CAMERA TRAP SURVEY IN Mt. SIBURAN IN THE MUNICIPALITY OF SABLAYAN, OCCIDENTAL MINDORO LOOKING FOR THE MINDORO BLEEDING HEART

Technical report

Activity done in partnership with the Municipal Environment and Natural Resources Office of Sablayan (MENRO Sablayan), Tamaraw Conservation Program Office (TCP) and D'ABOVILLE Foundation and Demo Farm Inc. (DAF).

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This document gives the results of the camera trap project in Mt. Siburan carried out between July and October 2020. This project is part of a collaboration between the MENRO Sablayan, the TCP and DAF, as a prelude of the camera trap project in Aruyan Malati. This document aims to give an overview of the results and their main biological and practical implications for further decision making in terms of research effort or protection.

INTRODUCTION

Background and rational

This survey was carried out as a side project under the Action 28 of the Tamaraw Conservation and Management Plan (TCMAP): "Declaration of the Aruyan-Malati as Critical Habitat for the Tamaraw.", and the Goal 1 "Mobilise for Tamaraw all natural areas of Mindoro that are suitable"; and the Goal 18.1 for the Meta-Population Management "Conduct survey mapping and planning (includes zoning of areas)" in Aruyan Malati.

Within this frame, we conducted a pilot non-systematic camera trap survey in the adjacent area of Aruyan Malati, called "Mt. Siburan" or "Siburan forest". This area has the peculiarity of sharing its land with the Sablayan Prison and Penal Farm (SPPF). This situation has created virtual protection for this area, making more difficult the access to it for outsiders. The main goal of the project was to further assess the local biodiversity towards inclusion in the declaration of "Critical Habitat" of the area so-called "Aruyan Malati". We pursued the identification of the species inhabitants of Mt. Siburan, with a specific focus in the Mindoro bleeding heart (*Gallicolumba platenae*), and other endangered and endemic species.

This project is mainly a call from the Municipal Environment and Natural Resources Office of Sablayan (MENRO Sablayan) who is seeking to confirm the presence of additional endemic and/or Critically Endangered Species, besides the Tamaraw (*Bubalus mindorensis*), within the proposed area for Critical Habitat, in order to push through or not with the inclusion of the Siburan forest area in the proclamation process.

Parties and participants

This project was developed through collaboration between the MENRO Sablayan, the Tamaraw Conservation Program (DENR TCP), and the D'ABOVILLE Foundation and Demo Farm, Inc. (DAF).

A summary of the role of each party can be described as followed and was defined in a specific Memorandum of Agreement (MOA):

- MENRO: Facilitator for the permits and consents of the concerned stakeholders for the launching of the project, and responsible, along with TCP, for the security and safety of the loaned equipment.
- TCP: Responsible of the fieldwork and operation, conducting the needed pre-surveys as agreed beforehand. Responsible for the setup and maintenance of the material, for its return at the end of the project, and for the security and safety of it, along with MENRO,
- DAF: Responsible in providing the needed equipment, elaborating an appropriate design for the study and contributing to the analysis of the resulting data., as well as in shouldering the cost of operation.

Mindoro bleeding heart

This ground-dwelling dove is one of the most emblematic endemic species of Mindoro, even though little is known about its ecology. It has been officially recorded a few times, and its range is very restricted to lowland forest with close canopy and sparse understory (Hernaez et al., 1999). This kind of habitat covered large areas of the lowlands of Mindoro, dominated by *Dipterocarpaceae* species (Hernaez et al. 1999), but it has been disappearing with time due to logging and agricultural activities. This has greatly affected the presence of all the species associated with it, including the Mindoro bleeding heart. This species also has faced other threats like trapping and pet trade. There are reports of miss catching this animal in SPPF whit traps that were intended to junglefowl (*Gallus gallus*) (Hernaez et al., 1999).

We can find information about sightings of this animal in the Mt. Siburan in 1999 (Collaret al., 1999), 2001 (Mallary et al., 2001), and the last report we could find was in 2005 by a birder tourist (Roberson, 2020).

Material and methods

Study site

The Mt. Siburan, located in the municipality of Sablayan, Occidental Mindoro, is the largest tract of lowland forest in Mindoro with an approximate area of 1,500 ha and an elevation range between 200-400 meters (Birdlife International, 2020; de Alban et al., 2004). The forest is partly confined by the Mongpong River in the North and its main tributary, the Kinarawan River in the East. This makes its access particularly difficult during the rainy season. It is claimed by the Mangyan Tau-buid tribe as part of their Ancestral Domain. Several communities are living within or at the limit of the forest complex.

