

LION CONSERVATION CRISIS IN QUEEN ELIZABETH NATIONAL PARK, UGANDA

FINAL PROJECT REPORT TO WCN/LRF



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DECEMBER 2018



Project Title: Lion Conservation Crisis in Queen Elizabeth National Park, Uganda

Agreement reference No: UG-WCS-01

Reporting Period: January – December 2018

Reporting Date: December 30, 2018

Executive Summary

The project aimed at recovering the lion population by addressing the current threats to the lion population in the Ishasha sector of Queen Elizabeth Park, particularly reduce retaliatory killing of lions in response to livestock depredation, and snaring and poaching of lions for their parts and their prey for bushmeat. The main activities implemented were construction and maintenance of eight kilometres of the elephant trench along the park boundary, monitoring illegal entry of cattle into the park, monitoring lion movements as well as several engagements to sensitize and build trust among the frontline communities. Due to the project interventions, not a single livestock was lost to lion attack and grazing of livestock inside the park did not occur during the period between May and December 2018. These positive results are attributed to the construction of the trench in the hotspot areas along the park and maintenance of the existing elephant trench as well as provision of direct benefits to the communities both employment, improved livestock management and prevention of livestock loss.

We have been able to prove beyond reasonable doubt that a well-maintained trench can effectively reduce human-lion conflict and offer other benefits such as deterring elephants from crossing to the community side to raid crops in the communities as well as deter communities from grazing inside the park. In addition, maintenance of the trench creates jobs for the local communities and diminishes the perceived risk of human kills by elephants and lions. Coupled with the different community engagement strategies, our incentive package helped to create a clear linkage between lion conservation and the role of communities in lion toward lion recovery and park management. The project benefited 3942 people both in the northern and southern parts of the park. Of these, 407 farmers, 40 trench maintainers, 8 scouts, 600 school children, and 150 cattle keepers in the southern and northern sectors mainly from Nyakatonzi, north of Lake Katwe, and Kasenyi and Hamkungu fishing villages.

The project also raised interest in lion conservation among stakeholders and facilitated formation of the QENP Lion Conservation Alliance involving UWA, WCS, Uganda Carnivore Program, eco-lodge owners such as Little elephant, Enjojo lodge, Volcanoes Safari Lodge, Kasenyi Safari Camp and Wild Frontiers and stimulate a lot of interest from potential donors such as National Geographic, Oakland Zoo of California who are very supportive of this initiative. The alliance is very timely and offers great opportunities for creating a strong collaborative process aimed at developing a comprehensive human-carnivore conflict mitigation around QENP and help to recover both the lion population and the prey base. In addition, the deployment of satellite collars on 11 lions (five in the southern sector and six in the northern sector) and the establishment of lion shields developed by RESOLVE and developed alongside the satellite collars on lions in Hamukungu and Kasenyi fishing villages located inside QENP has resulted in an anticipated benefits namely 1) confidence and trust building among researchers (UWA, WCS, UCP and PhD student from University of Queensland to share information, 2) resulted in a lot of support for lion conservation from private sector, particularly eco-lodge owners, individual donor, including the provision of funds to purchase of an additional five lion satellite collars and experimentation with 20 flashing lights provided by the Tanzania Lion Illumination Project installed in both Kasenyi and Hamukungu Fishing villages, 3) creation of rapid lion rescue response unit led by UWA with support from UCP and WCS. After the construction of the ranger post at Ishasha Customs, a

border crossing point to DR Congo from Uganda, UWA was able to deploy more rangers in the area, and 4) it helped to create a collaborative partnership with the Lion Guardians who visited the project site and provide very important recommendations such as the establishment of a lion rescue response unit, build a strong community-led human-lion conflict mitigation strategy, develop base-line metrics and protocols to measure impact, develop a lion monitoring, and Tailor an effective conflict mitigation intervention based on understanding of motivations. Lastly, we generated a lot of support from the local government who helped to mobilize communities and also allowed the veterinary officers and community development officers to work with us during the project.

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1.0 General Background

Before securing the funding from the Wildlife Conservation Network/Lion Recovery Fund, limited interventions and innovations were being implemented or discussed. The lion poaching in QENP was noted by WCS to be on the rise. Of the 27 Ishasha sector lions recorded by WCS in 2006, only 18 remain today. From January –September 2017 alone, we lost five to retaliatory killings and unaccounted for individuals were four. The last lion survey, conducted in 2013, estimated the total QENP population at 144 individuals (Okot et al., 2010). However, WCS together with the Ph.D. student from the University of Queensland embarked on conducting an accurate survey of lions in QENP using photogrammetric and individual identification techniques. The results of this study are still being analysed, but we anticipate a very accurate estimate of the lion population in QENP.

The biggest threats to lions in and around QENP is human-induced death, particularly retaliatory killing due to livestock losses and incidental death linked to bushmeat hunting using snares. Communities retaliate by poisoning carcasses of livestock killed by carnivores. In 2017, four lion carcasses were found to be missing heads and parts of their limbs—one had its kidneys removed— possibly suggesting a new trend in body parts being harvested for the illegal wildlife trade. We have noted that lions are killed for their valuable parts such as teeth, tail and fats used by traditional practitioners as medicine and these parts are collected by poachers from the community and sold to local people as a source of power, charm and luck for their businesses and wealth acquisition. Under this project, we set out to implement the following activities:

- 1) Increase law enforcement presence and poaching deterrence by constructing a ranger's accommodation facility at Ishasha customs and increasing the size of the ranger force, as well as test a new method to detect wildlife crime using live-streaming CCTV cameras along the border.
- 2) Strengthen law enforcement management by equipping new law enforcement, and community conservation rangers with SMART phones to monitor illegal activities inside the park and livestock grazing in the park, bring in the latest diagnostic tools (e.g., predictive models to guide patrols to most important areas that are not being patrolled) to increase effectiveness and efficiency of ranger force.
- 3) Increase poaching deterrence and our understanding of lion movements inside and outside the park by purchasing and deploying satellite collars for lions with a gradual shift away from VHF collars to reduce on-ground monitoring and vehicle operating costs.
- 4) Improve communication and coordination with the local communities. Immediately and directly address the need to improve our understanding of who is responsible for the illegal activities (including illegal livestock grazing, killing lions, and use of lion parts), and the communities' requests to reduce conflict. WCS proposed to hire a community liaison officer to support our existing staff to monitor livestock entry inside the park, collect relevant information that will be used to build a comprehensive Human Wildlife Conflict (HWC) mitigation plan articulating the long-term strategy. The practical actions included limiting access to the park by repairing a six (6) km existing barrier trench that has been neglected and is no longer functional, and constructing a two (2) km length of new trench in one of the elephant crossing hotspots, hire eight (8) community scouts, one from each of the eight villages to assist UWA in supervising the maintenance of the trench, help build relations with

communities as well as promote conservation among community members. We committed to train the eight scouts on how to establish better kraals by setting up three demonstration kraals in the community aimed at improving safety and security for the livestock at night, and providing basic veterinary services, particularly deworming of goats and castration of dogs (to reduce dog numbers that lure lions to the communities and used for hunting inside the park).

