be coordinated by STEP and done in collaboration with District and Local government. Additional data on human-elephant conflict and elephant movement in the corridor is being collected by a Tanzanian MSc student from the University of Dar es Salaam that STEP has been in communication with.

Output 5: All activities under this output will take place in Y3.

3.3   Progress towards the project Outcome

This project has continued to make good progress towards the project outcome in Y2: practical and theoretical training has been provided to participants from Tanzanian research institutions (TAWIRI), management authorities (TAWA, TANAPA), and conservation organisations (LL, STEP, FZS). All participants in the analytical training reported improved capacity in large carnivore monitoring techniques, and expressed an interest in furthering this knowledge (see 3.2) [B08-09, C07-09]. We have produced reports and scientific publications that can be used to inform management of Ruaha-Rungwa and Selous-Nyerere's large carnivore populations (see 3.1, 3.2) [E01-03], and will continue this effort in Y3.

In Y3 we will build upon this progress by supporting management authorities to develop large carnivore management strategies as part of wider management planning processes – particularly through the Selous-Nyerere Ecosystem Management Framework, which will be developed by TAWA and TANAPA under the leadership of FZS in Y3 – in addition to expanding our training to a cohort of staff and students at a Tanzanian university, thus building wildlife research capacity among Tanzania's next generation of conservationists.

In Y2, the research and training carried out under this project has unlocked additional funding from WWF Germany (in addition to a multi-year grant from the Lion Recovery Fund secured in Y1). The partnerships created through this project will enable monitoring to inform protection and vice versa, as project partner FZS supports TAWA and TANAPA's protection activities in Selous-Nyerere. Overall, this should result in an improved conservation outlook for the landscape's large carnivores by supporting evidence-based management.

3.4   Monitoring of assumptions

Assumptions 1 and 2 below were identified in our initial application; assumption 5 was added as part of a change request in July 2022 (CR2207), and assumption 6 was added as part of a change request in December 2023 (CR2312). Assumptions 3 and 4 have been added as part of this annual report:

1. **(Whole project) Necessary research clearance will be granted for the project activities**: This assumption was met for Y1 and Y2, and we are currently in the process of applying for research clearance for Y3. We have no reason to believe that this will not be granted. However, we did face substantial delays in obtaining the specific permit required for GPS collaring in Y1 and Y2 – although this permission has since been obtained. We may once

again face delays in Y3, but will do everything in our power to avoid this, including by making regular follow-ups on the phone and in person and making use of our network of contacts within TAWIRI, TAWA and TANAPA.

2. **(Whole project) None of the participating organisations withdraw their support**: At the time of reporting, all participating organisations are still in support of the project.

3. **(Whole project) None of the key project team members leave their positions**: At the time of reporting, we are not aware of any key team members planning to leave their positions.

4. **(Whole project) Exchange rates do not undergo extreme fluctuations**: We will continue to monitor exchange rates in Y3, and will use other funds to buffer fluctuations if necessary.

5. **(Output 4) Partner organisations will have sufficient staff to carry out Ruaha-Udzungwa corridor assessment**: We will survey endpoints of the Ruaha-Udzungwa corridor for wildlife presence using a combination of walking transects and key informant interviews. This survey will be coordinated by STEP and carried out in collaboration with District and Local government.

6. **(Output 5) Necessary permissions are granted for South African trainers to deliver wildlife capture and immobilisation training course in Tanzania**: We have received verbal confirmation from the Director General of TAWIRI that the institute is in support of the planned veterinary training, and will help secure the necessary permissions.

3.5   Achievement of positive impact on biodiversity and poverty reduction

In terms of its higher-level impact on biodiversity conservation, this project has collected vital baseline information on threatened large carnivore species in southern Tanzania, and ensured this information is incorporated into conservation plans for the target species through presentations and reports to key stakeholders (see 3.2). In Y2, this information was used to help ecologists from management authorities collaboratively develop evidence-based conservation recommendations; in Y3, this information will be fed into formal management planning processes. This process will equip participating institutions with a roadmap for how to apply their new skills and knowledge to achieve biodiversity conservation goals in the study area, and the lessons learned can be used to inform conservation elsewhere in the country.

This project will also support human development in the longer term: with the tourist industry accounting for over 10% of Tanzania's GDP, delayed or misinformed wildlife management interventions have the potential to significantly impact the country's poverty reduction goals. The results of our research in MBOMIPA WMA, some of which were presented in Y2 and which will be published in Y3, also have the potential to help attract investors, which should help contribute to long-term poverty reduction for participating communities. There are also short-term human wellbeing benefits from this project, as training participants have been equipped with improved skills and knowledge that will help them succeed in their careers, pursue further education opportunities, and publish research.

4.   Project support to the Conventions, Treaties or Agreements

By contributing to evidence-based large carnivore management and embedding monitoring capacity in protected area management authorities, this work is helping to achieve the **NDC** (2021) of promoting sustainable tourism – including by providing robust data on population densities required to inform sustainable trophy hunting quotas [D03]. The project has also contributed significantly to the Strategic Goals outlined in Tanzania's **NBSAP** (2015), which are drawn directly from the **CBD's Aichi Biodiversity Targets** (2010). We have empowered management authorities to manage species requiring special attention for long-term sustainability (Target 12) – which will help improve the status of biodiversity (SG-C) – by continuing to deliver in-depth training in field and analytical methods to monitor and conserve large carnivores to the two main protected area management authorities and the government

wildlife research institute (see 3.1, 3.2) [A01-02]. We have enhanced the implementation of scientific knowledge (SG-E) by working closely with training recipients to discuss and interpret the findings of our research using the data collected as part of the project. We will build upon this in Y3 by continuing to collaboratively write scientific papers and produce actionable management recommendations based on our research findings.

The project has also helped to support the delivery of multiple adaptation activities identified in the country's **National Adaptation Plan** (NAP; 2007) by providing valuable information to inform wildlife management policy to ensure conservation of wildlife resources; enhancing capacity building on wildlife management for sustainable development by delivering training to management authorities; supporting the implementation of Community Based Management programmes of wildlife management areas through activities in MBOMIPA WMA; and contributing to the development of migratory corridors and buffer zones for wildlife species. In Y3 we will build upon this by supporting the incorporation of the project findings into formal management planning processes for the protected areas where research has been carried out.

