



Preliminary results of the occupancy survey of the small tamaraw sub-population in the Aruyan-Malati area using camera trap technology

September 2021

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This document gives first insights of the data recorded during the occupancy camera trap study in the Aruyan-Malati area, conducted between November 2020 and June 2021. This study is part of the collaboration between the D'ABOVILLE Foundation and Demo Farm Inc and the Department of Environment and Natural Resources (DENR), represented by the Tamaraw Conservation Program (TCP). This document aims to give an overview of the fieldwork and a first glimpse of the results.



Acknowledgement:

This study was conducted in the frame of the Mangyan- Tamaraw Driven Landscape Program of DAF. This work is specifically supported by the funds from **Mandai Nature**, **AFdPZ**, **ZGAP** and **Berlin Tierpark**.



1. Introduction

Most of the conservation of the tamaraw (*Bubalus mindorensis*) relies on our accumulating knowledge and data collected at Mount Iglit-Baco Natural Park (MIBNP) (Long et al. 2018; Bonenfant et al. 2020; Isihara & Kanai, 2010; García Gil et al. 2020; Isihara et al. 2007; Suchomel, 2005). This population is the largest known so far, but others, likely smaller populations, are scattered on Mindoro Island (Long et al., 2018; Isihara et al., 2007). Because they are located in remote areas and have been the focus of less attention, what we know about those small tamaraw populations are very meagre. The Aruyan-Malati area hosts one of this small sub-population, for which a first description has been published in 2010 by (Matsubayashi et al. 2010). The status and viability of this population remain to be assessed and updated though.

Unlike in Mts. Iglit-Baco Natural Park, where the tamaraws are found in grassland dominated landscapes, the Aruyan-Malati area remains mostly forested (seasonal tropical forest). Though the pervasive land-use system of the residing Taubuid communities practising slash and burn agriculture creates a mosaic of open areas and bush/shrub land together with forest regeneration, the forest ecosystem is commonly defined as the main habitat of the tamaraw there. This context raises the question of the difference in the ecology of the species in both locations and subsequently the optimum density of animals that this area could host.



Fig. 1: *Tamaraw adult female: The presence of both sexes within the photos obtained during this study could indicate a stable population. To certify this idea there is a need of further studies of this population.*

Understanding the habitat range and the habitat use by this tamaraw subpopulation shall help achieve targets of the Tamaraw Conservation and Management Action Plan 2019-2028 (TCMAP), specifically the strategy for the meta-population point 3: Re-establish Aruyan-Malati as a Tamaraw site.

Any new data will help complete the application for the proclamation of this area as “Critical Habitat” and subsequent protection and management measures. Finally, it will guide future studies to better understand and monitor the situation of this small population.

Lastly, this study offers the opportunity to gather information on other wildlife species inhabiting the area and prone to be captured by the camera trap devices. It includes the Philippine deer (*Rusa marianna*) and the Mindoro’s warty pig (*Sus oliveri*), both classified as vulnerable under the IUCN Red List classification (Mackinnon et al., 2015; Schutz, 2016).

2. Study site

The study area (Fig. 2) was selected according to the most recent reports from the TCP rangers on the presence of the species in the overall Aruyan-Malati range. The sampling surface was defined by the number of camera trap devices we could mobilize and the availability of the field team. It covered 638.676 ha, located between the Malati River and the Kinarawan River in the municipality of Sablayan, in Occidental Mindoro. The altitudinal range lies between 150 and 500 meters.

