



# ENABLING HUMAN- ELEPHANT COEXISTENCE THROUGH APPLIED RESEARCH AND STAKEHOLDER ENGAGEMENT

## Final Report July 2021

Project Start Date: 01 January 2020  
Completion Date: 30 June 2021  
(6 months extension granted due to COVID-19)

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## Project Summary

The second largest threat to the continued survival of the African savannah elephant (*Loxodonta africana*) is the competition for resources with humans. As human populations increase, their footprint on uncultivated and protected lands throughout Africa increase as we strive to feed and provide for more people. The competition for resources between humans and wildlife are being exasperated by the effects of climate change and wildlife is moving out of protected areas in search of the resources they require.

It is the poorest communities that live alongside protected areas which suffer the consequences of competing for resources with wildlife, the majority of which rely on subsistence farming. We partner with communities that border the Makgadikgadi Pans National Park (MPNP), to understand their needs, challenges, and ambitions, working with them to provide them with access to information to enable them to work towards human-elephant coexistence and limit the negative impact of living with elephants, both on their livelihood but also their welfare.

Funding from the International Elephant Foundation enabled us to investigate how elephants utilise the community lands bordering the MPNP and deliver lifesaving workshops.

Sadly, the Covid-19 pandemic has impacted our work considerably, but we have worked hard to ensure that we have gotten as much data as possible given the restrictions we face in our day-to-day work to ensure we follow government recommendations and requirements and reduction in our budget and personnel. We have recently had three cases of Covid in our camp-based team and the entire team went into immediate quarantine and work bubbles to avoid infection spreading. This has affected the team's ability to finalise the data analyses and this report will be followed by additional documentation, such as the infographic.

Despite these setbacks, we are still determined to continue working with the communities in our area, and where possible expand our reach, as recent reports suggest our work will be increasingly required due to the economic fall out of the pandemic with job losses in the many businesses that rely on the tourism industry which has in affect dried up. Our work continues to address the needs of the communities and to date we have seen a decrease in crop-raiding incidents and an increased use of mitigation methods in the farmers we work with. Alongside this, our 'Living with Elephants' workshops are in increasing demand, providing important information to all community members about how to behave as and when they encounter elephants.

Despite the many setbacks, the team has rallied, and we are pleased to present our findings.

## Goals, objectives & actions taken

The overall goal of this project is to provide local data on elephant movements through community lands to better equip communities with knowledge of how elephants utilize their land and adjust mitigation practices accordingly. This is designed to decrease the negative interactions between humans and elephants and improve the livelihoods of communities living alongside elephants. The expected results and planned project activities are listed in Table 1.

These results will be used to focus our human-elephant conflict mitigation strategies to minimize elephant crop-raiding behavior, thereby improving the livelihoods and welfare of communities living alongside elephants and limit the number of human and elephant injury and deaths due to conflict. Despite the disruption of our project activities due to drought and then the global pandemic, we have completed the study, although with less data than we had originally planned for.

## Objectives

1. Obtain movement and demographic data of elephants utilizing communal lands, for the benefit of informing coexistence strategies for local subsistence farmers and advising national stakeholders on land allocation for agriculture and wildlife corridors
2. Decrease human-wildlife competition by applying knowledge from Objective 1 to a) decrease negative interactions between humans and elephants, b) increase the understanding of elephant behavior in rural communities, thus decreasing the threats to human lives and livelihoods, c) reduce levels of crop loss due to foraging by elephants and d) increase participation of community members in local decision making through citizen science