5) A visit by Lion Guardians to QENP site to assist WCS and its partners to identify opportunities for development of a human lion conflict mitigation. The scope of work for the Lion Guardian team was to: i) perform an initial site assessment in order to develop a better understanding of the human lion conflict situation and help to guide the focus for design and implementation of a lion/human mitigation effort; ii) prepare a short report following the on-site visit outlining recommendations for next steps, risk reduction and general observations during the service; and iii) advise and collaborate on the process to design and implement the next steps with WCS and other key stakeholders.

As such, WCS set out to monitor project performance and effectiveness of interventions by measuring the changes in illegal activities over the project life using the Spatial Monitoring and Reporting Tool (SMART), satellite collar and monitor lion movements, their use of the habitat, pride composition, and number of individual lions among the prides being monitored. We also proposed to develop a database for livestock keepers based on livestock photography so we can gradually encourage and support the community to take punitive action against non-compliant herders, track livestock losses and record incidences of human-wildlife conflict. The measures of success were a) an increase in lion population attributable to a reduction in illegal activities inside the park, b) a reduction in human-wildlife conflicts in the project area, c) an increase in lion population and d) improvement in adjacent community livelihoods attributable to a reduction in livestock loss and crop raiding.

1. Reporting on metrics

A quantitative report based on agreed metrics is given below.

2. Summary of Conservation Accomplishments

This project was developed in response to the enormous challenges facing lions in the Ishasha sector, the southern part of Queen Elizabeth National Park and funded by Wildlife Conservation Network (WCN) through the Lion Recovery Fund (LRF). Most of the drivers are anthropogenic in nature and fuelled by the lion-human conflict. In the past five years, 22 lions were killed by poachers and through retaliatory killings by frontline communities in response to livestock loss. As such, the project interventions we implemented sought to reduce lion killings through engagements with communities to develop a strong partnership in combating human-lion conflict as well as support UWA to strengthen the law enforcement. Below is a summary of the outputs and impacts of the project interventions.

2.1 Community engagements

In the first five months of the project, efforts were made to monitor indices of depredation and map the locations of livestock kills using the hand held global positioning system (GPS) receivers. Incidences of depredation were captured and records show that a total of 42 livestock were lost due to lion attacks between December 2017-April 2018 and these included 29 pigs, two dogs, and 11 goats. Two people and three goats were injured in similar attacks. We noted that the major drivers of lion depredation were 1) farmers lacked strong lion-proof

kraals to secure their livestock and some farmers were grazing inside the park, leaving a cattle trail that lions would follow to attack livestock in the community, 2) the elephant trench was not well maintained, 3) frontline communities were not receiving direct benefits from the park and yet they bore heavy conservation costs, particularly livestock and crop loss and sometimes human injury and death, 4) inadequate presence of rangers in Ishasha sector to conduct effective patrols, and 5) poor community-UWA relations. In order to achieve these results, WCS conducted massive sensitization among victims of livestock loss and the entire Ishasha community to encourage them to construct strong kraals to avoid livestock depredation by lions and other carnivores. Five demonstration kraals were constructed in Kihiihi and Nyanga sub counties. Among the direct beneficiaries of these demonstration kraals were two women and three men.

The other cause of human-lion conflict was the practice of herding livestock into the park, which lured lions to stalk the livestock into the communities at night. In order to address this challenge, WCS excavated a two km long trench along the park boundary and maintained an existing six km of the trench resulting in a total of eight km trench that was well maintained (Photo 1). In turn, we achieved double dividends by stopping livestock from crossing into the national park as well as preventing the lions and elephants from crossing into communities and cause crop and livestock losses. Therefore, no livestock losses were recorded in the period between May and December 2018. The two km trench was constructed in Ishasha, which was a key crossing point for livestock into the park. The trench also proved effective in checking elephants, and bush pigs that were always responsible for crop raids. As a result, the community members realised bumper harvests and crops like sweet potatoes, groundnuts, maize and cassava have been harvested in large quantities, something that was rare without the project interventions. Beneficiaries also testified that since the project started in January all through to December 2018, the park frontline households were able to enjoy sleep without worrying about crop raiding animals and their school going children never missed schools as has been the practice.

It was also evident that communities were benefiting from the project interventions through the regular and high numbers of community members who participated in wildlife conservation-focused meetings and got involved in implementing project activities. Communities enjoyed direct benefits from the project, particularly jobs, veterinary services, reduced problem animal incursions and training in the construction of carnivore-proof kraals among others. Community member now report human wildlife conflict (HWC) to relevant authorities (i.e. UWA and local government leadership) unlike in the past where retaliation against wildlife was the predominant practice. Two people from Nyanga Sub County (Assumpter and Benon) have already adopted the lion proof kraals. Looking at Musa Black's visitors' book, 50 community members have visited his homestead to have a look at the demo kraal and many locals have pledged to copy the design. In addition, we noted a reduction in the sale of bush meat in known location in the project area, which is attributed to the regular presence of WCS staff and the eight community scouts we recruited to supervise the maintenance of the trench in known hotspot areas. It is possible that the wildlife criminals now fear to conduct the illegal business, causing them to abandon or reduce their involvement in illegal activities.

The accomplishment of the construction of a six-unit ranger post at Ishasha customs (Photo 2) has brought rangers close to boundary, putting them in a better position to respond to lion incursions in their vicinity. This facility is now able to accommodate six rangers. In September 2018, UWA commissioned the 487 newly recruited rangers, of which, 87 were deployed in QENP. As we report, six rangers have been deployed to the Ishasha Customs area and are now using the newly constructed ranger post, which is equipped with solar panels for charging Spatial Monitoring and Reporting Tool (SMART) phones used in monitoring illegal activities inside the park. The ranger post has 10000 litre capacity water tank and energy efficient kitchen.

2.2 Lion collars and monitoring

A total of five lions were radio collared in the project area (Ishasha) which included two adult females, one adult and two sub adult males. The satellite capability of the collars enabled remote tracking of lion movements and location. Particularly interesting was the observation that one of the radio collared adult males crossed into the DRC's Virunga national park and back into Uganda has on several occasions. One collar malfunctioned and is yet to be replaced. In collaboration with the University of Queensland and Alex Braszcovik a PhD student, six more lions were fitted with satellite collars (Photo 3) in the northern part of Queen Elizabeth national park. The satellite collars installed on lions helped to avert two potential incidences of retaliatory killing in the community, that is, one incident involved a lion that bore cubs in the community at Ishasha customs and the other was about a lion that pursued a community member in the night. In the former case, WCS and UWA team were able to identify and locate this collared lion and pushed it back to the park with her cubs. The creation of a rapid response team comprised of WCS, UWA and UCP staff working closely with the community scouts both in the northern and southern sector has helped to avert potential livestock loss as well as lion kills. The team has also offered timely treatment of wounded lions and elephants found while monitoring the movement of lions (Photo 4). In addition, the regular presence of the rapid response team in the hotspot areas also deterred poachers from killing the lion for body parts.

