

Using Satellite Tracking for Health Monitoring and Treatment of Released Work Elephants

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Introduction

The Elephant Conservation Center (ECC) has been working with Asian elephants (*Elephas maximus*) in Laos since 2001. The ECC initially started as a captive elephant welfare organisation, assisting work elephants with veterinary care. In 2011 it transitioned into an eco-tourism venture, allowing people to observe captive elephants in a natural forest, providing time for captive elephants to form social bonds while giving tourists the opportunity to see elephants in a similar setting as they may find wild elephants.

In 2018 the ECC began working with the government of Laos to assist in wild elephant conservation issues, working mainly in Nam Pou National Protected Area to help monitor and protect the second largest population in the country. The ECC also runs Laos' only reintroduction project in the south-west of Nam Pou, monitoring four released captive elephants as they roam freely for just over four years.

The ECC's reintroduction project hopes to lay the foundations for a successful captive elephant release program in Laos. The ECC believes there is a lot of potential for reintroduction across the country, with limited options currently for work elephants and several small wild populations that could benefit from augmentation (Ministry of Agriculture and Forestry 2022). The project focuses not only on captive elephants but also on mahouts, how their traditional knowledge can be used to facilitate soft releases and how they could transition into a monitoring and tracking role in the future.

The current release is centred around four non-related captive elephants, three adult females,

35–40 years old and one juvenile male approximately 11 years old (Table 1). All individuals in the soft-release are captive born, born to captive females that have bred with wild males inside Nam Pou National Protected Area. All three of the adult females are former logging elephants that worked in and around the area they are now released pulling logs. The juvenile male was trained specifically for circus and was destined to be the star of a show in a middle eastern zoo. All four elephants were part of a 13-elephant sale to a zoo that was stopped at the last moment due to significant external pressure. All these elephants were then given to the ECC by the government.

The reintroduction program started in March 2019 when these four individuals were released into an area of the NPA well-known by the mahouts of these elephants. This was initially a 3-month project to give the ECC team a large continuous forest where we could release elephants and know they are far away from farms with ample food sources. The first goal was simply to understand if these four individuals, who seemed to stay together consistently at the ECC (a much smaller and fragmented forest) would stay together when they have a large forest and real opportunity to disperse.

The first three-months saw the group stay together at all times with no instances of human-

Table 1. List of released elephants.

Name	Age	Collar ID
Mae Mah	35	5331
Mae Noy	35	5332
Mae Boun Me Yai	38	5330
Dor Khoun Mueang	11	5329

elephant conflict. Because of the success of the first period, we asked for an additional six-months extension to continue the program. After this permission was granted for an additional year and currently, we can continue at least until December 2024, however talks are ongoing with the government to legally change the status of these four elephants, granting them permanent freedom as wild elephants.

After the first three months, once it was clear we would pursue a long-term project keeping these individuals free-roaming for extended periods of time, we start to collect faecal samples every two-weeks and blood samples once a month to monitor different parameters. Bodyweight and general health checks were also carried out monthly. All individuals were tested for infectious diseases such as tuberculosis pre-release and were vaccinated against tetanus.

The team in charge of tracking the elephants and monitoring their behaviour, consisting of 5 mahouts, 1 local assistant, 1 biologist and project manager stayed in the forest and went to check and monitor the group every day for the first three months. The release and monitoring were made possible thanks to the extensive knowledge of the landscape by the mahouts and their ability to track the elephants' using spoors, dung and a small 3 m drag chain on one leg.

With no real threats identified to the elephants or the local community the team took a less hands-on approach, seeing the mahouts go to check the group three times a week for the next 3 months. In 2022, after two years of using the traditional mahout skills to track the elephants, GPS collars were added to each individual thanks to financial support from The Smithsonian Institute. The tracking team now checks approximately once a week on the group, which spends the majority of its time together as a group of four. There have only been two instances of human-elephant conflict, both raiding rice and cassava plantations that reside inside NPA boundaries happening within three days of each other in late 2022 amounting to a total of 250 USD but the group does not appear motivated to crop-raid.

Treatment of Dor Khoun Mueang

The general movement of our released elephants seems to follow a pattern of spending 1–3 days in a small space of a few hectares before moving on to new feeding grounds (Fig. 1). However, on the rare occasions Dor Khoun Mueang leaves his surrogate group, he tends to be more active. This behaviour is normal for a male of his age in the wild, as they explore new areas independently, as they gradually leave the maternal herd and associate with adult bulls