Aims	Result	Result description	Methodology/Activity	Measurables	Status
<b>Objective 1</b> - Obtain movement and demographic data of elephants utilizing communal lands, for the benefit of informing coexistence strategies for local subsistence farmers and advising national stakeholders on land allocation for agriculture and wildlife corridors/ permeable					
Understand how elephants are utilizing the communal lands on the western boundary of the MPNP	<b>R1</b>	Local-scale map of elephant utilization	Track elephant footprints in the communal lands, logging spoor and direction of movement with GPS.	Interpretive maps showing the use of communal lands and highlighting potential hotspots	Complete
	<b>R2</b>	Assessment of landscape-scale movements in relation to habitat characteristics, including field locations.	Utilize GIS layers available (e.g. Landsat, NDVI) and EfA-collected data (e.g. field locations) to relate movement data to predictive variables	Set of predictive variables that can help predict the movement decisions made by elephants in communal lands.	Ongoing requires expertise
	<b>R3</b>	Local-scale map of elephant utilization	Trained farmers collecting data on elephant sightings and raids	Interpretive maps showing the use of communal lands and highlighting potential hotspots. Distributed to farmers and throughout the community. Knowledge of temporal use of community lands	Ongoing requires expertise
<b>Objective 2</b> - Decrease human-wildlife competition by applying knowledge from Objective 1 to a) decrease negative interactions between humans and elephants, b) increase the understanding of elephant behavior in rural communities, thus decreasing the threats to human lives and livelihoods, c) reduce levels of crop loss due to foraging by elephants and d) increase participation of community members in local decision making through citizen science					
Increase understanding of elephant behavior in community lands bordering protected areas.	<b>R5</b>	Local communities have access to the findings and data delivered by the farmers themselves	Translation of findings into infographics for distribution. Production and delivery of workshops.	Number of workshops (aim 2 per community per year).	Ongoing
Behavioral change in communities to move towards human-elephant coexistence	<b>R6</b>	Dissemination of results and implications to all levels of the community.	Workshops, meetings, and infographics are regularly scheduled/distributed in the communities.	Number of meetings (2/ year/ community). Number of meeting attendees (aim 30/ meeting). Number of infographics distributed (300 copies/ yr)	Complete Ongoing
	<b>R7</b>	Farmers consider, and are supported in decisions, to move away from field locations that are found to be in 'hot spot' areas of elephant activity.	Collaboration and communication with landowners, government (particularly Ministry of Agriculture, Land Board, DWNP), logistical support for identifying 'safe' areas for field location.	Reduced levels of crop loss due to foraging by elephants.	Field relocation on going Crop loss reduction seen
	<b>R7</b>	Use of pilot data during wider-scale elephant movement research.	Utilizing temporal, directional & demographic data of elephants to predict behavioral patterns in areas bordering MPNP.	Future research proposals that incorporate this project's pilot data.	Done & on-going

**Table 1.** Short-term (green) and long-term (pink) aims and objectives of the proposed project, with associated results, summarized methodology, activities and measurables. You will note that the long-term aims are the same as for our 2019 funding and our core to the CCP.

**Objective I** - Obtain movement and demographic data of elephants utilizing communal lands, for the benefit of informing coexistence strategies for local subsistence farmers and advising national stakeholders on land allocation for agriculture and wildlife corridors/ permeable

**Aim 1: Understand how elephants are utilizing the communal lands on the western boundary of the MPNP**

This project focused on the farmers of Khumaga, 26 of which ploughed in 2020 and 87 in 2021; reflecting the high dependency these farmers have on good rains (2020 was a drought year). Over the two years 89% of the raids occurred at night (Figure 1) with farmers reporting the raids early in the morning after returning to their fields and we attended the field as soon as possible thereafter. Where possible three staff members attended the raid, whilst two tracked the elephant(s) the third stayed behind to interview the farmer(s) about the number of elephants (verified by the spoors) and the damage caused by the elephants and be on radio-call in case vehicle assistance was needed by the trackers. If only two staff members could attend, then they tracked the elephants first then spoke to the farmer.

In 2020, the first raid was reported on the 27<sup>th</sup> of January, whilst in 2021 it was the 21<sup>st</sup> February. In 2020 the data collection season lasted 68 days and, in that time, we were able to attend 16 raids (from a total of 20 reported raids - 80%) reported by seven farmers. As reported earlier we had to curtail our visits to the field due to a national wide lockdown due to Covid-19, limiting our data and assistance to the farmers. We received two calls during lock down about raids, which we could not attend, however we think there were more raids, but the farmers knew that we were unable to leave camp and therefore did not waste valuable phone credit on calling us.

In 2021 the crop raiding season lasted 97 days and, in that time, we were able to attend 27 raids (from a total of 30 reported raids – 90%) reported by 16 farmers. On one occasion the vehicle was not available and other times we attended the field, but the farmer did not turn up.

The mode for the number of elephants raiding in both years was 1, whilst the median in 2021 was 2 compared to 1 in 2020. The largest group size in both years was 4 (Figure 2). Juvenile male elephants (10–20-year-olds) never raided alone, whilst adult males (< 26-year-olds) the most likely to crop raid alone (Figure 2).