The project has contributed much-needed information for **TAWIRI's Priority Areas for Research** (2012) and **COSTECH's Research Priorities** (2016). It has also directly addressed research and capacity gaps identified in TAWIRI's Lion & Leopard (2006) and Cheetah & African Wild Dog (2006) **Conservation Action Plans** – in doing so, the project has contributed to the joint **CITES-CMS African Carnivores Initiative** and the **CITES, CMS & IUCN CSG's African lion programme**. In Y2, the project leader participated in both the second *Tanzania Ministry of Natural Resources & Tourism (MNRT) Meeting to Review the National Action Plan for Lion & Leopard in Tanzania* in June 2023 [F01], and the *Global Cheetah Summit* in Ethiopia (see 3.2).

While we have not had any direct contact with the Tanzanian convention focal point – the Vice President's Office Division of Environment – we have had direct contact with MNRT, TAWIRI, and the Commission for Science and Technology (COSTECH), which all feed information into the focal point, by presenting our findings at meetings and providing regular reports.

5. Gender Equality and Social Inclusion (GESI)

Please quantify the proportion of women on the Project Board[1].	Women make up 83% (5 out of 6 members) of the project board: ✓ Dr Charlotte Searle (project leader; F) – WildCRU & Lion Landscapes ✓ Prof Amy Dickman (F) – WildCRU & Lion Landscapes ✓ Dr Alayne Oriol-Cotterill (F) – Lion Landscapes ✓ Ms Kathryn Doody (F) – FZS Tanzania ✓ Dr Josephine Smit (F) – STEP ✗ Mr Singira Ngoishiye Parsais (M) – TAWA
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at	60% (3 out of 5) of project partners are led by women or have a senior leadership team consisting of at least 50% women: ✓ Lion Landscapes is led by women; 4 out of 6 (67%) of the board of trustees and 80% (4 out of 5) of senior management positions are held by women. ✓ WildCRU is led by a woman; 40% (4 out of 10) of senior management positions are held by women. ✓ STEP is led by a man, but the organisation's research activities are led by a woman; 50% (2 out of 4) of the senior leadership team are women. ✗ TAWA is led by a man; 1 out of 9 (11%) senior management positions is held by a woman (https://www.tawa.go.tz/management)

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[1] A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

least 50% women[2].	✗ FZS Tanzania is led by a man, but the Selous-Nyerere programme director is a woman; 2 out of 8 (25%) of the senior leadership team are women.

GESI Scale	Description	
Not yet sensitive	The GESI context may have been considered but the project isn't quite meeting the requirements of a 'sensitive' approach	
Sensitive	The GESI context has been considered and project activities take this into account in their design and implementation. The project addresses basic needs and vulnerabilities of women and marginalised groups and the project will not contribute to or create further inequalities.	
Empowering	The project has all the characteristics of a 'sensitive' approach whilst also increasing equal access to assets, resources and capabilities for women and marginalised groups	X
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change	

This project is committed to fostering a more gender-equal conservation landscape in Tanzania's future, and half of the research assistants employed in lead partner LL's Tanzania programme are women. However, as discussed in our previous annual report, the widespread gender inequality within academic and conservation communities in Tanzania has resulted in this project having a low representation of women among its training participants (4 out of 43, 9% in Y1).

We resolved to address this issue in Y2 by actively seeking out opportunities to deliver training to women. One major achievement in this regard was the project leader's participation as a mentor and trainer in the Women in Conservation Technology course organised by WILDLABS, Fauna & Flora, and the Grumeti Fund. As part of this course, the project leader taught ten female conservationists how to use camera traps, as well as providing mentorship on broader issues relating to being a woman in conservation, bringing the representation of women in our field skills training to 26% (11 out of 43) [A01]. When organising the analysis workshop for TAWIRI, we also specifically encouraged them to identify as many female researchers as possible to benefit from the training, resulting in 6 out of 19 participants (32%) being women [A02]. In Y3, the project leader will participate in the Grumeti Fund's Women in the Field course to deliver more training in practical field skills to female conservationists, and will continue to support female students.

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[2] Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

Fig. 9: Participants in the 2023 Women in Conservation Technology course (left); a community information board showing wildlife photographed by the camera traps in the Kilombero Elephant Corridor (right).

This project is also committed to social inclusion. Local community groups have historically been marginalised during the gazettement of protected areas, so their close engagement is a key requirement for success in the newly-established Kilombero Elephant Corridor. To this end, STEP have been working closely and sensitively with these communities throughout their work to establish the corridor and subsequent monitoring activities. Prior to the start of fieldwork, meetings were held in Swahili with the three villages whose land the corridor passes through (Kanyenja, Sole, and Mang'ula). Each of these meetings was attended by 27 village council members, and was an opportunity to explain the work and address any questions or concerns the community members had. Members of these councils went on to participate in the camera trap deployment and checks, alongside village game scouts employed from local communities [I02].

6.   Monitoring and evaluation

M&E on this project is primarily carried out by the project leader; input is provided by other partners on relevant activities, particularly from STEP for activities relating to Output 4. On a monthly basis, the project leader reviews the activities carried out as part of the project, using the project logframe as a guide. This process provides an opportunity to track the project's performance against its intended Outcome, Outputs and Activities, and collate all financial and technical evidence in support of this. More detailed monitoring is carried out on a quarterly and annual basis – the Darwin reporting cycle is a good milestone for this planning – to review how well we are monitoring our impact.

The indicators of success include the number of papers published, number of people trained, number of students supported, training participants' responses to self-assessment questionnaires before and after training, meetings with management authorities to share the project findings, the incorporation of project findings into management plans, and collaborative corridor assessments; further detail on all indicators can be found in Annexes 1 and 2.

The contribution of the outputs and activities to securing the project outcome can be demonstrated by the fact that training participants and students have put their new skills and knowledge into practice by contributing to presentations, papers, and reports and pursuing opportunities for further study.

7.   Lessons learnt

Overall, we feel that the project has continued to work well over its second year: our capacity-building training has reached an even larger cohort of researchers and conservation practitioners, bringing the total number trained in field techniques to 86 (increasing to 113 when including people trained in 2020 and 2021 as part of the programme which formed the basis of this project) and analytical skills to 33 (see 3.1, 3.2) [A01-02]. We have seen the rewards from this training in the form of participants embarking on independent further study, and applying their skills to train colleagues and plan their own surveys elsewhere. In Y2 we have had the opportunity to expand the skills participants have received training in, including by carrying out the first large-scale acoustic survey targeting carnivores (see 3.1) [D01, F03]. This exposed Tanzanian researchers and practitioners to a cutting-edge new technology that could have numerous other applications beyond our focal species.

