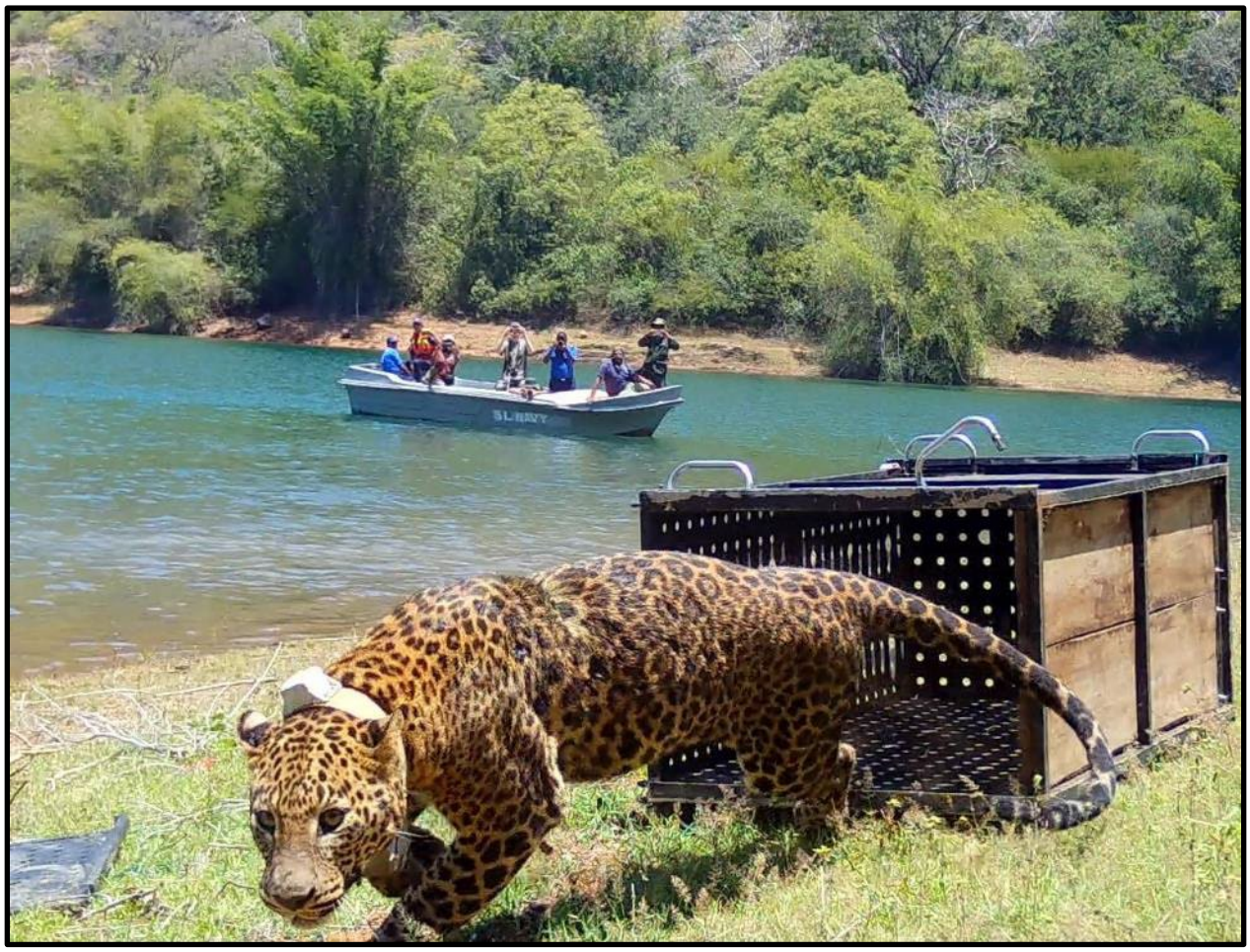
The Leopard Project

Annual Report 2023

February 2024



GPS Radio-Collared Release back into the wild, of a snared, injured, rehabilitated leopard

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Executive Summary

After several years of external challenges, from access restrictions post Easter Bombings of 2019, two years of Covid-19 restrictions and a full year of severe economic challenges, 2023 saw some stability. Although the economic situation in Sri Lanka remains difficult with prices of all goods rising dramatically in 2022, there is better availability, with fuel expensive but accessible, and other goods the same.

WWCT maintained its focus in 2023 for long-term leopard conservation in Sri Lanka, continuing monitoring across multiple sites and habitats.

A key milestone was achieved early in the year with the signing of the Elbedda Ridge Corridor (ERC) Memorandum of Understanding with Kelani Valley Plantations Ltd (KVPL), the Regional Plantation Company that operates all of the 7 partner tea estates along the southern and western bounds of ERC. KVPL has been an enthusiastic partner and has embraced the opportunity to maintain this identified conservation corridor. A well-received progress and awareness meeting – in conjunction with the Department of Wildlife Conservation (DWC) – in November, has kept up momentum.
Placement of a wider array of remote camera stations lower down on the ridge has provided considerable new information and further expanded our understanding of leopard spatial dynamics in this area. ERC currently holds a resident leopard population of 17.

The Peak Ridge Forrest Corridor leopards, current resident population of minimum 11, continue to teach us well, with one of the resident females – who we have now tracked for 8 years – having what is at least her 5th litter of cubs in 2023. This would have seemed a remarkable piece of information just a few years ago, but we now realize that this long-term occupancy, and resilience in the face of fairly intense human activity, is not especially uncommon for leopards here.
Importantly, we are planning on expanding this ridgeline protection model towards other highland connections in 2024.

As hoped, the reforestation of the PRFC site has improved in 2023. in terms of sapling success rate, helped by careful, individual care and an improved planting regime. The long, rainy second half of the year also helped to ensure adequate moisture in what can be a very dry part of the landscape. Several hundred trees were planted in 2023 and as of the end of the year almost all were still surviving. The early part of 2024 – the dry season in the hills – will be key to knowing that our re-wildling efforts are working.

The Yala Buffer zone monitoring suffered through the first 2/3 of the year due to widespread camera malfunction and issues with partner responsibilities, but by years' end, after WWCT resumed full responsibility of field checks and new equipment was re-deployed, monitoring was resumed. There has been a concerning complete turnover of individuals in this region, continued data will confirm the status of leopards here.

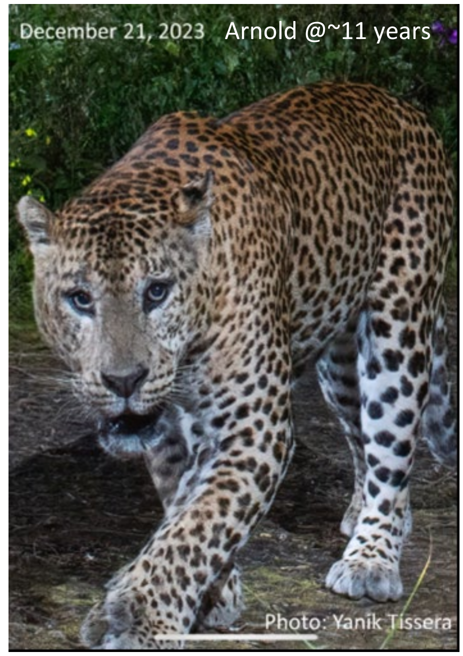
We were excited to re-start monitoring work in the Gal Oya National Park region. A number of remote cameras were set-up in the unprotected slash-and-burn landscape west of the NP, and although access was restricted due to heavy flooding in December, interesting information is being obtained.

A similar number of confirmed island-wide leopard deaths (9) to the past couple of years was recorded. This is both negative (that the number has not reduced) and positive (that the number has not increased). Most known deaths continue to be in the Central Highlands and caused by snares. WWCT conducted 13 environmental art competitions, 10 dedicated school awareness programs and 15 community awareness programs in this region in 2023. We will be expanding these outreach activities in upcoming years as we continue to encourage and maintain human-leopard co-existence here.

Finally, WWCT participation in the inaugural Global Leopard Conference (GLC) in 2023 was a fantastic opportunity to discuss ongoing work with the international community and to hear extensively – and learn

a great deal – from the international leopard research community. Further exposure of WWCT activities came from BBC television, a French documentary on Yala and a WWCT-authored newspaper series.

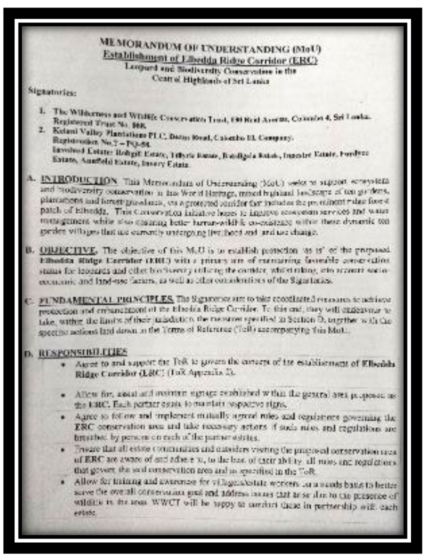
Update of WWCT Activities - January to December 2023



I. Research

A. Central Highlands

The biggest accomplishment in the Central Highlands in 2023 was the signing of the Memorandum of Understanding for the establishment of the Elbedda Ridge Corridor on April 17 (Fig. 1).



MEMORANDUM OF UNDERSTANDING (MoU)
Establishment of Elbedda Ridge Corridor (ERC)
Leopard and Biodiversity Conservation in the Central Highlands of Sri Lanka

Signatories:

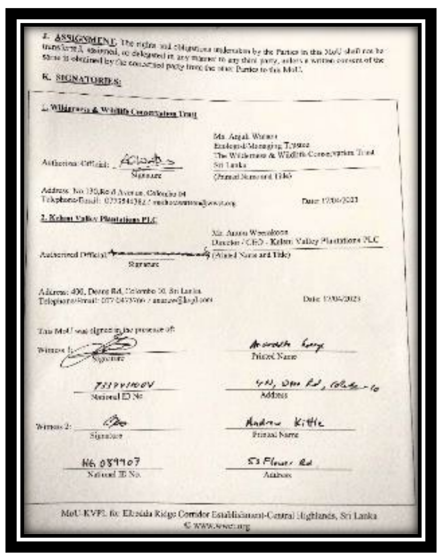
1. The Wilderness and Wildlife Conservation Trust, 130 Reid Avenue, Colombo 4, Sri Lanka. Registered Trust No. [illegible]
2. Kelani Valley Plantations PLC, [illegible] Road, Colombo [illegible] Company Registration No. [illegible]
   Involved Estate: [illegible]

A. INTRODUCTION. This Memorandum of Understanding (MoU) seeks to support ecosystem and biodiversity conservation in this World Heritage, mixed highland landscape of tea gardens, plantations and forest grasslands, via a protected corridor that includes the prominent ridge forest patch of Elbedda. This Conservation Initiative hopes to improve ecosystem services and water management while also ensuring better human-wildlife co-existence within these dynamic tea garden villages that are currently undergoing livelihood and land use change.

B. OBJECTIVE. The objective of this MoU is to establish protection 'as is' of the proposed Elbedda Ridge Corridor (ERC) with a primary aim of maintaining favorable conservation status for leopards and other biodiversity utilizing the corridor, whilst taking into account socio-economic and land-use factors, as well as other considerations of the Signatories.