The project interventions implemented by WCS and its partners with funding from LRF have helped to mend the bad relationship between UWA and communities. Satellite Collars have also provided an opportunity for WCS, UWA and UCP to effectively monitor and understand their movement patterns (Figure 1). From the lion ranging pattern, we now know that lions use the landscape widely moving from open savannahs to forests, wetlands, and open woodlands through highly populated community areas and sometimes crossing the Kazinga channel and cross to DR Congo and return back to Uganda.

WCS also installed four reconix wildlife cameras, which have the ability to detect movement and take covert photos in the park. The intention of deploying these cameras was to:

- test the effectiveness of the trench against illegal cattle grazers into the park,
- collect evidence of illegal livestock grazing,
- detect and capture photos of lions whenever they get very close to communities and
- capture and send us pictures of poachers that may pass within areas where the cameras were deployed

The remote reconix cameras planted in the park provided images of wildlife and illegal activities taking place in part of the park the park (Photo 5). On occasions, the cameras captured images of poachers inside the park and this information shared with UWA action. No illegal cattle grazing has been detected in the project area as yet, suggesting the effectiveness of the trench to deter cattle crossing into the park.



Photo 1: Elephant trench along the park boundary being maintained by communities



Photo 2: Ranger post constructed at Ishasha customs snared lion (left) satellite collars (middle) and snared lion (right)

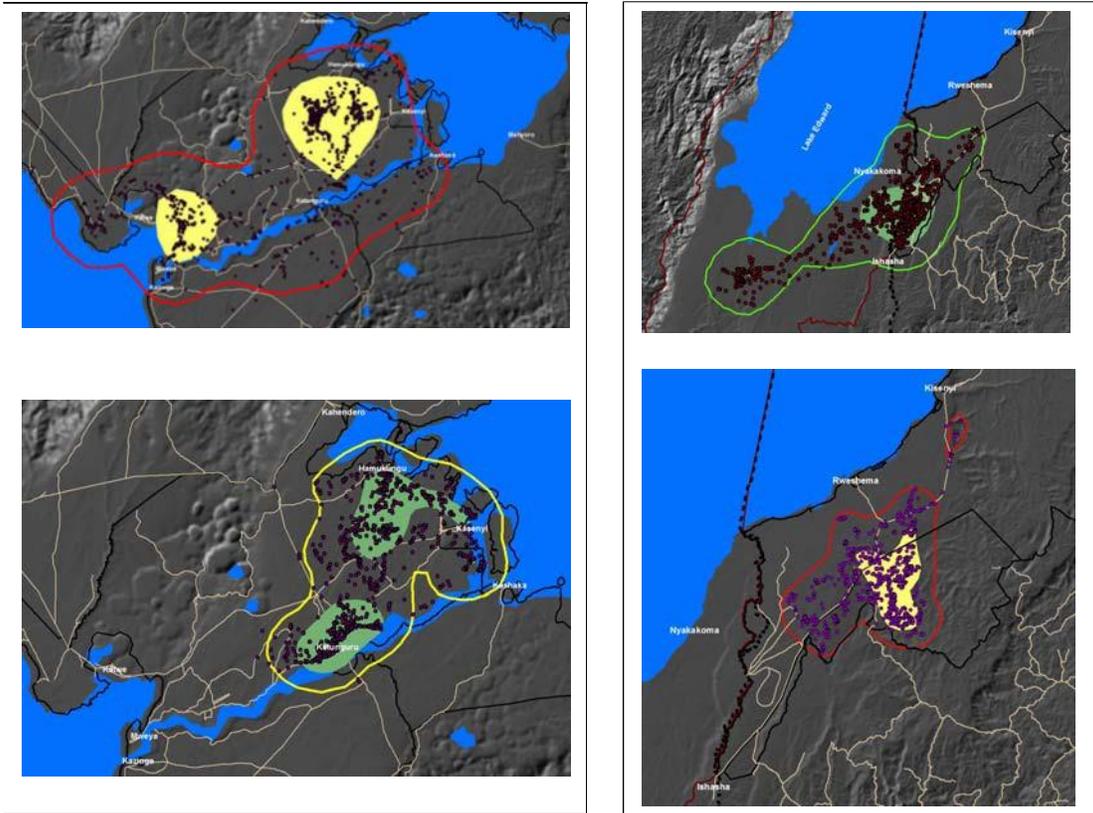


Figure 1. Lion movements of two individuals each collared in the north (left) and Ishasha southern sector (*right*). The core dark circles represent the 50% contour (core area) used more frequently compared to other areas in the home range and dark solid orange, red and green lines represent 95% contours indicating 0.95 probability of finding the collared lion in the study area

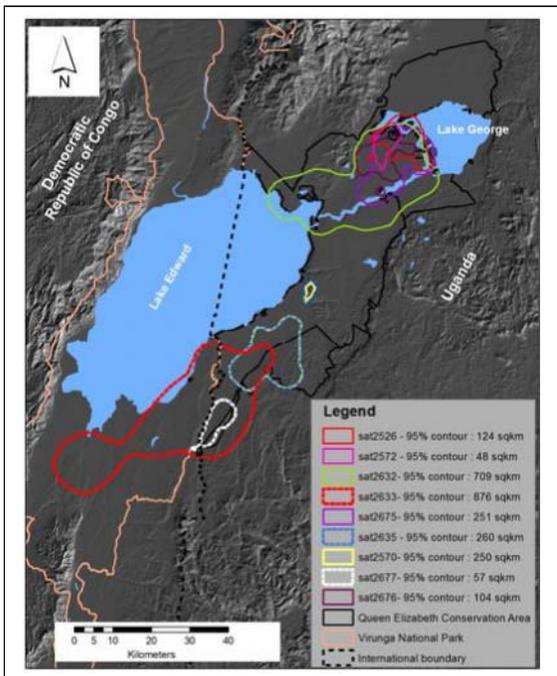


Figure 2 Ninety five percent 95% contours for nine collared indicating 0.95 probability of finding each individual in the study area



Photo 5: Wildlife Cameras installed inside the park in the southern sector of QENP

3. Other engagements with conservation organizations, private sector and development partners

The mass sensitisation and milestones achieved through this project contributed to the formation of the Queen Elizabeth National Park Lion Conservation Alliance, a loose network composed of eco-lodge owners (i.e. Wild Frontiers, Kasenyi Safari Camp, Little Elephant, Enjojo Lodge and Volcanoes Safaris), UWA, and NGOs (WCS, UCP) aimed at leveraging efforts and resources to conserve lions in QENP. Purpose of the alliance is to develop a collaborative process for tackling carnivore-human conflict inside and around Queen Elizabeth Protected Area (QEPA). The Specific Objectives were to:

1. Identify key partners “champions” that should spearhead the development of the carnivore-human conflict mitigation measures.
2. Review the lion monitoring progress and how it can be used in the design and implementation of the Carnivore–human conflict mitigation measures.