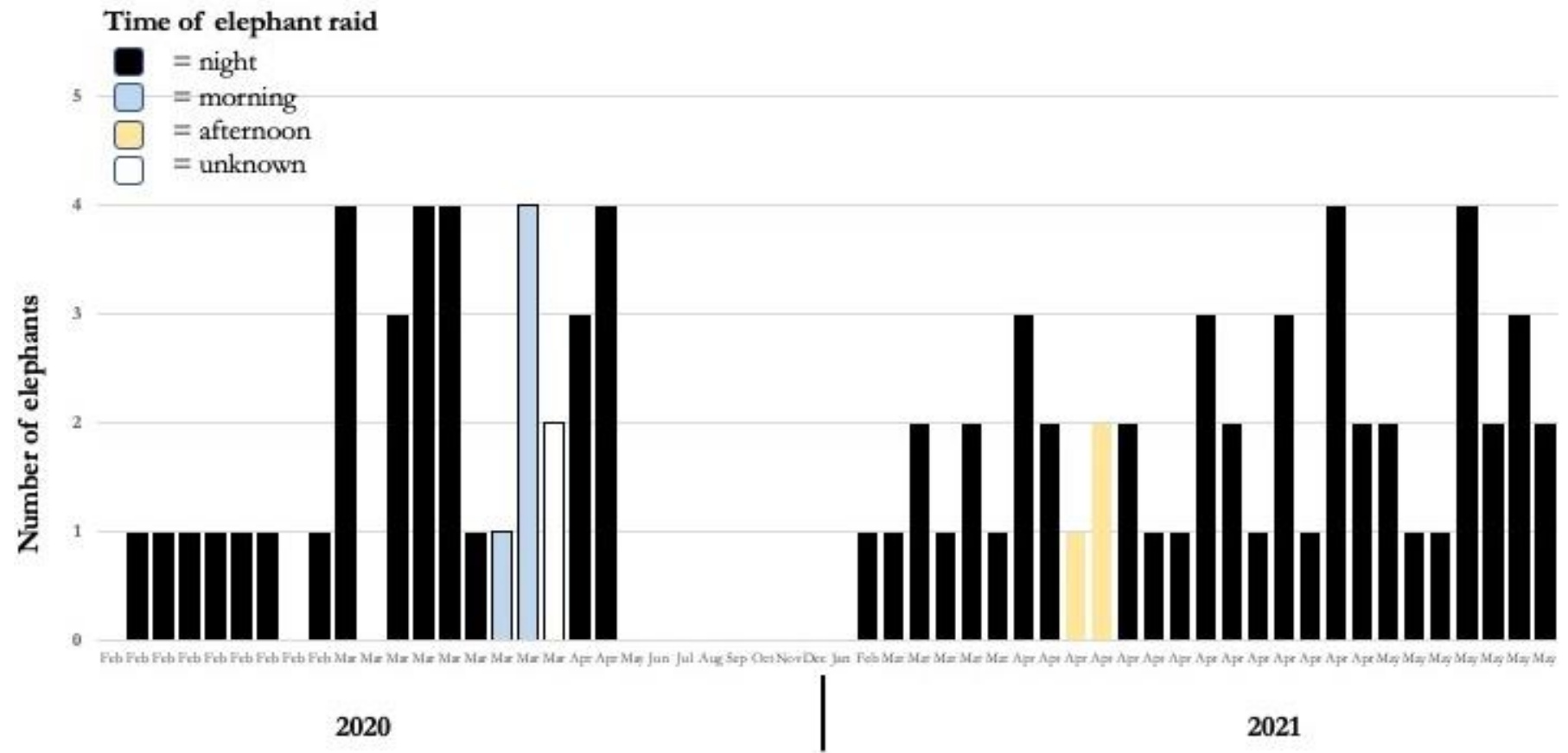


Figure 1: Chart showing the number of elephants involved in a crop-raiding incident and the time of day the raids occurred

