

🐾 The Leopard Project 🐾

Annual Report 2021



February 2022



The Wilderness & Wildlife Conservation Trust
130 Reid Avenue, Colombo 04, Sri Lanka
Website: www.wwct.org
Email: info@wwct.org

Executive Summary

For a second year running 2021 was dominated by the global coronavirus pandemic which saw yet more lockdowns and travel restrictions in Sri Lanka. As was the case in 2020, this impacted the Wilderness & Wildlife Conservation Trust's (WWCT) activities, especially the education and awareness component since in person meetings were largely restricted, but also some of the research, as entering new areas to set up monitoring projects requires initial in-person meetings with landowners and stakeholders. Despite these hurdles, WWCT managed to keep the flow of data ongoing by predominantly using remote cameras again in 2021, and also by using the windows of no lockdown to get to new locations and maintain old monitoring arrays.

Although the Memorandum of Understanding for the hard-won Peak Ridge Forest Corridor (PRFC), a collaborative agreement to protect a vital movement corridor and biodiversity refuge in the Central Highlands, was signed in 2020, it was in early 2021 that the launch of this exciting project occurred. This year saw some important movement by joint stakeholders, including the tea estate companies whose lands back onto this key ridgeline. A new forest plant nursery was implemented on one of the estates (Mahanilu) to complement the existing Dunkeld estate nursery, and the owner of the privately owned Kelanya-Breama estate agreed to give over ~20 hectares of the estates upper division lands for re-forestation. Although school programs were not allowed due to the pandemic, the groundwork was laid in 2021 to run awareness and education programs in the 15 schools that are within the PRFC buffer area.

We saw a reduction in the number of leopards killed in Sri Lanka in 2021, dropping from 14 to 9, although snaring remains a major problem, particularly in the Central Highlands. We lost 2 leopards that had been long-term residents of the PRFC in 2021, "Whitley", an adult male who had been on the ridge since 2019, was found dead in the Canyon reservoir in August, from unknown causes, and "Nina", an adult female who had produced 2 litters in the PRFC since 2019, was found dead in a snare in October. WWCT's anti-snare pamphlets and broadsheet signs, were widely distributed again in 2021, in collaboration with the governmental Department of Wildlife Conservation officers, throughout the southern Central Highlands in an effort to increase awareness of this issue and reduce its impact.

In the 2nd half of 2021, WWCT finally managed to get a proper camera array set up on two new ridgelines immediately north of the PRFC – the Western Ridge and Elbedda Ridge. We got very positive results from the cameras with significant leopard evidence on the Western Ridge including at least 2 animals that are clearly using both PRFC and the Western Ridge. This is important information as it provides ongoing evidence of how these animals use this unprotected landscape and improves our ability to pinpoint key connections and travel routes that need to be maintained and/or improved. The Elbedda Ridge seems similarly important and will be a central focus of WWCT's highland efforts in 2022.

Several more months of monitoring was also undertaken in the Yala Block I buffer zone with some interesting patterns starting to emerge. There are some apparent similarities between leopard activity and movement in this lowland arid zone landscape and the sub-montane, wet zone landscape of the tea estate leopards. Both populations are extremely nocturnal – more so than those living within PA boundaries – and both show similar sex-based differences in movement, with adult females keeping to refuge-type areas (forest sanctuaries and the forested hotel zone in Yala buffer and the upland ridges in the highlands) with adult males moving more widely and thereby utilizing even the human-dominated parts of the landscape (chena lands in Yala buffer and tea cultivation in the hills).

On-going monitoring of patch forests at the Sigiriya Back-of-Beyond properties, returned disappointingly few leopard images with "Daria", the Dehigahaela resident female, missing-in-action. We did however get images of another female from Pidurangala who we had not seen for over 3 years.

A large part of the latter part of 2021 was spent creating and designing new awareness material for buffer zone communities and school children in the Influence zone of Wilpattu National Park. Finally, 3 scientific papers were published in 2021 from WWCT research work, two in international journals and one in a national journal. Numerous media interviews and releases also occurred.

Update of WWCT Activities - January to December 2021

I. Research

- A. Central Highlands
 - i. Peak Ridge Corridor
 - ii. Western Ridge
 - iii. Elbedda Ridge
- B. Yala Buffer Zone
- C. Patch Forest Project
 - i. Sigiriya
- D. Human-leopard co-existence
 - i. Central Highlands

II. Education and Awareness

- A. Events
- B. Presentations/training sessions
- C. Awareness materials
- D. Social Media
- E. Staff/Students/Interns/Volunteers
- F. Media
- G. Publications

III. Acknowledgements

I. Research

A. Central Highlands

In 2021 WWCT continued to expand its work in the tea estate landscapes of the Southern Central Highlands, moving remote cameras onto two additional ridgelines that run roughly parallel to the Peak Ridge Forest Corridor (PRFC). This was a goal originally planned for 2020 but delayed due to the Covid-19 pandemic. We have also continued with the long-term monitoring of the leopards that reside on and utilize the PRFC and continued with our database, recording all known human-leopard interactions in the Highlands and throughout the country.

i. Peak Ridge Forest Corridor

Leopard Activity

Despite limited access to the region during lockdown periods and travel restrictions, we were still able to employ 9 remote camera stations along the PRFC for a total of 2012 remote camera days in 2021. This included two new “permanent” cameras which are dug and cemented into the earth at key locations to ensure that they are not removed (Fig. 1).

A total of 157 leopard photo-captures were attained which allowed us to continue to monitor the individual leopards inhabiting this key upland ridge.



Fig. 1: Our DCS Gardener, installing a new permanent camera on Dunkeld Estate. The pole and camera box set-up were made locally, in the nearby community of Norton Bridge.

It is now 5+ years that adult male leopards “Arnold” and “Ozzie” and adult female “OC” (Fig. 2) have been established on these hills, avoiding the many hazards and potential pitfalls that exist on this human-dominated landscape.



Fig. 2: Left to right – Arnold at Norwood Estate in October 2021, Ozzie at Osborne Estate in November 2021, and OC at Osborne Estate in October 2021. All three leopards have been resident in the region since we commenced work in August 2016 (~5.5 years).

Unfortunately, not all of the region’s leopards are as fortunate, and in 2021 we saw two resident animals succumb to the dangers that characterize this area. First, in August, it was “Whitley”, an adult male who had been resident in the Central part of the PRFC since early 2019, who was found floating in the Canyon reservoir during a period of extremely heavy rains (Fig. 3). Whether he died naturally was impossible to ascertain during the post-mortem. A couple of months later, in mid-October, a resident female leopard, “Nina”, who occupied the far southeastern section of PRFC, and was the mother of at least 2 litters of cubs, was found caught in a snare on Venture estate, near the center of her range (Fig. 3). Nina was first detected on the ridge as a young female in September 2018. Here death once again highlights the insidious threat posed by wire snares on this landscape.



Fig. 3: Whitley at Norwood Estate (top left) on July 25th, 2021 just days before being found floating in the Canyon reservoir (top right) on August 7th. Nina in June 2021 (bottom left), a couple of months before being found dead in a tea estate with a grievous snare injury (bottom right).

When resident leopards die, they leave a vacuum on the landscape that can be exploited by other leopards looking for a vacant area in which to establish themselves. In early 2019 “Whitley” had occupied a part of the ridge that was an overlap zone between “Arnold” and “Ozzie”, which means that it was not the core of either resident male’s territory and therefore could probably be claimed more easily. It was interesting to see that “Ozzie”, who had not been detected using what became the core area of “Whitley’s” range for almost 3 years (since October 2018), was back in the area just one month after “Whitley’s” unfortunate death (Fig. 4). Whether he continues to utilize this area is uncertain, especially as he already occupies a sizeable range (including roaming across to the Western Ridge – see below and Fig. 5). Already another, currently unknown male, has also been detected in “Whitley’s” old range, as has one of resident female “OCs” 2018 male cubs, “Oswald”, who is now an adult male (Fig. 6). How these 3 males sort out the now vacant territory – or whether another male shows up to enter the fray, remains to be seen.



Fig. 4: Adult male “Ozzie” on Dunkeld Estate in October 2018 (left), which became a central part of adult male “Whitley’s” range from early 2019 to his death in August 2021. In September 2021, “Ozzie” was detected back in the same area for the first time for almost 3 years (right).