This area is of great importance for wildlife conservation in Occidental Mindoro, with records of most of the endemic bird species from Mindoro Endemic Bird Area (Brooks, 1998). This has had led to its declaration as one of the 117 Important Bird Areas (IBA) in the Philippines (Mallari & Tabaranza, 2001). It is also one of the 10 sites from Mindoro island declared Key Biodiversity Areas (KBA) by the Protected Areas and Wildlife Bureau (PAWB) of the Department of Environment and Natural Resources (DENR) in 2006 (Gatumbato, 2009).In this area it has been reported an important number of endemic species to the Philippines (Tabaranza, 2003), including more than 30 species of flora, more than 6 species of mammals, and 9 species of herpetofauna (Welton et al., 2009; Brown et al., 2009; Esselstyn et al., 2009; Tabaranza, 2003). Some of this species and its status by the IUCN Red List of threatened species are:

- Vulnerable:
    - Mindoro littler frog (*Leptobrachium mangyanorum*) (IUCN SSC Amphibian Specialist Group, 2018a),
    - Oliver's warty pig (*Sus oliveri*) (Schütz, 2016);
    - Ashy trush (*Geokichla cinerea) (*BirdLife International, 2017a)

- Endangered:
  - Mindoro mottled-winged flying fox (*Desmalopex microleucopterus) (Cielo et al., 2019a),*
  - Mindoro stripe-faced fruit bat (*Styloctenium mindorensis) (Cielo et al., 2019b),*
  - *golden-capped fruit bat (Acerodon jubatus*) (Mildenstein & Paguntalan, 2016);
  - Schmacker's tree frog (*Philautus schmackeri*) (IUCN SSC Amphibian Specialist Group, 2018b)
  - Mindoro hornbill (*Penelopides mindorensis)* (BirdLife International, 2016a)
  - Mindoro Imperial-pigeon (*Ducula mindorensis*) (BirdLife International, 2016b)
  - North Philippine Hawk-eagle (*Nisaetus philippensis*) **(**BirdLife International, 2016c)
- Critically Endangered:
  - Black-hooded coucal (*Centropus* steeri) (BirdLife International, 2018)
  - Philippine Cockatoo (*Cacatua haematuropygia) (*BirdLife International, 2017a)
  - Mindoro bleeding heart (BirdLife International, 2016d)

Even with all this great value in terms of biodiversity for Mindoro, especially for endemic species, this area doesn't hold a protection figure. The last report from the Haribon Foundation in 2018 highlights a very high anthropogenic pressure on the environment with a current unfavourable condition (Birdlife International, 2020).