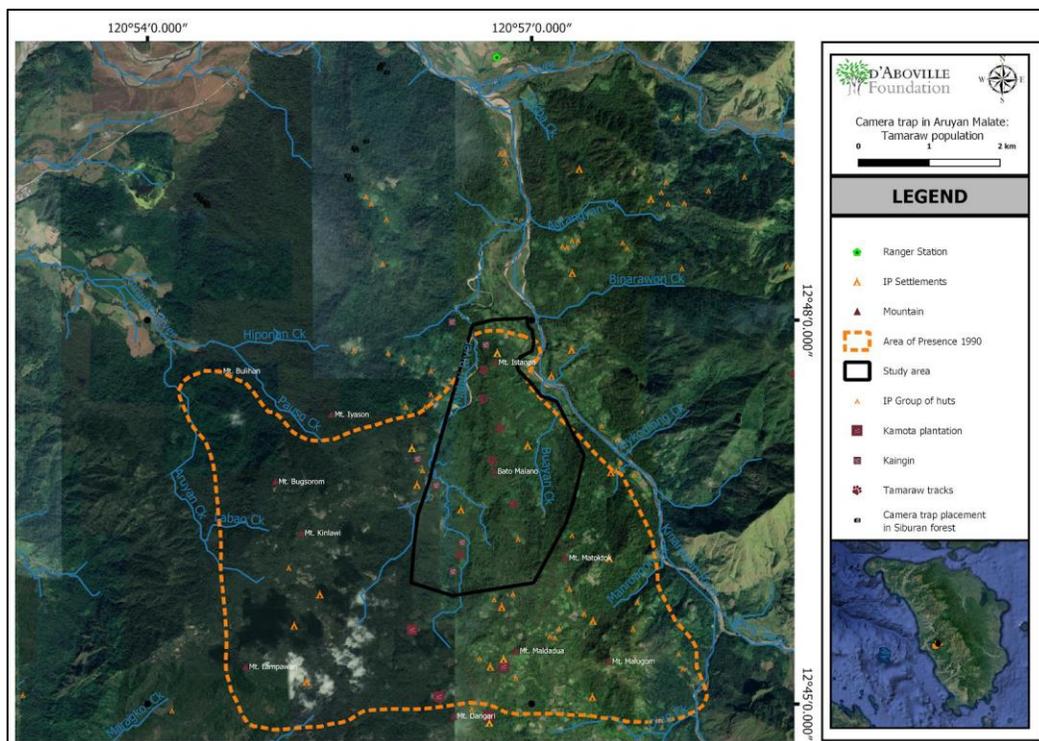


Fig. 2: General location of the study area within the Aruyan-Malati area,

According to the habitats classification of the National Mapping and Resource Information Authority (NAMRIA), the main vegetation form is brush and shrubs, with areas of open forest and small patches of grassland.

The main characteristic of the Aruyan-Malati Area is that it is populated by semi-nomadic Taubuid IPs with communities scattered all over the place. Cultural practices such as slash and burn agriculture are shaping the landscape, promoting a mosaic pattern of habitats, while traditional hunting using snare traps and spear traps induces pressure on the local fauna. Illegal activities from outsiders trespassing IP territories are also pervasive. There are two TCP ranger stations in the vicinity of the survey area located in Sitio Palbong and Sitio Pusog.



Fig..3: Tamaraw juveniles. Thanks to capturing photos of the animal at a young age, we can certify effective reproduction in this population.

3. Material, manpower and study design

15 Cuddeback & Reconyx Camera traps were deployed on the field for four months with four to five weeks rotation to cover a total of 60 camera sites in 4 runs. Due to technical difficulties, round 1 was repeated after the last planned round, plus a fifth-round was carried out to complete the design as precise as possible.

The Tamaraw Conservation Program (TCP) rangers involved in this study were the rangers currently assigned in the Aruyan-Malati area and composed of Randy Acosta, Eric Abowac, Jeward Dela Cruz, Medy Angagan, Edgardo Cañete, Frances Alfante, Frenz Alcaraz, Senen Hilario, plus two to four wardens.

The field coordination of the study was assumed by TCP team leader and TCP-DAF liaison officer Gener Fantuyaw and DAF Field Technical Assistant Jackie Belmonte. Additional members from the local IP communities joined the team, witnessing the work of the rangers and helping them identify the plants' local names during the habitat description step.

To stratify the habitat of the study site, we have used a combination of the results of the 2015 Land Cover Mapping from the National Mapping and Resource Information Authority (NAMRIA) of the Philippines and some modifications with Google Earth imagery with satellite photos from 2019.