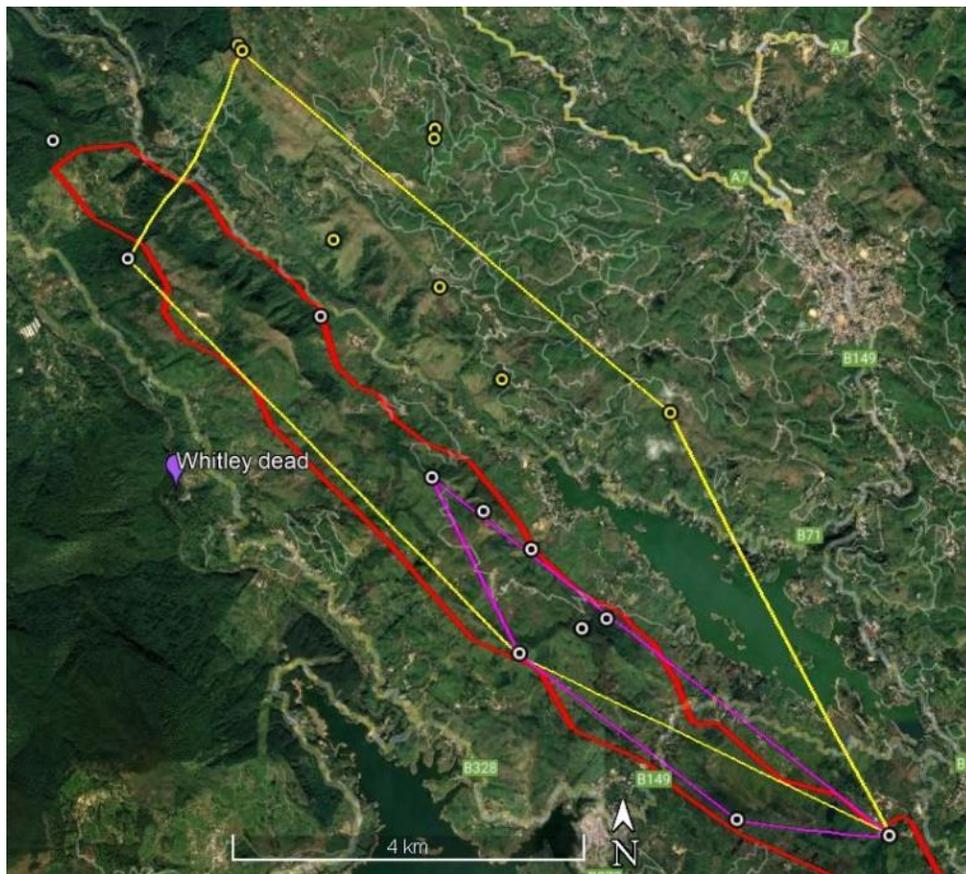


Fig. 5: The remote camera locations (white dots = PRFC; yellow dots = Western Ridge) where “Ozzie” (yellow lines) and “Whitley” (purple lines) have been detected. “Ozzie” ranges along the northern half of the PRFC (red outline) and also roams along the parallel Western ridge. “Whitley” utilized a smaller area of PRFC but also appears to have ranged to the west as this is where he was found dead in August 2021 (purple marker).



Fig. 6: An unknown male (left) that has appeared in “Whitley’s” old range after the latter’s death in August 2021. One of “OC’s” sons, “Oswald” (right), born in 2018 and now > 3 years old, who has also been detected within this newly vacant range.

It appears that “Nina” may be succeeded by one of her 2020 daughters, currently known as “Cub C” (Fig. 7). This young female is now ~18 – 20 months old and is regularly seen in this newly vacated area although only time will tell whether she manages to establish herself here, or another female enters from somewhere else.



Fig. 7: Nina’s 2020 “Cub C” at Kew Estate in September 2020 and again in October 2021. She is now ~ 18 – 20 months old.

Similarly, there are signs that “OC’s” most recent female cub, “OK”, who is now ~21 – 23 months old, is settling in the area immediately to the south-east of her mother. She has been detected using the Glentilt, Norwood and Venture estates (Fig. 8).



Fig.8: An inquisitive “OK” at Glentilt Estate which borders her mother’s range. She now moves around independently and we are keen to see whether she fully settles in this area.

Habitat Restoration

The re-forestation of the PRFC is proving a difficult task (Fig. 9) with initial efforts resulting in high mortality rates for saplings due to what appears a variety of reasons. Although planting is conducted only during wet periods, the extended dry periods in this region are taking their toll on saplings. Deer also browse the saplings (Fig. 10) and attempts to protect them with wood frames and plastic sheeting have not been successful due to people removing the wooden stakes to use as firewood.



Fig. 9: “Elephant Ear” plants at the re-forestation site on Dunkeld Estate. There is wide variation in success with some plants still very small (left) and others more robust (right).



Fig. 10: A barking deer (left) and sambar (right) browsing in amongst the tea bushes. These deer consume the fresh leaves of re-planted saplings.

We are approaching this long-term project using adaptive management, so are continually monitoring plant success and adapting our strategies to address issues that arise, as they arise. Currently we are creating bamboo shields which will be used to try and protect newly planted saplings from browsing wildlife since bamboo will not be removed for firewood and is more available on the estates. We are also focusing on growing plants in the nurseries for longer periods before planting so that saplings have a more mature root structure and hopefully are less susceptible to low water levels. The next phase of planting is scheduled for April/May 2022 when the rains will hopefully arrive in the Central Highlands.

Despite these hurdles, we have got a very positive response about the reforestation plan from the estates that are partners in the PRFC. One of these estates, Mahanilu, has already set up another forest tree species nursery on their land to assist in the propagation of native species. The original Dunkeld nursery, which sits beside a small butterfly garden (Fig.11) continues to hold a variety of species including many that are being propagated here experimentally. Success is mixed with some saplings thriving and others struggling in the nursery. The private Kelanya-Breama Estate that borders Dunkeld Estate (where WWCT has its field station) has also enthusiastically supported the reforestation plan and the Estate owner has agreed to give over ~ 20 hectares of currently unused land for this purpose (Fig. 12 & 13).

In order to ensure that this project becomes a long-term success, we are communicating with other projects that have undertaken similar restoration projects, both locally and internationally as reforestation of native tropical species is a difficult operation. The open data platform “Restor” (www.restor.eco) is an example of an international repository from which we can gain useful first-hand knowledge about successes and failures of other projects and contribute our results as they come.



Fig. 11: The Dunkeld forest nursery beside the butterfly garden (top left), and a new batch of a wide variety of forest plants being propagated inside the nursery.

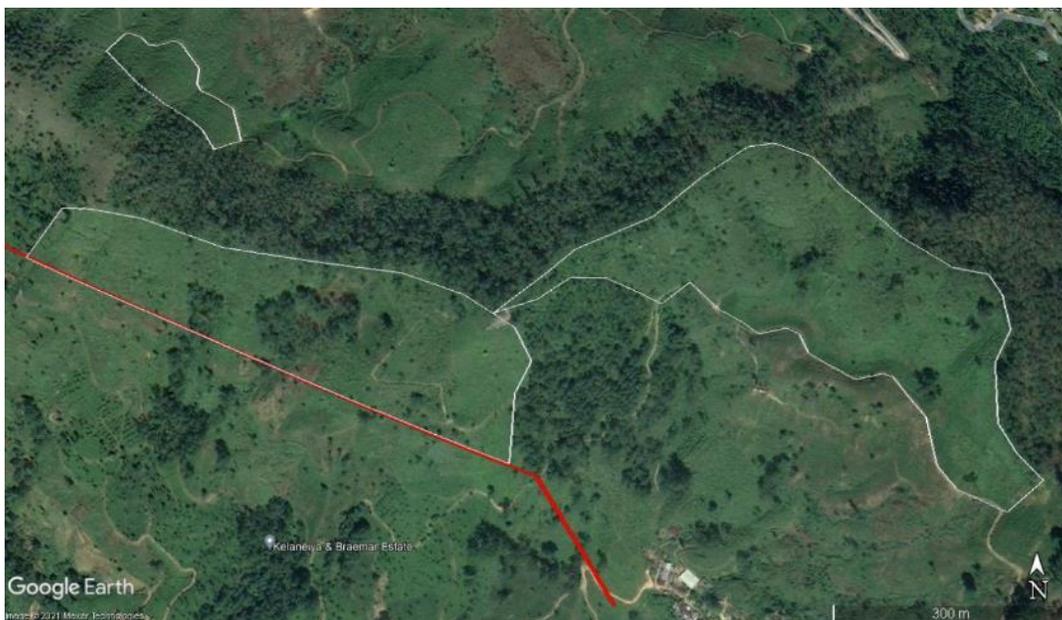


Fig. 12: The areas to be re-forested in the middle section of the PRFC. The small white polygon in the top northwest corner is on Dunkeld estate where re-planting is currently ongoing. The larger areas also demarcated in white are the areas on the Kelanya-Breama estate which have been earmarked for re-forestation. These will provide a much-needed buffer to the thin strip of forest cover that presently characterizes this section of the PRFC. The red line is the approximate border of the PRFC.