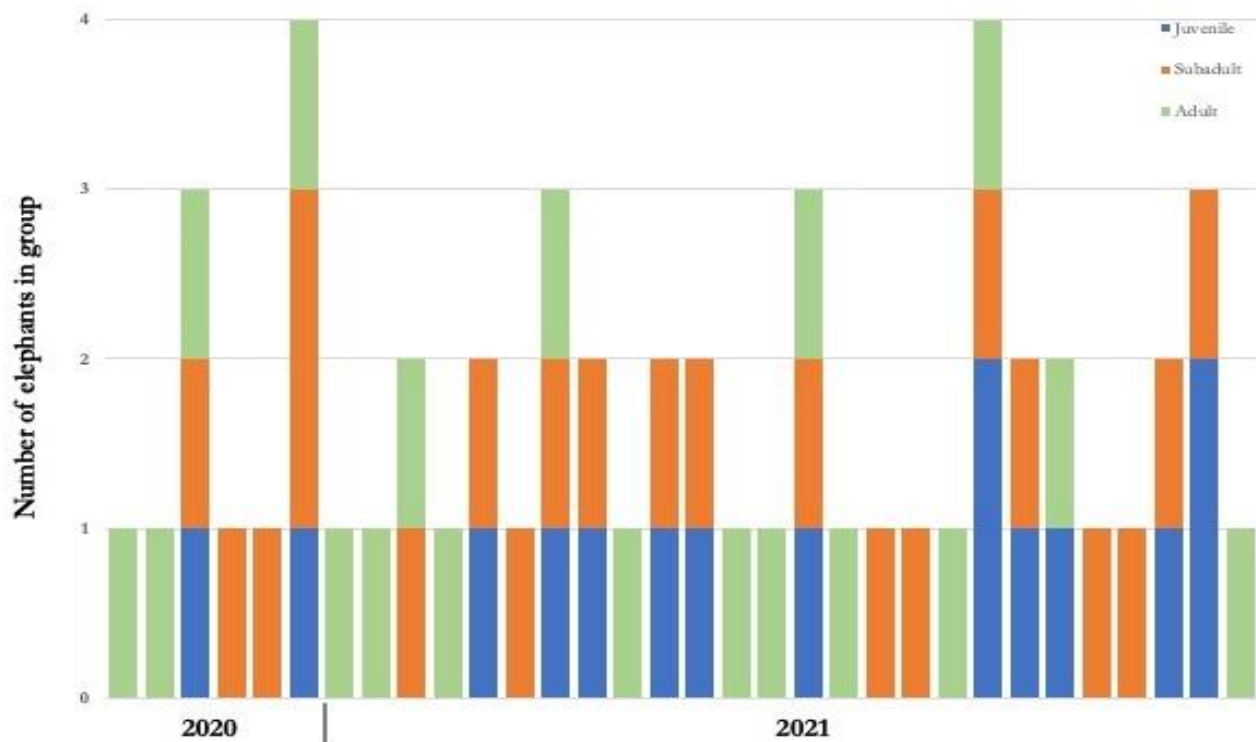


Figure 2: Bar chart showing the group size and demographics of crop raiding elephants

Our data suggest that at least some elephants enter the community land intentionally to raid crops (Figure 3). We found that elephants often directly moved from one field to the next, even approaching fields that have been abandoned for years, suggesting that they have a memory of where they have previously successfully raided a field. Others may simply follow their associates onto the communal land, taking advantage of their associates' knowledge of the area. This information is necessary to provide the communities with a good understanding of how the location of their fields affects elephant crop-raiding behavior and thus, to convince farmers in crop-raiding hotspots to move their fields and/or increase mitigation.

The hotspots of transgression points along the western of border of the MPNP are in alignment with where crop raiding occurred but at this stage it is hard to ascertain which is the causation factor, the location of the fields or the ease of exiting/entering the park at those points.



- = road
- - - = hot spot of elephant fence transgression
- - - = crop raiding tracks 2020
- - - = crop raiding tracks 2021