With funding from this project, the Lion Alliance was created and held three consultative meetings to identify the key threats to the lions and design interventions to address them. The first meeting held at Kasenyi Safari Camp (Photo 6) was intended to discuss and build consensus on the following issues: 1) Agree on a mechanism for collaboration, 2) Constitute a team to provide strategic guidance to the QEPA carnivore Alliance, 3) Constitute a rapid response unit to carnivore attacks on livestock, 4) develop ideas on how to meaningfully engage other key stakeholders, 5) Agree on how lion monitoring and research data can meaningfully contribute to improved carnivore conservation, and 6) Agree on the communication strategy and data sharing among partners.



Photo 6. Dr. Siefert Ludwig presenting at QENP Lion alliance meeting, Kasenyi Safari Camp

After agreeing on the above issues, the alliance members, collectively, identified the key priority threats to carnivores that needed to be addressed immediately. The top priority activities for immediate action were de-snaring the park, establishing a lion –human conflict response and rescue unit and initiating livelihood interventions respectively. De-snaring ranked top of the priorities due to the detrimental effect of snares on lion populations and costs of conservation. The team also underscored the need to undertake rapid responses in relation to human-lion conflicts in order to reduce both human suffering and the danger to lion populations, thus ranking establishment of a human-lion conflict response and rescue unit second.

The team appreciated the fact that no intervention can be effective without involving communities and helping them out of their problems. As such, community livelihood initiatives ranked third in on list of priorities. Community engagement could range from facilitating communities to develop community-based tourism products to engaging them in conservation activities such as de-sharing of the park or removal of invasive. However, engaging communities in activities inside the park needs to be done with caution and careful thought to ensure protection and safety of the persons involved. The summary of prioritized interventions categorised as short-term, medium-term and long-term activities are provided in Table below. WCS was tasked to develop a comprehensive budget and embark on holding talks with potential donors to raise funds for implementation of the strategic actions.

Table 1 . Priority activities segregated by short term, medium to long-term implementation scale

Activities	Lead implementer	Other contributors
Short term interventions (1-12 Months)		
De-snare the park	UWA	WCS, UCP, Scouts/Communities, Eco-lodge owners
Establish a lion-human conflict response and rescue unit and equip it with the necessary tools	UWA	WCS, UCP, LC leadership, development partners
Initiate livelihood interventions (Community Engagement in tourism activities e.g. community tourism, drama, crafts)	WCS/UWA/UCP	Traditional leaders, Religious leaders, Local Governments, Eco-lodge owners, Tour and travel operators, WCS, UCP, UWA, Communities, Donors/Development partners, Fisheries Department, BMU, MAAIF, Researchers/academia
Apply appropriate technologies and methods to prevent depredation and reduce human-lion conflict	WCS, UCP, UWA	Local government, scouts/communities
Improve livestock management (pasture, breeds, and diseases) mainly in the northern sector and encourage adoption better husbandry practices such as zero grazing and construction of lion-proof kraals	MAAIF/National Animal Genetics Databank, LG, WCS, UWA	WCS, UCP, LG, traditional and cultural leaders, Religious leaders, communities, BMU
Develop a community education and sensitization program (community exchange visits to other parks in Uganda and outside)	UWA, WCS, UCP	Eco-lodge owners, Tour operators, Researchers, academia
Work with traditional healers and practitioners to stop killing of lions for medicinal purposes	Traditional and Cultural Leaders, LCs, UCP	WCS, communities, Researchers/academia
Address the local community leadership crisis	WCS, UCP, UWA	Traditional leaders, Religious leaders, Local Governments, Members of Parliament
Strengthen law enforcement	UWA	Magistrates courts, High court, Police, UPDF, WCS, Development Partners

Medium term interventions (1-5 years)		
Develop a collaborative multi-sectoral program to address human-carnivore conflicts (key constituencies are fisheries, agriculture, health, education, local governments, tourism, water/wetlands)	WCS, UWA, UCP	UBF, LG, Parliament of Uganda, OPM, NEMA
Develop innovative ways of increasing park benefits to the frontline communities (e.g. create an education fund to provide scholarships to the girl child, strengthen wildlife clubs in schools - primary, secondary and tertiary institutions)	UWA, WCS, UCP, Eco-lodge owners, Tour operators	Researchers, Local government, communities, Development Partners
Improve the allocation and utilize of revenue sharing money to address critical community needs	UWA, Members of Parliament from the region	WCS, UCP, LG, traditional and cultural leaders, Religious leaders, communities, Beach Management Unit (BMU)
Diversify tourism packages	UWA, UTB	UCP, LG, Eco-lodge owners, Tour and travel operators
Restore the prey base (think of reintroductions of appropriate species informed by research)	UWA	WCS, UCP
Long term 5-10 years		
Combat illegal wildlife trade	UWA, WCS	Judiciary, communities, NWCCTF
Remove invasive species	UWA	UCP, WCS, communities, LG
Remove livestock from the park	UWA, LG	Parliament of Uganda, communities, WCS
Work closely with ministry of health to tackle human population management	UCP	CTPH, LG, Ministry of Health, National Planning Authority (NPA), Office of the Prime Minister (OPM)
Diseases response Unit at site level	UWA, Ministry of Health	OPM, LG, UCP, CTPH, Center for Disease Control (CDC)
Embark on a campaign to reduce use, ban or impose stricter regulations on the use of pesticides such as carbofuran (Furadin) that are abusively used to poison lions	National Drug Authority, UWA	WCS, UCP, MAAIF, UNBS, LG

UTB-Uganda Tourism Board, LG- Local Government, MAAIF – Ministry of Agriculture, Animal Industry and Fisheries, UNBS – Uganda National Bureau of Standards, CTPH – Conservation through Public Health

4. Major challenges with explanation and potential solutions

Below are some of the key challenges faced by the project and steps taken to address them where that was possible.

- a) Insufficient demonstration kraals: The five demonstration kraals were not enough to enable the wider community to learn from due to the fact that they were located a long distance away from some communities. The project did not have enough resources to transport affected communities to the demonstration sites or to construct other demonstrations and hence this remains a challenge.
- b) Insufficient resources to meet community demands: Local communities expected livestock screening and vaccination to continue throughout the year to conform to the vaccination and deworming cycle, however, this was not possible due to limited resources. WCS together with Lion Alliance has embarked on raising more funds.
- c) Deployment of the wildlife cameras delayed due to technical challenges. The camera were purchased from the USA and registered to AT&T telecommunication company with fixed sim cards. We had to send back the cameras to the manufacture with MTN sim cards for reconfiguration and this took two months before we could get them back. There was another problem of limited 3G cell phone network coverage inside the park. This hindered timely sending of pictures to the monitors hence affecting the rate of action. The Reconix Cameras were later moved to other places with a better 3G network within the area of interest.
- d) Insurgencies and disease outbreak in DR Congo: The insurgency and effects of Ebola outbreak in the DRC spilled to the project area and made movement around Ishasha risky. The government of Uganda is now vaccinating people in the project area against the deadly Ebola virus and the Uganda People's Defence Force (UPDF) deployed the army to check abductions that were taking place.
- e) Malfunction of one of the lion collars: A collar fitted on one of the males worked for a short time (nearly two months) before it went off. Fortunately, only affected the satellite capability but the VHF capability continues to be used. However, this technology requires a lot of driving and searching to find the lions.
- f) Impediments to trench construction: Obstacles such as roads prevented construction of a single continuous trench to completely deter livestock from crossing into the park and provide an entry point to the park for agile animals like goats.