Fig.13: View towards some of the land ear-marked for re-forestation on Kelanya-Breama Estate. The strip of shrubland between the tea (foreground) and Eucalyptus trees (ridge-top) is designated for re-planting.

ii. Western Ridge

From August through October 2021, WWCT operated 6 remote camera locations along the ridgeline – that we called the Western Ridge - that runs parallel to the PRFC on the northern side of the Castlereagh reservoir and Kehelgaha Ganga (Fig. 14).



Fig. 14: Left: The rugged eastern end of the Western Ridge (with the PRFC in the background across the valley to the south). Right: One of the remote cameras set up on the Western Ridge at Broad Oak division (tea estate community housing in the background).

Cameras were run for a total of 472 24-hour periods during which 36 leopard images were captured across 34 occasions. This gives a Relative Abundance Index (RAI = # of remote camera images/100 remote camera 24-hr periods) of 7.63 which compares quite closely to the RAI of 8.42 for the PRFC. A total of 8 individual leopards were photo-captured on the Western Ridge including 2 individuals – adult male “Ozzie” and adult female “Torn Ear” – that have also been detected on the PRFC. “Ozzie” clearly moves

regularly between the ridges, whereas “Torn Ear” was detected once at PRFC in August 2019 and now seems to have settled across the valley on the Western Ridge (Fig. 15). This is consistent with long term observations which show adult males moving throughout the tea estate landscape, including travelling through the lowland, tea-dominated areas, whereas adult females appear to reside in the upper slopes and ridges, crossing the more densely human-populated lower areas only when dispersing or infrequently.



Fig. 15: “Torn Ear” as a young female (left) in 2019 moving along the lower slopes of the PRFC towards the Kehelgamuwa river. In 2021 on the Western ridge on the far side of the Kehelgamuwa river (right).

In total we recorded 2 adult males (“Ozzie” and “Saint” (Fig. 16)), 3 adult females, 2 young adult males and 1 cub. One of the females, “Lena” was twice photographed in August transporting kills which suggested that she was likely a mother as female leopards typically take small, easily transportable prey back to dens when their cubs are small. One of the kills was a black-naped hare and the other a domestic dog (Fig. 17). One and a half months later we photo-captured a cub which was likely hers (Fig. 18). This confirms that leopards are reproducing in this landscape, which, given the abundant evidence from PRFC, was hoped for, and now useful to verify.



Fig. 16: Adult Male “Saint” photo-captured at St.Heliers Estate on the western edge of the Western Ridge.



Fig. 17: Resident female “Lena” on Lethenty Estate carrying a dead black-naped hare (left) and on Broad Oak Estate carrying a dog (right). It is likely that this is the mother of the cub that was also photographed at Lethenty Estate.



Fig. 18: The cub photo-captured at Lethenty Estate on the Western Ridge.

Other Wildlife

As with the PRFC landscape to the south, both fishing cats (*Prionailurus viverrinus*) and rusty-spotted cats (*Prionailurus rubiginosa*) were also detected on the Western Ridge (Fig. 19). Typical of the patterns usually observed in Sri Lanka, rusty-spotted cats were detected more often ($n = 5$) with fewer fishing cat sightings ($n = 3$), although this represents very little real difference with such a small sample size. Sri Lanka’s fourth wild cat, the jungle cat (*Felis chaus*), which appears to be more of a lowland denizen, was again not detected.



Fig. 19: Fishing cat (left) on Lethenty estate and rusty-spotted cat (right) on Broad Oak Division on the Western Ridge.

iii. Elbedda Ridge

In the middle of December 2021, 5 remote camera stations were set up on the Elbedda Ridge (Fig. 20) which links directly to Horton Plains National Park (HPNP), which is Sri Lanka's most famous – and well-visited – protected area in the Central Highlands.

Although only limited data has been obtained from these cameras so far, there are already several leopard detections including mothers and dependent cubs (Fig. 21). We hope to obtain substantially more information about the leopard population in this important landscape, including movement patterns and habitat use, in 2022.



Fig. 20: The Elbedda Ridge where WWCT commenced remote camera work in December 2021 (yellow). Also shown is the Peak Ridge Forest Corridor across the valley (red). Horton Plains NP is the dark green forest patch surrounding the brown plains in the southeast corner.



Fig. 21: A mother (background) and her cub (foreground) at Batalgala estate on the Elbedda Ridge.

B. Yala buffer zone

Leopards

In 2021 WWCT continued to run 10 remote cameras in the Yala National Park Buffer region south of Block I, Palatupana. We monitored 5 remote camera locations in the Nimalawa Sanctuary and another 5 in Hotel Zone within the electric fence that surrounds the National Park, but outside the park boundaries (Fig. 22). A total of 1548 24-hour periods of camera effort were undertaken during which 35 leopard events were captured.



Fig. 22: The study areas in the buffer zone of Yala National Park southern Block I with the general location on Sri Lanka's south coast (left) and the zoomed in image showing the two sites. Remote camera locations are white dots. Note a single camera outside both the Nimalawa Sanctuary and Hotels Zone in the heavily fragmented agricultural cultivations.

Over the duration of the monitoring of this site (December 2019 to September 2021) we have had cameras active for 3520 24-hour periods and photo-captured 109 leopard images during 107 occasions, giving a Relative Abundance Index (RAI = # captures/100 remote camera days) of 3.1 (Table 1). The RAI for the Hotels Zone (3.6) was higher than for the more distant Nimalawa Sanctuary (2.6), although this pattern was only apparent after 2021 when Nimalawa, for unknown reasons, saw a reduction in the frequency of leopard photo captured. WWCT’s 2019-20 research in the wider buffer zone (including cattle and chena cultivation areas) documented an RAI of (0.65), much lower, suggesting that both the Nimalawa Sanctuary and Hotel’s Zone act as refuges for leopards in this human-dominated landscape.

Table 1: The Relative Abundance Index (RAI = # of individual captures/100 remote camera 24-hour periods) for leopards across several WWCT studies from 2015 – 2021.

Study Area	Remote Camera Days	Relative Abundance Index
Wilpattu National Park	797	22.96
Gal Oya National Park	3278	6.53
Peak Ridge Forest Corridor	10931	7.99
Namal Oya Sanctuary	1568	0.96
Yala Southern Buffer	3520	3.10

So far WWCT has documented 15 individual leopards – 6 adult females, 4 adult males, 1 sub-adult female, 3 sub-adult males and a single cub within this buffer area. Although almost 50% of photo-captured individuals have only been detected on a single occasion, there are several animals that are clearly resident in the study area, having been monitored for over 300 days (Fig. 23). The adult resident density (~2.5 F:1 M) is standard for leopard populations internationally.

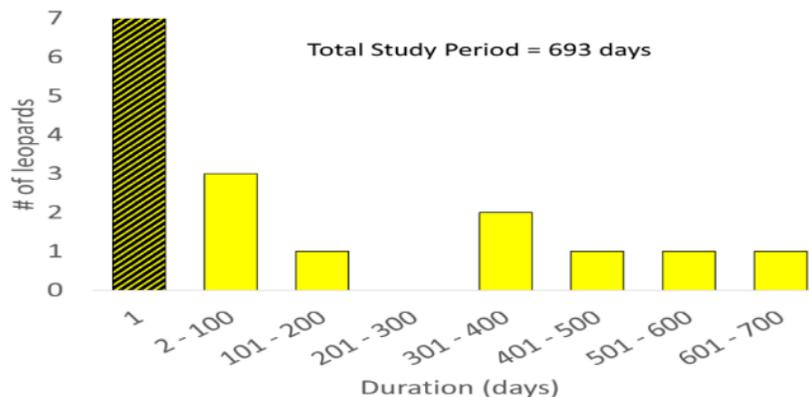


Fig. 23: The duration over which each individual leopard (N = 15) has been detected in the Yala National Park Southern buffer zone between December 2019 and September 2021.