Within the survey area, we can find three habitat strata, which we considered with the same importance, meaning that only the proportion of each one within the survey area affected the number of camera traps.

The result was as follow:

- Brush / Shrubs: 495 ha = 78% of the survey area = 48 camera trap placements.
- Open forest: 133 ha = 21% of the survey area = 11 camera trap placements.
- Grassland: 10 ha = 2% of the survey area = 2 camera trap placements.

As mentioned above, in the best-case scenario, we would use the expected home range of the animal to establish the minimum separation between camera sites. As we do not have this information currently, this distance was decided by its feasibility in terms of resources and manpower. After computing the minimum distance to accommodate the 60 camera positions and included the three habitat types described above, the proposed distance between neighbouring camera traps was 300 meters, preventing spatial autocorrelation between camera traps.



Fig. 4: Tamaraw adult male. This male has a distinctive scar in his right ear, allowing us to identify it individually.

4. Implementation and fieldwork

The study was conducted between November the 18th and June the 27th. This period included four complete movements of the camera traps, plus a repetition of Round 1 and one last round to complete the design as precise as possible, making a total of 51 positions factually surveyed.

The distance between the cameras was 300 +/- 20 meters. During the missions, the field team were setting the camera traps, registering signs of the presence of animals in the vicinity of the placements, and carrying out one habitat plot per position.

This project was an opportunity for the TCP rangers to strengthen their relationship with the residing Taubuid communities and gather updated information on the location of their settlements, the names of chieftains as well as document their current lifestyle.

Consultations were made with different relevant members of the communities, and they had the opportunity to join the fieldwork, enabling them to witness the nature of the study. One example emphasizes the increase of trust during the study: During the first round, some members of the IP communities manipulated the camera traps deployed in the field. This event prompted the team to carry out additional consultations and explanations with the tribe. Thereafter, there was no more account of that nature.