5. Additional funds raised / investors in project attracted:

This project leveraged funding from an individual donor (Nina from South Africa), G&S Wilderness Frontiers, and Enjojo Lodge owners who provided money to purchase nine more satellite collars as a donation in support of UWA, WCS, and Uganda Carnivore Project work on lions. Nina also paid for 20 viral units of the vet drugs to be used for lion collaring. The NGO RESOLV, Washington DC through Sanjiv Fernando who works for the this NGO and part of the team pioneering the LION SHIELD technology, they donated five lion shields and have agreed to sponsor the establishment of another 20 warning base stations to be placed in lion-human conflict hotspot areas such as Hamkungu and Kasenyi, and potentially the broader Ishasha region. The radio tags are part of the collars we have deployed on the five lions so. The funds leveraged are summarized in Table 2.

Table 2 Summary of additional funding leveraged during the project implementation period

Item	Amount (US\$)
Vet drugs (package)	\$3,625.40
collar cost for 9 collars	\$12,520.80
Satellite time	\$9,616.32
Shipping and inspection fees	\$560.95
5 Lion shields (donated)	\$9.45
UWA staff time	\$5,000
TOTAL	\$31,332.92

RESOLVE in partnership with WCS received a grant of US\$40,000 from the National Geographic which is be used to scale up the deployment of 20 base stations to be deployed in communities where human-lion conflict is an issue, purchase five additional GPS iridium lion collars with in-built Lionshield transmitters. RESOLVE will also provide a VillageGuard, a new technology they have developed that will use the LionShield alarm base station at bomas to trigger sirens and flashing lights to warn off approaching predators, rather than rely on collared problem animals. We will use cameras with on-board artificial intelligence to detect lions. The idea is that a camera/ cameras will be placed on a path to the boma, and it captures an image if motion is detected, and then the camera will run a model to detect if the image contains a lion. If so, it should be able to send out text alerts or trigger alarm responses on the base station. Microsoft Artificial Intelligence for Earth is helping RESOLVE to develop detection models for lions as well as elephants to be run on VillageGuard technology.

RESOLVE has been working with Henrik Rasmussen (of Savannah Tracking) since 2015 on developing LionShield, an automated system to prevent lion predation on livestock. After developing prototypes of the technology in 2016, we set up initial tests and achieved proof of concept that the base stations placed at bomas can detect approaching tagged lions AND that the alarms can deter predation attempts. Over the past year, we have been testing at two more sites in Kenya - Soysambu and Laikipia – where we have had more positive results in preventing livestock depredation. Given the early results, we felt the time was right to do a larger test, and were seeking to apply to National Geographic Society’s Big Cat Initiative for a grant.

The LRF project paved way for and facilitated the formation on the QENP Lion Alliance which is in the process of writing a comprehensive proposal for the conservation of lions in QENP. Out of the consultations so far held, a concept note has been shared with potential donors. WCS has already approached USAID, which is developing two programs, one on countering wildlife crime, and the other on Biodiversity Resilience. We have also asked the French Development Agency (AFD) to consider funding human-wildlife conflict mitigation measures as part of the program they are developing. We are also aware that WWF Belgium received funding from European Union (EU) to implement a transboundary project in the Greater Virunga Landscape, of which QENP and Rwenzori Mountains National Park are part of this landscape. The project is meant to improve law enforcement, support livelihood interventions as well as address natural resource conflicts.

We also identified areas of collaborations with Conservation Society of California and Oakland Zoo that will focus on lion conservation in QENP. These are:

- i. Establish a joint community engagement initiative and work closely with Margaret Kemigisia of Kibale Fuel Wood Project to QENP to do a training on their Science Center Creation, Artisan Community Groups to empower community groups involved with crafts making and train women in making of marketable and high priced items for international markets.
- ii. Implement a Lion Appreciation Day, when Oakland Zoo visits Uganda in fall of 2019
- iii. Work closely with Conservation Society of California to film and document project achievements, lessons learned and experiences acquired, including writing a blog about the project once the interventions commence.

6. Provide best stories from this investment in your project

Communities adjacent to parks realise improve livelihoods from Lion Conservation Initiatives

Musa Black is a farmer with at least 35 cows, countless goats and six acres of farm land near the park boundary. Prior to the implementation of the Lion Recovery Fund project in his village, he used to spend sleepless nights guarding his livestock from lions and crops from elephants. "It has not always been easy to safeguard our livestock. Together with my brothers, we would go as far as staying up all night for even five days to keep lions away from our livestock," he narrates. Today, it is a different story. Musa and his brothers sleep soundly following the construction of a demonstration kraal at his farm. He said, "I am so happy and promise to cement the floor and build a roof over the kraal." He added that the dung from the kraal will also be used as fertilizers for his plantation and gardens. Through the project, Musa was also able to have his livestock vaccinated.

Musa also pledged to help the youth that are engaged in poaching in his village to start a rabbit project in order to boost their livelihood. "In this village, we normally know who is engaged in poaching and identifying the young men who will benefit from the rabbit project will not be a tough task" he said light-heartedly. Musa has not always been this light-hearted. He lost his father in 2000 following a lion raid on his father's kraal and left at least four cows and a goat dead. Musa says that once his father saw the littered pieces of beef in his compound early in the morning, he collapsed and died.

Due to this project, locals who are interested in building similar kraals visit Musa's home regularly. A look at his visitors' book shows the number of locals that flock his home to have a look at the structure in hope of emulating the design. Musa is not the only beneficiary. Gad Rushenyi and Magezi Johnson are among the locals contracted to maintain the trench. Since the start of the project, they were able to save and build houses for their families.

Agatha, a community scout says "I opened up a retail shop that supplements my household income." Kwesiga onesmus says, "I sold my goats and bought a motorcycle that helps supplement my income." In Uganda motorcycle transport is a lucrative business that generates up to \$20 per day. In Africa, this relative a decent income especially in the village.

Casual workers also testify that the proceeds from digging trenches have enabled them to pay school fees for their children while others have invested in animal farming. A total of 49 local community members have been directly employed by the project.

7. Training and Outreach Accomplishments

Through sensitisation and awareness activities, community members in the project area appreciated and understood the ecological interdependence of the components of ecosystems. The connection between human wellbeing, lions, livestock, and the other environmental factors was made clear to communities through sensitisation and awareness. In addition, communities were sensitised on aspects of CBO management and received basic instruction in leadership and management. Emphasis was put on developing constitutions and MOU. At least five community based groups/organisations registered their groups after a series of sensitisation trainings.