Leopard activity patterns in the Yala buffer zone is markedly similar to what is found in the unprotected tea estate landscape of the Central Highlands, with minimal activity during the day – especially between 9am – 4pm - when compared to what is seen in protected landscapes such as Wilpattu NP and Gal Oya NP (Fig. 24). The exception seems to be the early morning until 9am during which time there is similar, or even more, activity in the Yala buffer area. In the Central Highlands leopard activity is essentially finished by 8am. Another difference from the Central Highlands is that the spike of activity seen in that landscape just after sunset is absent in the Yala buffer, and instead leopards here are more similar to those in established PAs at this time and increase their activity as darkness falls in a similar way (Fig. 24).

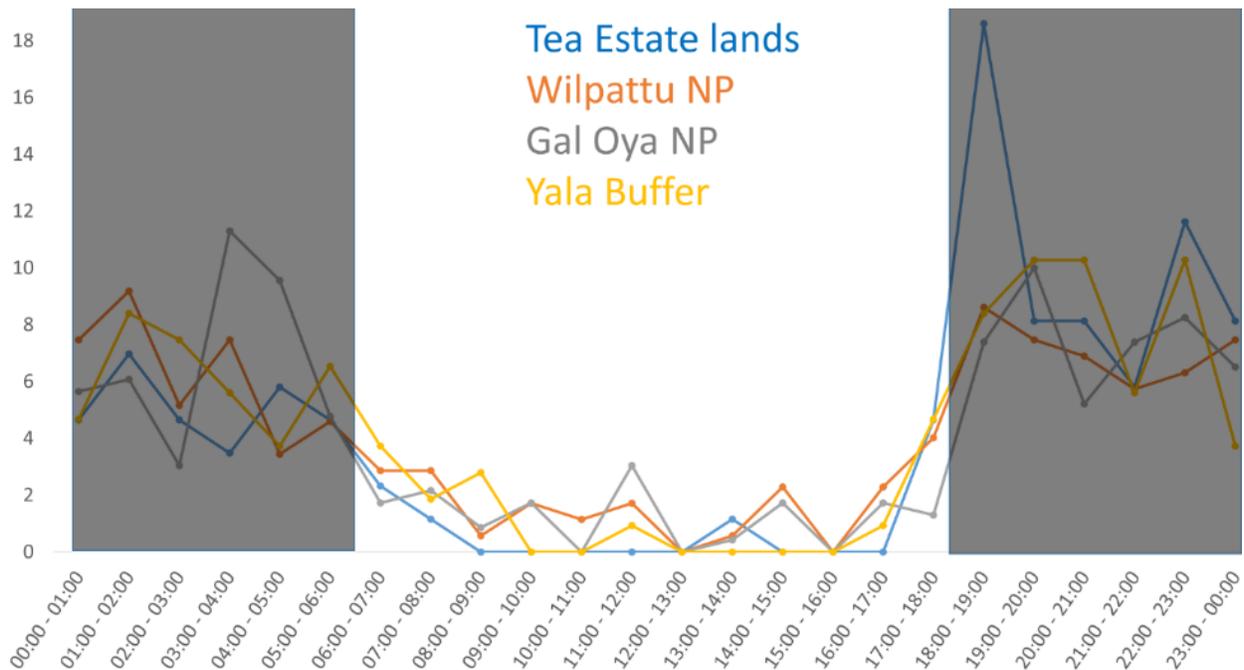


Fig. 24: Activity patterns in 4 study areas in Sri Lanka based on detections of leopards by remote cameras set along trails and roads. The Tea Estate lands have no level of protection and are in a human-dominated landscape, both Wilpattu and Gal Oya are within long-established National Parks, and the Yala Buffer is adjacent to Yala National Park and includes unprotected lands as well as a Sanctuary which is of lower protection level than a National Park. Leopards in the unprotected landscapes exhibit very little daytime activity – particularly between 9:00 and 16:00 - compared to the two Protected Areas. This may be a way to avoid encountering humans in these human-dominated landscapes.

In terms of space use, we seem to see females either on the Nimalawa side or the Hotels zone side, but not both, possibly due to the heavily fragmented, human-dominated landscape that separates them. For example, adult female CinRockF1 is almost exclusively in the Hotel's zone, although does get picked up in the remote camera at the edge of the more fragmented landscape (Fig. 25).



Fig. 25: Adult female CinRockF1 has been detected as several cameras within the Hotel's Zone as well as the single camera in the central fragmented zone (upper left). She has never been detected at Nimalawa Sanctuary.

Female CinRockF2, was picked up in both the Hotel's zone and the Nimalawa Sanctuary, but it appears that this was due to a shift in range use and not due to using the entire range since she was detected in the Hotel's zone only in 2020 when still quite young, and has only been detected in 2021 in the Nimalawa Sanctuary (Fig. 26). We suspect that she dispersed to that area but need additional cameras in the fragmented central area to be sure. Adult males do appear to use the wider landscape (Fig 27), as they range over much larger areas with their range size partially dictated by the ranges of a number of females. This is the same pattern that we see in the Central Highlands tea estate landscapes, whereby adult females are mostly restricted to upland ridge habitat while adult males move between ridges- and therefore through the lower tea estates - as they have much larger ranges.

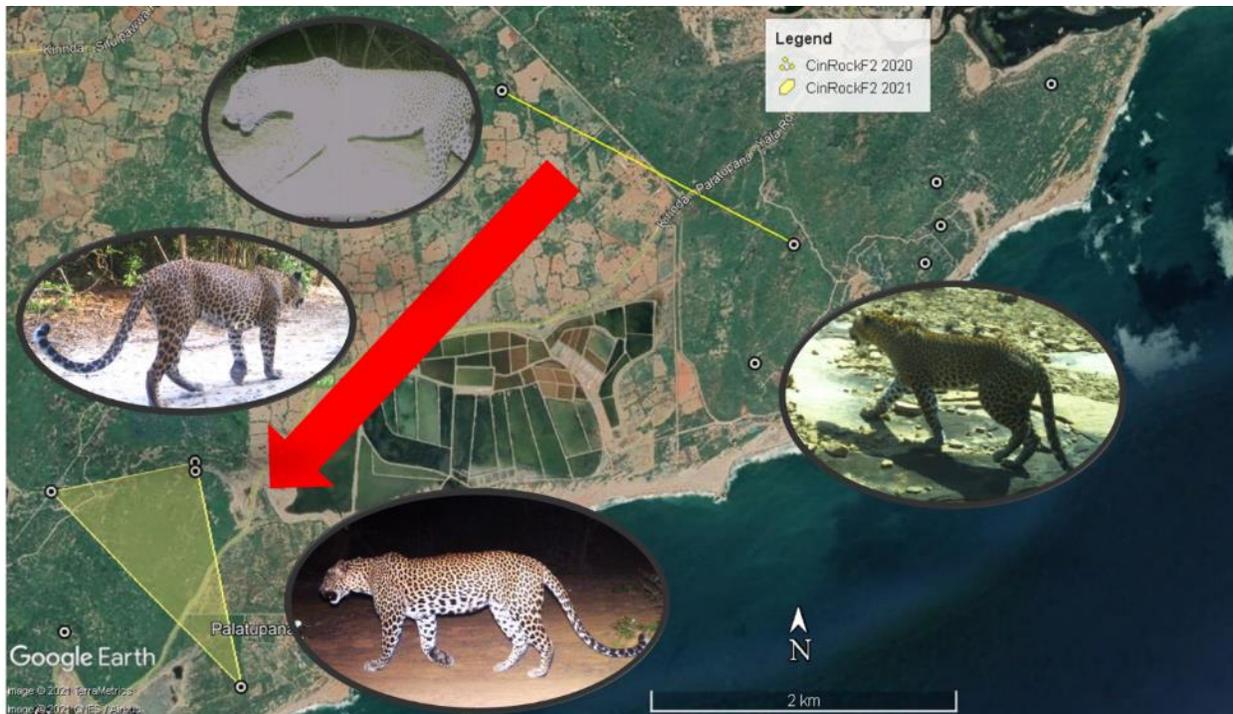


Fig. 26: Adult female CinRockF2 seems to have shifted her range from when she was young (in 2020) and was in the Hotel's zone area (upper right) to where she now – in 2021 - seems to have settled in the Nimalawa Sanctuary (lower left).