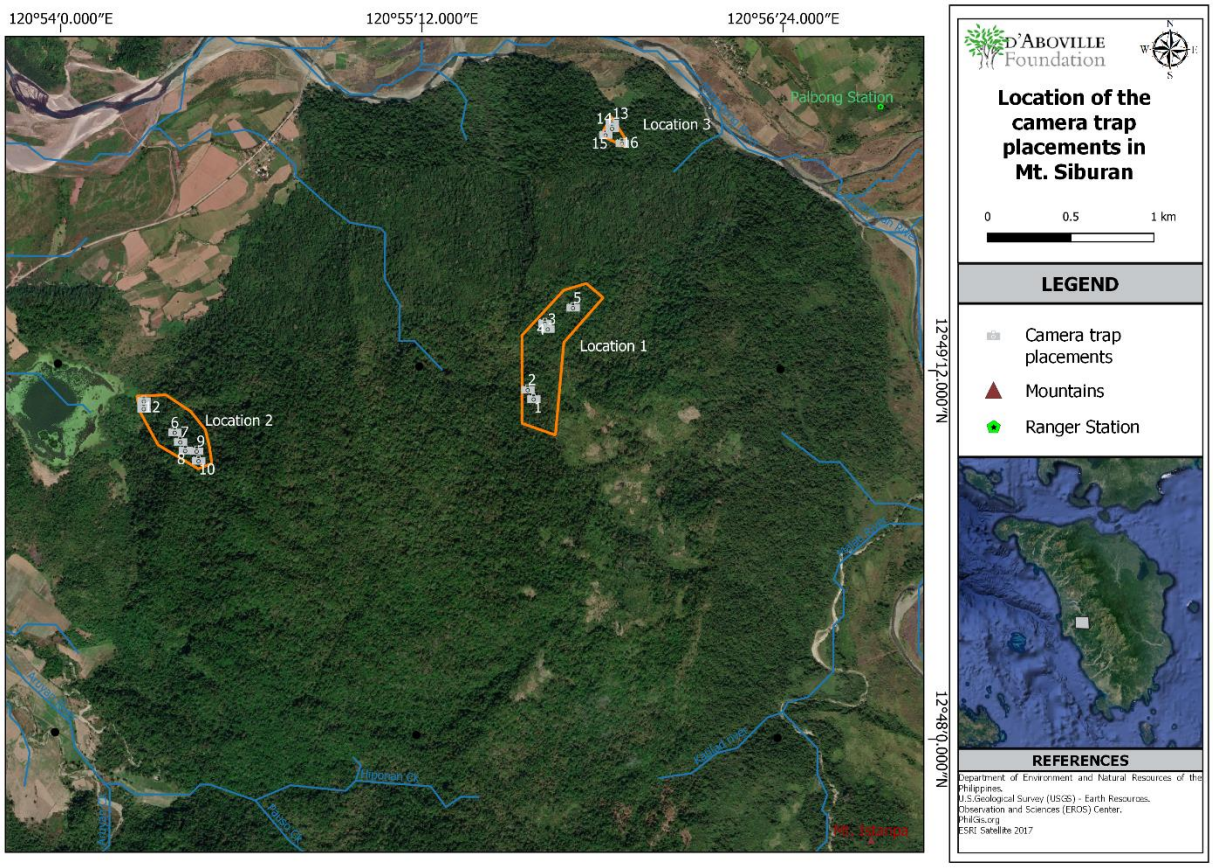
A very important addition of this area is that it has been used historically by tamaraw (*Bubalus mindorensis*) (Tabaranza, 2003), and it is actually adjacent to the Aruyan Malati area where a little population of this animal can still be found.

Data collection

The field operation was conducted between July and October 2020. The cameras were set in a non-systematic design, targeting areas where locals suggested the possible presence of the Mindoro bleeding heart, or where the habitat was suitable for this species. We couldn't prepare a more elaborate design because of the impossibility to clearly define the exact limits of the study area. The restriction due to covid 19 crises prevented DAF Conservation Research Officer to access the site prior to the set-up of the devices. Nonetheless, DAF, as a consultant for this project, provided a protocol for the equipment management, fieldwork and data management. Some practical suggestions were included in the protocol in order to, among other, identify and select adequate habitat for this species (forest with close canopy and fruiting trees with open understory vegetation), proper set-up of the camera trap to target this species (20 cm), as well as the minimum distance between cameras (200 meters). Finally, the real surveyed area was reduced to 33 ha from a potential of 1,500 ha approximately. The cameras were very clustered in three different locations (Map 1). These locations were selected by the rangers, following the advice from DAF and from the information of the locals.

Five Cuddeback camera traps were deployed on the field for 66 days, plus 19 days only with four of them (due to one device that went missing before the last rotation). They followed a two to five weeks rotation to cover a total of 16 camera sites in 4 runs. One of these rounds affected only to two of the cameras while the rest of them were maintained in the same placements. In the end, a total of 406 camera trap nights were completed. Those camera trap placements can be aggregated in three locations. The minimum distance between cameras was 43 meters.

The study team was composed of the TCP rangers assigned in the Aruyan Malati area, namely: Randy Acosta, Eric Abowac, Jeward Dela Cruz, Medy Angagan. TCP Team Leader Assistant Gener Fantuyaw fulfilled the task of field project coordinator. Some additional members from TCP, MENRO, and SPPF did join the study team during the field operation.



Map 1: Placement of the camera traps. They are aggregated in three different zones of the survey area.

<u>Data management and analysis</u>.

We used Digikam version 7.1.0 to process the photos. This open-source software allowed us to introduce the information that we considered important as part of the metadata of the photos. After this process, we were able to use camtrapR package (Niedballa et al., 2016) for R software, to analyze this information.

For the independence of the events, we computed 1-hour lapse to avoid pseudo-replications (the repetition of the same individuals in a continuous set of photos). We only recorded information on wild animals, avoiding the feral pets like cats and dogs.