Eight community scouts (4 female and 4 males) were trained twice in a year in management and community leadership. Key highlights into the ecological system and how the imbalance can accelerate HWC were taught. By the end of the trainings, scouts identify and differentiate lion foot prints from those of other species. The eight scouts have been able to influence positive change in the community by confronting bad cultural practices and beliefs that have been a contributing factor to lion kills (lions for body parts). These scouts were also taken for a study trip to Mweya peninsula inside QENP. From this trip, the scouts understood the link between conservation and personal growth and development.

During the vaccination exercise, farmers were trained by the vets on how to manage their livestock and the risk they put on their livestock when they graze in the park.

8. Community engagement

A total of 49 local community members have been directly employed by the project. Eight of these work as wildlife scouts that supervise the casual labourers, 40 are casual labours that regularly maintain the trench while 1 is the community liaison officer. Most of these have had different testimonies concerning the existence of the project in the area. Most of the community members engaged in the project actually come from the park boundary and are regularly affected by lion depredation and other problem animal issues like elephants and bush pigs. The project also conducted sensitisation on lion conservation in four primary schools, namely Bukorwe, Ishasha, kororo and Kimbimbili primary school in Kihiihi and Nyanga Sub Counties. Lion clubs have been formed in these schools to champion lion conservation among the homes they come from and among peers. Several community meetings were held in Kazinga trading centre, Kacwampale and Nyanga , Kameme, Chumbugu, and Ishasha villages in Kihiihi and Nyanga sub counties to sensitise community members on the need to conserve ildlife and how best to co-exist with lions on limited land. Three community gatherings were held per village during the course of the project. The locals were encouraged to form organised groups if they were to benefit from community projects. Other engagement meetings were held with Kanungu district local government as well as Nyanga and Kihiihi sub county leadership. All the engagements were intended to make all stakeholders aware of the LRF project and be to encourage them to be actively involved in its implementation.

In order to build rapport with communities and further understand the salient human-lion conflict issues WCS conducted a livestock vaccination, deworming, screening and treatment exercise in Kihiihi and Nyanga sub counties. A total of 250 farmers were reached and a total of 1015 livestock and other domestic animals (370 cattle, 553 goats, 70 dogs, 20 pigs and two cats) received veterinary services. Two veterinary doctors of the above-mentioned sub counties were contracted to offer the vet services. The exercise was also a golden opportunity to show case the constructed demonstration kraals. Approximately 80 % of the farmers pledged to construct the model kraal for their livestock.

Some of the social challenges in the project area are scarcity of water in the project area. The existing water dam is shared between livestock, lions and humans. This needs to be fenced off and improved with a solar water pump to minimise human-lion conflict. Installation of a solar water pump to pump water into a constructed water reservoir away from the wildlife areas is recommended. There is need to continue with trench maintenance in order to sustain its benefits to both wildlife and communities. Part of the trench that was excavated by the excavator lies in a low land area and occasionally gets flooded and silted, especially after the heavy rains. Without proper maintenance, the steep sides of the trench are bound to collapse and create crossing points for animals.

9 Ten select images / video clips of the work:

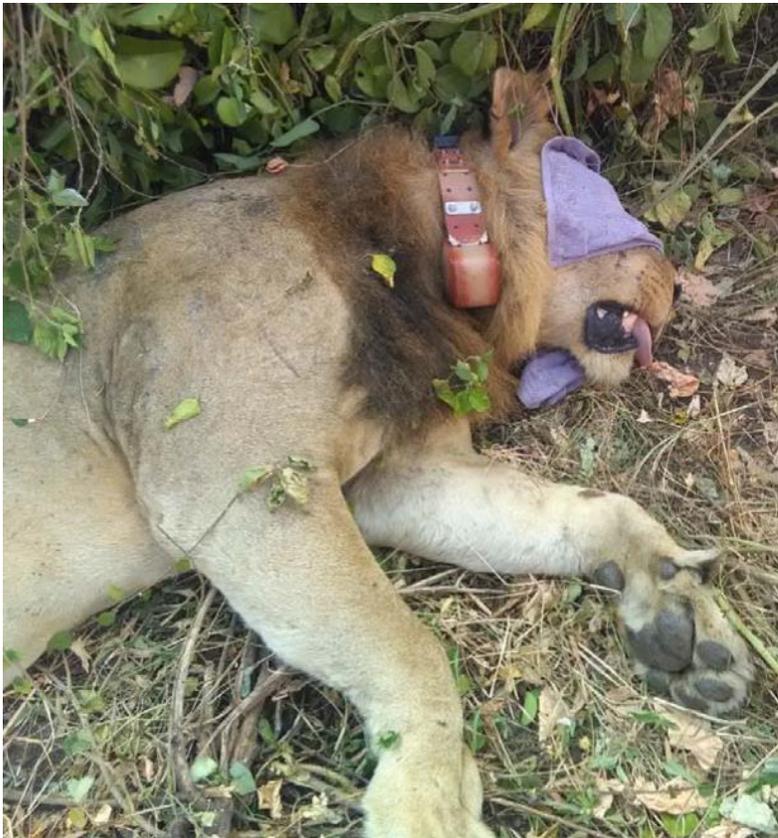
please submit these assets to the LRF for use on our website and social media.













Trench excavation



Demonstration boma for goats at Ben kasigwas homestead in Ishasha



Livestock vaccination



Well maintained trench



Community conservation meeting

9. List of Publications or media materials

List of publications or media materials that have resulted, or are in preparation related to the project, including reports to governments and other organisations, scientific publications, popular articles, radio or TV programs, and internet pages.

Following the collaborative process developed under the QENP lion alliance, WCS wrote an article about this platform (<https://uganda.wcs.org/About-Us/News/ID/11651/Stakeholders-meet-to-tackle-dire-state-of-lion-numbers-in-QENP-and-the-increasing-threats-from-Humans.aspx>) to create awareness about this initiative and rally more support from other interested parties.

10. Future plans

WCS future plans are:

1. WCS together with the lion alliance members committed ourselves to fundraise for the implementation of the priority interventions we identified (Table 3). We are in the process of developing an activity budget to estimate the cost of implementing these interventions.

Table 3 Priority activities for immediate implementation

1. De-snaring of the park	1.1. Removal of snares: Engage 15 UWA personnel
	1.2. Snare handling
	1.3. Involve community scouts in snare removal
	1.4. Scout recruitment and screening
2. Park frontline community sensitization on wildlife conservation	
	2.2. Show wildlife films in schools around the park
	2.3. Organize outreaches to other parks/sectors
	2.4. Organize wildlife competitions (debates, quiz, painting, etc.)