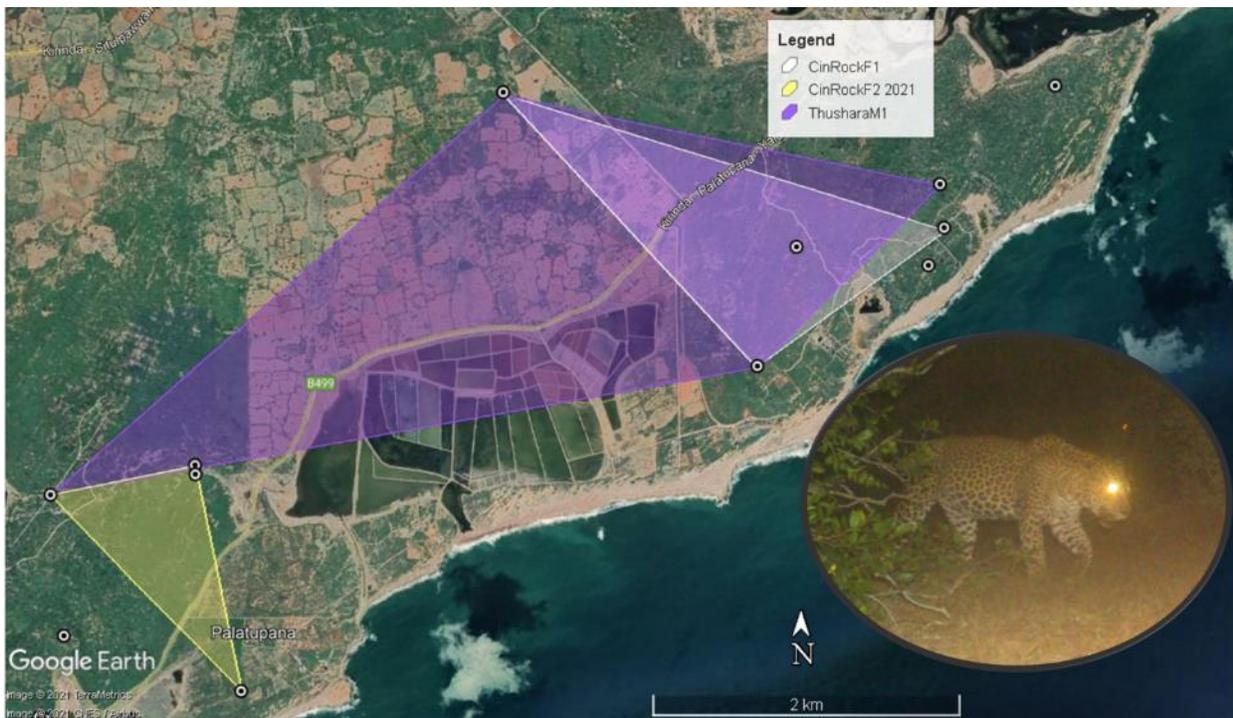


Fig. 27: Adult male ThusharaM1 moves between the Hotel's zone (upper right) and the Nimalawa Sanctuary (lower left) and also overlaps the ranges of both CinRockF1 and CinRockF2. This means he must manipulate the heavily fragmented central portion of the area.

It is important to continue to monitor these buffer zone leopards as we know that some individuals have come from inside the PA and settled in this zone (Fig. 28), and furthermore, the zone itself is getting increasingly fragmented which is a threat to the wildlife that exists here (Fig. 29).



Fig. 28: Adult female BoBF1 was detected by WWCT cameras in Nimalawa Sanctuary in 2019 and 2020 and was matched to a leopard that used to reside within Block I of the National Park. This female was not seen in 2021.

July 2009

November 2021



Fig. 29: The forest cover that has been lost since the end of the civil war in 2009 along the south-western edge of Yala National Park, Block I. The yellow star in the right photo is a remote camera location used by WWCT from 2019 – present. The road that runs diagonally from top centre to bottom right, is along the electric fence that forms the boundary of YNP. This remote camera gets a lot of activity including leopards, bears and small cats, probably because it is in one of the few remaining corridors on the landscape.

Finally, there is the ever present threat of snares and, in this landscape, “*haka patas*” (explosives that are placed in food sources such as melons which then detonate in the mouths of foraging animals – mostly elephants and wild boar; Fig. 30). Tracking the extent and recording the locations of these gruesome events can help the DWC more effectively target snare removal activities



Fig. 30: A jackal with a snare around its neck (left), a sloth bear with a snare around its waist (centre) and a wild boar with injuries to the jaw consistent with a haka patas (right). Unfortunately, by the time these animals are detected on the remote cameras, it is often many days since the image was captured, so acting on these gruesome events is very challenging.

Other Wild Cats

All four of Sri Lanka’s wild cats can be found in the Yala buffer zone, with the leopard the most frequently detected, followed by the rusty-spotted cat (Fig.30). This is the same pattern that we find throughout leopard range, with the rusty-spotted cat appearing to use very much the same paths and areas as the leopard. Less frequently detected here, as in other areas of their range, is the fishing cat, which although widespread across the island, either exists at relatively low densities or uses the landscape in a way that reduces their capture by remote cameras set along well used animal trails. While the leopard and rusty-spotted cat were detected with higher frequency in the Hotel’s zone, the fishing cat was much more likely to be photo-captured in the Nimalawa Sanctuary (Fig.30). This may be due to their use of the Lewaya (lagoon) and Nimalawa tank that are both within the Sanctuary, and in proximity to which we have remote cameras. The jungle cat is also seen in both regions, albeit infrequently (Fig. 30). All three small wildcats are very nocturnal, with no diurnal activity at all for either fishing or jungle cats (Fig.31).

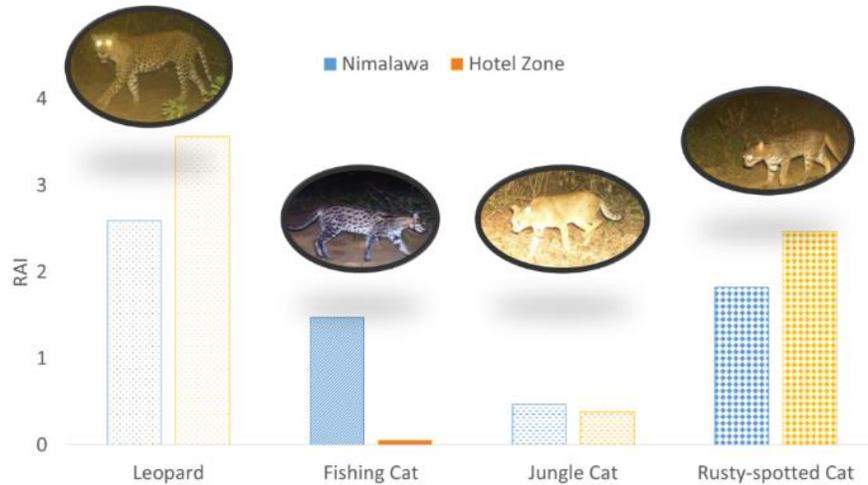


Fig. 30: The Relative Abundance Index (RAI = # remote camera images/100 remote camera 24-hr periods) for all of Sri Lanka's 4 wild cat species in the Nimalawa Sanctuary and Hotels Zone of the Yala buffer zone area.