If we were to start the project again, one thing we would do differently would be to try and confirm the availability of the team for the Ruaha-Rungwa – Udzungwa corridor assessment further in advance of when the activity was planned to be carried out. Delays to this activity during the dry season in Y2 resulted in it being pushed to February 2024, which then meant that it could not be completed due to heavier than usual rains. While we addressed this issue by requesting an extension until December 2024 (CR2312), in hindsight it may have made more sense to submit this request earlier on in Y2, once it was clear the assessment would not be able to be completed

in the dry season. This issue should not re-emerge in Y3, as the dry season runs from June to December. Nonetheless, we would advise others working in East Africa to not plan for any field activities during the break between the rains unless absolutely necessary, given the often unpredictable nature of rains and their substantial impact on accessibility.

Reflecting on our two analytical workshops in Y2 has also helped highlight some ways we can strengthen the capacity-building in Y3. While both workshops were successful, the TAWIRI workshop group (19) was much larger than that of the TAWIRI/TAWA/TANAPA lion density workshop (9). Although we had requested a maximum of 10 people for the workshop, we opted to include all 18 research assistants put forward by TAWIRI to maximise its reach, but this meant it was not possible to deliver as much of the one-to-one guidance that can be really impactful in this kind of training. Going forward into Y3, we will explore the possibility of providing more intensive follow-up training to a subset of the TAWIRI workshop participants, to guide them through leading their own carnivore research.

One issue we are addressing at this stage is that our logframe still lists certain activities as being due to be completed by end of Y2, where in fact they will be completed by the end of Y3 (December 2024). This was an oversight, as we intended the indicators to mean that the activities in question would be completed by the end of the project, which is now end of Y3. We have made some small adjustments to the logframe to correct this (shown as tracked changes in Annex 2), and can submit this as a formal change request if required.

8.   Actions taken in response to previous reviews (if applicable)

The review of our first annual report raised some concerns that we have sought to address:

- **The need to recruit more female trainees**

As discussed in section 5 above, we sought to address this issue in Y2 by actively seeking out opportunities to deliver training to women, and made positive progress through the project leader's participation the Women in Conservation Technology course and the analytical workshop at TAWIRI HQ. However, there is still progress that could be made in recruiting more female trainees for the field-based activities, where representation has remained low. In Y3, we will continue to specifically ask management authorities to put forward women to participate in training opportunities.

- **The need to include additional assumptions in the logframe**

We apologise for not having incorporated additional assumptions into the logframe after the last review. New assumptions have now been added regarding staff leaving and fluctuating exchange rates, which have both impacted the project to date, so potential future impacts can be monitored.

- **The need to link conservation strategies into wider management plans**

We agree with the reviewer that the conservation strategies developed under activities 1.3 and 3.2 should link in clearly to any wider management plans for the protected areas, rather than being standalone documents that can be side-lined or ignored in favour of any formal management plans. To this end, the outputs of our research will feed into the Ecosystem Management Framework in Selous-Nyerere, which is due to be developed in Y3. This process will be led by TANAPA and TAWA and facilitated by FZS; these different institutions' involvement in the Darwin project should therefore help ensure our results and recommendations are incorporated into the framework. Our activities in Ruaha-Rungwa focus primarily in MBOMIPA WMA, which lacks such a formal planning structure. Nevertheless, STEP have a long-standing role in supporting the MBOMIPA board with management and protection activities, so the research findings can be fed into decision-making through this link. In Y3, we will finalise more results from the data collected in MBOMIPA WMA and share a recommendation report with the board.

9.   Risk Management

A new risk for the project that has emerged in the last 12 months is the impact of heavy rain on planned fieldwork activities. Specifically, the planned Ruaha-Rungwa – Udzungwa corridor assessment was unable to be carried out in February 2024 as planned due to particularly heavy rains as a result of El Niño. We were able to adapt to this risk in Y2 by delaying the activity to the dry season of 2024 (Y3), as part of a change request to extend the project duration by six months (CR2312). We have added this risk to the updated risk register, attached alongside this report.

Another risk that has impacted the project in Y2 is unforeseen delays in being issued permits for GPS collaring. Collaring requires both an overarching research permit to be granted and then a specific collaring permit to be granted. In both Y1 and Y2 our fieldwork plans were impacted by delays to this second permit, in addition to other unforeseen delays, which resulted in us needing to extend the project (CR2312) and push some collaring activities into Y3. We have sought to mitigate this risk in Y3 by applying to renew our research permits one quarter earlier than usual, so there should not be any gap between the expiry of our existing permits and the start of our new ones. This risk is captured as part of the risk relating to obtaining necessary research clearance.

10.   Sustainability and legacy

The responses of training participants to the self-evaluation questionnaire completed before and after the training workshops provide clear evidence of increased capacity resulting from this project (see 3.2) [B09, C09]. The progress of one training participant in his MSc research and the opportunity for another participant to embark on an international PhD programme is also an illustration of the capacity built since the project's inception (see 3.1) [G02, G06]. The enrolment of these two participants on their MSc and PhD will also help maintain the built capability and capacity in-country: both are employed by Tanzanian government entities, and will be expected to return to these positions after their studies. Completing advanced degrees will enable them to progress within their organisations, meaning they will be likely to have more decision-making power and be able to mentor the next generation of conservation practitioners.

Another training participant from LL – Darwin Project assistant Joseph Kaduma – will travel to Kenya in Y3 to deliver training in camera trap survey design and management for large carnivore monitoring to the Kenyan LL team and collaborators. This opportunity will allow the capacity built through this project to extend beyond a national scale, and having the responsibility for training other conservationists will solidify the skills and knowledge Joseph has developed to date through the project.

Strong evidence for the increasing interest resulting from the project was provided by the fact that TAWIRI approached the project leader in Y2 to request a training workshop for their early-career research assistants. The institute was interested in receiving training on how to monitor lion, leopard, and other large carnivores through camera trap surveys, so they can apply this to their own monitoring efforts elsewhere in the country. This resulted in the addition of a TAWIRI training workshop to the Y2 project activities (CR2312), which was delivered in March 2024.

11.   Darwin Initiative identity

The Darwin Initiative logo is captured on the lead partner's website. We have credited the Darwin Initiative Capability & Capacity fund and included the Darwin Initiative logo on all reports and presentations relating to the project in Y2 [D01-08, H01-08]. LL has also specifically mentioned the Darwin Initiative in multiple online communications, including two email newsletters to the organisation's supporters [F01-02] and three posts on our social media channels [F04].

