

## Annex 5 – Final Progress Report

### 1. Identification:

Partners Name: KENYA WILDLIFE SERVICE

Budget line: BAC USD 23440

POW 2018-2019 Sub-Programme

Expected Accomplishment(s): Rangers are well- trained and mitigation measures on drought-identified

Output(s):

- 1) A strategy for the management of elephants during drought period in Tsavo,
- 2) A technical field report produced
- 3) Publication in a referred Journal
- 4) Quality elephant data collected

Title of the approved PRC project: **Developing drought mitigation measures for elephants in the Tsavo Ecosystem by understanding long-term elephant distribution and mortality patterns in relation to NDVI, vegetation and rainfall**

SSFA starting date:

Completion date: 1 June, 2021

### 2. Summary of Status:

The Main Achievements: Kenya Wildlife Rangers who collect mortality data and even monitor elephants and those who are involved in the census have learned how to collect quality data that can be used in CITES. They have learned how to age living elephants, sex them and learned how to age elephant carcasses and even assign sex with confidence.

The following was undertaken during the project period:

1. Sourcing, and compiling data on elephant mortality mainly in Tsavo East National Park and ageing georeferenced elephant jaws of known mortality cases. This compiling historical elephant mortality data, locating elephant jaws and skulls in the field and estimating the ages of elephants at the time of death using georeferenced and historical data.
2. Obtaining and processing data on NDVI and climate for Tsavo East over the last 40 years using remotely sensed data and climate station data,
3. Mapping elephant distribution, and watering points in Tsavo in the last 20 years
4. Training of rangers on elephant ageing, sexing and georeferenced for long-term elephant mortality monitoring

The process to compile georeferenced elephant mortality data for Tsavo for the period Jan-2000-June-2020 was completed and about 100 elephant jaws have been aged and sexed. In addition, data on elephant distribution in the last twenty years has been sourced and compiled. The process to acquire satellite image data for processing NDVI for the period 2000 to 2020 was completed. Rainfall data were obtained for the period 1960-2016 for some stations in Tsavo.

The main challenge was the emergence of COVID-19 and the logistical challenges that affected training and even the fear of mobilizing rangers for the training at short notice. Tsavo being very expansive reaching certain areas proved difficult. Connectivity (communication) was a challenge during training. Data collection has never been considered to be of importance and was at first taken casually by rangers during the training. Frequent refreshers courses are recommended for field officers and rangers alike in order to realize SSFA's objective.

### 3. Activity delivery status

Activity	Description of work undertaken during reporting period	Deliverables	Delivery date	Status of Activity (completed or not completed)	If activity is not completed, please describe the reason why and indicate mitigation actions that were taken.
Activity 1 – name of activity					
<b><i>Impact of previous elephant drought mortality on elephant age and sex structure</i></b>	The main activity for this objective was field-based. It involved locating elephant jaws and skulls in the field and estimating the ages of elephants at the time of death using georeferenced historical data (past 10 years) as well as contemporary data and the current data being collected. The molar progression method of Laws et al 1966 was employed. Sex was determined from jaw morphology and tusk measurement when available using the method of Western 1989.	The expected output was a report on the potential impact of Tsavo droughts relative to other causes of mortality on elephant population age-sex structure and implications for population growth and sustenance. This will impress upon conservation managers to consider drought in elephant conservation. The monitoring indicator was to generate a comprehensive list of	End of the project	It was completed	The collection of jaws and measuring and analyzing them was completed.

		georeferenced elephant carcasses in the last 10 years compiled by the first and second quarters. From the second quarter onwards the number of georeferenced jaws located, aged, and sexed per quarter would serve as indicators for the progress in this objective.			
Activity 2.					
<b><i>Temporal and spatial pattern of live elephants as well as dead elephants in relation to NDVI, vegetation, rainfall NDVI, and waterholes</i></b>	<p>Data were compiled for Tsavo East elephant mortality data for the last 10 years. In addition, aerial census data were digitized and georeferenced from the 1990s to the last aerial census. Sourced and compiled current and historical rainfall data for Tsavo East Weather stations from the 1960s to the present. Data were obtained from archived data collected from a network of 10 weather stations in Tsavo East NP as well as Voi.</p> <p>As a field component, elephant water points were mapped and geo-referenced. Remotely sensed images were processed to produce NDVI to relate the distribution of elephants with their habitat.</p> <p><i>Monitoring indicators and expected outputs</i></p> <p>Objective indicators include a number of years of compiled rainfall data obtained from KWS archives and the Kenya Meteorological Department. The target was to obtain rainfall and temperature data since the 1960s for Tsavo East weather stations and Voi met station. Remote sensed monthly data from 1995 to present was sourced and quality images were obtained for Tsavo East. The number of aerial</p>	The expected output was a report on the Spatio-temporal relationships in dead and live elephant distribution and their relations to rainfall, NDVI, vegetation, and waterholes. A geospatial analysis of discordance in elephant distribution resource availability and mortality patterns will inform new locations for waterholes and ranger outposts. Implemented, this will minimize the negative effects of drought on elephant populations.	End of the project		The final Technical field report has been produced

	census data was compiled or digitized. Aerial census data for the Tsavo Ecosystem is available from 1960 to the present. More recently this aerial census data is available for intervals of 4-5 years.				
Activity 3.					
<b>Strengthening the capacity of KWS rangers to monitor elephant drought mortality</b>	<p>Develop Training Materials</p> <p>The activities for this objective were to develop a training manual on elephant mortality monitoring including techniques for ageing and sexing live and dead elephants. The training also involved protocols for determining the cause of mortality, geo-referencing, note-taking, and reporting procedures. The training targeted 60 rangers from Tsavo East, Tsavo West, and surrounding community conservancies. This was a 4-day training workshop for each area and included hands-on practical training inside Tsavo East NP.</p> <p><i>Monitoring indicators and expected outputs</i></p> <p>Manual for elephant monitoring developed and printed. Another indicator was that the ranger training conducted and rangers are competent at, sexing and ageing dead and live elephants, assessing the cause of elephant mortality whenever possible, and following reporting protocols for Monitoring the Illegal Killing of Elephants (MIKE).</p>	The expected outcome is consistent and high-quality data collection of elephant mortality and distribution data that will be used for elephant conservation management and 60 in total rangers were trained and are competent with quality data collection in the field of elephants	End of the project		The MIKE monitoring booklets were used in the training but with additional field notes from the experts. Everything was customized to meet the expectations of the trainees.
<b>Activity 4. Report dissemination</b>	Hold a workshop with stakeholders to share the findings	Information disseminated to stakeholders and the public at large	After the end of the project	Completed	

A handwritten signature in blue ink, appearing to be 'David Kimutai Korir', with a large, stylized flourish extending to the right.

**Signature:**

**Date:** August 29, 2023

**Name and title of signing officer:** David Kimutai Korir