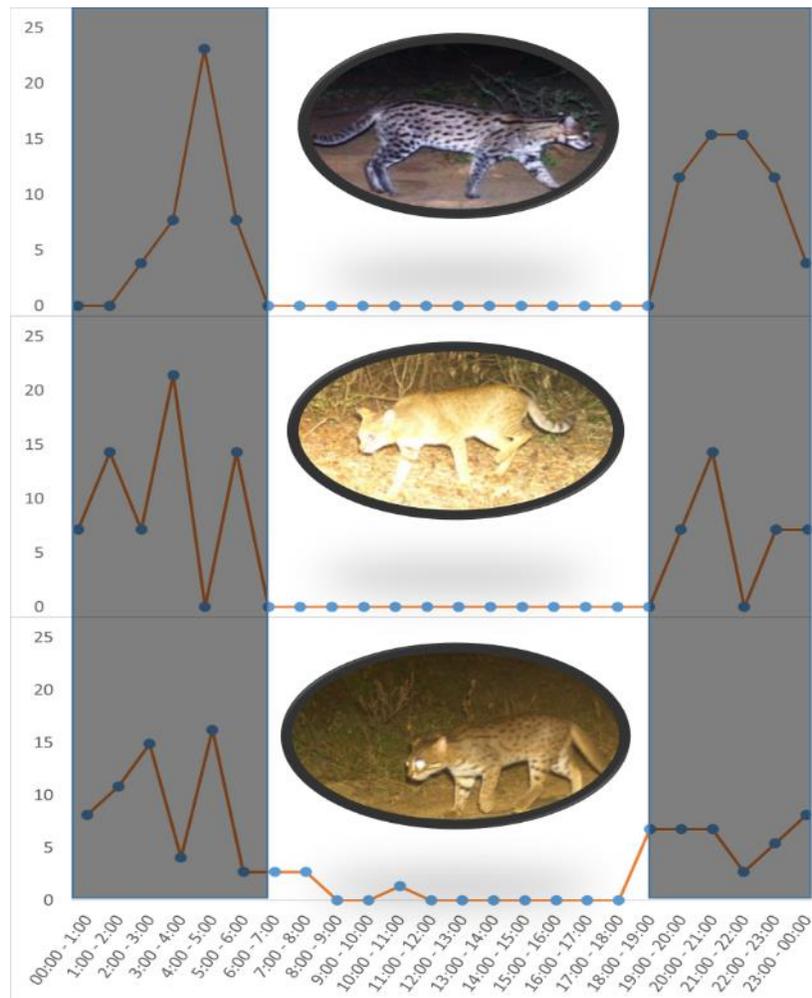


Fig. 31: The activity times, based on remote camera images of the 3 small cats in the Yala buffer zone. All three species are highly nocturnal, with only the rusty-spotted cat active at all diurnally.

C. Patch Forest Project

Sigiriya

Leopards

Remote cameras were again operated at Back of Beyond's two Sigiriya properties, with 666 remote camera days from 2 stations at Pidurangala and 833 remote camera days from 3 stations at Dehigahaela. It was a low year for leopard sightings, with leopards only detected twice at Pidurangala and double that at Dehigahaela. However, disappointing that return was, it was exciting to see that one of the leopards at Pidurangala was the same individual that we had first photo-captured in February of 2018 (Fig. 32). Since 2 sightings across 3.5 years is pretty infrequent we can only assume the camera is at the edge of her range, or on a path infrequently used. Unfortunately, the resident female leopard from the Dehigahaela location – “Daria” - was not detected in 2021 after having been seen regularly in 2019 and 2020. A leopard was killed in that area in 2021 but whether it was “Daria” is unknown. The new leopard photo-captured at Dehigahaela in 2021 appears to be a younger animal.



Fig. 32: Pidurangala Female #1 (PF1) in February 2018 (left) and October 2021 (right).

An important caveat for 2021 was that we had a lot of remote camera technical issues at these sites, with one set of camera flashes regularly failing to work, resulting in lots of black night images. This hampers the research efforts considerably, making it difficult to effectively quantify survey effort, and has been a real flaw in this particular batch of cameras, although we have subsequently had several of these units repaired to good effect in Colombo.

D. Human-leopard Co-existence

Leopard mortality

Of the 9 leopards that were detected to have died in Sri Lanka in 2021 (Fig. 33), 6 were killed during interactions with people, one was found dead from natural causes inside a National Park, another died with an incision on its neck of unknown provenance in a tea estate and another appears to have drowned in a reservoir in the Highlands. Of the 6 known to be killed by people, all were snared and 5 of those were in the Central Highlands (the other in Killinochichi in Northern Sri Lanka). This represents a steep decline in human-induced mortality from 2020 when 14 leopards were killed by people in Sri Lanka (Fig. 34) with 11 killed by snares in the Central Highlands (Fig. 35). The dedicated anti-snare campaign undertaken by WWCT together with the DWC in 2020, as well as various other organizations, may have helped to reduce leopard mortality in 2021. It is vital to keep this message resonating to reduce the prevalence of snaring in the country and the Highlands in particular.

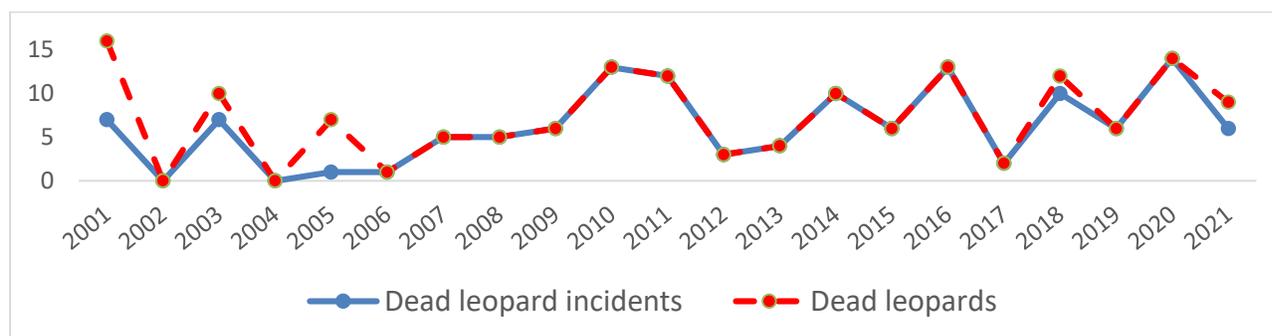


Fig. 33: Dead leopards and incidents with humans that resulted in dead leopards between 2001 and 2021. If all dead leopards (including those that potentially died naturally) are included, there were 9 deaths in 2021, of which 6 were known to have been caused by humans, a sizeable reduction (>50%) from 2020.

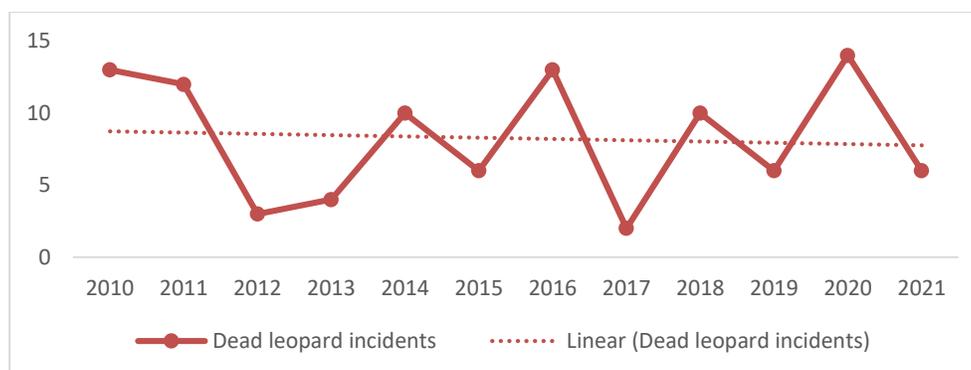


Fig. 34: Leopard-human incidents that resulted in one or more dead leopards, from 2010 – 2021. The number of incidents in 2021 was less than the average of the past decade and ≤ 5 of the past 7 years.



Fig. 35: Number of leopards reported caught in snares and killed in snares in Sri Lanka between 2010 and 2021. Twenty-twenty has seen the most snaring incidents in the past 12 years with 2021 levels falling back to more typical levels.

II. Education and Awareness

A. Events

In February, WWCT was very proud to take part in the official signing ceremony for the initiation of the Peak Ridge Forest Corridor (Fig. 36). This was a much-delayed event due to Covid-19, but finally the stakeholders all came together to add their signatures to the document to make the PRFC reality. WWCT gave a presentation at this event which detailed the history of the project and the impetus behind the importance of the ridge protection in this landscape.

B. Presentations/Training Sessions

Due to Covid-19 restrictions there were not a lot of these sessions organized in 2021, however in December we presented our work in the Yala buffer zone to some interested guests and then gave a summary presentation of this work to date to the naturalists from Wild Coast Lodge, with whom we are conducting the research.

C. Awareness Materials

In 2021 WWCT was sub-contracted via DWC and an international German consultancy, GOPA, under a grant from the German International Technical Development organization (GIZ) to the Sri Lankan government to implement an Education and Awareness campaign in the Wilpattu National Park (WNP) Influence Zone. This is the community area on the periphery of the National Park. Under this program, WWCT created, designed, printed and distributed the following material to the communities and schools in the Influence zone.