C. FUNDAMENTAL PRINCIPLES. The Signatories aim to take coordinated measures to achieve protection and enhancement of the Elbedda Ridge Corridor. To this end, they will endeavour to take, within the limits of their jurisdiction, the measures specified in Section D, together with the specific actions laid down in the Terms of Reference (ToR) accompanying this MoU.

D. RESPONSIBILITIES
- Agree to and support the ToR to govern the concept of the establishment of Elbedda Ridge Corridor (ERC) (ToR Appendix 2).
- Allow for, assist and maintain signage established within the general area proposed as the ERC. Each partner estate to maintain respective signs.
- Agree to follow and implement mutually agreed rules and regulations governing the ERC conservation area and take necessary actions if such rules and regulations are breached by persons on each of the partner estates.
- Ensure that all estate communities and outsiders visiting the proposed conservation area of ERC are aware of and adhere to, to the best of their ability, all rules and regulations that govern the said conservation area and as specified in the ToR.
- Allow for training and awareness for villagers/estate workers on a needs basis to better serve the overall conservation goal and address issues that arise due to the presence of wildlife in the area. WWCT will be happy to conduct these in partnership with each estate.



J. ASSIGNMENT. The rights and obligations undertaken by the Parties in this MoU shall not be transferred, assigned, or delegated in any manner to any third party, unless a written consent of the same is obtained by the concerned party from the other Parties to this MoU.

K. SIGNATORIES:

1. Wilderness & Wildlife Conservation Trust

Authorized Official: [signature]
Signature

Ms. Anjali Watson
Ecologist/Managing Trustee
The Wilderness & Wildlife Conservation Trust
Sri Lanka
(Printed Name and Title)

Address: No. 130, Reid Avenue, Colombo 04
Telephone/Email: [illegible]
Date: 17/04/2023

2. Kelani Valley Plantations PLC

Mr. Anura Weerakoon
Director / CEO - Kelani Valley Plantations PLC
Authorized Official: [signature] (Printed Name and Title)
Signature

Address: 400, Deans Rd, Colombo 10, Sri Lanka
Telephone/Email: [illegible]
Date: 17/04/2023

This MoU was signed in the presence of:

Witness 1: [signature] Signature — Anuradha [illegible] Printed Name
[illegible] National ID No — [illegible], Colombo-10 Address

Witness 2: [signature] Signature — Andrew Kittle Printed Name
N6 089907 National ID No. — 53 Flower Rd Address

MoU-KVPL for Elbedda Ridge Corridor Establishment-Central Highlands, Sri Lanka
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Fig. 1: The MoU signed between The Wilderness & Wildlife Conservation Trust (WWCT) and Kelani Valley Plantations PLC (KVP) on April 17, 2023 to establish the Elbedda Ridge Corridor.

This agreement, between The Wilderness & Wildlife Conservation Trust (WWCT) and Kelani Valley Plantations PLC (KVP) was to ensure the protection "as is" of a strip of land ~9.5 km in length and ~1 km wide that runs along the Elbedda Ridge, northwest from the Agra-Bopats Forest Reserve, to an area east of Hatton which connects to further ridgelines to the north and west (Fig. 2).

Similar to the Peak Ridge Forest Corridor (PRFC) to the south (which was established in 2021), ERC ensures the protection of key habitat that acts as both a refuge and movement corridor for leopards and a host of wider biodiversity in the highly fragile, sub-montane system.

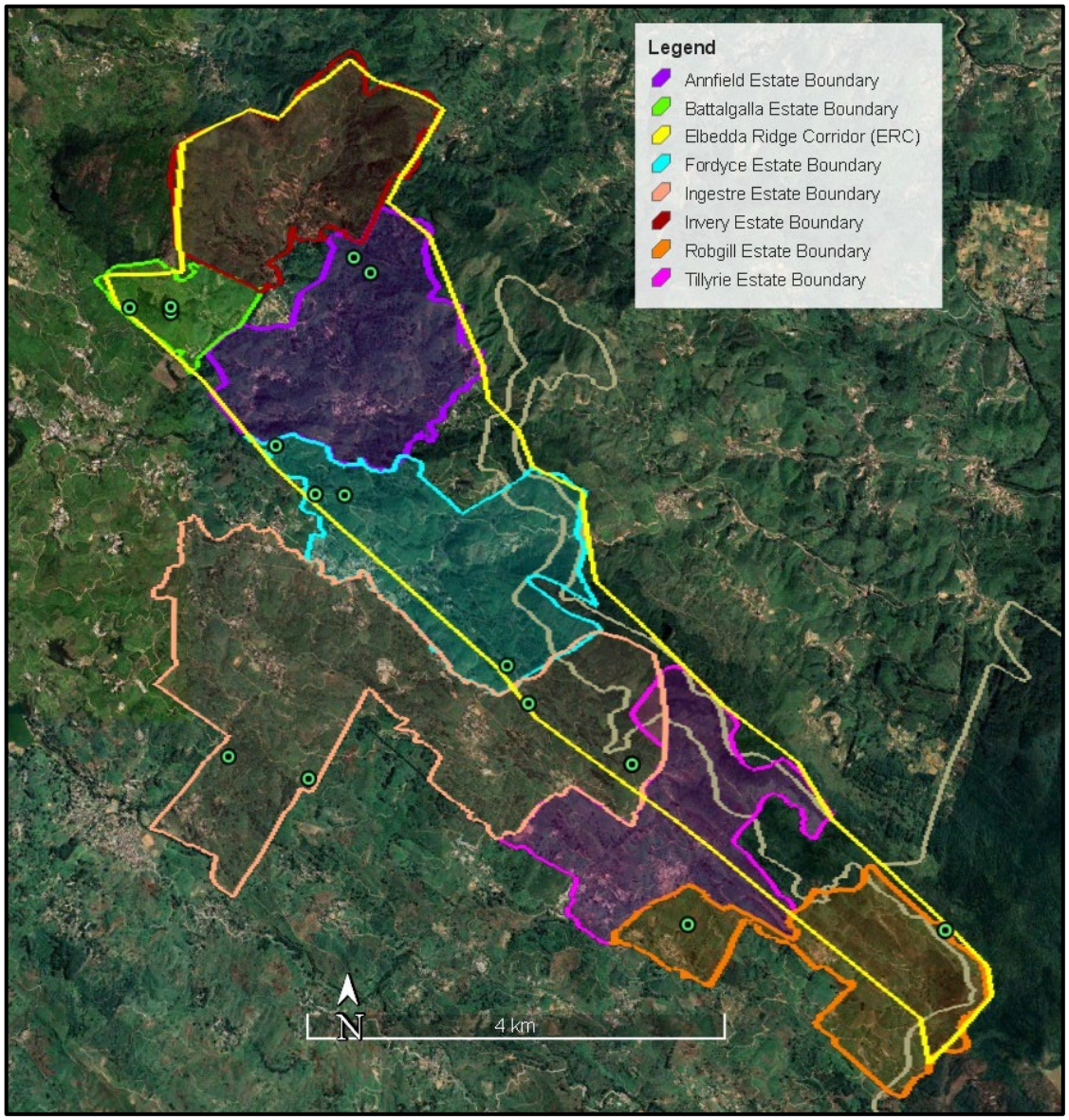


Fig. 2: Elbedda Ridge Corridor (ERC) outlined in yellow, overlaid across the 7 Kelani Valley plantations PLC estates. Remote camera locations are shown with green dots.

i. Peak Ridge Forest Corridor

Leopard Activity

Monitoring of PRFC improved in 2023 with 1982 active remote camera days (Fig. 3) which collected 154 leopard images across 140 observations (Fig. 4). The relative abundance index (RAI = # leopards/100 monitoring days) for the year was 7.81 which is consistent with past years and almost exactly the average across all 8 years (7.78). While monitoring of the southern and central sections of PRFC was better in 2023, we were again unable to monitor the northwestern section of the PRFC. As such the 11 identified individuals recorded using PRFC in 2023 was an underrepresentation of the entire ridge.

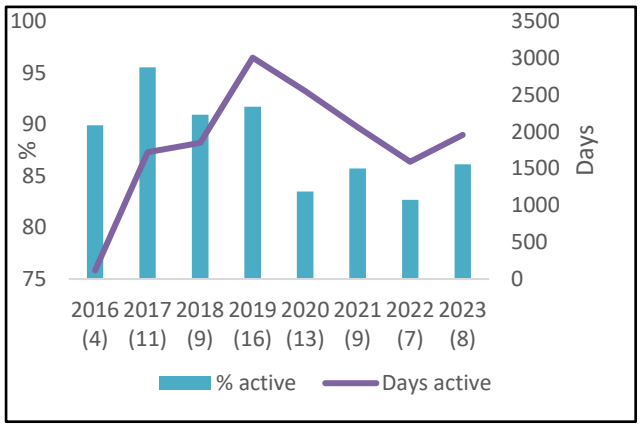
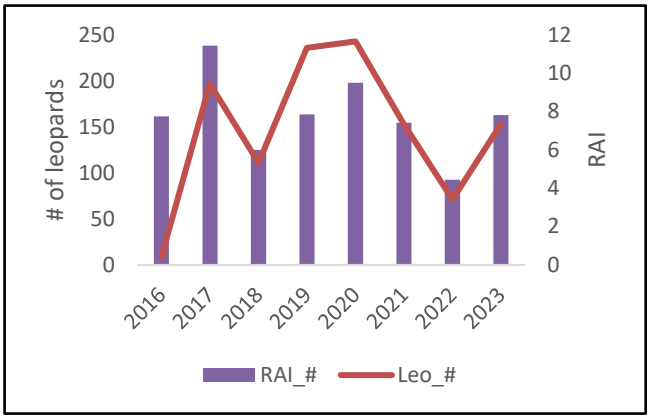


Fig. 3: The total number of days of remote camera activity across all PRFC camera locations (line) and the percentage of the total time that cameras were set up that they were effectively functioning (bars). The number of camera locations appear in brackets beneath the relevant year.

Fig. 4: The yearly total number of leopard photo-captures (line) and Relative Abundance Index (RAI = leopard photos/100 remote camera 24-hr periods) in the PRFC study area.



Of the 11 leopards detected along the PRFC in 2023, 6 were adult females, 3 were adult males and there were (at least) 2 cubs. The females included long-term resident "**OC**", who has now been monitored in the region for 7+ years, as well as her 2019 cub "**OK**", who in 2023 (or very late 2022) had 1 or 2 cubs of her own (Fig. 5). Further south along PRFC, "**Nellie**", the daughter of a female killed in a snare in 2021 ("Nina"), also had a cub (Fig. 6), although neither "Nellie" nor the cub have been detected since August. A new adult female "**Kween**" appeared in "Nellie's" range in June and has been detected fairly regularly since (Fig. 7). Another young adult female "**Kewpie**" was recorded on a few occasions in the middle of the year (Fig. 7). The final adult female recorded was unfortunately photo-captured once at the top of a path leading to an upper division community where dogs had been reported taken (Fig. 8). This female was first detected in 2021 on the Western and Elbedda Ridges and recorded as a "young female" (Fig. 8). Whether she is now resident on PRFC is uncertain.

Fig. 5: Long-term resident “OC” on Dunkeld estate (left) and her 2019 cub “OK” with her own cub on Glentilt estate (right).