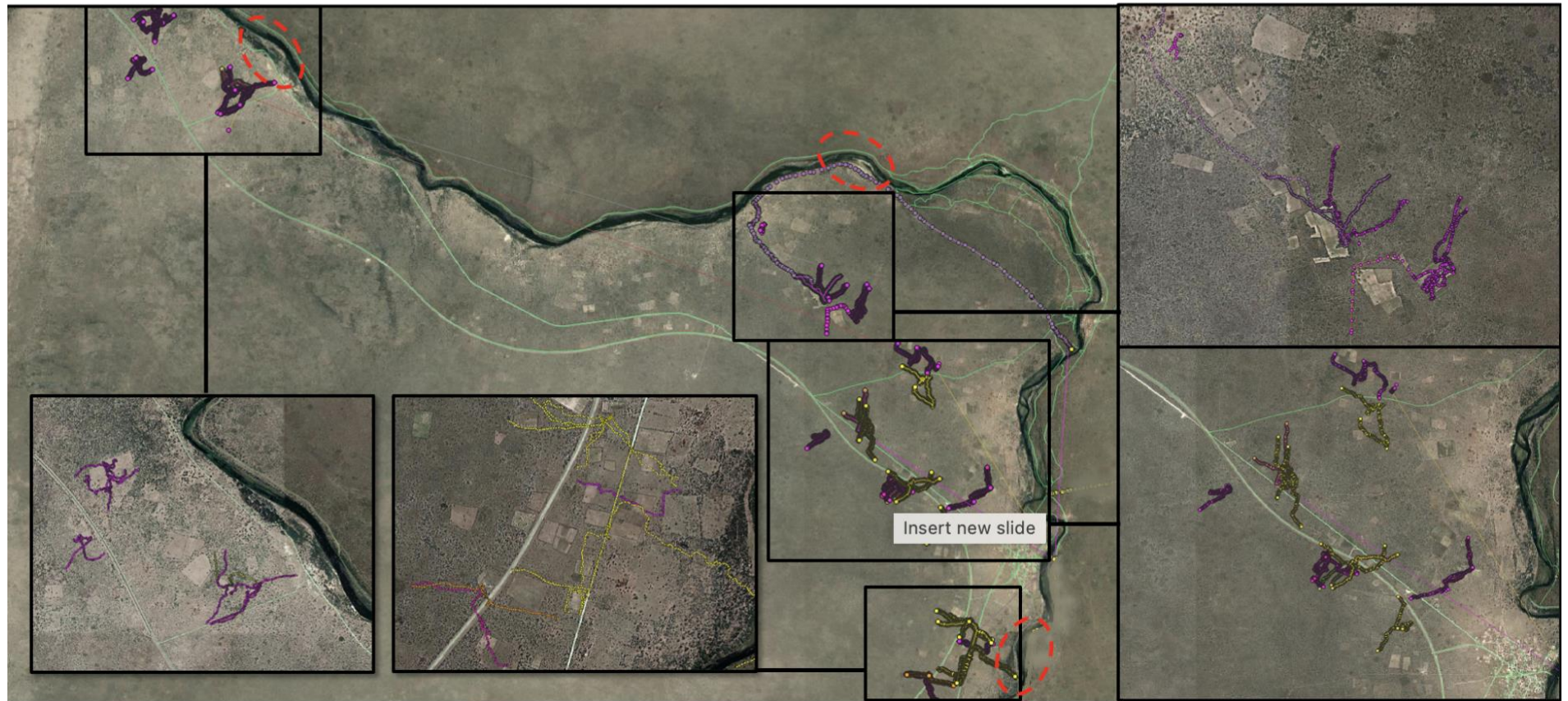


Figure 3: Map of Khumaga region showing crop raiding elephants tracks and the local hotspots of elephants' transgressions of the Makgadikgadi Pans National Park



**Objective II** - Decrease human-wildlife competition by applying knowledge from Objective 1 to a) decrease negative interactions between humans and elephants, b) increase the understanding of elephant behavior in rural communities, thus decreasing the threats to human lives and livelihoods, c) reduce levels of crop loss due to foraging by elephants and d) increase participation of community members in local decision making through citizen science

**Aim 2: Increase understanding of elephant behavior in community lands bordering protected areas.**

Whilst there was a larger data set for 2021, the pandemic and drought have limited the number of tracking data, but it has given good insight into how elephants are utilizing the community lands around Khumaga village bordering the MPNP and has helped us focus our future research and community outreach efforts. We hope to continue aspects of this data collection in 2022, pending funding, which will also help us understand the impact of the erection of the fence, between the community land and the Makgadikgadi Pans National Park. We are also currently applying for funding for satellite radio collars with a view to collar adult males in the area to get insight into how they utilize the community lands bordering the MPNP and the Makgadikgadi and wider Kavango-Zambezi Transfrontier National Park.

**Aim 3: Behavioural change in communities to move towards human-elephant coexistence**

Thanks to the funding provided by IEF and other organizations, we have been able to present our *Living with Elephant* workshops in four communities (Khumaga, Morecomaoto, Motopi and Phuduhudu) as well as at eight cattle posts in the Boteti region over the past two years. During encounters with elephants' community members often experience behaviors they have not seen before and it is important to address any uncertainties related to these encounters, so community members can feel safe and confident in their knowledge about elephant behavior.

In recent times the number of Facebook followers from Botswana has increased (currently 26%) and with growing interest on Instagram, where currently 4.9% of our audience is Botswana based, this is influencing what we are reporting as a tool to get pertinent information to local stakeholders. These alongside Living with Elephant Workshops provide good means of reporting our findings to community members.

According to data we received from farmers after each cop-raiding season, the rate of elephant crop-raiding behavior has decreased (Figure 2) from 4.2 raids per farmer in 2018 to 2.1 raids per farmer in 2020 and 1.1 in 2021. This is a positive outcome; however, many covariates will have influenced this, including the number of farmers that ploughed and the available vegetation elsewhere. 2021 was a much better year for crops following good rains after a drought, and so we saw more farmers cropping and a reduction in

the average of crop raiding incidents per farmer. The infographics we can now producing summarizing that crop loss was highest for those farmers that did not use mitigation tools and they were raided more frequency (29 raids vs 9) will certainly help persuade farmers that investing time in mitigation is worthwhile (Figure 5), especially as some farmers have told us that they have given up on using any mitigation methods because they do not believe in their effectiveness.

This year our Community Coexistence Project has expanded into the village of Moreomaoto and so it will be interesting to see if there is a cultural difference in the uptake of mitigation tools between the two villages. However, the raids that do occur are often due to a bad use of mitigation methods and thus despondency to use these techniques. In 2021 we conducted mitigation workshops prior to the farming season to discuss the advantages and disadvantages of the different mitigation strategies for those that were new to the program. Working with the local Ministry of Agriculture Crop Officer we shall hold workshops on various conservation agricultural practices that can help the farmers to improve their yield.