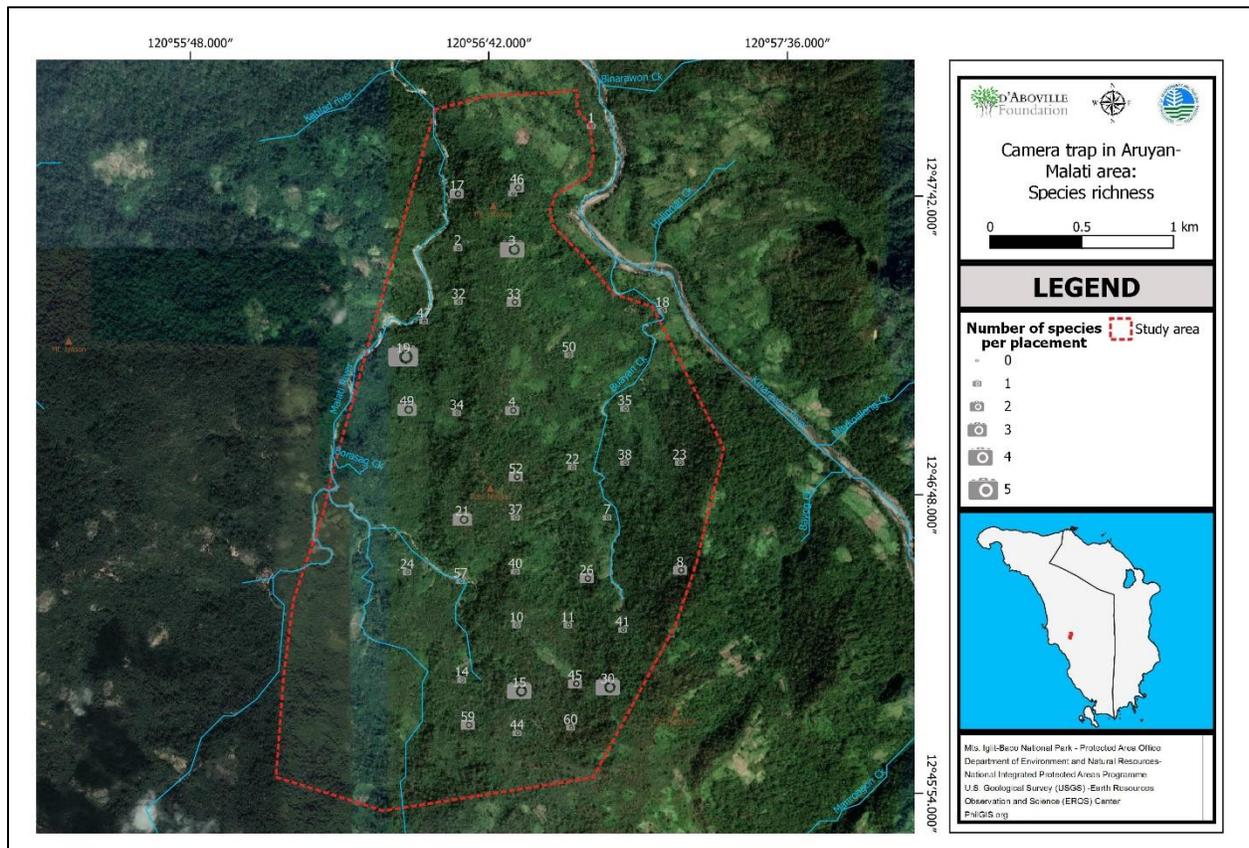


Fig.5: Tamaraw adult male. Unlike in the photos of Fig. 4, we can not see the right ear of this animal, making it impossible to know if they are the same individual.

5. Preliminary results.

As stated above, some relevant IP members joined the teams during the work, witnessing the work and helping to identify the plant species with the local names. They were also crucial informants on the presence of tamaraw outside the study area, helping the team to define where the study shall be expanded in the future. They also reported that the animals are moving a lot, suggesting that the species is sensitive to human disturbance and adapt its ecology according to land-use and activities of residing communities, thus impacting the distribution of the species in the area.

Fifty-one (51) placements were successfully surveyed, with a total of 1402 camera trap days. Thirty-eight (38) cameras did capture photos of animals, ranging from at least 1 to 5 different species (Fig. 6). In total, a minimum number of 13 different species of animals were recorded during the study.



Tamaraw

Signs of the presence of tamaraw were recorded in the vicinity of 22 positions, with 8 of them with photos of the animal as well. In addition, two camera traps recorded the presence of tamaraw in positions where no tracks of the animal were found nearby. In total, tamaraws were reported in twenty-four (24) different locations, including ten (10) camera trap positions. (Fig. 7).

Different individuals from different age and sex classes were photographed during the study, including at least one male (Fig.4 & Fig. 5), one female (Fig. 1) and one juvenile (Fig. 3 & first page), thus confirming active reproduction.

Other species

From the other species of medium to large mammals presents in Mindoro although signs of the presence of Mindoro's warty pig were recorded in 30 positions, only two photos were captured (see Annex I, Annex II & Annex III). Each of these photos was captured in different camera positions. No photos or signs of the presence of Philippine deer were recorded. The long-tailed macaque (*Macaca fascicularis*) (see Annex I & Annex III), classified as vulnerable under the IUCN Red List classification (Eudey et al., 200), was recorded by 21 camera trap positions, suggesting the species is relatively abundant in the area. Finally, the common palm civet (*Paradoxurus hermaphroditus*) was captured in two distinct locations (see Annex I & Annex II). The species is classified as "least concern" by the IUCN Red List classification (Duckworth et al., 2016).

Additional to these findings, we have recorded at least five bird species. Between them, most probably the black-hooded coucal (*Centropus steerii*) was recorded in placement 49 (see Annex I, Annex II & Annex III). This species is a Mindoro endemic Critically Endangered by the IUCN Red List classification (BirdLife International, 2018), with very few sightings in the past years.