Fig. 6: Adult female “Nellie” (left) and her cub who was born in the end of 2022 or early 2023. “Nellie” has not been seen since August and her cub since May.


Fig. 7: Adult females “Kween” (centre) and “Kewpie” (right) were also seen in “Nellies” range on the southeastern section of PRFC in 2023.

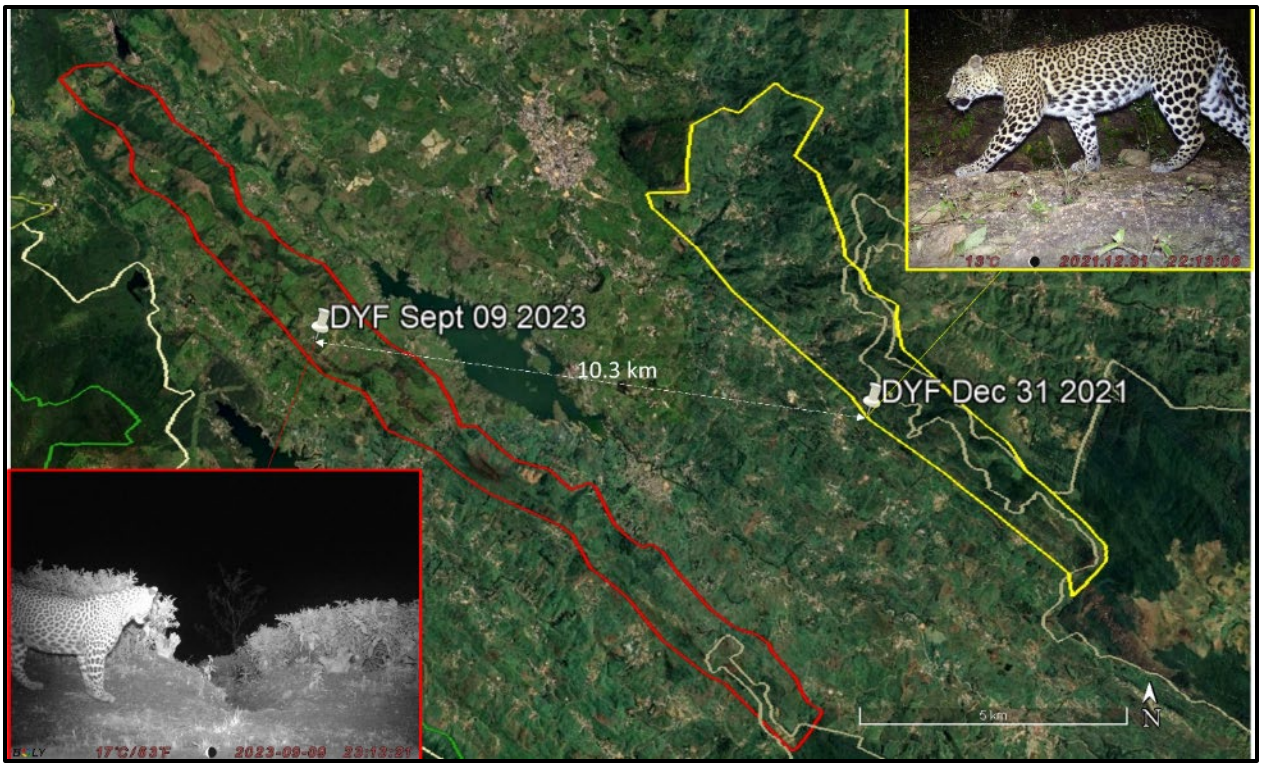


Fig. 8: A young female “DYF” was photo-captured on the Elbedda Ridge at the end of 2021 and not re-sighted until early September 2023 on the PRFC, a straight-line distance of over 10km.

The village trail where she was monitored also saw two different males detected there over the course of 3 months (Fig. 9). Previously evidence suggested that female leopards with young cubs were the ones that enter village areas to prey on dogs, which they then drag away to share with their cubs. However, the presence of adult males at the village periphery – the top of the path where these leopards were photo-captured is ~20m from the homes - has made us question whether this is a more widespread activity. This is further discussed in the “Human-wildlife co-existence” section.

Fig. 9: Two different males at the top of a short pathway that leads to an Upper division community. Left is a previously undetected male that appears to be heading straight down the path towards the community in August. Right is the known resident adult male, “**Norman**”, pausing at the top of the pathway in October. Several dogs were reported missing from this community prior to our placing the remote camera. An adult female was also detected here in September.

The most rewarding moment of the year arrived right at the end, when one of our colleagues, Yanik Tissera, who had previously worked with WWCT in 2022 capturing high quality leopard images with his specialized DSLR remote camera equipment, sent us an image that he'd just retrieved. Taken on Gartmore estate, nestled in the arms of the Peak Wilderness Sanctuary, and part of WWCT's original monitoring survey in 2016, the stunning image was of an adult male leopard staring straight at the camera, with the lights of Sri Pada sacred mountain in the background.
The leopard in the image was "**Arnold**", the first leopard WWCT had photo-captured as part of what would become the Peak Ridge Forest Corridor project, back in August 2016 (Fig.10).

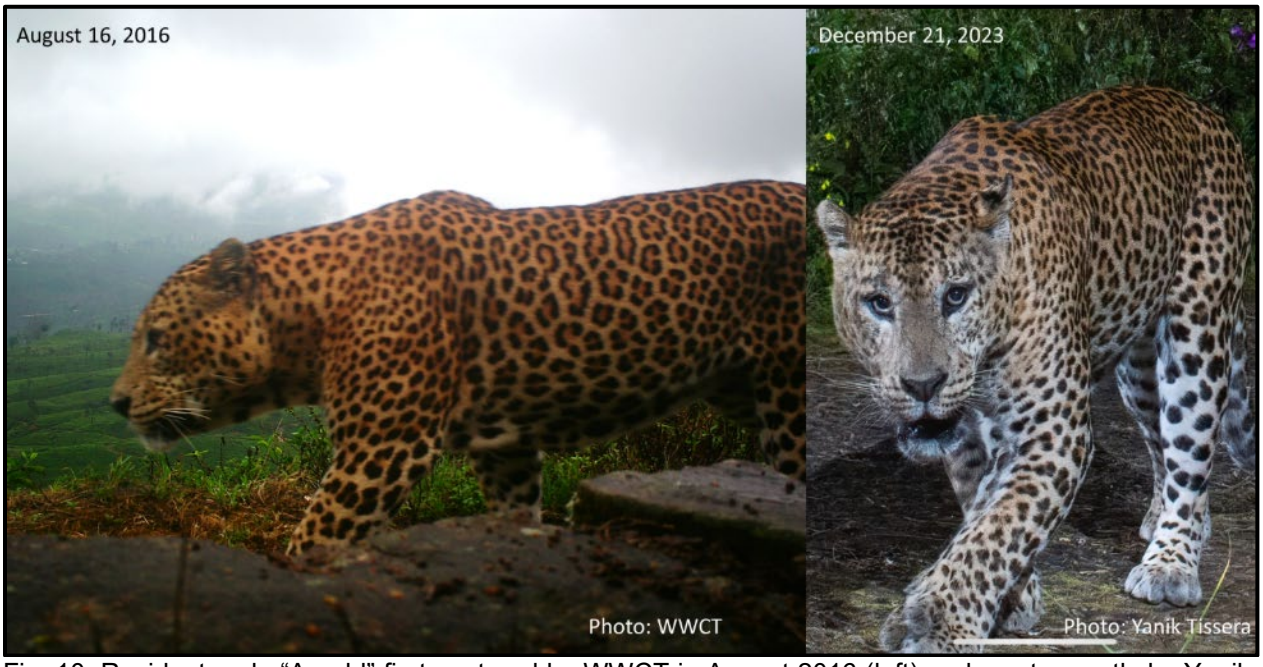


Fig. 10: Resident male "Arnold" first captured by WWCT in August 2016 (left) and most recently by Yanik Tissera in December 2023 (right)

"Arnold" was by far our most frequently monitored individual, until he rather abruptly disappeared from the PRFC at the end of 2021. To see him still striding the tea paths of the region was a wonderful finding, and importantly, together with female "OC" and male "Ozzie", he makes it 3 leopards that we have now been tracking for 7+ years in this landscape. We had feared that Arnold had died in the end of 2021, but as we hoped, Arnold had simply shifted his range use, ceding part of the area to the two newcomers "**Newton**" and "**Norman**".

Other Wildlife

Although species-specific biodiversity surveys were not conducted in 2023 on PRFC, we continue to detect important endemic and vulnerable species on this key ridgeline, with thirty-two species from various taxa identified as threatened so far:

Identified so far:

Mammals:	Sri Lankan leopard (*Panthera pardus kotiya*) – VU
	Fishing cat (*Prionailurus viverrinus*) - VU
	Purple-faced langur (*Semnopithecus vetulus monticola*) – CR
	Toque macaque monkey – (*Macaca sinica aurifrons*) - EN
	Indian Pangolin (*Manis crassicaudata*) – EN
	Sambar deer (*Rusa unicolor*) – VU
	Asian highland shrew (*Suncus montanus*) – VU
Amphibians:	Montane Hour-glass tree frog (*Taruga eques*) – EN
	Pug-nosed shrub frog (*Pseudophilatus silus*) - EN
	Schneider's shrub frog (*Pseudophilautus schneideri*) – CR
	Dull-green shrub frog (*Pseudophilautus viridis*) – EN
	Samarakoon's shrub frog (*Pseudophilautus samarakoon*) – CR
	Gunther's bubble nest frog (*Pseudophilautus microtympanum*) – EN
	Jagath Gunawardana's shrub frog (*Pseudophilautus jagathgunawardanei*) – CR
	Bambaradeniya's shrub frog (*Pseudophilautus bambaradeniyai*) – CR
	Asanka's shrub frog (*Pseudophilautus asankai*) – EN
Reptiles:	Templeton's Kukri snake (*Oligodon calamarius*) – EN
	Whistling lizard (*Calotes liolepis*) – EN
	Kandyan day gecko (*Cnemaspis kandiana*) – EN
	Slender gecko (*Hemiphyllodactylus typus*) – VU
	Deignan's Lanka skink (*Lankascincus deignani*) – EN
Butteflies:	Red Helen (*Papilio helenus*) – VU
	Painted Sawtooth (*Prioneris sita*) – EN
	Spotless Grass Yellow (*Eurema laeta*) – VU
	Indian Fritillary (*Argynnis hyperbius*) – EN
	Tamil Treebrown (*Lethe drypetis*) – EN
	Sri Lankan Hedge Hopper (*Baracus vittatus*) – VU
Birds:	Streak-throated woodpecker (*Picus xanthopygaeus*) – EN
	Pied Bushchat (*Saxicola caprata*) – EN
	Sri Lanka Orange-billed Babbler (*Turdoides rufescens*) – VU
	Hill Swallow (*Hirundo tahitica domicola*) – EN
	Ceylon Scaly Thrush (*Zoothera dauma imbricata*) - EN

Habitat Restoration

Despite numerous difficulties at the planting sites, we have persevered and are finally seeing improved sapling success. 2023 had a lot of precipitation, which made a lot of other field work difficult, and resulted in landslides and slumping (including some slumping that impacted our Upper division nursery!), but has proven a boon to our reforestation efforts as the greenhouse saplings thrived (Fig. 11) and the hundreds of trees planted in 2023 (Fig 12) are doing considerably better than those previously planted. Of course we are not celebrating just yet as the dry season, from January through March, is the real test for the regenerating landscape, but we are more hopeful in the end of 2023

Fig. 11: The Dunkeld forest plant nursery in early 2023 (left) and again in mid-2023 (left below) with saplings large enough to plant.