3. Sensitization of national and global community on conservation in Uganda	
	3.2. Video/Films
	3.3. Brochure/booklet
	3.4. Production of documentaries/ success stories
	3.5 Community exchange visits to East African parks
	3.6. Involvement of government officials and politicians
	3.7. Targeted radio talk shows pegged to special events (e.g. wildlife day, environment day, etc.)
4. Apply appropriate technologies and methods to prevent depredation and reduce human-lion conflict	
	4.1. Provide improve animal husbandry North of QENP including improving cattle breeds, pasture management, provision of vet services, valley dam construction
	4.2 Improved animal husbandry South of QENP to reduce human-lion conflict
	4.3 Trench maintenance
	4.4 Lion Monitoring
5. Initiate livelihood interventions (Community Engagement in tourism activities e.g. community tourism, drama, crafts)	

2. Establish a rapid lion rescue and response unit, equipped with the appropriate tools and trained staff to handle lion-related emergencies as well as offer veterinary interventions
3. Conduct exchange visits for the frontline communities and UWA and WCS staff to other lion conservation sites dealing with similar challenges e.g. Niassa (Mozambique), lion guardians in Kenya and Tanzania
4. Develop stronger partnerships with lion conservation organizations, local government, private sector as well as protected area authorities in the neighbouring counties to share ideas and exchange knowledge and information about human-lion conflict mitigation as well as trafficking in lion parts
5. Since QENP lion conservation incentive package has proved successful, we aim to duplicate this model elsewhere, particularly in Murchison Falls National Park and potentially Kidepo Valley National Park, both parks with lion populations that have the potential to recover and attain population viability.
6. Develop a strong partnership with reknown lion research experts such as Arjun Gopaldaswamy of the Wildlife Conservation Research Unit at University of Oxford, and Professor David McDonald of the WildCRU at the same university to deploy superior methods of censusing large carnivores in Uganda to improve the population estimates and guide UWA on setting hunting quotas for permitted species for trophy hunting. We already started the discussions with Arjun about conducting a national-wide carnivore census for Uganda using superior techniques.

Reference

Okot O.E, Mudumba T., Buckland, S., Mulondo, P. and Plumtre, A.J., 2013. Estimating population sizes of lions *Panthera leo* and spotted hyaenas *Crocuta crocuta* in Uganda's savannah parks, using lure count methods. *Fauna & Flora International, Oryx*, 48(3), 394–401 doi:10.1017/S0030605313000112.

Lion Recovery Fund

Metrics



Area-related metrics	Details
Km ² covered by project	<p>Km² covered by project (broken down by land tenure type – state protected area, private land, community land, forestry area) The project covers about 500 km² of the queen Elizabeth’s Ishasha sector and it is state protected, however, an area of approximately 14 km² (i.e. 14 km long by 1 km wide from Ishasha Customs in the south to Ntungwe river in the East) of critical lion ranging area neighbouring the park is privately owned by communities. A couple of sub counties that are traversed by the project are in close proximity with the park and include kihihi and Nyanga sub counties. In these communities land is customary held and owned by different individuals.</p>
Additional km ² encompassed by the project as a result of LRF support	<p>Additional km² encompassed by the project as a result of LRF Worked closely with UWA, Dr. Siefert Ludwig of the Uganda Carnivore Project and Aleksander Brackowski, a Ph.D. student from University of Queensland, we have been monitoring the lion conflict situation in both Hamukungu and Kasenyi fishing villages. WCS through Alex received additional funds to purchase nine extra satellite collars and veterinary drugs to increase the number of lions collared in both the southern and northern sector for monitoring. We have so far collared five lions in the southern sector and two in the northern sector, including the lioness with seven cubs for easy of monitoring. The collars are also mount with lion shield that send alerts whenever the lions get closer to communities to help trigger rapid deployment of UWA rangers to stop them from going to the communities. We estimate the additional area that is benefiting from the LRF is es The northern sector of queen Elizabeth park was hit by a</p>
Km ² of different land tenure types encompassed by work supported by LRF grant	<p>deadly incident that culminated in the poisoning survived the poisoning 500 km² public land (protected area and state owned) 14 km² under customary (privately owned) in the southern sector.</p>
Lion and prey numbers	

<p>Approximate number of lions at site when grant was issued (also reported as lions per km²)</p>	<p>Approximate number of lions at site when grant was issued (also reported as lions per km²)</p> <p>There were 18 known individual lions in the entire Ishasha sector (collected as lions per km. These lions belonged to two different prides that occur namely Bwentale and the southern circuit.</p>
<p>Insights into the population size of lions each year (or suitable time interval) thereafter (if possible) (also reported as lions per km²)</p>	<p>One of the breeding females recently gave birth to 4 cubs pushing the total number of known individuals to 22 lions in the entire ishasha sector.</p>
<p>Insights into trends and abundance of prey before the project and then thereafter, as regularly as is practical (e.g. table of estimated numbers of each species)</p>	
<p>Interventions & threats</p>	
<p><i>Site management</i></p>	<p>Spatial monitoring and reporting tool (SMART)</p> <p>We have supported UWA to improve the application of SMART in monitoring illegal activities inside the entire QENP, but special emphasis on the southern sector to remove snares, stop illegal livestock grazing, poaching, bush meat hunting and collection of non-forest timber products firewood, herbs, charcoal and others products illegally. The ranger post being constructed at Ishasha customs will guarantee permanent presence of rangers to query illegal activities and gather intelligence information about poaching and killing of lions for body parts used in traditional medicine.</p>
<p>Number of APUs supported during the project period</p>	
<p>Number of patrol days</p>	<p>See table 4 and Figure 3</p>
<p>Area in km² patrolled</p>	<p>See Figure 2</p>
<p>Number of poachers camps detected</p>	
<p>Number of poachers camps destroyed</p>	<p>See table 4</p>
<p>Kg of bushmeat confiscated</p>	<p>See table 4</p>

Number of snares/gin traps removed	
Number of lions de-snared	
Number of animals of other species de-snared	2
Number of poachers arrested:	46 poachers, of which 14 are on remind in prison awaiting trial, 20 were cautioned and released.
Number of poachers convicted:	12 are serving prison sentence
Number of scouts trained	Eight scouts trained in community mobilization, education and sensitization, trench maintenance supervision, and identification of carnivore footprints as well as intelligence gathering with respect to poachers
<i>Human-lion conflict</i>	
Number of conflict-mitigation projects supported	See main report
Number of livestock killed by lions	42 livestock were killed by lions of which 29 were pigs, 11 goats, and 2 dogs in a time frame of month from December 2017-april 2018.
Number of livestock injured :	3 goats were injured.
Reductions in numbers of livestock injured or killed relative to before LRF support :	On a serious note there has been 100% reduction in livestock loss 5 month after receiving support from LRF. Communities last has lion predation issues in April 2018 and since then, no livestock loss has been recorded again.
Number of Kraals secured	5
Number of community members employed to tackle conflict:	70
Number of people injured or killed by lions	None
Number of innovative methods being trialled to reduce conflict	
Number of conflict incidences responded to	
Insights into changes in community attitudes / propensity to kill lions	Communities are developing a positive attitude towards lion conservation compared to before the project/ support from LRF. This can be justified by confessions made by key opinion leaders in the community. For example,