With the results obtained, we conducted a sample-size and coverage-based rarefaction-extrapolation curves to assess the appropriate size of the survey to find the species richness (number of species) of the sampled area. We used the iNEXT (Hsieh et al., 2016) package from R software.

RESULTS

A minimum of seven (7) species were recorded (Tab.1), four (4) mammals, and three (3) birds. There is uncertainty about the number of rodent species recorded, with a minimum of two, and a maximum of five. The identification of these animals, if possible, will need some consultations to other experts on the field.

Species Common name	Species Scientific name	Order	IUCN RED LIST STATUS	National List of Threatened Terrestrial Fauna of the Philippines
Rodent sp [1]		Mammal		
Slaty-legged crake	Rallina eurizonoides	Bird	LC[2, 4]	
Junglefowl	Gallus gallus	Bird	LC[2, 5]	
Crab-eating macaque	Macaca fascicularis	Mammal	VU[3, 6]	
Oliver's warty pig	Sus oliveri	Mammal	VU[3, 7]	EN[9]
Philippine serpent eagle	Spilornis holospilus	Bird	LC[2, 8]	

Tab.1: Species found in this study. [1] There are 6 events were rodents where found. At least 2 different species are included. [2] Least concern. [3] Vulnerable. [4] (Birdlife international, 2020). [5] (BirdLife International. 2016e). [6] (Eudey et al., 2020). [7](Schütz, 2016). [8](BirdLife International. 2016f). [9] Endangered.

There are 27 independent events (minimum of 1hour lapse) (Tab. 2 in Annex 1). The animals with more independent events were the crab-eating macaque (*Macaca fascicularis*) with six events, followed by Oliver's warty pig (*Sus oliveri*). In the other side, the animal with less independent events was the Philippine serpent eagle (*Spilornus holospilus*) (one event). There is a medium-sized mammal impossible to identify in placement 3. In addition, one camera captured the picture of a domestic cat in position 5 (see Tab. 2 in Annex I)

We can observe in Fig 2 and Fig. 3 how we have reached the interval of the maximum species diversity with the 17 placements covering nearly 100% of the sample area. The range of species we can expect with an interval of confidence of 95% if we increase the number of placements is between seven and eleven.

We can divide the position of the cameras into three separate locations: Location 1, Location 2 and Location 3 (See map 1). We didn't obtain any photo in Location 3, and there are not many differences between the species found in the other two sites. Only two species, the Philippine serpent eagle as well as some of the rodent species are not in both locations, but only in Location 1.

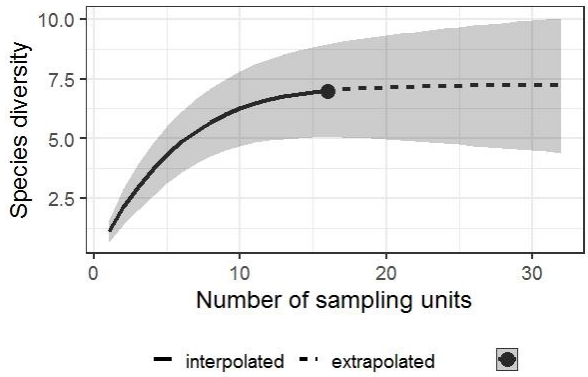


Fig. 2

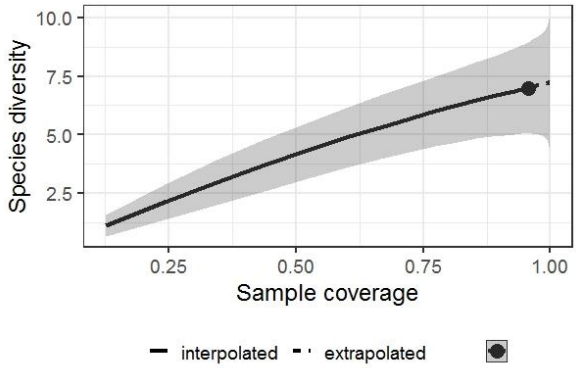


Fig. 3

Fig. 2 Sample-size-based rarefaction-extrapolation sampling curves of species richness with 95% confidence intervals for the incidence data. X-axis represents the number of sampling units (camera trap placements). Y-axis represents the species diversity (number of species). The continuous line represents the increase of the number of species with the increment of the number of the camera trap placements in our study, while the dotted line represents the expected number of species if we continue adding camera placements. We can observe that the curve is already approximating to the asymptote, meaning we are close to find all the species of the area. Fig. 3: Coverage-based rarefaction-extrapolation sampling curves. X-axis represents the number of sample coverage (Extent of the population covered). Y-axis represents the species diversity (number of species). We can observe that with these seven species, we almost cover the 100 % of the sample.