Fig. 12: Loading, delivering and unloading the saplings to be planted at the planting site in November.

A load of 450 new saplings were also secured at the end of 2023 (Fig. 13) so 2024 will see not only the successful establishment of the already planted trees, but also the initiation of new sites.

Fig. 13: A new batch of plants situated and categorized in the Dunkeld nursery at the end of 2023.

ii. Elbedda Ridge

The ERC runs across 7 different tea estates – all belonging to KVPL – and we have been monitoring leopard activity and movement across these estates since 2022 (Fig. 2&14).

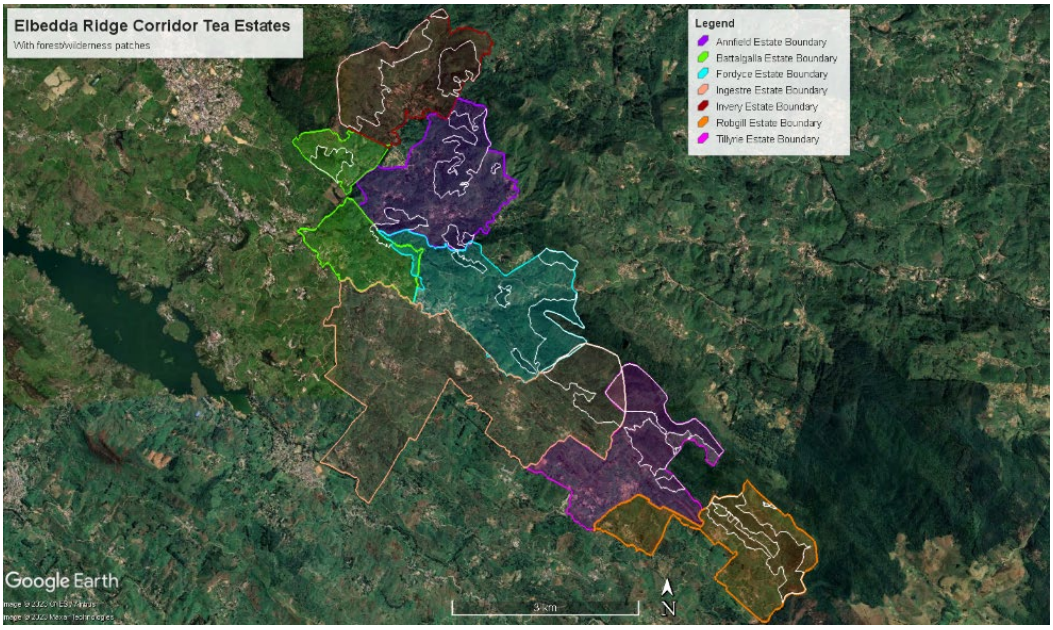


Fig.14: The 7 Kelani Valley Plantations tea estates that comprise the Elbedda Ridge Corridor (ERC) landscape. The white outlines are the existing forested patches along the length of ERC. The town of Hatton can be seen in the upper left just below the title.

As with PRFC, there is a distinct ridgeline that runs NW-SE and connects the Agra-Bopats forest reserve in the SE – which itself connects further east to Horton Plains National Park (HPNP) – with the Kotagala hill (1755m asl) just east of Hatton town. While not an officially protected area, the forested Kotagala hill appears to be a junction with further potential corridors running in 3 directions – southeast along ERC, west along the Western Ridge (which WWCT has previously investigated), and north towards the Rilagala Conservation Forest.

Most of WWCT's work in this area has been along the ridgelines, but in 2023 we established new remote camera locations in an effort to monitor some of the lower elevation areas (Fig. 2) as there had been at least 2 incidents with female leopards and small cubs being seen here.

Leopard Activity

In 2023 WWCT set up remote cameras again on the ERC only in July, with a total of 870 remote camera monitoring days undertaken across the year. A total of 96 images of 102 individual leopard captures, giving a RAI of 11.7, which is slightly lower than in 2022 but still higher than PRFC. With the monitoring of the lower slopes of ERC we were able to identify one new female – "**Portia**" – who, together with another new female "**Gona**" (Fig. 15), brings the total number of individual leopards identified here to 17 (6 adult males, 6 adult females, 4 cubs and 1 transient female).

Fig. 15: Two new females detected on the expanded camera grid on ERC in 2023. "Portia" (right) from the lower slopes of Ingestre estate and "Gona" (right below) from upper regions of ERC.

It was heartening to see most of the 2022 individuals remained on ERC in 2023 (except the cubs who have presumably moved out to new areas).

Of the 10 adult leopards detected in 2022, 7 were re photo-captured (Fig. 16). Of the 3 that weren't, two of them (resident male "**Battle**" and resident female "**Iris**") were both seen only on the NW edge of ERC including where we did not have a camera in 2023, suggesting the possibility that they still reside there. The other leopard-"**Baloogie**"- was a young adult male and may have shifted to another area due to the presence of established residents. Ongoing monitoring will hopefully clarify this.

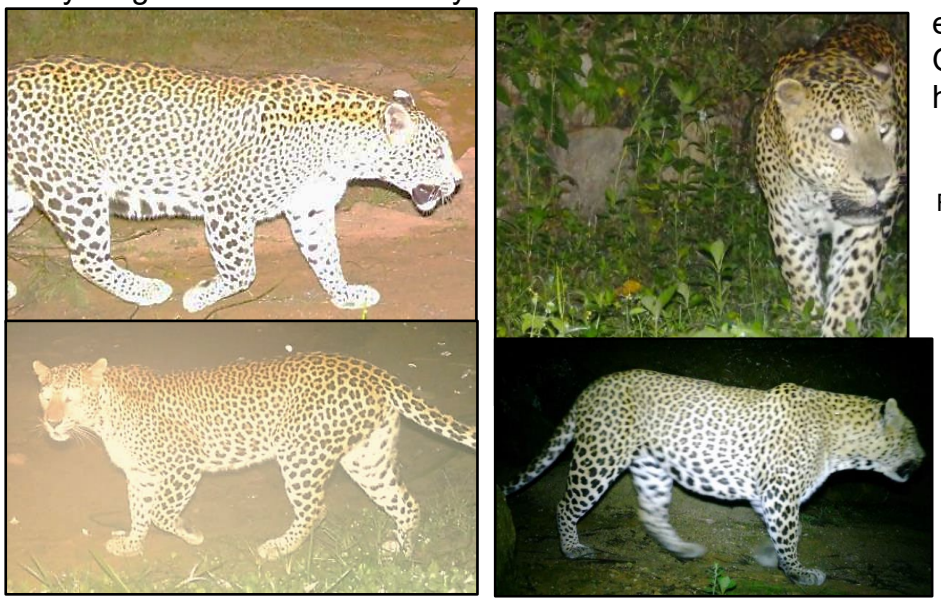


Fig. 16: Clockwise from top left, "Batty" in September, "Nino" in December, "Robgi" in October and "Freja" in July.

These are 4 of the 7 individuals monitored for the 2nd consecutive year on ERC.

The long-term resident, “**Ozzie**”, was also detected in 2023, 7+ years of monitoring of him, inclusive of photo-captures on PRFC, Western Ridge and ERC. Betwee end 2022 and August 2023 he had been injured, showing new eye, nose and lip scars (Fig. 17).

This did not stop him from mating with resident female “**Inga**” (Fig. 17) and probably “**Portia**” who he was courting at the end of the year (Fig. 18). “Portia” was also seen with younger resident male “**Nino**” (Fig. 18) just a few days before “Ozzie” and “Portia” suggesting that she was mating with multiple males. Female leopards do this in what is thought to be an effort to confuse paternity and ensure increased security for her eventual cubs – although it also increases likelihood of pregnancy.

From image timings “Nino” appears to be monitoring “Ozzie”, indicating perhaps the source of his new injuries? Male leopards do constantly keep track of each other, mostly through scrape and scent marking, which typically ensures actual physical confrontation is kept to a minimum, but sometimes open conflict is unavoidable.

Fig. 17: Long-term resident male “Ozzie” (left) in August 2023 with scars on his ear, eye, nose and lip that were not present in 2022. “Ozzie” just prior to mating with resident female “Inga” in August 2023.

Fig. 18: Resident adult male “Nino” (left) followed closely by resident female “Portia” (right) in mid-December 2023. Both leopards were seen together on at least 2 occassions in mid-December, assumed to be courting and mating during this time.

"Portia" at the same location in end-December (left), with resident adult male "Ozzie" (right), suggesting that they were courting and mating.

Other Wildlife

The remote camera surveys have again detected the presence of 21 mammal species along ERC, which is 33% higher than the previous estimates from KVPL biodiversity surveys, and consistent with 2022. The presence of the small cats also remains similar to previous observations in 2022, with 25 rusty-spotted cat image photo-captures compared to just a single fishing cat (Fig. 19). In 2022 there were 123 and 3 observations respectively.

WWCT has a Dutch student from the University of Amsterdam, collaborating with us, whose focus is on carnivore co-existence and he is specifically investigating the occurrence (and co-occurrence) of the 4 wild cat species across all of WWCT's remote camera monitoring projects. We hope that his efforts will shed some additional light onto the factors underlying the well-established observation patterns that we see in this, and other landscapes.

Fig. 19: Rusty spotted cat on Battalgalla estate, October 2023 (left) and the lone fishing cat photo-captured, on Fordyce estate in November 2023 (right)

B. Yala buffer zone

Although we continue to monitor the Yala Buffer landscape, 2023 was not a good year for this component of the research. We had a lot of equipment problems as our remote cameras had been in the field for some time and were starting to break down, plus our partners who were responsible for monitoring the cameras in their vicinity were unable to do so effectively for a variety of reasons. We therefore took over the monitoring of these cameras again with our own staff and also replaced several of the malfunctioning cameras with new ones (which we were able to source during 2023). We have also set back up in the Nimalawa Sanctuary, where no cameras were set during most of 2023 as we awaited DWC permit renewal. As such, we expect to get a lot more information in 2024 from this fragile, but vital, buffer area.

Leopards

Data that was obtained from this landscape came from 598 useable remote camera 24-hour periods (347- Hotels zone, 143-Nimalawa Sanctuary,108- “chena” cultivation lands). Total photo-captures were low overall (RAI = 2.3; Fig. 20). RAI was greatest in the “*chena*” landscape (RAI > 8), however it must be noted that this was all due to multiple photo-captures of a single individual female in the month of December, with nothing throughout the rest of the year. Nimalawa Sanctuary (RAI = 1.4) was considerably less than previous years (RAI ~ 4), whereas the Hotels zone showed an even greater decrease (RAI ~7 in 2022 to <1 in 2023). The patchy nature of the camera operation might be partially responsible for the lower numbers, but there may well be an ecological/anthropogenic reason behind these patterns. There is a considerable amount of construction work on-going in the Hotels zone with one new hotel opened in August 2023 and another still under construction. The new hotel also does walking safaris within the Hotels zone, as do some of the existing hotels, but this one goes directly past two of our remote cameras. Although leopards are renowned for being able to overcome/ignore these types of intrusions, perhaps this ongoing disturbance has had an impact on their travel routes. Meanwhile, although the “*chena*” lands are becoming increasingly fragmented, perhaps with an attendant risk for wildlife, the few patches that remain may prove even more important than previously. With more effective monitoring in 2024 we hope to establish whether this is a temporary aberration or a worrying long-term trend.