Camera trap study in Aruyan-Malati area: Tamaraw presence

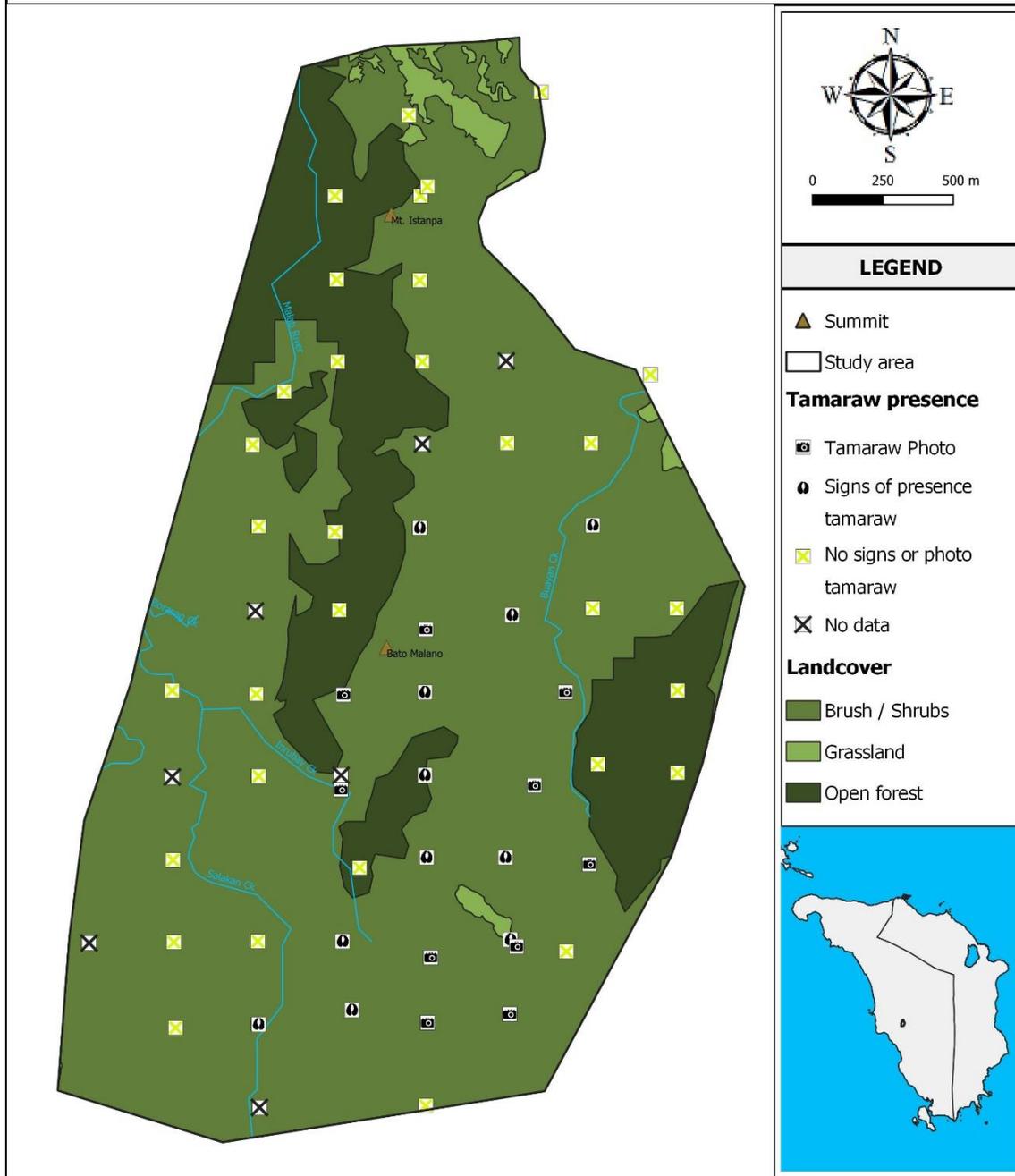


Fig. 7: Map of the study area, including the data collected about the presence of tamaraw. "No Data" refers to actual camera trap positions unable to collect data due to defective devices.