This Darwin grant forms part of a wider programme of ecological research, monitoring, and capacity-building training led by LL in Tanzania. However, the Darwin Initiative is one of only three core funders for this work (alongside the Lion Recovery Fund and WWF Germany), and as such is a core part of the programme's identity.

There is some understanding of the Darwin Initiative within the host country, as there have been 41 projects supported by the Darwin Initiative in Tanzania, including two Capability & Capacity projects (including this project). However, there is still scope to expand this recognition. By mentioning the Darwin Initiative by name and including the logo on our reports to in-country partners and government stakeholders – including the Tanzania Commission for Science and Technology (COSTECH), TAWIRI, TAWA and TANAPA – we hope to help promote the initiative as a meaningful supporter of capacity-building, biodiversity conservation, and poverty reduction in the country.

12. Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?	No
Have any concerns been reported in the past 12 months	No
Does your project have a Safeguarding focal point?	Yes Name: BenJee Cascio Email: ████████████
Has the focal point attended any formal training in the last 12 months?	No
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 80% [12] Planned: 100% [15]
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses. No	
Please describe any community sensitisation that has taken place over the past 12 months; include topics covered and number of participants. N/A	
Have there been any concerns around Health, Safety and Security of your project over the past year? If yes, please outline how this was resolved. No	

13. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2023 – 31 March 2024)

| Project spend (indicative) since last Annual Report	2023/24 Grant (£)	2023/24 Total Darwin Initiative Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)	████	████		N/A
Consultancy costs	████	████		N/A
Overhead Costs	████	████		N/A
Travel and subsistence	████	████		Lower than expected fuel costs, higher than expected travel costs
Operating Costs	████	████		Higher than expected fieldwork allowances, lower than expected collaring costs
Capital items (see below)	████	████		Had to replace some faulty equipment
Others (see below)	████	████		Higher than anticipated collar subscription costs
TOTAL	**42,839.00**	**42,840.12**		

The project budget was changed as part of a change request (CR2312); this reduced the Y2 budget (Apr23-Mar24) from ██████ to ██████ and increased the Y3 budget (Apr24-Dec24) from ██████████. The main changes included creating new budget lines in Y2 to support training participants to present results at the TAWIRI Scientific Conference and in Y3 to organise a wildlife capture and immobilisation training course.

Project mobilised or matched funding during the reporting period (1 April 2023 – 31 March 2024)

	Secured to date	Expected by end of project	Sources
Matched funding leveraged by the partners to deliver the project (£)			
Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project (£)			

14. Other comments on progress not covered elsewhere

An additional output achieved through this project in Y2 was the production of educational booklets for tourists and tourism operators in Nyerere NP and Ruaha NP, providing an explanation of the conservation and research work done by LL in both landscapes [D07-08]. These booklets present key information on how and why we do research in a way that is accessible to a non-expert audience, and were produced to answer some of the questions we are frequently asked about our work. In doing so, we hope they will expand the reach of our capacity building by allowing guides to access new insights into large carnivore conservation and ecology that they can pass on to their guests.
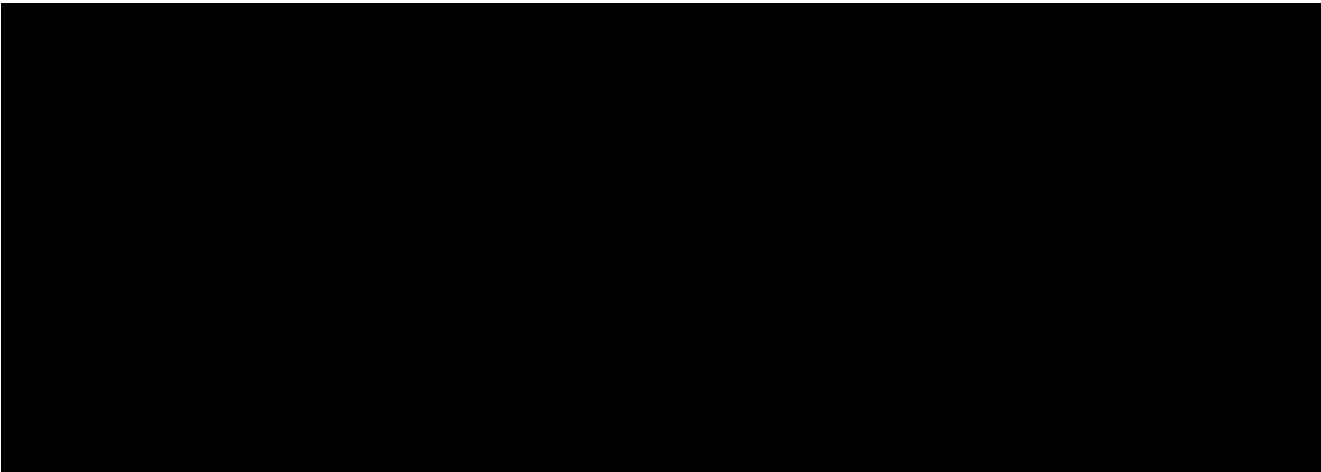
15. Outstanding achievements or progress of your project so far (300-400 words maximum). This section may be used for publicity purposes.

I agree for the Biodiversity Challenge Funds to edit and use the following for various promotional purposes.

From April 2023 to March 2024, Darwin Capability & Capacity project DARCC009 delivered training in field skills and analytical techniques to a total of 67 Tanzanian conservationists and researchers. This included an intensive training workshop held for early-career researchers (32% women) from the Tanzania Wildlife Research Institute (TAWIRI) in April 2024, which led participants through all the steps required to estimate population density from camera trap survey data. The goal is for these researchers to now use their newly developed skills to conduct surveys to assess the status of lion, leopard, and other large carnivores across the country.

In 2023, the Head Ecologist of Selous Game Reserve, Singira Ngoishiye Parsais, embarked on his master's studies at the Nelson Mandela Institution of Science and Technology (NM-AIST) in Tanzania with the support of a Wildlife Conservation Network scholarship. Singira has been a key member of the Darwin Capability & Capacity project team since 2020, and is now putting the skills he has developed through the project training to practice in his own studies. For his research, Singira is using data from camera traps, GPS collars, remote sensing, and interviews with community members to shed light on the ecology and threats of African wild dog in the Selous-Nyerere landscape. The Darwin grant is funding the majority of Singira's data collection, and has enabled him to unlock additional funding in the form of an Inclusivity Accelerator award from the University of Oxford's Wildlife Conservation Research Unit (WildCRU), which he used to buy a laptop for use in his research.