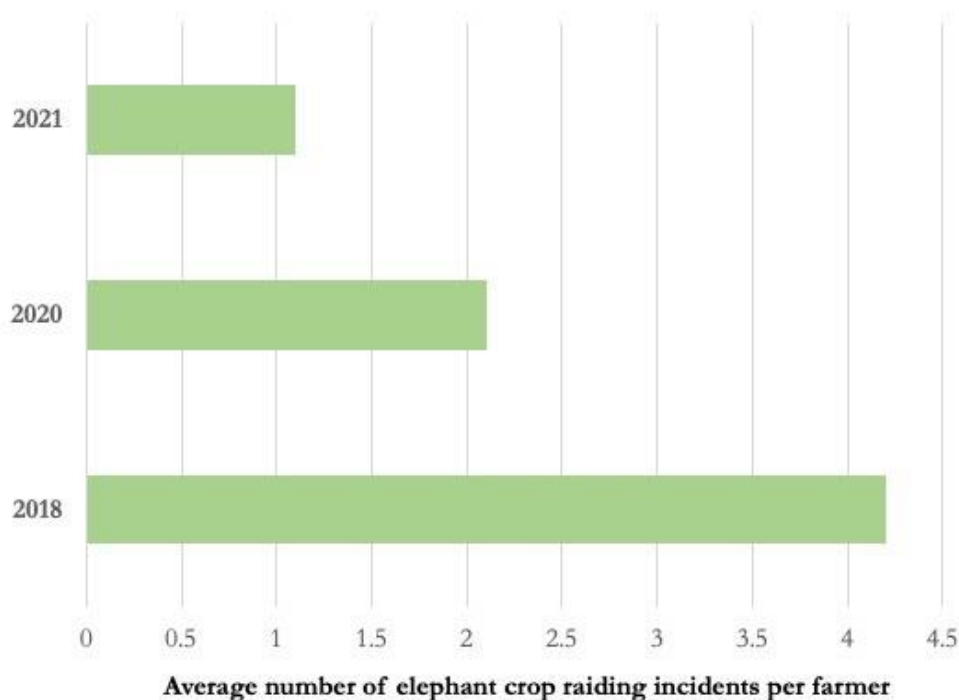


Figure 4: Bar chart showing the average number of raids per farmer

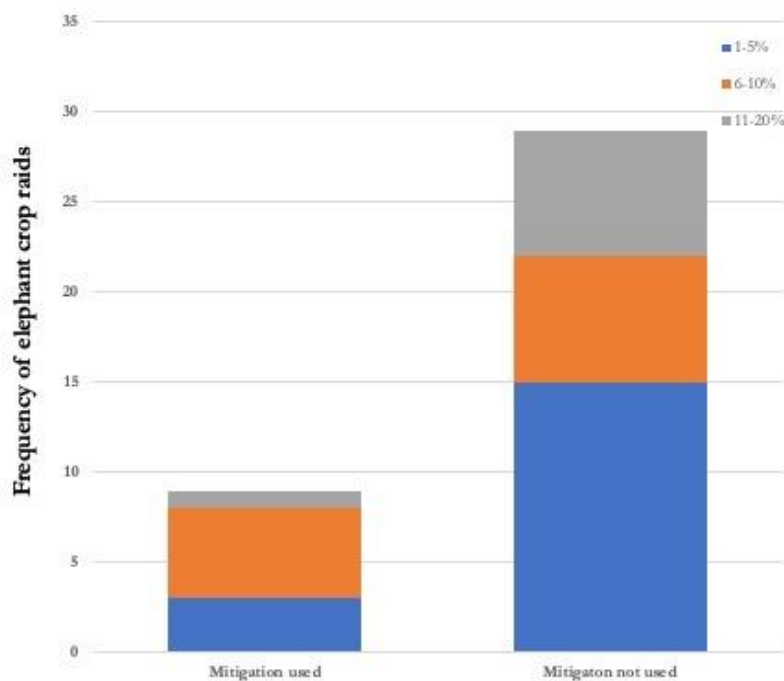


Figure 5: Frequency of elephant crop raids and percentage crop lost for mitigated and non-mitigated fields

## Conservation outcomes for elephants and humans

- Active involvement of the community: 42 farmers trained as ‘elephant monitors’
- 26 farmers ploughed and when requested, provided mitigation materials in 2020
- 32 farmers ploughed and when requested, provided mitigation materials in 2021
- Considerable uptake in mitigation methods used: 89% of the farmers used one or multiple of the mitigation methods we suggested
- Decrease in the average number of raids from 4.2 raids per farmer in 2018 to 2.1 raids per farmer in 2020 and 1.1 in 2021
- Less than half of the farmers (42%) were satisfied with the harvest in 2020. However, despite 60% of the farmers having been raided that year, only three farmers blamed the bad harvest on crop-raiding elephants. The evaluations for 2021 will be carried out in August 2021.
- Mitigation is a powerful tool in decreasing crop loss, this coupled with increasing yield would do much to assist the farmers that we work with.