Fig. 36: Top left: PRFC Member Certificate. Top right: WWCT's Andrew Kittle and Anjali Watson presenting the background of the Peak Ridge Forest Corridor at the official signing in February 2021. Bottom: Signatories of the PRFC MoU at the event. Images courtesy of Resplendent Ceylon and Dilmah Conservation.

Newspaper inserts

We produced 6 themed newspaper inserts (Fig. 37) covering: 1. The history and ecological and cultural importance of WNP; 2. What it means to live beside WNP from an environmental, social and legal perspective; 3. How to co-exist with wildlife in this area; 4. Terrestrial conservation of WNP; 5. Marine conservation of WNP; and 6. Ecologically sustainable farming and fishing practices. We distributed 12,000 copies (1,600 Sinhala and 400 Tamil copies for each of the 6 insets) over the course of the project period. Inserts were placed within National newspapers published in the respective languages dominantly present in the targeted region (Sinhala or Tamil depending on the target village) and distributed via newspaper agencies that would supply to the villages in the target GN divisions located along the boundaries of WNP.



Figure 37. Sinhala newspaper insert informing about the value of WNP got distributed via local newspapers.

Posters

The content of the six newspaper inserts was condensed to create a set of six attractive, laminated A2 posters (Fig. 38) which are to be distributed in early 2022 to a variety of prominent community locations including government institutions and schools. A total of 90 posters were printed, 72 in Sinhala (12 for each of the 6 posters) and 18 in Tamil (3 for each of the 6 posters), with the language breakdown consistent with that used for the newspaper inserts as determined by the ethnic composition of the region.

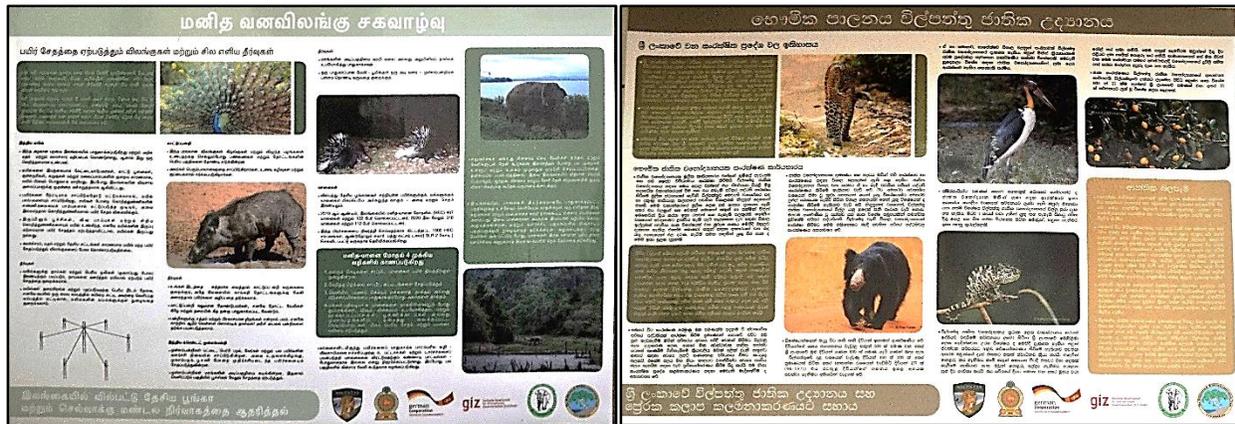


Fig. 38: Left – Tamil language poster #3 about co-existence with wildlife in the WNP influence zone and Right – Sinhala language poster #4 about terrestrial conservation in WNP.

Notebooks

We created a 74-page tri-lingual notebook with 23 pages of awareness material (Fig. 39) interspersed with ruled pages for writing, with the aim to educate community members regarding important aspects of living in proximity of WNP using a simple and useful method. The awareness material comprised 5 different areas: 1. Educational information about the 4 wild cats of Sri Lanka – the leopard, fishing cat, jungle cat and rusty-spotted cat, 2. Detailed and specific information about how to co-exist with wild cats, 3. Detailed and specific information about how to co-exist with elephants – from conflict to co-existence, 4. Detailed and specific information about how to co-exist with other wildlife (e.g. wild boar, peacocks etc.), and 5. Information about the illegality and consequences of setting snares to capture wildlife. Much of this material was adapted from pamphlets and booklets previously created by WWCT, with some additional new information.

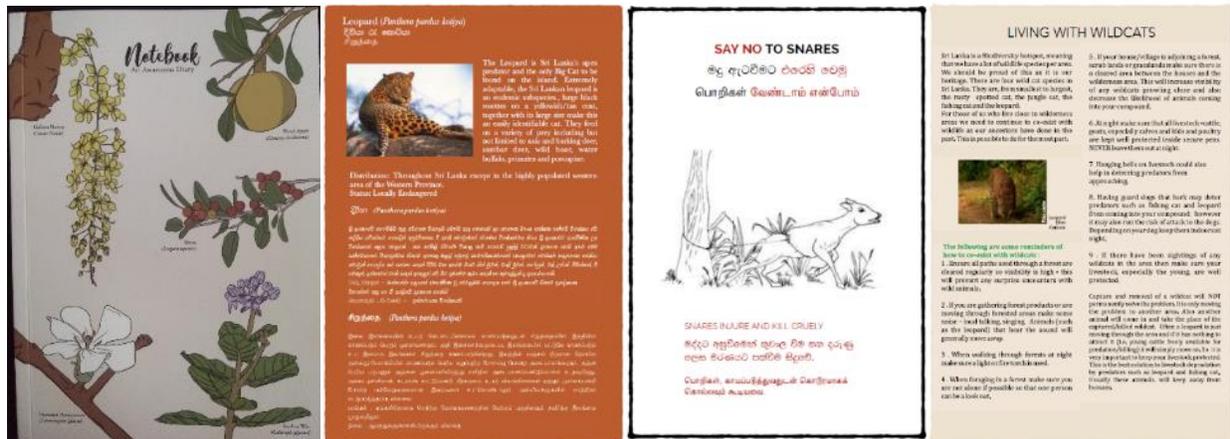


Fig. 39: The cover (left) and some samples of the awareness pages in the notebooks.

Mammal cards

For younger children in the WNP Influence zone, WWCT developed a card game comprising 18 pairs of animal cards, depicting 18 different mammals common in the area in and around the PA (Fig. 40). Each 4 x 6 cm card has the animal's photograph and a smaller animated version of the same animal for visual appeal, together with information about its size, shape, habits and status.

Information is in Sinhala and Tamil, with the English name of each species included to further encourage learning. Three different games can be played with the cards: a memory matching game, a version of snap and a 'Who am I' guessing game. Game instructions are detailed on the outer box/sleeve. The idea is for kids to have fun while familiarizing themselves with the wildlife with which they share their landscape. A total of 75 card packs are being printed and will be provided to target schools within the WNP Influence zone in early 2022.



Fig. 40: From left: The jungle cat card; picture on the back of each card; elephant card

Workbooks

For older schoolchildren, WWCT designed and created two workbooks: a ‘Junior Workbook’ (grades 4 – 6; Fig. 41) and ‘Senior Workbook’ (grades 7 - 9).

These are activity workbooks which aim to engage and challenge students in a way that is more interesting than rote learning. The workbooks contain directed activities but also contain self-learning opportunities and are meant to be fun and informative.

Workbooks contains 7 modules: 1. Life beside/in Wilpattu National Park, 2. Mapping, 3. Biodiversity, 4. Water management, 5. The creation of a school garden, 6. The 4Rs of waste management, and 7. Climate change resilience.

As the Junior workbook is targeted at younger children, its concepts are more simply presented with a greater emphasis on games, visual elements and introductory concepts.

The senior workbook takes these concepts further and provides greater depth of information and theory. The largest component of the workbooks is the Biodiversity module as a key goal is to educate children about the non-human living world around them.