File Type (Image / Video / Graphic)	File Name or File Location	Caption including description, country and credit	Social media accounts and websites to be tagged (leave blank if none)	Consent of subjects received (delete as necessary)
Image	1_TAWIRI workshop_Charlotte Searle	TAWIRI training workshop participants learning how to classify species in camera trap photos – taken by Charlotte Searle	Lion Landscapes, TAWIRI, WildCRU	Yes
Image	2_TAWIRI workshop_Charlotte Searle	TAWIRI training workshop group photo – taken by Charlotte Searle	Lion Landscapes, TAWIRI, WildCRU	Yes
Image	2_MSc student Singira_Charlotte Searle	Tanzanian MSc student Singira Parsais – taken	Lion Landscapes, TAWA, WildCRU,	Yes

		by Charlotte Searle	Wildlife Conservation Network	

Annex 1: Report of progress and achievements against Indicators of Success for Financial Year 2023-2024

Project summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
Outcome Strengthened capacity amongst Tanzanian research institutions and PA management to conserve and manage large carnivore populations in southern Tanzania, alongside improved conservation outlook for two of Africa's most important large carnivore populations through evidence-based management		
Indicator 0.1 Five scientific papers on large carnivore assessment and monitoring with Tanzanian authors submitted for publication through this project by the end of Year 2	Two papers published [E01-02] and one paper in review [E03] (see 3.1 and 3.2)	Submit at least two of the following papers: - Selous-Nyerere lion density - Selous-Nyerere leopard density - Wild dog status in Selous GR (student-led) - Caracal habitat use in Ruaha NP (student-led) - Citizen science to study lions (student-led)
Indicator 0.2 Training participants (two TAWIRI researchers, ten TAWA/TANAPA Ecologists & Game Scouts/Rangers, and five LL/STEP research assistants) show increased confidence on average within each skills category in which they have received training (survey design, field skills, analytical skills, IT software & tools), compared to their confidence before the training	Lion density analysis & interpretation workshop [A02]: 100% of participants rated the workshop highly (mean = 5 out of 5), and all participants reported increased confidence in each of the skills covered by the training [B08-09] TAWIRI large carnivore density estimation workshop [A02]: 100% of participants rated the workshop highly (mean = 4.9 out of 5), and participants reported increased confidence in an average of 87% of the skills covered by the training, with ten participants reporting increased confidence in all of the skills covered [C07-09] (see 3.1, 3.2, and 3.3)	Support lion density analysis & interpretation workshop participants to co-author lion density paper. Provide ad-hoc support to TAWIRI density estimation workshop participants if designing their own SECR surveys.
Indicator 0.3 All UDSM Zoology students (BSc and MSc) and staff attending the UDSM training course show increased confidence on average within each skills category compared to their confidence before the course	To be delivered Y3	Organise and deliver training course at UDSM
Indicator 0.4 Research findings incorporated into PA management strategies by TAWA and TANAPA in relevant PAs in Selous-Nyerere and Ruaha-Rungwa by the end of Year 2	To be delivered Y3	Once TAWIRI approval of lion and leopard results confirmed, arrange meetings with TAWA and TANAPA senior staff to present results and recommendations. Participate in Ecosystem Management Framework planning for Selous-Nyerere.
Output 1 Improved skills and knowledge among Tanzanian PA management authorities, research institutions, and NGOs to assess and monitor large carnivore populations, including through the ability to carry out wildlife corridor assessments		
Indicator 1.1 Two TAWIRI researchers, ten TAWA/TANAPA Ecologists & Game Scouts/Rangers, and five LL/STEP research assistants (at least 30% women, or all women eligible for training if they make up less than 30% of the cohort) receive in-depth training in field methods for large	Training in field methods (camera trapping, GPS collaring, acoustic surveys, corridor assessment) delivered to 3 TAWIRI staff, 7 TANAPA staff, 2 FZS staff, 3 UEMC research assistants, 1 STEP	Continue field training

	research assistant, 3 LL staff, 11 village game scouts, 3 village council members, and 10 WiCT course attendees [A01] (see 3.1 and 3.2)	
Indicator 1.2 Two TAWIRI researchers, ten TAWA/TANAPA Ecologists, and five LL/STEP research assistants (at least 30% women, or all women eligible for training if they make up less than 30% of the cohort) attend a week-long training workshop on how to analyse the data collected and use findings to identify threats and inform population management (one workshop each year, in both Year 1 and 2)	Training delivered to 1 TAWIRI researcher, 5 TAWA/TANAPA ecologists, 2 FZS staff, and 1 LL research assistant (2 F = 25%, but all male attendees were ecologists and researchers who had been assigned for the field skills training from 2020 to 2022) [A02, B01-09] (see 3.1 and 3.2)	Work with training participants to collaboratively publish papers and deliver management recommendations based on density estimates
Indicator 1.3 Senior TAWA & TANAPA PA Managers in Ruaha-Rungwa and Selous-Nyerere are made aware of how findings can be used to inform PA management strategies, by attending a day-long meeting at TAWA & TANAPA HQs in Year 3	Meetings delayed due to TAWIRI being slower than anticipated to officially accept the results (see 3.1)	Once TAWIRI approval is confirmed, arrange meetings with TAWA and TANAPA senior staff to present results and recommendations
Indicator 1.4 At least six TAWIRI researchers (at least 30% women, or all women eligible for training if they make up less than 30% of the cohort) attend a week-long workshop on survey design, data processing, and analysis for carnivore population density monitoring through spatially explicit capture-recapture (SECR) analysis	Training delivered to 18 TAWIRI researchers and 1 LL research assistant (6 F = 32%) [A02, C01-09] (see 3.1 and 3.2)	Provide support to training participants to apply what they learnt to their own work
Output 2 Improved skills and knowledge among young Tanzanian academic researchers on how to study, monitor, and secure large carnivore populations in Tanzania		
Indicator 2.1 Four Tanzanian Master's students and one PhD student (at least 50% women) begin research projects with a focus on large carnivore research, monitoring, and conservation (two Master's students register in Year 1; two Master's students and one PhD student register in Year 2)	3 MSc students and 1 international Diploma student began or continued research projects with a focus on carnivores. We have continued supporting 1 prospective PhD student to plan his research and seek funding for his PhD [G01-06] (see 3.1 and 3.2)	Continue to support students to carry out their research; support prospective PhD student to secure a place for an international PhD programme
Indicator 2.2 50+ BSc and Masters students (at least 50% women), and 5+ faculty staff (at least 50% women) receive training in wildlife monitoring techniques by attending a week-long training course at UDSM in Year 3	To be completed in Y3	Organise and deliver training course at UDSM
Output 3 Improved knowledge on the status of, and threats to, large carnivore populations in two globally-important conservation areas is available to the scientific/conservation community and is employed to improve their management		
Indicator 3.1 Summary report on findings of field project in Ruaha-Rungwa and Selous-Nyerere drafted and shared with relevant PA management authorities by the end of Year 3	To be completed in Y3 due to delays with fieldwork and TAWIRI authorisation of results (see 3.1)	Produce summary report of fundings for management authorities in Ruaha-Rungwa and Selous-Nyerere
Indicator 3.2 Meetings held with senior management of Nyerere NP, Selous GR, Ruaha NP, and MBOMIPA WMA to collaboratively draft large carnivore conservation strategies based on the above findings by the end of Year 3	To be completed in Y3 due to delays with fieldwork and TAWIRI authorisation of results (see 3.1)	Once TAWIRI approval of lion and leopard results confirmed, arrange meetings with TAWA and TANAPA senior staff to present results and recommendations. Participate in Ecosystem Management Framework planning for Selous-Nyerere.