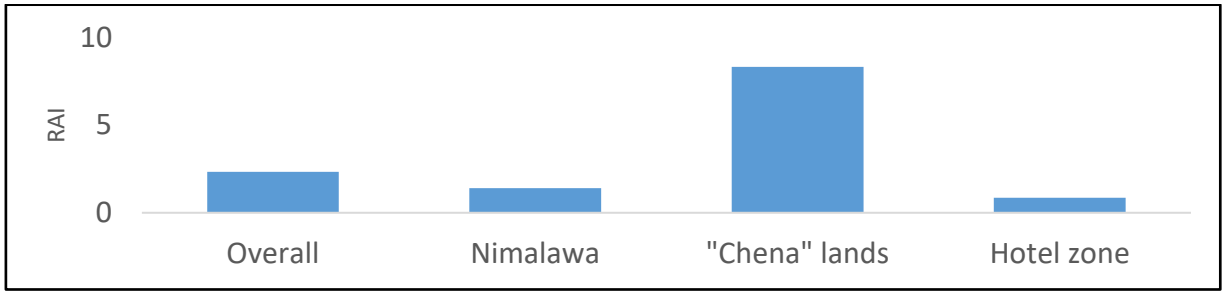


Fig. 20: The relative abundance index (RAI = # photocaptures/100 remote camera 24-hr periods) for leopards overall in the study area and across the three study zones for 2023.

Of the 14 leopard photo-captures that we did get, two were of new females with the third a female that we had only captured once before in the end of 2022 (Fig. 21). No males were detected. Again, this seems a cause for potential concern as we have previously documented residence of at least 2-3 years in this highly fractured landscape and we are eager to see if any of the established residents will re-emerge in 2024.

Fig. 21: New adult female photo-captured at Nimalawa Sanctuary (left) and a different adult female in the Hotels zone who had been detected once before in 2022 (right). Both photographs are from December 2023.

Other Wildlife

As in 2022, only 2 of the 3 small wildcats were detected in the Yala buffer zone area in 2023, with the fishing cat again absent (Fig. 22). This species typically lives at low population densities in dry and arid zone habitats such as that found in the southern buffer zone of Yala, but given the occurrence of man-made lakes ("tanks") and other waterholes here it is expected that they are extant. To get no evidence of this threatened felid two years in a row, is concerning.

Fig. 22: A jungle cat (*Felis chaus*; left) and rusty-spotted cat (*Prionailurus rubigonosa*) in the "*chena*" lands of the southern Yala buffer zones in 2023.

Only 3 photo-captures of jungle cat were made in 2023, all of them in the "*chena*" lands as they were in 2022. Given the habitat preference of this species for grassland/scrub this is not unexpected. As in past years, the diminutive rusty-spotted cat was by far the most frequently detected of the small cats, with 44 observations in 2023 (Fig. 22). Unlike the leopard, the rusty-spotted cat was detected more frequently in 2023 than the previous year, with the most regular observations (RAI~9) within the "chena" cultivation landscape (Fig. 23).

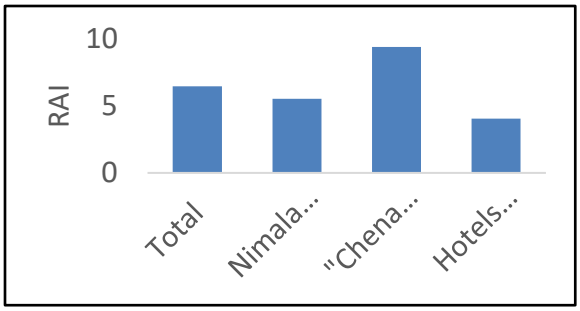


Fig. 23: Relative abundance index (RAI = # individuals/100 remote camera 24-hr periods) for rusty-spotted cat (*Prionailurus rubigonosa*) across the study area (Total) and within each of the three zones – Nimalawa Sanctuary, the "chena" lands and Hotels zone.

Sloth bear (*Melursus ursinus*) were detected at roughly the same rate as in 2022, with the most frequent photo-captures within the Nimalawa Sanctuary (Fig.24). The regularity of observations were similar in the "*chena*" landscape and Hotels zone (RAI = ~2.6).

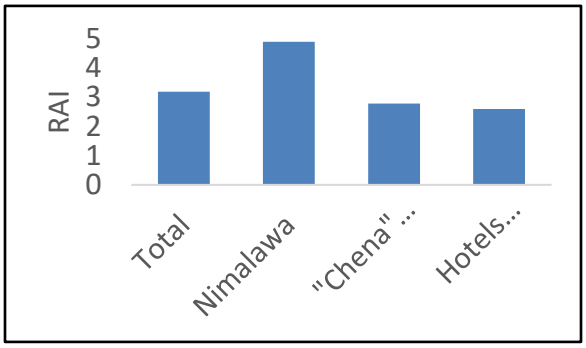


Fig. 24: The relative abundance index (RAI = # remote camera images/100 camera trap 24-hr periods) of sloth bears (*Melursus ursinus*) across the entire study area ("total") and the 3 distinct zones.

Several of the bear images from 2023 were of animals with old snare wounds on their waists (Fig. 25). While some of these may have been the same animal, there are at least 2 different individuals with these wounds (Fig 25a, c). In addition, in 2021 there was an adult female with a bad snare injury (despite which she was in the process of raising 2 cubs). It is clear that snares pose a serious threat to bears (and other wildlife) in this landscape.

Fig. 25: Four sloth bears (left & below) all showing the distinctive scars from wire snares which were at one point cinched around their waists. A) January B) November C) and D) December 2023.

As employing the leopard as an umbrella species for wider biodiversity conservation is one of the key concepts of WWCT's work in unprotected and buffer landscapes, we track the presence particularly of threatened or endemic species within our study areas.
It is a positive to note that some of these species, including the Endangered Indian pangolin (*Manis crassicaudata*) remain fairly widespread amongst study sites, including the Yala buffer (Fig. 26).

The Vulnerable Mugger crocodile (*Crocodilus palustris*) is also found in this area and can be seen walking between waterholes, especially in the dry season (Fig. 26). The Sambar (*Rusa unicolor*) a globally Vulnerable species is found in small groups and often individually, in this fragile landscape (Fig. 26).

Another species about which relatively little is known in Sri Lanka is the Golden jackal (*Canis aureus*), which although listed both globally and locally as a species of Least Concern, by IUCN, nevertheless may play an important role in some of Sri Lanka's dry zone systems. The Yala area is one of the few places in Sri Lanka where jackals can regularly be seen (Fig. 26). The Endangered Indian elephant (*Elephas maximus*) also overlaps with leopards in the Yala buffer study area. Like the leopard, unprotected landscapes are particularly important for the elephant as it is estimated that ~70% live outside the country's PA system in Sri Lanka. Although the elephant is not uncommon in the Yala area, since only ~7% of males (and no females) have tusks here, it remains unusual to see tuskers, some of which frequent the southern buffer (Fig. 26).

Fig. 26: A selection of other species photo-captured in 2023 in the southern Yala buffer including the Indian pangolin (*Manis crassicaudata, EN*) top left; the Mugger crocodile (*Crocodilus palustris*, VU) top right; a male Sambar (*Rusa unicolor*, VU) bottom left; the rarely seen Golden jackal (*Canis aureus,* LC) bottom middle; and a rare tusked male Indian elephant (*Elephas maximus*, EN), bottom right.

C. Gal Oya -Unprotected Landscape

Located in East Central Sri Lanka, bordering the Intermediate zone, Gal Oya still boasts waste swathes of forest and ragged, forest-clad mountains (Fig. 27). The Veddhas, Sri Lanka's indigenous peoples, live here and although most are now settled and undertake "*chena*" (slash and burn) agriculture, there are still some bands that hunt and forage as their ancestors did for thousands of years.

Fig. 27: Left: WWCT team members, partner Oya Lodge naturalist and two local school children guides shelping with remote cameras set-up west of Gal Oya NP. Right:, Bakingaswala with the distinctive rugged Gal Oya region hills in the background.

WWCT was conducting research in forest patches in this area as well as within the Gal Oya National Park (GONP), until Covid-19 interrupted proceedings in 2020. In September 2023 we re-launched some of this work, setting up an array of remote camera stations in the unprotected patchwork landscape west of GONP (Fig. 28).

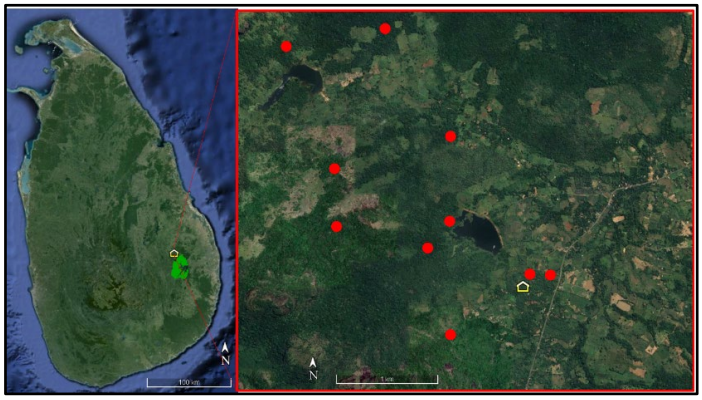


Fig. 28: (left) Gal Oya unprotected landscape and Gal Oya NP in relation to Sri Lanka; (right) the10 remote camera stations set during 2023 on that landscape

All of Sri Lanka's wildcats, including the leopard (Fig. 29), have been detected during these surveys, which continues WWCT's efforts to document the rich biodiversity, as well as leopard connections and corridors that exist outside Sri Lanka's Protected Area network. Funding for this project was garnered by WWCT in collaboration with Gal Oya Lodge, a tourism property that occupies a small patch of wilderness landscape in this region. Due to access difficulties in 2023 we have yet to fully collect (or conduct initial analysis) on all of the data. This will be accomplished in 2024.

Leopards

Fig. 29: A male (left) and female (right) leopard photo-captured in the unprotected landscape west of Gal Oya NP in November and September respectively.

Other wildlife

WWCT's previous work here highlighted the importance of this area for fishing cats and again, this mid-sized felid was captured regularly on one of two locations (Fig.30).

Fig. 30: Fishing cat on the Gal Oya Lodge property, just west of Gal Oya NP.

Other species of note detected so far include Indian pangolin (*Manis crassicaudata*) the most highly trafficked mammal in the world, Eurasian otter (*Lutra lutra*), golden palmcivet (*Paradoxursus zeylonensis*) which is endemic to Sri Lanka, and stripe-necked mongoose(*Urva viticolla*) (Fig. 31).

Fig. 31: clockwise: Indian pangolin, Eurasian otter, stripe-necked mongoose and golden palm civet.

In addition to wildlife our monitoring is also able to detect levels of poaching ongoing here, for bush-meat and illegal wood, which unfortunately is not irregular (Fig. 32).

Fig. 32: Poachers photo-captured in the unprotected Gal Oya region from September to December 2023.