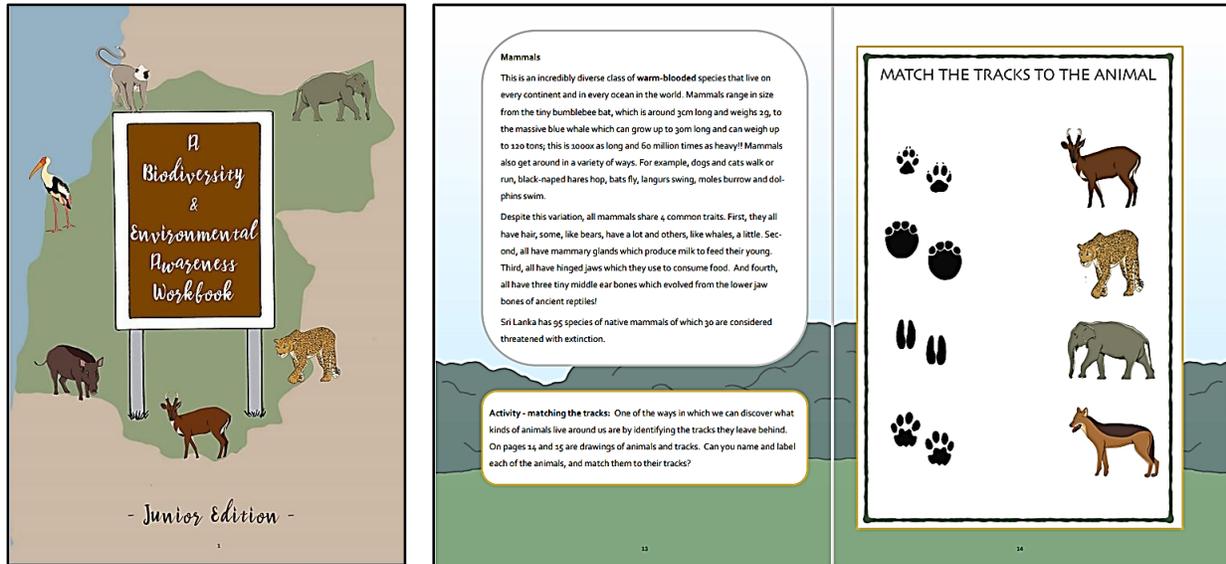


Fig. 41: Left – the front cover of the junior workbook. Right – sample activity pages from inside the junior workbook. These images are from the English version from which the Sinhala and Tamil versions have been translated.

Wall murals

At ten schools, selected in consultation with the Divisional Education Directors, paints (11 colours), brushes (9/school) and a template, created by a professional artist and depicting a typical nature and wildlife scene in the WNP area, were provided for schoolchildren to create colourful murals on their school walls.

Teachers were instructed to lead the painting by using the template to re-create the scene on the available school wall, and then the children could follow the template loosely, but improvising when and where they wanted, to fill in the details of the scene (Fig. 42). The idea is for the murals to be judged by the WWCT team and the professional artist and for prizes and perhaps media coverage for the winning schools. This will be done in early 2022.



Fig. 42: A partially completed wall mural from the Horuvila school based on the template delivered by WWCT with the paints.

D. Social Media

WWCT's Instagram page was active in 2021 with regular posts about wildlife research and conservation.

E. Staff/Students/Interns/Volunteers

Nimalka Sanjeevani: one of WWCT's long term versatile members continues to do our outreach work and undertakes a lot of our Sinhala translations. A Phd candidate in floral biodiversity across landscape gradients, Nimalka also handles our plant identification requirements for reforestation.

S. Krishnakumar: WWCT's Dunkeld Conservation Station assistant. His work includes station maintenance, regular snare patrols, checking remote cameras, assisting with the butterfly garden, community outreach and the Dunkeld re-forestation project.

M. Rajaram: Remains the Dunkeld Conservation Station resident gardener, maintains the PRFC forest plant nursery, collects and propagates seedlings for the re-forestation project. He is also the DCS handyman.

Sean Jayasinghe: A fantastic addition to WWCT, he took on field work at the Central Highlands, Yala buffer and Sigiriya sites. He also oversees the DCS re-forestation work.

Chanaka Kumara: WWCT's current Masters student who undertook his final year undergraduate project in 2008, after which he worked with WWCT as a Research Assistant until 2012. In 2019 he re-joined WWCT to undertake his MSc research in the Central Highlands, part of a larger project aimed at understanding the ecological and anthropogenic factors driving human-leopard interactions in the region.

Kaitlin Manuel: worked with WWCT in 2018 as an intern. In 2020 she re-joined WWCT handling our design and social media component. She was instrumental in designing the awareness material for the Wilpattu National Park Influence Zone project, Kaitlin returned to Canada to continue her pandemic-interrupted Environmental Architecture program at the University of British Columbia.

Joelle Perera: joined the WWCT team in 2021 as a volunteer and has taken over from Kaitlin in running WWCT social media outreach activities. WWCT then hired her on a contract basis for the Wilpattu National Park and Influence Zone project where she was instrumental in creating, designing and writing the school workbooks.

Sriram Mahodaram: volunteered for WWCT in 2018 – 2019, did most of the Tamil translation of the education and awareness material for the Wilpattu National Park and Influence Zone project. Now based in India, Sriram is involved in wildlife projects there.

Venushka Rodrigo: joined WWCT as a volunteer in 2021, following in the footsteps of his brother, Varushka, who worked with us in 2017. Venushka assisted with field work and has helped with distribution of the material to the Wilpattu National Park Influence Zone.

F. Media

Digital / Television / Radio:

WWCT together with the Daily Mirror online created a series of short, informative videos about biodiversity, conservation concepts, leopards and other wild cats of Sri Lanka and their ecology, behavior, threats and conservation. “Keeping it Wild”, is a twelve-part ongoing series.

[Keeping It Wild | Episode 01 - Biodiversity - YouTube](#)

[Keeping It Wild | Episode 02 - The Importance of the Wilderness - YouTube](#)

[Keeping It Wild | Episode 03 - Protecting and Increasing Our Wild Spaces & Wilderness - YouTube](#)

[Keeping it Wild | Episode 04 | What is an Umbrella Species? - YouTube](#)

[Keeping It Wild | Episode 05 | The Leopard as an Umbrella for Conservation in Sri Lanka - YouTube](#)

[Keeping It Wild | Episode 06 | Stepping Stones for Conservation - YouTube](#)

[Keeping It Wild | Episode 07 | The Empty Forest Syndrome - YouTube](#)

[Keeping It Wild | Episode 08 | Wildcats of Sri Lanka - YouTube](#)

In December, ROAR Media showcased the Peak Ridge Forest Corridor: [The Peak Ridge Corridor: Protecting The Leopards Of Sri Lanka’s Highlands \(roar.media\)](#)

Print / Newspapers:

A number of media organizations picked up on the Peak Ridge Forest Corridor signing event in February. Below are a couple of examples:

[The Peak Ridge Forest Corridor Collaboration: A landmark partnership - The Morning - Sri Lanka News](#)

[Plantation companies join hands with WWCT to protect Peak Ridge Forest Corridor | Dilmah PRESSROOM \(dilmahtea.com\)](#)

G. Publications

Uduman, A., Hagerman, S., Kroc, E. Watson, A., Kittle, A. & Burton, A. C. 2021. Attitudes towards the Sri Lankan leopard (*Panthera pardus kotiya*) in two rural communities with varying levels of cattle rearing, and considerations for human-leopard coexistence. *Oryx*. Doi: 10.1017/S0030605321000247.

[\(17\) \(PDF\) Attitudes towards the Sri Lankan leopard Panthera pardus kotiya in two rural communities \(researchgate.net\)](#)

Kittle, A.M., Watson, A.C. & Prasad, T. 2021. Spatio-temporal insights into human-induced leopard mortality in Sri Lanka from 2001-2020. *WILDLANKA* 9(1): 136-149.

[\(17\) \(PDF\) SPATIO-TEMPORAL INSIGHTS INTO HUMAN-INDUCED LEOPARD MORTALITY IN SRI LANKA FROM 2001 -2020 \(researchgate.net\)](#)

Kittle, A. M., Watson, A. C. & Samaranyake, P. K. L. 2021. Edge effects and distribution of prey forage resources influence how an apex predator utilizes Sri Lanka's largest protected area. *Journal of Zoology (Lond.)* 314(1): 31 – 42. <https://doi.org/10.1111/jzo.12870>

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) where needed and we sincerely thank them for continued collaboration.

Funding support has been provided by Whitley Fund for Nature (WFN), Lanka Environment Fund (LEF) Oxford University's WildCRU, Alliance Finance PLC, Resplendent Ceylon/Dilmah Conservation, CERZA Conservation, Parc Animalier de la Barben, EcoFaune, Zoo de Maubeuge, Olu Waters/Rockland Conservation, Back of Beyond and Lanka Environment Fund. We thank these partners without whose support the extent of WWCTs work would not be possible.