## Impact of project

Our Community Coexistence Program was initiated in 2015 and has since assisted members of four local communities in finding workable solutions on how to live alongside elephants. Understanding the elephants' behavior and what drives their decisions to move across the communal land is an important step to become proactive, rather than reactive, in mitigating elephant conflict. So far, our mitigation methods have been aimed at preventing elephants from entering a field. The spatial data from the project will allow us to advise on the movement of fields from areas of high conflict to areas of low conflict, which will limit the number of elephants passing the fields and thus, hopefully, the number of crop-raiding incidences.

To mitigate elephant conflict, we largely rely on the cooperation of the farmers. While we can teach them about elephant behavior and mitigation methods and assist them with mitigation material, it is important that the methods we are suggesting are correctly applied by the farmers, so that in the long-term they can become self-sufficient. The decrease in the number of raids per farmer per year is very encouraging and shows that our approach is successful. Nevertheless, convincing farmers to move fields from their traditional locations to new ones is not going to be easy. Many farmers in Khumaga have accepted that they are going to share their landscape with the elephants they have been encouraged by their increasing success in harvesting despite the presence of the elephants, but we must work harder to prove to them that mitigation works so that they will be willing to put in the extra effort that is necessary to coexist with elephants. At the conclusion of this project, we feel confident that we will be able to use the data of this project to further improve the lives of the farmers around Khumaga while also taking our newly gained knowledge to the neighboring communities to assist them with crop-raiding elephants.

Despite of the many challenges we have faced over the past 2.5 years we conclude that this project has been successful and provides a very strong foundation for continuing work.

## Challenges

As described in our interim report the lock down in Botswana and following travel restrictions severely disrupted our work and that of the farmers and continue to do so. Our initial fast response to the impending lockdown in 2020 with the distribution of mitigation materials was much appreciated but we missed out on collecting the data from any raids, thankfully in 2021 we were able to attend raids throughout the cropping season.

Whilst we appreciate behavioral change is a long-term investment it is hard at times to not get despondent that not more people are taking on board mitigation techniques, but then something like this wonderful song arrives and we know that our hard work is paying off <https://bit.ly/JusticeThankQSong> and that sponsors monies are well invested.

At the final stages of this project, we have been hit by Covid with three members of staff testing positive for Covid-19. The camp-based team immediately went into quarantine for the recommended 10 days and thankfully all had mild symptoms.

In 2020 we were sad to say farewell to the original PI on this project, Dr Kristine Meise (Project Manager), who took the decision to return to Germany to be close to her family during the pandemic. We have since recruited a Scientific Officer and a Community Outreach and Education Coordinator, two senior roles to share the responsibility of the Project Manager, however neither have the skills for the mapping analyses needed to strengthen the understanding of the data collected in this project. Dr Kate Evans is learning these skills but currently has to juggle this with the added responsibility of the loss of our Project Manager alongside the additional reduction of staff (Administrator) due to financial implications of the pandemic.

Dr Evans has chosen not to visit the camp/Botswana since her last visit in March/April 2020 just before the lockdown in Botswana. Whilst travel options have become available during this time, she felt it irresponsible to travel outside of her home country until fully vaccinated and more information about the effectiveness of the vaccines. Whilst frustrating this was a decision best for the whole team and the communities we serve. Thankfully we have good mobile connection and satellite internet and so communication is frequent, and the field team have coped incredibly well under the very trying and difficult circumstances.



## Measurement of success

Activity	Target	Achieved
Employment of local, experienced tracker	1	1
Attendance of crop raiding events	60	47
Tracking of elephant trails (% of raids attended)	75%	86%
Map produced of elephant utilization of community land (Figure 3 - to be improved)	1	1
Infographic detailing elephant utilization of community land	1	In progress
Distribution of infographic	300	To do
Living with Elephants workshops	6	12
Mitigation workshops	6	7
Reduced levels of crop loss	Decrease	Yes
Reports	8	8
Community Members attending workshops	60	255
Kgotla (Village) meetings	2	2
Quarterly Education Advisory Board (NGO) meetings	8	8
Incorporation of pilot data into research proposal for permit renewal	1	1

**Table 2:** Table showing our measurables for success, our original target and what we have been able to achieve

## Next Steps

**Aim 1:** Understand how elephants are utilizing the communal lands on the western boundary of the MPNP

This foundational work has really enhanced our understanding of how elephants are utilizing community lands and importantly engaged more farmers in our work (25% of the farmers we interviewed were not enrolled in our Community Coexistence Project). Our next step is to understand what other factors, aside from crop-raiding, is driving the expansion of elephants outside of protected areas in this region and identify if we have repeat offenders in this region. We are seeking funds to collar elephants to help us answer these questions.

**Aim 2:** Increase understanding of elephant behavior in community lands bordering protected areas.

Continue and expand our reach for the Living with Elephants workshops. We are currently working with Maryland Zoo to incorporate more videos of elephant behaviors into the workshops and have been requested by four other communities to deliver Living with Elephants workshops.

