Ministry of Forestry

Forest Department

Taninthayi Nature Reserve Project

Survey Report On

Evaluating the Status of Tigers (*Panthera tigris*) and their Prey

In

Taninthayi Nature Reserve

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Evaluating the Status of Tigers (*Panthera Tigris*) and their Prey In Taninthayi Nature Reserve

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Abstract

The status of tigers and their prey in Taninthayi Nature Reserve -TNR was evaluated using questionnaire survey, track & sign data collection and camera-trapping in November, 2010-February, 2011. During questionnaire surveys, 13 out of 25 respondents gave exact times and places of their encounter with tiger signs throughout the Reserve. Due to very low density and detection probability, camera traps could not capture any individual tiger. But a plaster cast of a tiger track could be mold by the team from Meke upstream. At two separate areas, tiger tracks were taken measurements and photographed during track & sign data collection. A total 551 trap nights yielded 543pictures of prey mammals out of 762 total animal records. Captured prey mammals are gaur, sambar, barking deer, serow, wild pig and porcupine etc. Distance encounter rate of tiger calculated from track & sign data of total 112km walk was 0.026 per km indicating a decline of the tiger population in the Reserve while prey mammal encounter rate per 100 km from track & sign survey was 253.5 and photo-capture rate per 100 trap night from camera-trapping was 107 respectively.

Those findings confirmed the presence of tigers and sufficient prey mammals in TNR. A certain level of hunting pressure and habitat disturbances caused by peripheral villages was also encountered during the survey. Matters relating to the security of TNR caused restrictions on the movement of both patrol staff and survey team. Finally, the team could overcome the difficulties encountered throughout the period.

For the rapid recovery of TNR tigers, the following immediate management actions are suggested to;

- Set up new local operating units-LOUs at Ban I Thong and Talaingya,
- Deploy camera traps monthly along the upstream of Khoetama and Mayanchaung streams,
- Increase patrol efforts at all LOUs making it a functional reality and
- Raise awareness along the towns and villages.

Keywords: Reserve, Taninthayi Nature Reserve-TNR, Track & Sign Survey, Camera-trapping, Questionnaire Survey, *Panthera tigris*, tiger, Prey mammal, Patrol, Capture, Carnivore, Detection Probability, Presence.

1. Introduction

Taninthayi Nature Reserve is one of Myanmar's 43 protected areas where tropical rain forest ecosystem is being given protection. The Reserve was notified on 31st May, 2005 with notification number 18/2005 of Ministry of Forestry, a timely wise decision while diverse, rich, undervalued tiger ecosystems around the world are rapidly degrading and disappearing. It comprises Heinze-Kaleinaung and Luwaing Reserved Forests, a region of mammal species richness under Tavoy district. Rapid economic development and market demand from the neighboring countries has led to increasing pressure on the Reserve s' natural habitats. Hence, the Reserve is currently suffering a high level of encroachments, particularly in areas near the northern and western boundaries. Taninthayi Nature Reserve supports 68 mammal species including, Asia's' most iconic animal, tiger and its preys.

The tiger survey is one of half a dozen research programs sponsored by the project with the aim of seeking expert advice for the decision making process in general, and species management in particular.

2. Background

Two natural gas pipes operated by Motama Gas Transporting Company-MGTC and Taninthayi Pipeline Company-TPC cross the Reserve from west to east into Thailand. The implementation of Taninthayi Nature Reserve Project funded by the said two companies to establish administrative institutions for managing wildlife and natural habitats has come to its second year of second phase at this time. Public participation and compliance with wildlife law has appropriately developed as a result of continuous efforts on awareness raising, establishment of community forests and patrolling.

In Taninthayi Nature Reserve, three national consultants conducted the mammal surveys from January, 2008 to August, 2008 and gave management recommendations as research outcomes, reflecting the challenging situations for the management authority. The report described the presence of tiger, elephant, gaur, sambar, barking deer (muntjac), wild pig, serow, rhinoceros and tapir etc. It also recommended to specifically monitoring tiger, elephant and tapir with an emphasis on their abundance, distribution and ecology. As a matter of fact,

firsthand knowledge on a top carnivorous animal like tiger can help produce recommendations for the effective management decisions for the Reserve. Therefore, a national consultant was hired to conduct a comprehensive tiger survey with Terms of Reference as follows:

Assess the abundance, distribution and ecology of Tiger in TNR

Background

TNR is recognized as one of the last remaining strongholds of Tiger in Myanmar. TNR is ideally situated to connect to large protected landscapes across the border in Western Thailand. These are the most likely the source sites for Tigers in TNR but this need to be confirmed. Therefore it is possible that TNR formed a genetic corridor of international importance as well as providing suitable prey and habitat for the few surviving Tigers left in Myanmar. Surveys during the first phase of TNR recorded multiple local reports of this species as well as documenting that it is still hunted in the area. Because of this specie's perilous status further information regarding the abundance, distribution and ecology Tiger in TNR is needed to effectively manage the threats it faces and ensure the species can continue to survive in the area.

Tasks

1. *Compile all known background information to understand current and historical Tiger occurrence in TNR.*
2. *Using photographic maps identify suitable areas for the detection of Tigers and then ground check whenever possible.*
3. *Set camera traps in suitable areas where tracks or other signs have been found to document individual animals.*
4. *Collect large carnivore scat for DNA testing by WCS/AMNH so that carnivore identities can be confirmed and interrelationships documented. This is particularly important to understand the dynamic role TNR plays as a potential genetic corridor between populations in Western Thailand.*
5. *Document historical killing and trade to understand presumed decline and key areas for law enforcement and/ or educational activities.*
6. *Involve local LOU staff in all activities so that activities can continue once the consultancy is completed.*
7. *Provide recommendations for the recovery and long-term protection of the species in TNR.*

3. Justification

Tiger is an endangered animal that has served as an effective flagship species in conserving wildlife and wild lands in many parts of Asia including Myanmar. As a symbol of ecosystem health, tiger and its conservation are integral to the future of the forests. The tiger epitomizes the forest values and acts as an umbrella species for the conservation of biodiversity throughout range countries. As top predators, tigers play a vital role in regulating and perpetuating ecological processes and systems. The tiger numbers and range continue to decline despite national and international efforts to conserve the species. Habitat loss, fragmentation, prey depletion, and poaching are considered the major factors responsible for this decline. Tigers are in a precarious state and threats to their survival do not seem to be declining despite the concerted efforts.

Previous surveys in TNR have indicated the presence of tiger in certain areas as well as hunting pressures on this particular species and its prey base. In such a phenomenon, park authority needs clear and reliable answers to some basic questions for determining management actions.

1. What is the distributional range occupied by tigers?
2. Is population increasing or decreasing?
3. What is the proportion of the area occupied by productive breeding population?

In order to preserve the remaining tiger population of TNR, there is an urgent need of informed conservation interventions guided by reliable ecological knowledge which can only be generated by rigorous method of data collection.

4. Objectives

The objectives of the survey are to:

(1) Document the distribution of tigers in Taninthayi Nature Reserve,

(2) Identify significant areas for patrol and awareness activities so as to reduce hunting and wildlife trade,

(3) Collect carnivore scats for future DNA analysis in order to know the individual identity and genetic relationship between Myanmar and Thailand tigers,
(4) Train local staff concerning camera trapping skills for follow-up monitoring activities,
(5) Suggest immediate management actions to be done for the rapid recovery of existing tiger population and effective protection.

5. Area description

The TNR is situated at N 14°20.83'-14° 57.91' and E 98° 05.16'-98° 31.5', Yebyu township, Taninthayi Division. The total area is 1700 square kilometer. The area is characterized by close tropical evergreen forests along valleys and ravines, and open evergreen forests with bamboo patches and grasslands on hill ranges. The TNR is about 70 km long with an average width of some 24 km orienting in a north-south direction. It lies within Terrestrial Eco-region 53 of Indo- Pacific Realm. It is generally hilly and rises steeply from west to east. The water regime of TNR includes 5 major perennial rivers and many small seasonal streams. In general, fresh water resources are relatively abundant and substantially dependable for wildlife.

The TNR is one of a few remaining wilderness areas in the southern part of Myanmar. In fact, Taninthayi Nature Reserve is quite a world class areas worth conserving not only for flora and fauna but also for its ecosystem services like carbon sequestration and regular fresh water flow into the bay of Bengal.

6. Topography

Topography ranges from about 15 meter low lands up to 1400 meter hills at Myanmar-Thailand border. Streams at north, west and south-west part of the Reserve flow down into Tavoy River. Kamaungthwe stream starting from the middle-eastern part of the Reserve flows southward and meets the Greater Taninthayi River at further down south-east corner of the Reserve boundary.