6. Conclusion and recommendations

These results reconfirm the presence of the tamaraw in the Aruyan-Malati area, with photos of animals of both sexes and at least one juvenile. Such information is of most importance as proof of active reproduction justifies increasing efforts to preserve this isolated sub-population and support its restoration towards a viable number. The study also brings some hints of the current distribution of the animal, as apparently, it is present only in the southeast of the study area.

Thanks to the contact of the TCP rangers and the residing indigenous communities, we have indirect information of the animal presence to the south, southeast beyond the study area. This information recommends a new camera trap study, focusing on the areas where tamaraw photos were captured, or signs of its presence were observed, expanding the study towards areas where the species is highly suspected to be present at the moment. For that purpose, DAF, in collaboration with TCP, is planning to carry out a new camera trap study, adding more devices, to continue understanding the situation of this tamaraw sub-population. This study is in the planning phase, intending to start in October - November 2021.

Tamaraw will remain the main focus of the study, but data collected on other species will help take stock of the status of wildlife in the area and the pressure affecting them. Specifically, the protocols will be adjusted to increase the chance of detection of the Mindoro warty pig.

This study, with the addition of past reports, highlight the presence of several endemic species of birds, like in our case, black hooded coucal, but specific studies shall be carried out to corroborate that information or confirm the possible persistence of other species historically known to be present such as the Mindoro bleeding heart (*Gallinula platensis*) (Hernandez et al., 2019).

All data collected shall help complete the required information in the application of the area under the Critical Habitat category.

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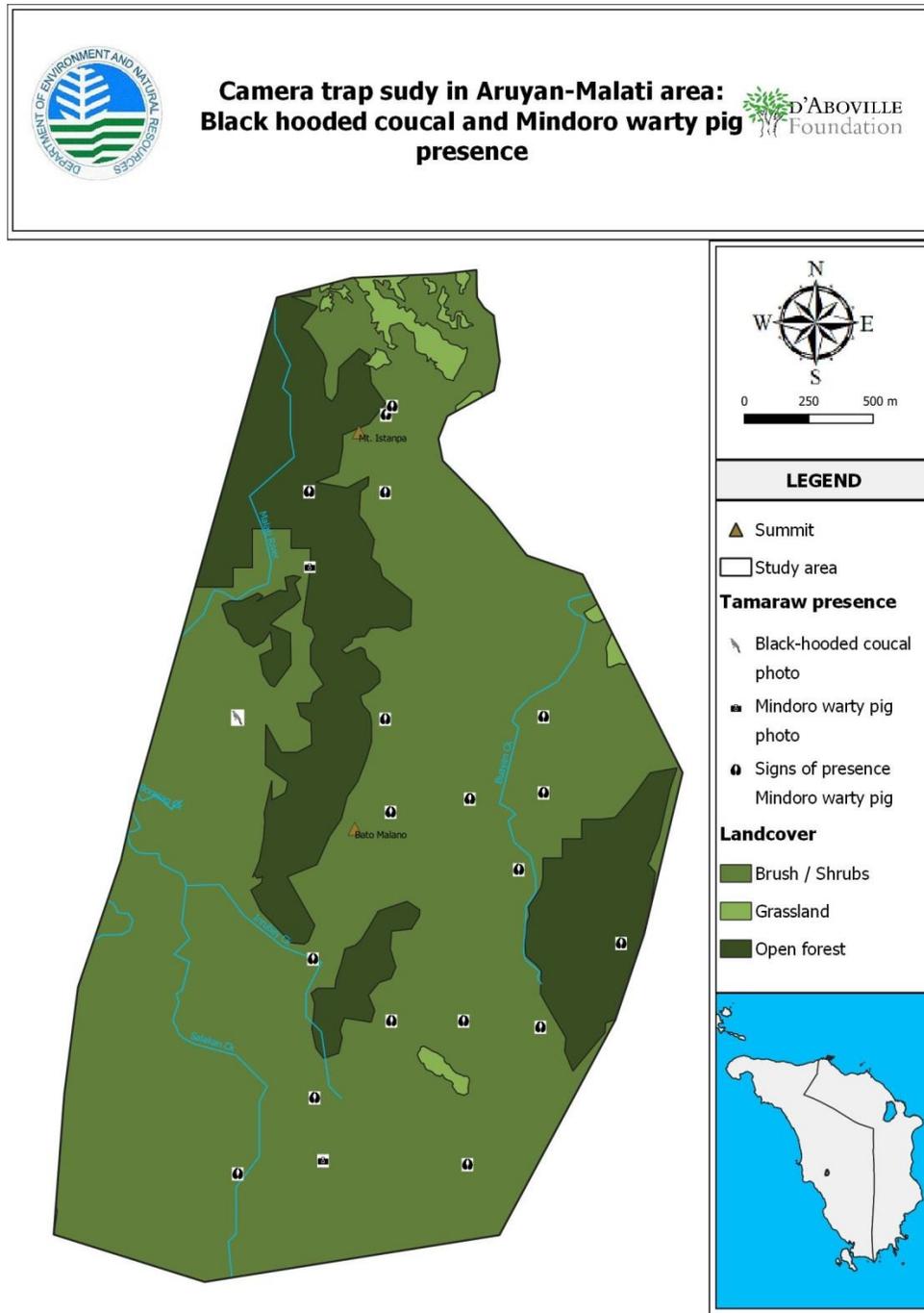
Annex I