Indicator 3.3 Findings shared with the wider public through the submission of at least five scientific papers, to be led or co-led by Tanzanian training participants from TAWIRI, TANAPA, TAWA, Universities, LL and STEP, in open access journals by the end of Year 3	Two papers published [E01-02] and one paper in review [E03] (see 3.1 and 3.2)	Submit at least two of the following papers: − Selous-Nyerere lion density − Selous-Nyerere leopard density − Wild dog status in Selous GR (student-led) − Caracal habitat use in Ruaha NP (student-led) − Citizen science to study lions (student-led)
Output 4 Improved knowledge by all relevant stakeholders of the status, threats to, and functional connectivity of corridors linking these landscapes (Ruaha-Rungwa – Udzungwa & Nyerere-Selous – Udzungwa)		
Indicator 4.1 Collaborative corridor assessments and preliminary data analyses are carried out in both corridors of interest	Camera traps deployed for five months in Nyerere-Selous – Udzungwa corridor [I01-02] (see 3.1 and 3.2)	Redeploy camera traps to monitor Nyerere-Selous – Udzungwa corridor Complete assessment of Ruaha-Rungwa – Udzungwa corridor
Indicator 4.2 Findings are shared with relevant stakeholders by the end of the project, through the production of a final report by the end of Year 3	To be completed in Y3	Produce final report on Nyerere-Selous – Udzungwa corridor assessment Produce final report on Ruaha-Rungwa – Udzungwa corridor assessment
Output 5 Improved skills and knowledge among Tanzanian wildlife veterinarians on wildlife capture and immobilisation		
Indicator 5.1 Wildlife capture and immobilisation training course organised for at least ten participants, including TAWIRI, TANAPA and TAWA vets and LL research assistants	To be completed in Y3	Complete wildlife capture and immobilisation course
Indicator 5.2 Training participants successfully complete the training course and pass the end of course assessment	To be completed in Y3	Complete wildlife capture and immobilisation course

Annex 2: Project's full current Indicators of Success as presented in the application form (unless changes have been agreed)

Project summary	SMART Indicators	Means of verification
Outcome Strengthened capacity amongst Tanzanian research institutions and PA management to conserve and manage large carnivore populations in southern Tanzania, alongside improved conservation outlook for two of Africa's most important large carnivore populations through evidence-based management	0.1 Five scientific papers on large carnivore assessment and monitoring with Tanzanian authors submitted for publication through this project by the end of Year 3~~2~~	Journal confirmation emails
	0.2 Training participants (two TAWIRI researchers, ten TAWA/TANAPA Ecologists & Game Scouts/Rangers, and five LL/STEP research assistants) show increased confidence on average within each skills category in which they have received training (survey design, field skills, analytical skills, IT software & tools), compared to their confidence before the training	Self-evaluation surveys completed by participants before and after training activities
	0.3 All UDSM Zoology students (BSc and MSc) and staff attending the UDSM training course show increased confidence on average within each skills category compared to their confidence before the course	Self-evaluation surveys completed by UDSM students and staff before and after week-long training course
	0.4 Research findings incorporated into PA management strategies by TAWA and TANAPA in relevant PAs in Selous-Nyerere and Ruaha-Rungwa by the end of Year 3~~2~~	Large carnivore population management strategies to be shared
Output 1 Improved skills and knowledge among Tanzanian PA management authorities, research institutions, and NGOs to assess and monitor large carnivore populations, including through the ability to carry out wildlife corridor assessments	1.1 Two TAWIRI researchers, ten TAWA/TANAPA Ecologists & Game Scouts/Rangers, and five LL/STEP research assistants (at least 30% women, or all women eligible for training if they make up less than 30% of the cohort) receive in-depth training in field methods for large carnivore population assessment & monitoring and wildlife corridor assessments~~ across Years 1 and 2~~	Fieldwork activity logs; co-authorship of field team participants on subsequent reports and scientific publications
	1.2 Two TAWIRI researchers, ten TAWA/TANAPA Ecologists, and five LL/STEP research assistants (at least 30% women, or all women eligible for training if they make up less than 30% of the cohort) attend a week-long training workshop on how to analyse the data collected and use findings to identify threats and inform population management (one workshop each year, in both Year 1 and 2)	Training course attendance certificates
	1.3 Senior TAWA & TANAPA PA Managers in Ruaha-Rungwa and Selous-Nyerere are made aware of how findings can be used to inform PA management strategies, by attending a day-long meeting at TAWA & TANAPA HQs in Year 3~~2~~	Meeting minutes, signed by all participants
	1.4 At least six TAWIRI researchers (at least 30% women, or all women eligible for training if they make up less than 30% of the cohort) attend a week-long workshop on survey design, data processing, and analysis for carnivore population density monitoring through spatially explicit capture-recapture (SECR) analysis	Signed list of attendees and training course attendance certificates