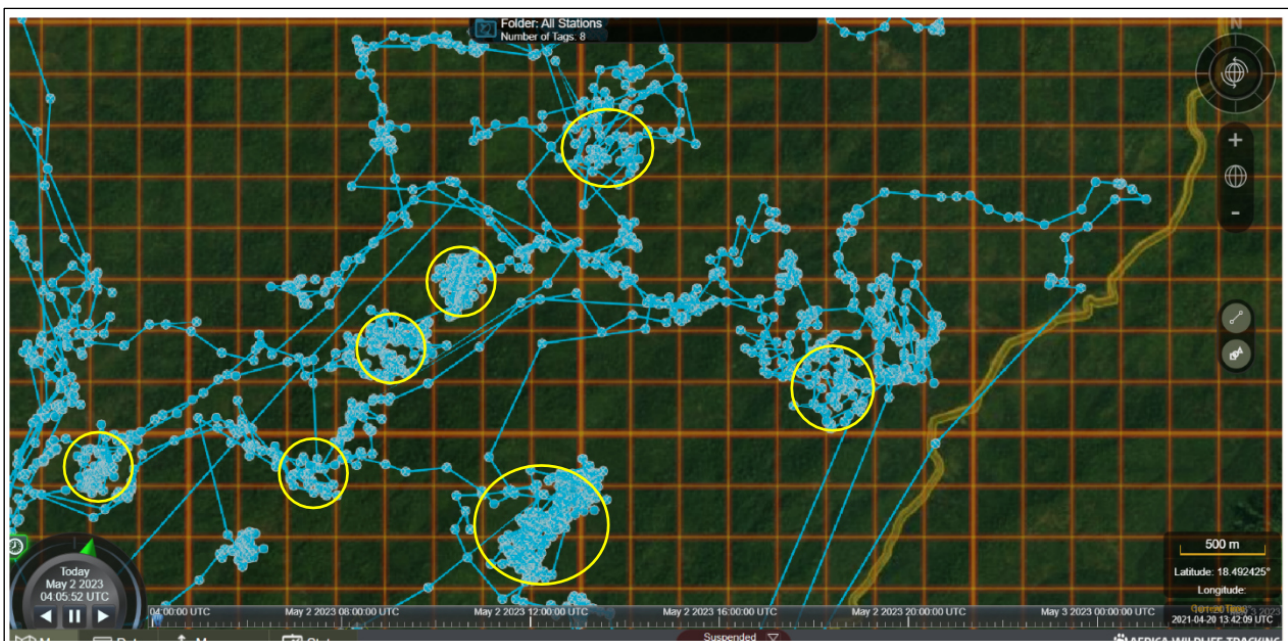


Figure 1. Movement data for four released elephants January 2023, yellow circles showing clusters where elephants' graze.

and/or looking for females in oestrous (Keerthipriya *et al.* 2021).

After a few days solitary roaming we noticed that Dor Khoun Mueang moved very little and remained in an area no larger than 300 m² for 3 days, prompting us to send the tracking team to check on him. After the first day the team called back to say they couldn't find him. They continued to reach for him the following day and luckily found him at 10 am the following morning. The team explained that he seemed very weak, had diarrhoea and was not eating. Due to the remote area DKM was found in it was not possible to perform any sort of blood, urine or parasitic analysis, however, based on the description and physical examination our veterinarian suspected a bacterial infection leading to dehydration. Our vet assistant and team then spent the next 4 days in the forest performing treatments (Figs. 2–4) including:

- Rectal and IV Fluid administration: Dextrose 5% (5 l), Ringer (4 l), Saline solution (4 l), for 4 days
- Enrofloxazine 10% (100 mg/ml): (5 mg/kg), IM, QD, for 7 days
- Flunixin Meglumine: dose 1.2 mg/kg, IM, QD, for 4 days
- Cathosal 10%: 100 ml, IV, QD, for 4 days
- Biosan TP: 100 ml, IM, QD, for 3 days
- Ivermectine: 0.1 mg/kg, IM, 1 time

The body score for each elephant is calculated using Fernando *et al.* (2009) description where 1 is very skinny and 10 is obese. Weight for



Figure 2. Rectal fluid administration for Dor Khoun Mueng.



Figure 3. Team assisting with the treatment.

dosage was calculated using the following calculation:

$$\text{Girth (cm)} \times \text{Girth (cm)} \times \text{Shoulder Height (cm)} \times 0.93 \div 10,000 = \text{Weight (kg)}$$

After two days of treatment Dor Khoun Mueang showed a drastic improvement in his energy levels and appetite. He was eating, drinking and defecating regularly. The mahouts moved DKM to a more accessible area of the forest on day three so we could drive to the area with a 4x4 car in less than 1 hour instead of the 2.5-hour tractor trip at his current location and the mahouts and vet team continued to monitor him.

For the rest of January, Dor Khoun Mueang was kept isolated from the released group and managed in a more traditional way, on a 40 m chain tied up in the forest (Fig. 5). His mahout and the



Figure 4. Tracking team assisting with treatment.



Figure 5. Dor Khoun Mueng eating some watermelon after treatment.

rest of the tracking team camped nearby to continue monitoring until they assessed he was at full health. He was then released back with his surrogate herd and made a full recovery (Fig. 6). All of our mahout tracking team can still handle and manage their elephants without sedation, making these situations much easier.

Conclusion

Although a lot of the success of this soft-release program stems from the mahouts traditional tracking knowledge, it is highly likely that without the satellite data the team would not have been aware of his disease or in time and Dor Khoun Mueng would have not recovered from the illness. However, with satellite data alone, in a large forest such as Nam Poui, there is a likelihood that the veterinary team would not have been able to find him in the forest so efficiently. These situations perfectly highlight the need to merge traditional knowledge and skillsets with modern technological tools. This project aims to lay foundations for reintroduction programs in Laos which emphasises and champions traditional mahout skills.

This small group will continue to be monitored by their mahouts, now dubbed the ‘reintroduction program monitoring team’ for the foreseeable future. Even if the legal status of these elephants is changed to wild, we still see the team of 5 mahouts as a valuable unit to continue to

monitor and provide information on this group. Their continued employment will help us fine-tune exactly what roles mahouts will be able to have long-term in elephant conservation. With potential across the country for elephant reintroduction, we hope expansion into new areas can be beneficial for elephants and mahouts alike, providing a new life for elephants and sustainable employment for mahouts.

Acknowledgements

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Figure 6. Dor Khoun Mueng (far right) back with the group in late April 2023.