D. Patch Forest Project

i. Sigiriya

Leopards

Our monitoring of the Sigiriya Patch Forests at Pidurangala (541 remote camera 24-hr periods) and Dehigahaela (772 24-hr periods) continued throughout 2023 with “Daria”, the resident female from Dehigahaela, again detected, along with a new, young animal (Fig. 33).

Fig.33: Left, long-term resident “Daria” in April, 2023 and a new leopard, right, in September in the Dehigahaela patch forest.

This is now the 6th year that “Daria” has been monitored here, showing that small patch forests provide important refuge for leopards outside PAs. Although the RAI here is very

low (< 0.3) the fact that this small patch forest remains utilized – and by more than 1 individual – is encouraging. Unfortunately, after documenting leopards in Pidurangala from 2018-2021, it is now 2 years without, which suggests that negative influences are impacting leopard presence there. However, loss of equipment here may have decreased our chances of capturing leopards, as felids repeatedly utilize same travel routes, having a much narrower set of routes when compared to canids (ongoing research we are contributing to is revealing this).

Other wildlife

Although Jungle cats (*Felis chaus*) were not photo-captured in 2023 in either site, most of the other key mammal species were again detected including fishing cat, rusty-spotted cat, Indian pangolin (regularly), golden jackal, golden palm civet, giant squirrel, sambar, elephant and toque macaque, in addition to the more common wild boar, barking deer, axis deer, ruddy and brown mongoose, black-naped hare, ring-tailed civet, common palm civet, palm squirrel, mouse deer and langur.

E. Victoria-Randenigala

Leopard Collaring
In April, 2023 WWCT fit a self-release GPS telemetry collar (the first time this has been done in Sri Lanka) on a young adult male leopard that had undergone treatment at the Department of Wildlife Conservation's (DWC) Randenigala Wildlife Rescue Centre.

The leopard had been caught in a wire snare in the northern Central Highlands and had 3 months of extensive successful treatment. It was decided that this leopard was an ideal candidate for a remote collar release and WWCT did so while the leopard was still in its holding cage so that it would get used to the equipment (Fig. 34). On April 24, WWCT and DWC, accompanied by the Sri Lanka Navy, conducted the release at a prior selected location. A navy boat with the caged leopard and DWC personal and vet, another boat with navy and ourselves and the radio tracking equipment were transported across the Randenigala reservoir, to the pre-selected release site (Fig. 34).

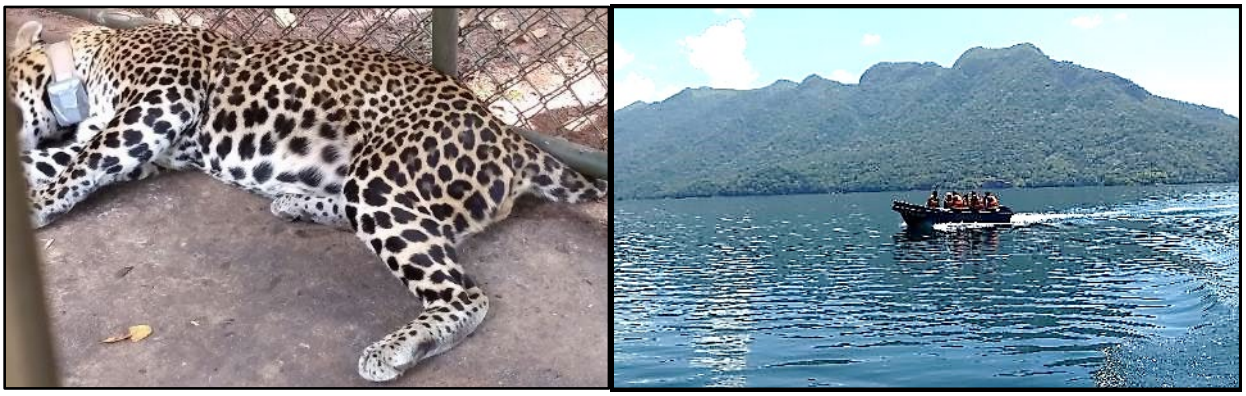


Fig. 34: Left: The rehabilitated leopard with the newly fitted telemetry collar in the holding cage in Randenigala. Right: The boat with the release team and leopard travelling across the reservoir to the release site.

The decision to release the animal here instead of where it had been caught was due to the high human density of the original site and the obvious threat to the leopard from snares that may still be there. However, the young adult leopard immediately made his way back south towards the Central Highlands where he had been originally trapped (Fig. 35). Since there was a vast expanse of open water in the way, this meant he had to swim, which he did, travelling ~100m between the mainland and a small island in the reservoir, then a longer (~400m) swim to a larger one in the middle of the reservoir. He stayed on this island for several days before again swimming, ~250m to the far mainland. He then moved south and up into the hills. Unfortunately, due to the immersion in water, the collar stopped taking GPS positions after only 1 ½ weeks but DWC and WWCT staff were able to monitor its movements with the VHF signal for another 5 weeks, determining that he settled back into a heavily human-dominated location ~10 kms from the original snaring site.

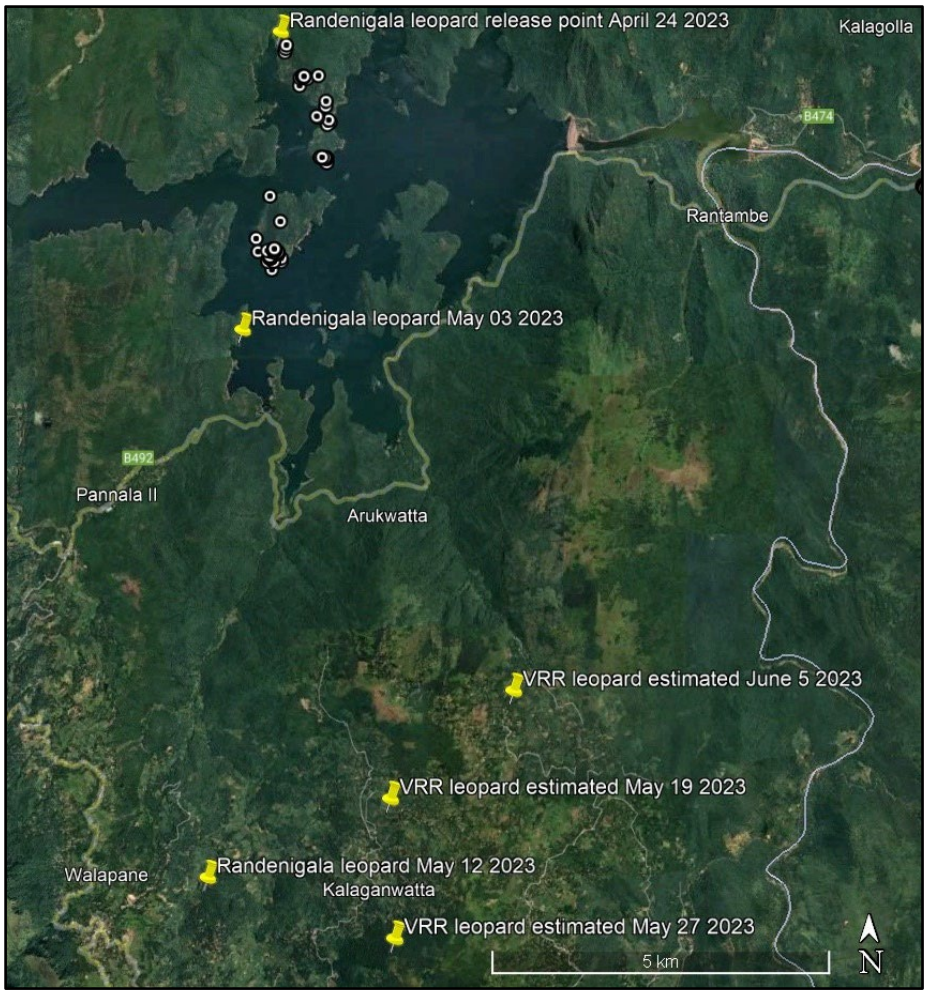


Fig.35: The tracking of the rehabilitated young adult male leopard released on April 24, 2023 (top yellow pin). The white dots with black centres represent the GPS locations post-release showing steady movement south, including across open water of the Randenigala reservoir. By May 03 the leopard was back on the south side of the reservoir from where he continued southwards higher up into the hills. He was then tracked using the VHF signal and repeatedly located in the same general vicinity (yellow pin locations from May 12 – June 5). His original snare capture location was ~5 – 10 kms further south.

Thankfully, no issues have been reported from the area. Despite the shortened collar lifespan, we still learned that that relocated animals will return to known/familiar areas. This has been previously shown with translocated leopards in both India and Namibia, where “problem” leopards moved far from their ranges have determinedly returned back. That this leopard swam across open water is an unusual behavioural occurrence of note.

F. Human-leopard Co-existence

Island-wide 9 leopard deaths were recorded in 2023, as there were in 2022. Of these, 6 were in the Central Highlands. 67% of the dead leopards were killed by snares, which remain the most obvious threat to these animals. This death toll is remarkably consistent with the previous few years. We continue to work on education and awareness programs to reduce threats to leopards and it is time to once again launch an anti-snare campaign which we had done prior to Covid-19 successfully.

In the Central Highlands tea estate landscape, the issue of leopards preying on domestic dogs is the most common and widespread form of human-leopard interaction. A current WWCT student is conducting a study to better understand this. 353 interviews with community members on the ERC were conducted. Results show that perceived loss of dogs by leopard predation is more of an issue than livestock loss (Table 1). Actual loss is not as high as the perception of dogs being taken by leopard.

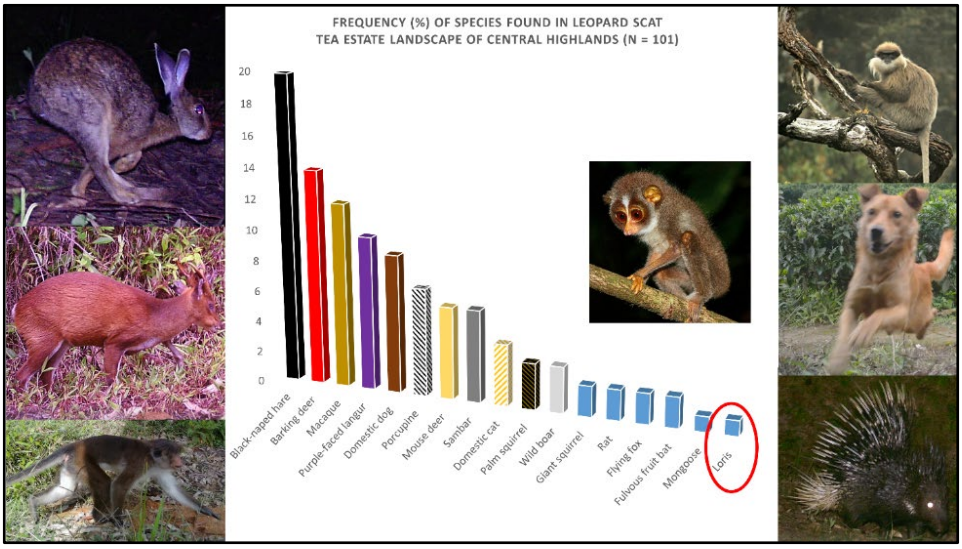
This dramatic difference between the perceived impacts of leopards on domestic pets (which affects > 25% of all respondents) vs livestock (which affects < 3%), provides a strong indication that leopard predation on domestic dogs/pets is what is fueling a possible human-leopard issue in this region (Table 1) and supports our earlier studies that show human-livestock conflict in this region is low (Uduman *et al.* 2022).