Number of livestock compensated for / amount of compensation paid	None
Number of human lion conflict mitigation tools distributed	none
Number of times lion-killings by people have been averted:	Lion killing by people in the community has been averted on 2 occasions in the community. The first incidence was when a lion bore her curbs in the community at ishasha customs. WCS and UWA team were able to identify this collared lion and she was pushed back to the park with her curbs. Presence of both teams on the ground offset fear of community being injured by lions. Poachers could not also kill the lion for body parts in fear of law because UWA team is on the ground.
<i>Encroachment</i>	
Number of projects supported that tackle human/livestock encroachment	
x Number of km ² of land encroached (specify land tenure of area affected)	
Number of livestock recorded in the wildlife area	
x Number of incidents of livestock incursion recorded	
x Number of conflict mitigation workshops/awareness raising	
<i>Community</i>	
X People employed (numbers of men and women, locals and expats) and households involved	
x Number of community members engaged in other ways (e.g. trained)	
Quantitative insights into the impacts of the training	
USD invested in community projects	
Number of alternative livelihood projects supported	
Number of alternative protein supply projects supported	

Number of performance payments projects supported	
x Number of education projects supported (e.g. nights, etc) and number of people reached scholarships/adult literacy/school	
Number of health projects supported (e.g. clinics, family	
Amount of dollars invested in the community in one way or another	
Indications that community interventions have had an impact	
Number of school/community visits to wildlife area	
<i>Lion monitoring</i>	
Number of lions collared	Number of lions collared We have radio collared 5 lions in the project area with satellite radio collars intended to give us updated in real time and location of lions in the two lion prides of the Ishasha sector. The collars were mounted with geo –fences (lion shields) and we want to set up base stations in areas prone to lion livestock incursions in order to enable us get alarms and messages onto phones of different responsible personnel including Uganda wildlife staff in order to be able to respond in time whenever lions attempt to cross into neighbouring communities.
Number of call ups under taken (stations, nights)	
Km of spoor surveys driven	
Number of lions individually recognised	
<i>Non-site projects</i>	
Number and type of engagements on relevant policy made engagement with parliamentarians Three meetings with the Members of Parliament of Uganda to discuss the amendments of the Uganda Wildlife Bill of 2017. WCS has also been asked to provide input to the UWA Community Conservation Policy undergoing review. One meeting with the National Animal Genetic Databank under the Ministry of Agriculture Animal Industry and Fisheries to help extend the livestock breed improvement program in the project areas Agriculture Animal Industry and Fisheries to help extend the livestock breed improvement program in the project areas	
Number and type of engagements on relevant policy made	

Number of wildlife authority staff trained (and insights into associated impact)	
Number of training events involving magistrates or police (and insights into associated impacts)	
Number of confiscations of wildlife	
Number of arrests of traffickers	
Contributions to the development of national conservation strategy for Lions killed	
Number of lions killed in snares/gin traps	
Number of lions killed in retaliation/pre-emptively due to HWC	
Number of lions killed in ritual killings	
Number of lions poisoned	
Number of lions trophy hunted	
Number of lions killed due to insecurity	
Number of lions killed due to roadkill	
Number of lions killed for bone trade?	

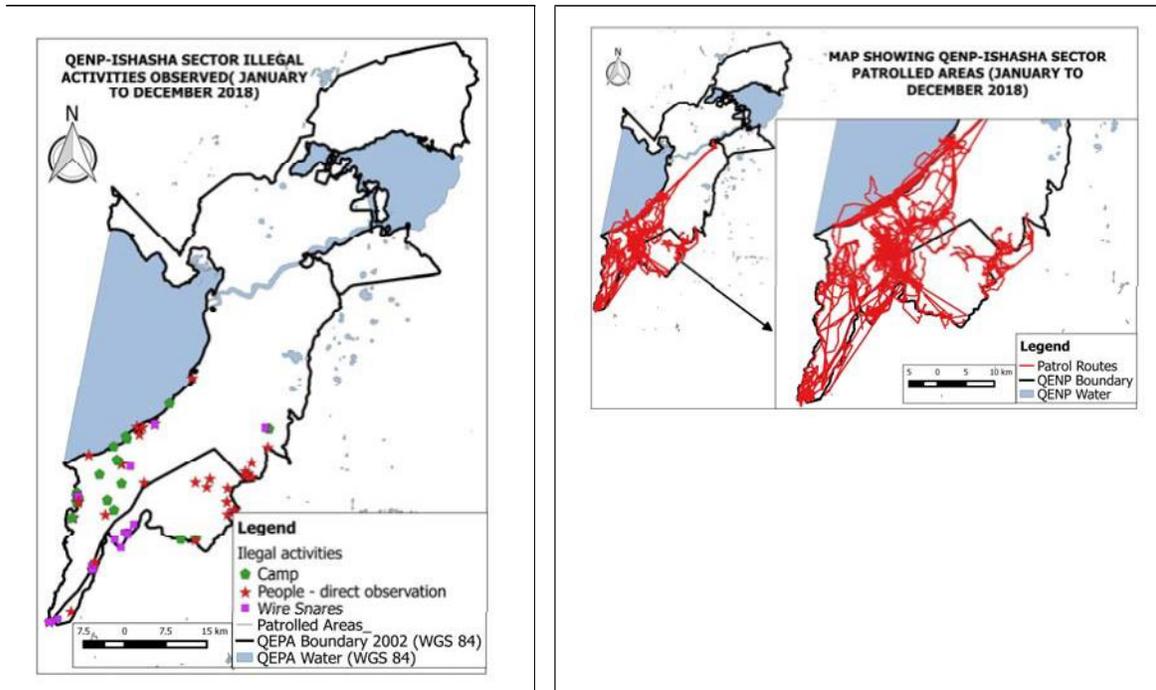


Figure 3. Map showing illegal activities (left) and patrol coverage (right)

Table 4 Summary of the patrol effort and illegal activities recorded during the project period in Ishasha sector

QENP-Ishasha Ranger Posts	Distance Patrolled	Camps Observed	Camps Destroyed	People observed	Number of Days	Wire snares removed	Kg of bush meat Recovered
Guruka	194.47				51	9	15
Bwentale HQ	680.21	2	1	1	348		
Kakimba	24.97			1	2		
Kikeri	948.79	7	4	4	169	1	1
Kiyanga	454.96	1	1	16	63	3	
Bukorwe Sector HQ	431.38	1		2	74	20	
Tented Camp	208.39	1		3	170		12
Ishasha Customs	820.80	7	6	5	491	27	
Rwenshama Marine/Patrol Base	872.53	3	3	5	145		8
Totals	4636.49	22	15	37	1513	60	36

Acknowledgement

WCS with great pleasure acknowledges the funding support from the Lion Recovery Fund, particularly Dr. Peter Lindsey's personal support and interest in our work. We are also grateful to the strong partnership among UWA, Kanungu District local government, eco-lodge owners and Uganda Carnivore Program for the in-kind support to the project. We also recognize the collaborative effort and technical support from Alexander Braczkowski, Ph.D. student at University of Queensland for his contribution to the lion research and monitoring component of the project, and the Lion Guardians for the technical support. Great thanks to RESOLVE for providing the lionshields and tags. We are highly appreciate the contribution of the eight scouts worked tireless to ensure the trench is well maintained. Samuel Ayebare, and Helen Mwiza, both WCS staff that contribute in terms of data analysis and communication are highly appreciated.