Output 2	2.1 Four Tanzanian Master's students and one PhD student (at least 50% women) begin research projects with a focus on large carnivore research, monitoring, and conservation (two Master's students register in Year 1; two Master's students and one PhD student register in Year 2)	University registration certificate & research project plan co-signed by student, Project Leader, and University supervisor
Improved skills and knowledge among young Tanzanian academic researchers on how to study, monitor, and secure large carnivore populations in Tanzania	2.2 50+ BSc and Masters students (at least 50% women), and 5+ faculty staff (at least 50% women) receive training in wildlife monitoring techniques by attending a week-long training course at UDSM in Year 3~~2~~	Signed list of attendees
Output 3	**3.1** Summary report on findings of field project in Ruaha-Rungwa and Selous-Nyerere drafted and shared with relevant PA management authorities by~~at~~ the end of Year 3~~2~~	Findings report
Improved knowledge on the status of, and threats to, large carnivore populations in two globally-important conservation areas is available to the scientific/conservation community and is employed to improve their management	**3.2** Meetings held with senior management of Nyerere NP, Selous GR, Ruaha NP, and MBOMIPA WMA to collaboratively draft large carnivore conservation strategies based on the above findings by the end of Year 3~~2~~	Meeting minutes, signed by all participants
	3.3 Findings shared with the wider public through the submission of at least five scientific papers, to be led or co-led by Tanzanian training participants from TAWIRI, TANAPA, TAWA, Universities, LL and STEP, in open access journals by the end of Year 3~~2~~	Journal confirmation emails
Output 4	**4.1** Collaborative corridor assessments and preliminary data analyses are carried out in both corridors of interest ~~in Year 2~~	Preliminary field report, signed by all participants, for both corridor surveys
Improved knowledge by all relevant stakeholders of the status, threats to, and functional connectivity of corridors linking these landscapes (Ruaha-Rungwa – Udzungwa & Nyerere-Selous – Udzungwa)	**4.2** Findings are shared with relevant stakeholders by the end of the project, through the production of a final report by the end of Year 3~~2~~	Final report
Output 5	**4.3** Wildlife capture and immobilisation training course organised for at least ten participants, including TAWIRI, TANAPA and TAWA vets and LL research assistants	Training course attendance certificates
Improved skills and knowledge among Tanzanian wildlife veterinarians on wildlife capture and immobilisation	**4.4** Training participants successfully complete the training course and pass the end of course assessment	Report from training providers confirming participants' assessment results

Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)

1.1 Establishment of one large carnivore research & monitoring team in MBOMIPA WMA and Ruaha NP in Ruaha-Rungwa, and one in Selous GR and Nyerere NP in Selous-Nyerere, to carry out large carnivore research and monitoring for the duration of the project. Tanzanian TAWIRI, TAWA, TANAPA, and LL staff will lead the data collection for both, under the supervision of the Project Leader. Data will be collected, and training will be provided, in survey & monitoring programme design, camera trapping, sign-based surveys, demographic surveys, threats identification, and prey population assessments

1.2 Analytical training workshops held to train participants in 1.1 on how to employ the data collected to monitor populations, identify threats, and strengthen management

1.3 A series of meetings are held by the Project Leader, TAWIRI researchers, TAWA & TANAPA Ecologists with TAWA/TANAPA PA Managers at each PA in the study sites, and large carnivore monitoring strategies for each are collaboratively developed

1.4 Week-long intensive training course in survey design, data processing, and analysis for carnivore population density monitoring through spatially explicit capture-recapture (SECR) analysis is led by the Project Leader for TAWIRI researchers

1.5 Write-up of key findings in the form of findings reports & up to five scientific publications, to be collaboratively led by the Project Leader and TAWIRI, TANAPA, and TAWA staff

2.1 Data collected by the field teams is made available to four Master students and one PhD student from the UDSM over the course of the project's lifetime, under the co-supervision of the Project Leader. Students will also be invited to join the field research & monitoring teams to collect their own supplemental data

2.2 Week-long course on the fundamentals of wildlife monitoring is held by the Project Leader at the UDSM for BSc and MSc Masters and faculty staff

2.3 same as 1.1

3.1 same as 1.5

3.2 same as 1.3

4.1 Collaborative functional connectivity assessment survey and training in the Ruaha-Rungwa – Udzungwa wildlife corridor, to be carried out by LL, STEP, TANAPA, and TAWIRI, using a combination of sign-based, questionnaire, and camera trapping methods, followed by analysis of data and collaborative write-up of preliminary & final findings report

4.2 Collaborative functional connectivity assessment survey and training in the Selous-Nyerere – Udzungwa wildlife corridor, to be carried out by LL, STEP, TANAPA, and TAWIRI, using a combination of sign-based, questionnaire, and camera trapping methods, followed by analysis of data and collaborative write-up of preliminary & final findings report

5.1 Wildlife capture and immobilisation training course is organised for TAWIRI, TANAPA and TAWA vets and LL research assistants

Important Assumptions

– *Whole project*: Necessary research clearance will be granted for the project activities

– *Whole project*: None of the participating organisations withdraw their support

– *Whole project: None of the key project team members leave their positions*

– *Whole project: Exchange rates (GBP-USD and GBP-TZS) do not undergo extreme fluctuations*

– *Output 4*: Partner organisations will have sufficient staff available to carry out Ruaha-Udzungwa corridor assessment. If this is not possible, we will design the assessment and seek Tanzanian partners to lead the data collection after receiving training.

– *Output 5*: Necessary permissions are granted for South African trainers to deliver wildlife capture and immobilisation training course in Tanzania

Annex 3: Standard Indicators

Table 1   Project Standard Indicators

DI Indicator number (*core)	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Total to date	Total planned during the project
DI-A01*	Number of people from key national and local stakeholders completing structured and relevant training	People	Men	39 field skills 6 analytical	32 field skills 19 analytical	71 field skills 25 analytical	17 field skills 23 analytical (at least 30% F or all women eligible for training)
DI-A01*	Number of people from key national and local stakeholders completing structured and relevant training	People	Women	4 field skills	11 field skills 8 analytical	15 field skills 8 analytical	
DI-A02*	Number of students undertaking research in collaboration with project	People	Men	1 F MSc	2 F MSc 1 F Diploma	2 F MSc 1 F Diploma	4 MSc 1 PhD
DI-A02*	Number of students undertaking research in collaboration with project	People	Women	1 M MSc 1 M PhD	1 M MSc 1 M PhD	1 M MSc 1 M PhD	(at least 50% F)
DI-A03*	Number of local/national organisations with improved capability and capacity as a result of project	Number	Organisation type	6 MBOMIPA, TAWIRI, TAWA, TANAPA, LL, STEP	8 TAWIRI, TAWA, TANAPA, LL, STEP, FZS, UEMC, Village committee	14	3
DI-A01* DI-A03*	Proportion of training participants reporting improved capacity after training	People	Gender	6 100% (all M)	26 100% (20 M, 6 F)	32 100% (26 M, 6 F)	23 100%
DI-A07	Number of government institutions/departments with enhanced awareness and understanding of biodiversity and associated poverty issues	Govt. institutions	Organisation type	3 TAWIRI, TANAPA, TAWA	3 TAWIRI, TANAPA, TAWA	3	3
DI-B01*	Number of corridor assessments completed	Number	-	NA	1	1	2
DI-B02*	Number of new/improved species management plans available and endorsed	Number	-	0	0	0	2
DI-C06	Number of downloads of new peer reviewed publications.	Number	-	0	Selous-Nyerere cheetah: 450 HTML views	1,654	NA