7. Climate

Two distinct seasons belong to the area. The open dry season begins from October and ends in March. The hottest months are March and April peaking up

to 25-28°$\boldsymbol{C}$. In the beginning of June, the hot steamy period gives way to the monsoon rains that lasts until September. Average annual rain fall is 5000 mm.

8. Surrounding villages

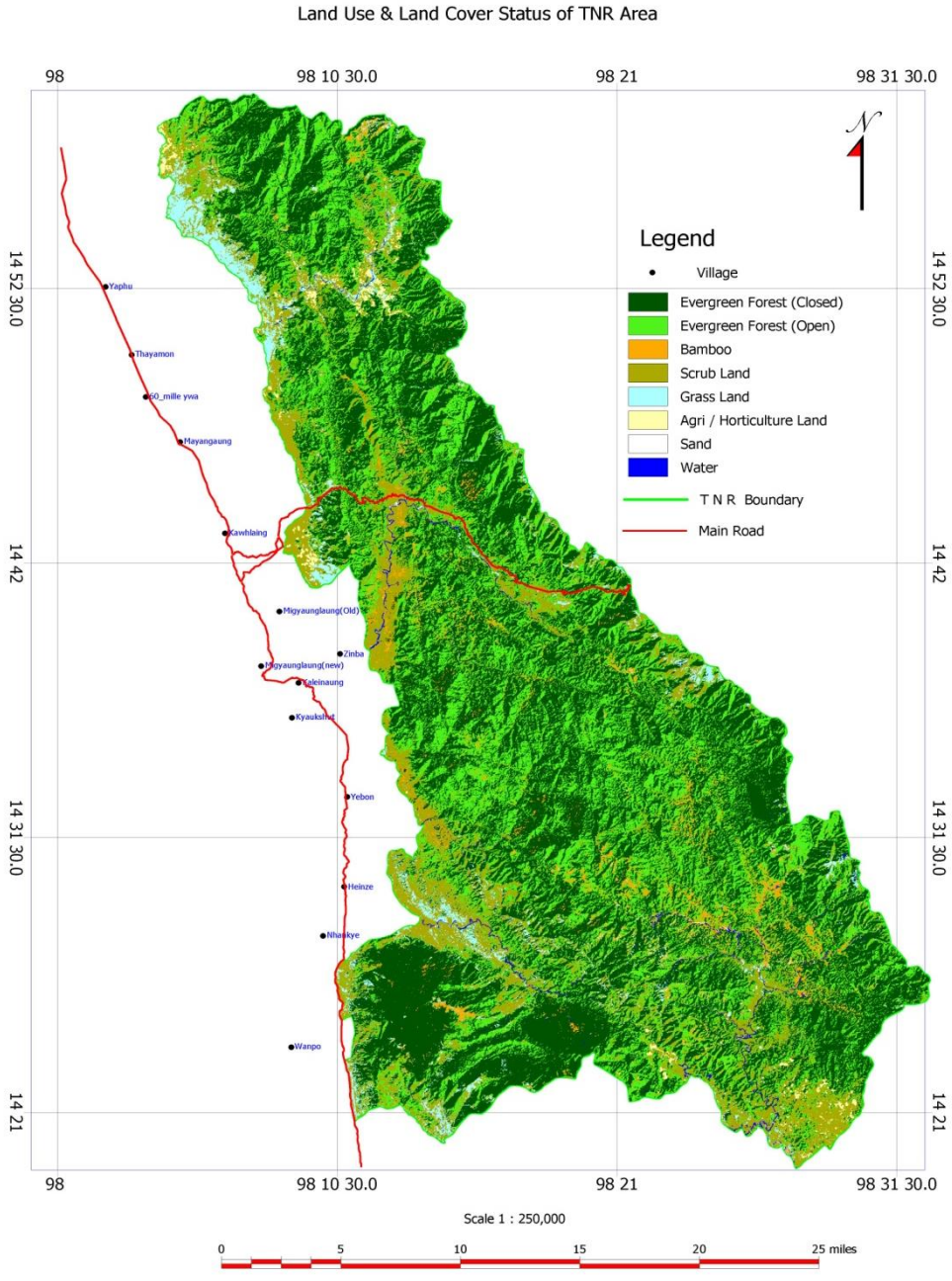
Total 14351 people from 2804 households of 2 sub-township towns and 19 villages are living near the western and southern boundary of the Reserve. The resources extracted from the Reserve include timber, bamboo and palm-thatch etc. Hunting and illegal fishing are also present along the areas adjacent to the villages ranging from subsistence to commercial scales. Means of resolving issues relating to respective villages are described in the following **Table 1**.