Crab-eating macaque (*Macaca fascicularis)* (left) and Philippine serpent eagle (*Spilornis holospilus*) (right) with the carcase of a bat in its claws

Discussion

Siburan forest has been highlighted in several reports, and from different organizations, as a very important area for the conservation of Philippine and Mindoro biodiversity (Gatumbato, 2009; Birdlife International 2020; Mallary et al., 2001; DENR, 2005). As DENR stated (2005), most of the threatened birds of the Mindoro Endemic Birds Area has been recorded in this forest. During this project, we surveyed three distinct locations, and we could find at least 7 species, (4 mammals and 3 birds). According to the analysis of the maximum number of species that we can expect in the area, we can assume that most probably, if we extend the number of locations of the cameras, we might not find new ones. However, this result must be treated cautiously. As mentioned above, it was not possible to define the exact delimitation of the targeted study area and, the constraint due to the covid 19 crisis prevented us to further prepare the study through more thorough site visits and supervision. Most of the preparation, design and field operations were coordinated remotely, and the team was left on its own to conduct the study itself. Therefore it was not possible to develop a very sophisticated study. In the end, the cameras were deployed in only three distinct but finally restricted areas, which we cannot consider as sufficient to represent the entire potential study site. In addition, it must be kept in mind that the set-up of the camera traps was designed to capture small ground animals.

Thereby, this study was not intending to record other bird species of interest as listed in the material and methods section, which would request a different protocol.

Unfortunately, we couldn't find the Mindoro bleeding heart. This is a threatening news, taking into consideration that this area could be one of the last bastion of this species in Mindoro, and therefore worldwide. There is a large area still to survey within Mt. Siburan, and considering the local importance of this species (Tabaranza et al., 2003), we consider that a more extensive and systematic survey is needed to verify its presence or local extinction.

Among the recorded species, two are listed Vulnerable (Vu) on the IUCN Red List, among which, the Oliver's warty pig, is declared as endangered by the National List of Threatened Terrestrial Fauna of the Philippines (Tab. 1). This animal, apart from its ecological role, is one of the main sources of meat for the residing indigenous people (IP), while it is known to be a prized bushmeat target by the local tagalog settlers of Mindoro. The protection and conservation of such singular forest habitat seems crucial for maintaining the dynamic population of the species, and the persistence of the traditional lifestyle of the nearby IP communities. We can speculate that a reduction of the abundance of the warty pig in the Siburan forest would lead to an increase of hunting pressure in the adjacent area of Aruyan-malati with a detrimental impact on the small population of the tamaraw that persists there.

It is important to note that at this stage, it is not possible to clearly confirm that these are pure breed Mindoro warty pig or not. Further analysis and more data are needed to clarify this.

In addition, we can note the absence of records of the Philippines brown deer (*Rusa mariana*), despite the fact that this ungulate is generally associated to the presence of the warty pig in other areas of Mindoro. It would be therefore interesting to understand if the absence of a report of this species in the Siburan forest is due to insufficient survey effort or excessive anthropogenic disturbance or if this habitat is less favorable to its ecology.

Finally, the presence of a domestic cat in this natural area reinforces the concerns on the status of the bleeding heart pigeon and other ground birds that could suffer from predation from this vagrant animals.

Recommendation

This study has been a substantial opportunity to better understand the conservation situation of Mt. Siburan and its associated biodiversity. But the results are quite worrying. The non-record of the critically endangered endemic Mindoro bleeding heart suggests a very unoptimistic situation for the conservation of this animal. As Mt. Siburan could be one of the last locations where we can find it, if not the only one, its possible local extinction could mean its virtual extinction.

On the other hand, the surveyed area was approximately 33 ha. of a potential extension of near 1,500 ha. Considering this, we already found an interesting number of species. The Mindoro warty pig and crab-eating macaque seems frequent in the area and participate to the sources of meat for the local IP communities.

This forested area hosts several communities inside and at its boundary, that participate to the fragmentation of the habitat and source of disturbance, but with a much lower incidence than what can be observed in other IP territories or in areas occupied by lowlander tagalog settlers where nature has literally vanished.