However, leopard deaths due to snares laid for other animals, by humans, as discussed above is far more of a threat to leopards. Addressing these scenarios is necessary for easing negative perceptions against leopards.

Table 1: Percentage of all interviewees (N = 353) who reported owning dogs, cattle and goats, the percentage of owners reporting leopard predation, and the community - wide impact of this predation.

	Domestic	Livestock	
	Dog	*Cow*	*Goat*
% owning	48	27	26
% of owners claiming leopard predation	56	1	9
% of all interviewees impacted	27	0.3	2

To investigate further the role of dogs in leopard diet in this region, 83 leopard scat samples collected along the PRFC, ERC and Western Ridge by WWCT since 2017 was analyzed and combined with a previous samples set. In keeping with typical leopard behavior, the diet was wide-ranging with 17 different prey species identified with no single species detected in > 20% of the scats (Fig. 36). The most common species detected were all small to medium-sized (2.5 – 25.5 kg) with black-napped hare (*Lepus nigricolis*, 19.8%) the most frequently detected, followed by barking deer (*Muntiacus muntjak*, 13.9%) and two endangered, endemic primate species – the toque macaque (*Macaca sinica orifrons*, 11.9%) and purple-faced langur (*Semnopithecus vetulus*, 9.9%). Dogs were fifth on the list (8.9%) and domestic cats 9th (4%) which indicates that



>85% of leopard diet in this region is of wild prey. Of interest also was the inclusion of the endangered highland red slender loris (*Loris tardigradus*) in the diet, which is the first known instance of leopards preying on these small, nocturnal primates (Fig. 36).

Fig. 36: The frequency of the 17 different species detected in leopard scat from the PRFC, ERC and Western Ridge from 101 scat samples collected between 2016-2023. Images are of the top 6 most frequently found species. Also of note, the red slender loris (inset photo) was also detected in scat, the first time this has been found.

II. Education and Awareness

A. Events

In March 2023, WWCT was involved in the week long Global Leopard Conference, hosted by South Africa's Cape Leopard Trust and supported by Oxford's Wildlife Conservation Research Unit (WildCRU), the Panthera Foundation, Endangered Wildlife Trust, WildCats Conservation Alliance and the Arabian Leopard Fund.

WWCT presented 3 full length talks across the sessions:
1. *Spatio-temporal insights into human-induced leopard mortality in Sri Lanka from 2001-2020*
2. *From the outside looking in: Assessing an island leopard's behavior and ecology in unprotected vs protected landscapes in Sri Lanka*
3. *Tea with Leopards: Tracking the highland leopard and the creation of the Peak Ridge Forest Corridor using a multi-partner landscape approach*.

WWCT's Anjali Watson also chaired the wrap up session and gave the Conference Summary at the end. This was an excellent program which brought together leopard researchers from around the globe to talk about their work and share findings and insights with global colleagues (Fig. 37).

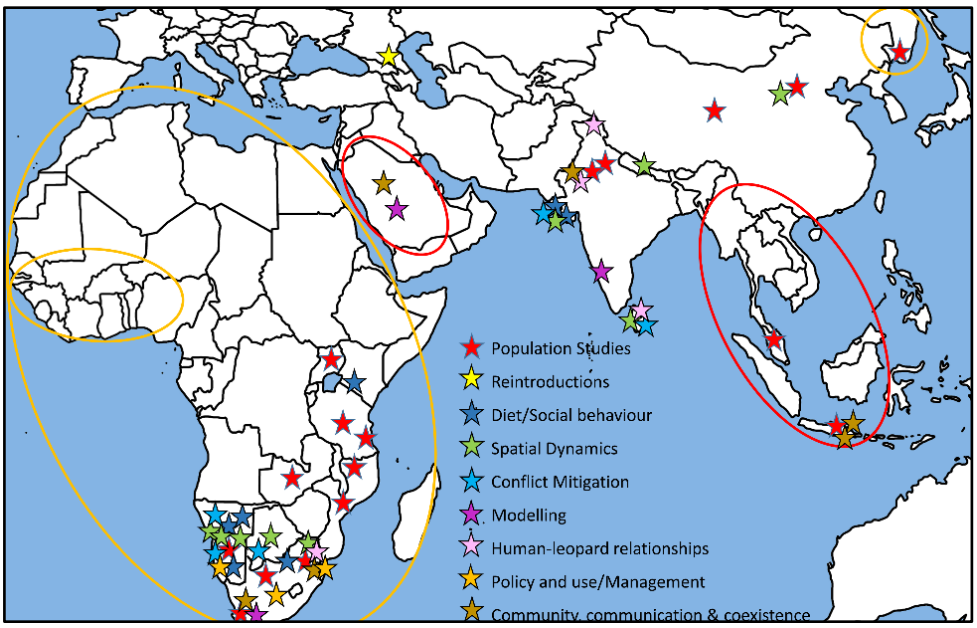
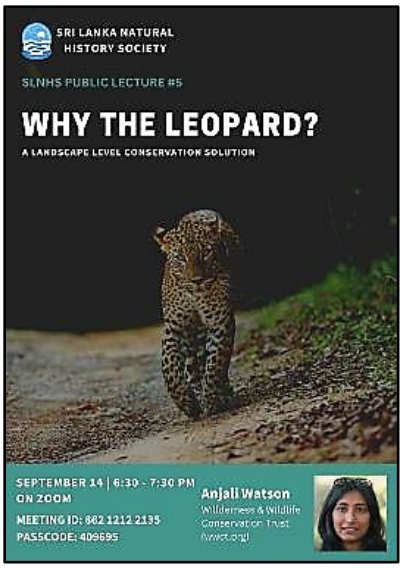


Fig. 37: The summary map created by WWCT, showing global spread of speakers and projects participating in the inaugural Global Leopard Conference 2023. Sri Lanka was represented with 3 talks from WWCT. Although the range of speakers and topics was excellent, in future years the goal is to get more participation from Central and West Africa in particular.

In May, WWCT partnered with Olu Tropical Water to launch the leopard bottle themed glass bottles, the sale of which will contribute towards WWCT's Corridors for Conservation project. Olu, which has made the impressive environmentally sustainable step of completely switching from plastic to glass water bottles, previously supported WWCT's research in Gal Oya National Park in 2018-19

[Olu Tropical Water unveils "Leopard Edition" on International Leopard Day | Daily FT]



In September, WWCT's Anjali Watson gave a well-received talk to the Sri Lanka Natural History Society entitled "Why the Leopard?" which focused on the importance of the leopard in Sri Lanka's natural systems and using the leopard as a proxy species for wider biodiversity conservation (Fig. 38).

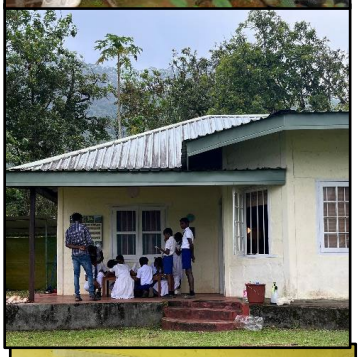
Fig. 38: The information poster for Anjali's public lecture to the Sri Lanka Natural History Society in September 2023

B. Community Awareness/Training Sessions

Our Outreach team have been very active in 2023 conducting Education and Awareness programs, with all 15 schools along the PRFC accessed in 2023. In total our outreach officers have conducted 20 awareness programs and 15 art competitions (Fig. 39) reaching ~1500+ students plus additional community members.

Fig. 39: School children from primary school hold up their art competition entries (left) and some of the senior category winning entries.

The art competitions – which focus on depicting "the wilderness and wildlife around you" are very popular with the schoolchildren. Unfortunately, many tend to draw animals not found in the local area (*e.g.* lions, tigers, giraffes) and a fair amount of Disney-type characters, highlighting the need for greater awareness on local and regional wildlife, which we are doing. We have also started programs on ERC with the first school art competition held in end December.



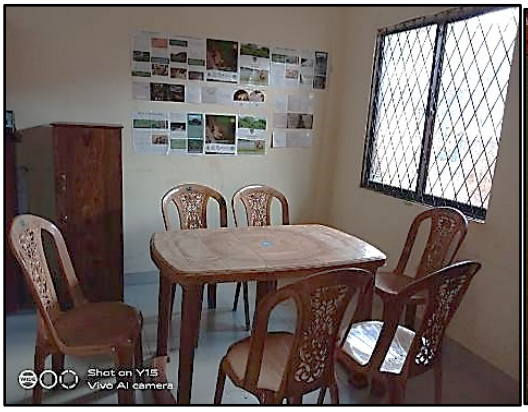
Forest Guardians group visited the Dunkeld Conservation Station and forest plant nursery where they learnt about the importance of watershed forests and the operations of the nursery which is growing trees to replant on the PRFC. There was also an opportunity to play games and have fun! (Fig. 40)

Fig. 40: Some of the Dunkeld school students engaging with WWCT's Paulkishan at the Dunkeld Conservation Station (DCS) where they learned about watershed forests, the forest tree nursery, sapling care and maintenance, and also had fun playing games.

In November a tree planting program was held at the Dunkeld school with native trees sourced from our nursery and also talked to the students about the importance of trees, as well as watershed forests. All of the staff members and many of the students took part in the tree planting and it was a good opportunity to get hands-on experience (Fig. 41)

Fig. 41: WWCT's Dr. Andrew Kittle at the Dunkeld school at a tree planting day in November, 2023. WWCT's Paulkishan with Dunkeld school students, planting one of WWCT's donated saplings.

As part of the ongoing Forest Guardian initiative, WWCT set up a dedicated resource room in the Carfax school on Osborne Estate, PRFC, providing furniture and resource materials (Fig. 42).



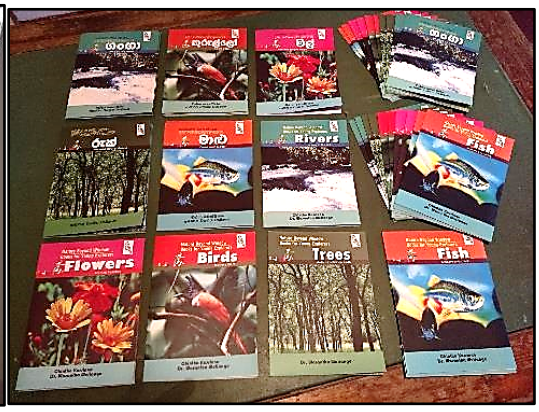


Fig. 42: The newly established Forest Guardian resource room at Carfax college on Osborne estate. (left). A selection of resource books provided by WWCT to the PRFC and ERC schools.

In addition to all of the school and community programs in the Central Highlands, WWCT conducted numerous lectures/talks/media interviews in 2023 including at the Overseas School of Colombo, Ladies College, Roar Media, LMD online and several news feature interviews.

In mid-November WWCT was part of a one-day workshop at Ingestre Estate where an overview of the research results from ERC to date was shared (Fig. 43). This workshop, for all 7 estate managers, assistant managers and human development officers and was conducted in collaboration with the Department of Wildlife Conservation (DWC).