Table 1: Demographic data of villages, resource extracted and means of resolving issues

N0.	Name of Place	H.H	Pop.	Resource Extracted	Means		
					EE	Pat.	Suit
1	Lawtthai Tract	665	3654	Hunting	√	√	√
2	Yafu (Old)	198	1068	MFP	√	√	-
3	Yafu (New)	67	390	MFP	√	√	-
4	Thayamon	113	482	MFP	√	√	-
5	60 Mile	28	117	MFP	√	√	-
6	Mayanchaung	106	495	MFP	√	√	-
7	Kawklai	65	275	MFP		√	-
8	Migyaunghlaung(O)	77	470	MFP	√	√	-
9	Migyaunghlaung(N)	75	399	MFP	√	√	-
10	Kaleinaung Town	501	2305	Market	√	√	-
11	Zinba	143	789	Hunting, MFP	√	√	-
12	Kyaukshat	175	904	MFP	√	-	-
13	Yebone	115	655	MFP	√	-	-
14	Heinze	38	173	MFP	√	√	-
15	Hnankye	96	452	MFP, Cattle smuggling	√	-	-
16	Bamar Shinhtabe	38	201	----------	√	-	-
17	Kayin Shinhtabe	79	399	MFP	√	-	-
18	Thetkekwet	20	100	MFP	√	-	-
19	Oathayan	60	300	MFP	√	-	-
20	Pitaukkone	40	200	MFP	√	-	-
21	Kalonehta	105	525	Quartz mining	√	√	√
22	Taungthonelone	1000	5000	Trade	√	-	-
23	Myitta Town	200	1000	MFP	√	-	-
24	Seikphyone	200	1000	Orchard	√	-	-
25	Myaekhanbaw	250	1250	----------	√	-	-
26	Ban I Thong	200	1000	Trade	-	-	-
27	Phusuk	-	-	--------	-	-	-
28	Ban Bong Ti Bon	-	-	--------	-	-	-
29	Army Camps at Service Tract	-	-	Hunting	√	√	-
	Total	**4654**	**23603**				

N.B; EE = Environmental Education, HH = Household, Pat. = Patrol, Pop = Population,

Figure1: Land Use Cover Status of TNR



9. Law Enforcement

9.1. Areas of responsibility and staff deployment

Local Operating Units-LOUs namely Yafu, Migyaunghlaung, Kyaukshat, Yebone, Heinze and Myaekhanbaw are established and staffs are assigned to take responsibility in area protection as shown in **Table 2**:

Table 2: Staff deployment of local Operating Units (LOUs)

No.	Name of Guard Post	Range Officer	Ranger	Forester	Forest Guard	Local Guard	Total	Remark
1	Yafu	-	1	-	-	3	4	
2	Migyaunghlaung	-	1	-	-	4	5	
3	Kyaukshat	-	1	1	-	1	3	
4	Yebone	-	1	1	-	3	5	
5	Heinze	-	1	1	-	3	5	
6	Myaekhanbaw	-	2	-	-	-	2	
7	Mobile	1	-	-	-	-	1	
	TOTAL	**1**	**7**	**3**	**-**	**14**	**25**	

Existing (1.4) patrol staff per 100 sq km is much lower than standards of Africa and India whereas 8-10 patrol staff /100 sq km is being deployed. One more disadvantageous situation for patrol staff of TNR is not being armed with any kind of weapon as law enforcement personnel to be able to face hunters with guns.