Therefore, the Siburan forest could play a crucial role in promoting dynamic populations of many species for dispersion in adjacent areas suffering higher anthropogenic pressure (sink source effect), and thus maintaining high biodiversity at the regional scale. However, it would be needed to conduct comparative studies on the abundance of these different species outside and inside the Siburan forest in order to validate this assumption.

These results, complementing previous reports, highlight the necessity to increase the efforts in understanding the current conservation situation and the ecological importance of the Siburan forest complex within the whole Aruyan-Malati area. The ecological survey of a larger part of the forest would allow determining the real situation of the Mindoro bleeding heart, and other endangered and endemic species.

Though, enhanced preservation of the integrity of this forest complex, hosting a high diversity of trees and plants, seems definitely crucial for the entire biodiversity and its persistence at a regional scale.

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Annex I.

Station	Date	Time	Order	Common names	Cientific name	Individuals	Adults	Juveniles	Infants	Unknown Age	Males	Females	Unknown sex
3	19/08/2020	11:24:47	Bird	Junglefowl	Gallus gallus	1	1	0	0	0	0	1	0
3	19/07/2020	20:12:06	Mammal	Rodent sp 1		1	1	0	0	0	0	0	1
3	26/07/2020	05:24:16	Mammal	Rodent sp 1		1	1	0	0	0	0	0	1
3	15/08/2020	09:12:52	Bird	Slaty-legged crake	Rallina eurizonoides	1	1	0	0	0	0	0	1
3	16/08/2020	09:56:54	Bird	Slaty-legged crake	Rallina eurizonoides	1	1	0	0	0	0	0	1
4	31/07/2020	16:13:50	Mammal	Crab-eating macaque	Macaca fascicularis	1	1	0	0	0	0	0	1
4	05/08/2020	23:35:20	Mammal	Rodent sp 1		1	1	0	0	0	0	0	1
5	31/07/2020	00:16:20	Mammal	Cat	Felis catus	1	1	0	0	0	0	0	1
5	21/07/2020	15:01:59	Mammal	Crab-eating macaque	Macaca fascicularis	1	1	0	0	0	0	0	1
5	05/08/2020	08:36:13	Mammal	Crab-eating macaque	Macaca fascicularis	1	1	0	0	0	0	0	1
5	13/08/2020	10:34:05	Mammal	Crab-eating macaque	Macaca fascicularis	3	0	0	0	3	0	0	3
5	26/07/2020	12:44:45	Bird	Junglefowl	Gallus gallus	1	1	0	0	0	1	0	0
5	03/08/2020	07:17:26	Bird	Junglefowl	Gallus gallus	1	1	0	0	0	0	1	0
5	02/08/2020	08:02:36	Mammal	Oliver's warty pig	Sus oliveri	5	1	0	0	4	1	0	3
5	05/08/2020	00:45:51	Mammal	Rodent sp 2		1	1	0	0	0	0	0	1
6	22/08/2020	11:53:47	Bird	Philippine serpent eagle	Spilornis holospilus	1	1	0	0	0	0	0	1
7	08/09/2020	14:36:44	Mammal	Crab-eating macaque	Macaca fascicularis	1	1	0	0	0	1	0	0
7	11/09/2020	04:21:55	Mammal	Rodent sp 2		1	1	0	0	0	0	0	1
8	03/09/2020	07:13:42	Bird	Junglefowl	Gallus gallus	1	1	0	0	0	1	0	0
8	27/08/2020	06:30:51	Mammal	Oliver's warty pig	Sus oliveri	1	1	0	0	0	0	0	1
8	13/09/2020	16:54:40	Mammal	Oliver's warty pig	Sus oliveri	2	1	1	0	0	0	0	1
8	13/09/2020	18:00:19	Mammal	Oliver's warty pig	Sus oliveri	1	1	0	0	0	1	0	0
8	24/08/2020	05:05:43	Mammal	Rodent sp 2		1	1	0	0	0	0	0	1
9	03/09/2020	16:20:50	Mammal	Oliver's warty pig	Sus oliveri	3	3	1	1	0	0	0	3
10	26/08/2020	07:35:24	Mammal	Crab-eating macaque	Macaca fascicularis	1	1	0	0	0	0	0	1
12	16/09/2020	05:15:51	Bird	Slaty-legged crake	Rallina eurizonoides	1	1	0	0	0	0	0	1

Tab. 2: Representation of the results of the camera trap project in Mt. Siburan: The entries are independent with the time lapse of 1 hour.