Fig. 43: WWCT's Anjali Watson (centre) talks to Kelani Valley Plantations (Ltd) estate managers, community engagement staff from the Elbedda Ridge Corridor, as well as Department of Wildlife Conservation staff at Ingestre Estate in November 2023.

C. Awareness Materials/Publications

As we had focused on creating and distributing signage for the PRFC in 2022, the same was done for the ERC in 2023 (Fig. 44). Signs detailed the establishment of the conservation zone, partners and prohibited activities.

In addition, resident leopard population charts for both PRFC and ERC were created, printed and given to all estates (Fig. 44). The long-term monitoring that is ongoing here highlights the relative stability of the leopard population, showing resident animals and length of residency in the area and the connections and links between individual animals. All of the animals are named as it has been found that this creates a stronger connection for people and makes it more likely for them to support ongoing conservation initiatives.

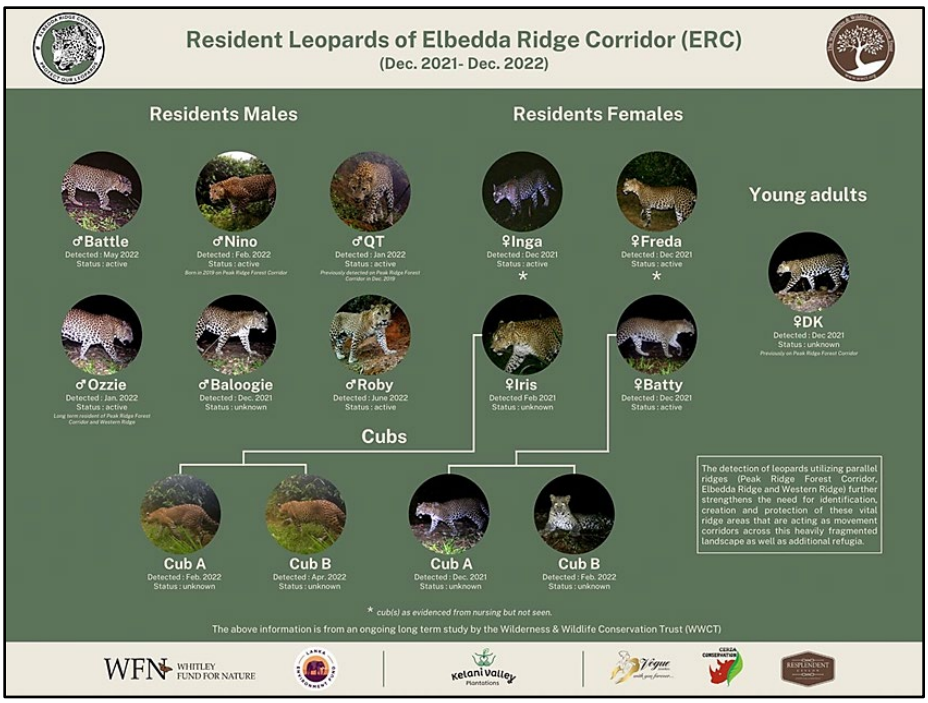
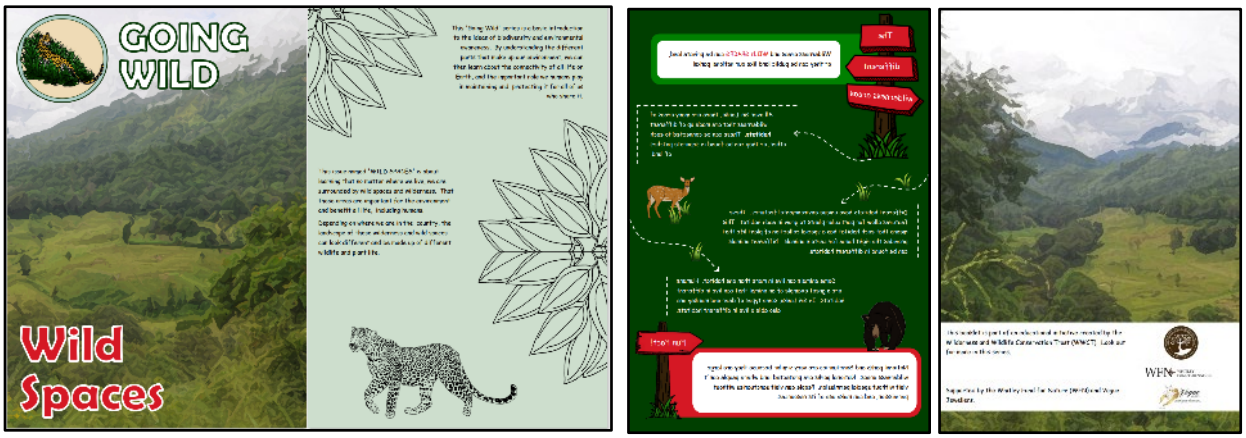


Fig. 44: The leopards of Eledda Ridge Corridor information sign (above) and leopard chart (left), created and distributed to all ERC partner estates in 2023. A similar leopard chart for PRFC was also created and disseminated across PRFC estates.

School material: '*Going Wild'* is a series of activity booklets for children for our ongoing school programs (Fig. 45). Some of the themes this series focuses on are Wild Spaces, Mapping our surroundings, plant biodiversity, animal biodiversity, importance of forests and water, forest gardens and restoration (5 R concept) and human-wildlife co-existence/responsible wildlife interactions.

Fig. 45: WWCT's "Going Wild" series of interactive educational material.



Newspaper articles: Highlighting the Global Leopard Conference (GLC) held in March, a four-part series was published in the National newspaper, the Daily Mirror on July 25, August 3, August 9 and August 21 (and reprinted in the Sunday Times online):
Article 1: Let Leopards Live, Daily Mirror, July 25, 2023
Let Leopards Live - Recomended News | Daily Mirror
Sunday Times E-Paper (pressreader.com)
Article 2: Leopard Conservation Unveiled, Daily Mirror, August 3, 2023

Article 2 of a series of articles on the leopard Update on the global status of leopards (Pantherapardus) "Leopard Conservation Unveiled: From Mumbai's Streets to Iran's Wilderness" - News Features | Daily Mirror / Daily Lankadeepa E-Paper (pressreader.com)

Article 3: The Leopard – an Ideal Conservation Umbrella, Daily Mirror, August 9, 2023

The leopard -An ideal conservation umbrella - News Features | Daily Mirror

PressReader.com - Digital Newspaper & Magazine Subscriptions

Article 4: Sri Lankan leopards – a symbol of Hope, Daily Mirror, August 21, 2023

The Leopard - An Ideal Conservation Umbrella Lankan leopards a Symbol of hope - News Features | Daily Mirror

Journal articles: WWCT contributed to an international publication in 'Conservation Letters': *Economics of conservation law enforcement by rangers across Asia,* which describes how rangers are now responsible for more Protected Areas per individual than previously (2.4-fold increase since 1990s) and highlights the potential for improving ranger-based law enforcement across Asia.

Economics of conservation law enforcement by rangers across Asia (wiley.com)

D. Media coverage

1. In July, WWCT featured in the newspapers for our partnership with Vogue Jewellers (Pvt) Ltd, who generously gave a 2nd donation supporting our work from their dedicated Sri Lankan Icononc Collection. Vogue Jewellers – The Island

2. WWCT's work was featured on the UK's BBC television series "Life Beyond the Lobby" which looks at hotels around the world that are going beyond the typical tourism-related activities to include unusual or innovative additional ventures (Fig. 46). For this program, Sri Lanka's Tea Trails boutique hotels were featured, the parent company – Resplendent Ceylon – who is a prominent partner in the PRFC and has provided the Dunkeld Conservation Station for WWCT's research base.

Fig. 46: Screenshots from BBC's "Life Beyond the Lobby" series which featured a segment on WWCT's partnership with Resplendent Ceylon and our collaborative work in the Central Highlands which led to the creation of PRFC

3. WWCT featured in a French-Brazilian television documentary about Yala National Park ("*Saving Paradise: Yala National Park*") which was filmed in 2022 but aired on French National television in 2023 (Fig. 47).

Fig. 47: Screenshots from “Saving Paradise: Yala National Park”.

E. Staff/Students/Interns/Volunteers

Udaanthe Ranatunga: Primary research assistant responsible for field checks across all WWCT study sites.
M. Paulkishan: Dunkeld Conservation Station (DCS) assistant, who also focuses on outreach and re-forestation work.
Yehani Weerasinghe: Outreach and awareness officer, field office assistant at the Maskeliya office.
Chanaka Kumara: MSc. Student, Sabaragamuwa University of Sri Lanka. His dissertation is on the ecological and anthropogenic factors driving human-leopard interactions in the region.
Storm Engelbrecht: Dutch MSc student, Amsterdam University. Utilizing WWCT’s years of remote camera data from around Sri Lanka, his thesis is on small cat occupancy, habitat suitability and how the island’s 4 wild cats co-exist.
Thilagavale Chandrasegar: Reforestation site gardner, lives close to the re wilding site.
Emad Sangani: Previous research assistant prior to undergraduate studies; continues to assist with fieldwork as needed.
Joelle Perera: Conservation communications officer, worked with WWCT for most of 2023.
Dr. Nimalka Sanjeewani: WWCT’s long term member. Now overseas after obtaining her PhD from Peradeniya University, studying floral biodiversity across landscape gradients, continues to assist remotely as needed.
Sean Jayasinghe: Although Sean is currently overseas, he remains involved with WWCT when he is in Sri Lanka, visiting field sites and checking cameras.
Valentin Lefebvre: A French volunteer who helped with field work and awareness material design. He is now following an MSc degree.

M. Rajaram: *DCS Gardener for several years, but not with WWCT since in mid-2023.*
S. Krishnakumar: *DCS manager for several years prior to his leaving in April 2023.*
R. Yogarani: *Data entry assistant who worked for a few months at DCS.*

III: Acknowledgements:

All WWCT work within Sri Lanka is conducted under the purview of the Department of Wildlife Conservation (DWC) and the Forest Department (FD) when needed and we sincerely thank them for continued collaboration. We thank the varied DWC field staff for support and collaboration in the field.

WWCT's ongoing work in the Central Highlands involves groundbreaking partnerships in a broad-scale collaborative agreement to protect and preserve key ridgelines.
The partners for the Peak Ridge Forest Corridor (PRFC) are **Horana Plantations**, **Madulsima Plantations, Bogawanthalawa Plantations, Maskeliya Plantations, Kelani-Braema Plantation, MJF Tea Gardens** and **Resplendent Ceylon**.
For the Elbedda Ridge Corridor (ERC) the partner is **Kelani Valley Plantations**.

Funding and logistical support for WWCTs ongoing island-wide work has been provided by Whitley Fund for Nature (WFN), Vogue Jewelers, Lanka Environment Fund (LEF) Oxford University's WildCRU, Vogue Jewellers, Alliance Finance PLC, Resplendent Ceylon/Dilmah Conservation, Olu, CERZA Conservation (Parc Animalier de la Barben, EcoFaune, Zoo de Maubeuge, Les Terres de Nataé, Rio Safari Elche), Back of Beyond, Gal Oya Lodge, AYU in the Wild and Facets Sri Lanka.
We thank these partners without whose support the extent of WWCTs work would not be possible.

We sincerely thank the ever dynamic WWCT team whom together, allows us to carry out this diverse and varied research for conservation work.