DI Indicator number (*core)	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Total to date	Total planned during the project
					Ruaha-Rungwa hyaena: 1,204 full-text views		
DI-C14	Number of decision-makers attending briefing events	Number	Gender Type	0	0	0	At least 3
DI-C17	Number of unique papers submitted to peer reviewed journals	Number	-	1	2	3	5
DI-C18	Number of papers published in peer reviewed journals	Number	-	0	2	2	NA

Table 2   Publications

Title	Type	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
Spotted hyaena population density across habitat and land use types in southern Tanzania	Peer-reviewed paper	Charlotte E. Searle, Paolo Strampelli, Josephine B. Smit, Lameck Mkuburo, Fiona Mathews, Halima Kiwango, David W. Macdonald, Andrew J. Loveridge, Amy J. Dickman (2023)	F (5 of 9 authors F; 56%)	British (2 of 9 authors Tanzanian; 22%)	Journal of Zoology	https://doi.org/10.1111/jzo.13119
Cheetahs in Tanzania's Selous–Nyerere ecosystem: Lack of evidence for current persistence, and reflections on historical status	Peer-reviewed paper	Charlotte E. Searle, Paolo Strampelli, Leonard Haule, Singira N. Parsais, Kandey Olesyapa, Nasri Dadi Salum, Dennis Ikanda, Samuel Mtoka, Germanus Hape, Daniel Mathayo, Manase Elisa, Alex L. Lobora, Amy J. Dickman (2023)	F (2 of 13 authors F; 15%)	British (10 of 13 authors Tanzanian; 77%)	Oryx	https://doi.org/10.1017/S0030605323001424
Catching up with Lion Landscapes – July 2023	Newsletter	Lion Landscapes (2023)	NA	NA	Lion Landscapes	https://mailchi.mp/lionlandscapes/newsletter-july-2023
Catching up with Lion Landscapes – January 2024	Newsletter	Lion Landscapes (2024)	NA	NA	Lion Landscapes	https://mailchi.mp/lionlandscapes.org/catching-up-with-lion-landscapes-12674571
The first large-scale acoustic survey for lions	Blog	Jonathan Growcott (2023)	M	British	Lion Landscapes	https://www.lionlandscapes.org/post/the-first-large-scale-acoustic-survey-for-lions

Annex 4: Supplementary material

Please see the attached evidence:

Reference	Category/activity	Evidence
A01	Training	Field methods_Participants list
A02	Training	Analytical_Participants list
A03	Training	Women in Conservation Technology_Course overview
B01	Lion analysis workshop	Invitation letters
B02	Lion analysis workshop	Pre-workshop email
B03	Lion analysis workshop	Post-workshop email
B04	Lion analysis workshop	List of attendees
B05	Lion analysis workshop	Booklet
B06	Lion analysis workshop	Slides
B07	Lion analysis workshop	Certificates
B08	Lion analysis workshop	Questionnaires
B09	Lion analysis workshop	Summary of questionnaire responses
C01	TAWIRI SECR workshop	Pre-workshop email
C02	TAWIRI SECR workshop	Post-workshop email
C03	TAWIRI SECR workshop	List of attendees
C04	TAWIRI SECR workshop	Booklet
C05	TAWIRI SECR workshop	Slides
C06	TAWIRI SECR workshop	Certificates of completion
C07	TAWIRI SECR workshop	Pre-workshop questionnaires
C08	TAWIRI SECR workshop	Post-workshop questionnaires
C09	TAWIRI SECR workshop	Summary of questionnaire responses
D01	Reports	Selous-Nyerere large carnivore research report for TANAPA
D02	Reports	COSTECH & TAWIRI quarterly report examples
D03	Reports	Population density of lion and leopard in Selous-Nyerere
D04	Reports	Email sharing Selous-Nyerere lion and leopard report
D05	Reports	Lion and leopard action plan_Ruaha-Rungwa lion population estimates
D06	Reports	Lion and leopard action plan_Selous-Nyerere lion population estimates
D07	Reports	Lion Landscapes booklet for tourism operators_Ruaha-Rungwa
D08	Reports	Lion Landscapes booklet for tourism operators_Selous-Nyerere
E01	Publications	Paper_Ruaha-Rungwa spotted hyaena
E02	Publications	Paper_Selous-Nyerere cheetah
E03	Publications	Paper review_Selous strawberry leopard
F01	Communications	LL newsletter_202307
F02	Communications	LL newsletter_202401
F03	Communications	LL blog_Acoustic survey
F04	Communications	LL social media updates
G01	Students	MSc_Janeth_Thesis cover and abstract
G02	Students	MSc_Singira_Concept note
G03	Students	MSc_Anitha_Email about project
G04	Students	Diploma_Nyasatu_WildCRU blog post
G05	Students	Diploma_Nyasatu_Paper title and abstract
G06	Students	PhD_Leonard_Proposal
H01	Presentations	Zambian Carnivore Program visit
H02	Presentations	Women in Conservation Technology_Camera trap case study
H03	Presentations	Women in Conservation Technology_Data management
H04	Presentations	TAWIRI conference_Status of wild dogs in Selous-Nyerere
H05	Presentations	TAWIRI conference_MBOMIPA carnivore trends
H06	Presentations	TAWIRI conference_Selous-Nyerere lion and leopard densities
H07	Presentations	Ruaha-Rungwa results presentation
H08	Presentations	Selous-Nyerere results presentation
I01	Corridor assessment	Camera trap check protocol_Swahili
I02	Corridor assessment	Corridor monitoring tracking