The distribution of our findings at meetings and through infographics will certainly help us increase the understanding of community members on how and why elephants are utilizing their lands and how best to communicate to elephants that they are not welcome there.

We continue to see farmers not mitigating with chilli, which has repeatedly been shown to work and to which we provide access. They often complain that it is too much work to maintain the chilli mitigation, which we have addressed historically by developing and providing mbulas (Zambian work for stove – see



*Photo 1: Community Officer Mankind Moloiswa with a mbula burning a chilli brick*

Photo 1) and the provision of tents to enable the farmers to stay in their fields at night and maintain the burning mbulas so they burn throughout the night. This year we expanded our Community Coexistence Program into the neighboring village of Moreomaoto and so it will be interested to see how this community responds and if we are able to understand any covariates that may affect farmers willingness to try and maintain mitigation.

**Aim 3:** Behavioral change in communities to move towards human-elephant coexistence

Perhaps the biggest hurdle to human-elephant coexistence is for community members to see the value of elephants to themselves and to Botswana. When you have only ever met an elephant in a negative circumstance or seen the negative consequences of an elephant encounter (loss of livelihood, loss of life) then you are less willing to try and live in harmony. Our Community Coexistence strategy includes opportunities for community members to visit their national park (School's Environmental Education Program and in 2021 workshops a photography course for youth (Photo 2) in partnership with Wild Shots Outreach) as well as workshops on alternative livelihoods training (in 2021 we introduced weaving workshops, a traditional Motswana craft, innovation workshops, creating solutions to local problems).

Slowly but surely, we are seeing more acceptance that the elephants are here to stay and that only personal action alongside assistance from the government and international community will their communities have a sustainable future.



*Photo 2: Pretty Majaga (20) - I was excited and scared at the same time to see an elephant closeup – but I was proud to have the opportunity to experience and learn the behavior of elephants. This opportunity to do the Wild Shots course comes once in a lifetime. Visiting the Makgadikgadi Pans National Park for the first time gives me hope and inspiration*

## Associated Organizations

Oxford University's Wildlife Conservation Research Unit (WildCRU) – Elephants for Africa and WildCRU work together on developing and delivering workshops to communities that border the MPNP

Department of National Parks and Wildlife (DWNP) – Elephants for Africa maintains the DWNP chilli plot on their behalf (as funding shortages prevent DWNP from doing so), DWNP allow access to the park for research inside the Park boundaries and supports EfA where possible (presenting to EfA's Environmental Clubs, etc.)

## Online footprint

You can learn more about Elephants for Africa through our online channels noted below. Through our website you can view news articles and also sign up to Elephants for Africa's newsletter.

**Website:** <http://elephantsforafrica.org>

**Facebook:** @elephantsforafrica

**Instagram:** @elephantsforafrica

**Twitter:** @E4Africa

**YouTube:** <https://www.youtube.com/ElephantsForAfrica>

## Financial report (January 01, 2020 – July 15, 2020)

Item	Budget	Spent	Remaining
Research Assistant salary	\$ 700.00	\$ 700.00	\$ 0.00
Tracker salary	\$ 2500.00	\$ 2500.00	\$ 0.00
Fuel	\$ 975.00	\$ 975.00	\$ 0.00
Car maintenance	\$ 720.00	\$ 720.00	\$ 0.00
Supplies for workshops	\$ 100.00	\$ 100.00	\$ 0.00
Refreshments for workshops	\$ 60.00	\$ 60.00	\$ 0.00
Airtime for farmers (to report raids)	\$ 420.00	\$ 420.00	\$ 0.00
Field office telecommunications	\$ 220.00	\$ 220.00	\$ 0.00
Field office satellite internet	\$ 600.00	\$ 600.00	\$ 0.00
Advisory board meeting	\$ 250.00	\$ 250.00	\$ 0.00
Printing of infographics	\$ 200.00	\$ 50.00	\$ 150.00
Accommodation for staff member	\$ 650.00	\$ 650.00	\$ 0.00
Lodging, meals and incidentals	\$ 1000.00	\$ 1000.00	\$ 0.00
Out-of-camp, lodging, meals, and incidentals	\$ 240.00	\$ 240.00	\$ 0.00
In-country Airfare	\$ 520.00	\$ 0.00	\$ 520.00
<b>TOTAL</b>	<b>\$ 9,155.00</b>	<b>\$ 8,435.00</b>	<b>\$ 720.00</b>

## Budget request

We kindly request that the unspent money is released so we can use it for the printing of the infographics and the in-country airfare, not used due to travel restrictions within Botswana is utilized for the distribution of the infographics and follow-up meetings with the farmers.

Attachments submitted separately

- ✓ 5 x high resolution images
- ✓ 1 x video clip
- ✓ Media Coverage – Multiple posts on social media