Species that were found during the study, with the number of independent events (60 min time-lapse) and the number of camera trap positions where they were located.

Sp. Nb	English name	Latin name	Nb of events	Nb of camera trap positions	Position names
1	Pechora pipit	<i>Anthus gustavi</i>	1	1	19
2	Tamaraw	<i>Bubalus mindorensis</i>	26	10	7, 15, 21, 26, 41, 45, 52, 57, 60.
3	Coucal	<i>Centropus sp</i>	1	1	15
4	Black-hooded coucal	<i>Centropus steerii</i>	1	1	49
5	Domestic cat	<i>Felis silvestris catus</i>	1	1	50
6	Red junglefowl	<i>Gallus gallus</i>	1	1	19
7	Long-tailed macaque	<i>Macaca fascicularis</i>	53	22	2, 3, 4, 10, 11, 14, 15, 17, 21, 22, 24, 26, 30, 33, 34, 37, 38, 40, 46, 49, 52, 59
8	Asian palm civet	<i>Paradoxurus hermaphroditus</i>	2	2	33, 47
9	Hooded pitta	<i>Pitta sordida</i>	1	1	19
10		<i>Bat sp</i>	21	3	3, 30, 45.
11		<i>Rodent sp</i>	100	10	1, 3, 8, 18, 19, 23, 30, 31, 35, 46
12	Mindoro's warty pig	<i>Sus oliveri</i>	2	2	32, 59
13		<i>Undetermined sp</i>	13	9	3, 4, 8, 15,17, 19, 21, 30, 49

Annex II

Map of the study area, including the data collected about the presence of Mindoro warty pig and black-hooded coucal. "No Data" refers to actual camera trap positions unable to collect data due to defective devices. The position where a photo of black hooded coucal was taken had also signs of the presence of Mindoro warty pig.



Annex III

Camera trap photos of other animals than tamaraw captured during the study.



Mindoro warty pig (*Sus oliveri*) Mindoro endemic (Vu)



Long-tailed macaque (*Macaca fascicularis*) (Vu)



Asian palm civet (*Paradoxurus hermaphroditus*) (LC)



Black-hooded coucal (*Centropus steerii*). Mindoro endemic and Critically Endangered (CE).



Western hooded pitta (*Pitta sordida*) (LC)



Red junglefowl (*Gallus gallus*) (LC)