10. Survey design

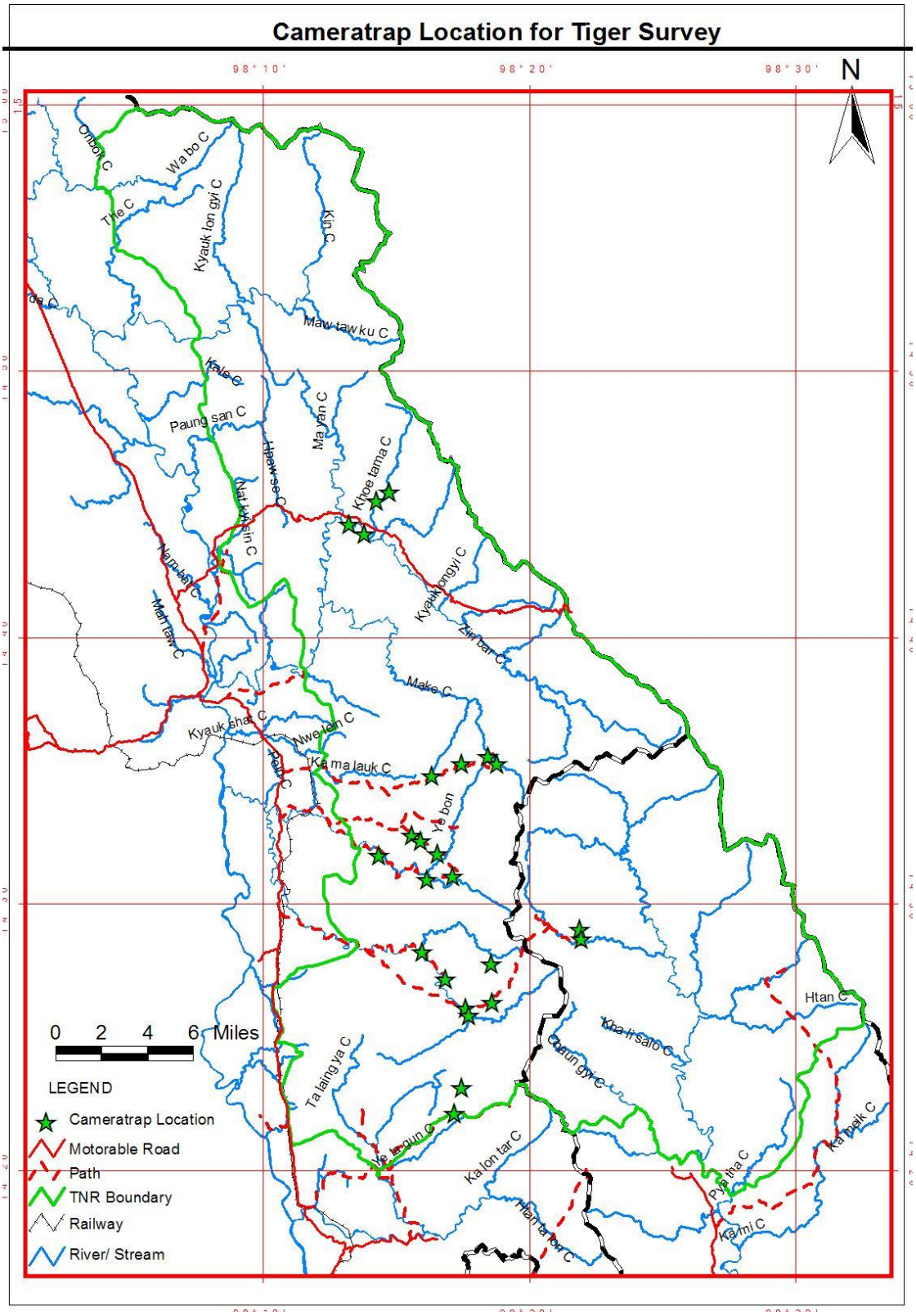
In order to get naïve estimate of proportion of area occupied by tigers, 10 ×10 minute grid cells of Latitude and Longitude were applied. As shown in **Figure 2**, Total (7) camera-trapping surveys stretched out within (4) out of (7) grid cells. Selected (4) grid cells are namely;

- Upper middle grid consisting of Paungsan, Mayanchaung, Khoetama and Zinba streams,
- West lower middle grid consisting of Meke, Kamyauk and Yebone streams,
- Two southernmost grids consisting of Heinze, Kyaukphyu and Malwanpo streams.

The number of camera traps used in TNR was much less than minimum requirement 50 camera traps per 100 sq-km in areas of low tiger density (Gopal, et al. 2010). Along Khoetama stream and at the middle portion of Zinba stream, open evergreen forest with mixture of bamboo clumps are observed. At upper triangle terrain east of Yebone confluence, evergreen forest is confined mainly to valleys and ravines. Along the ridges, the deciduous types dominate with sporadic bamboo patches. Both sides of Heinze stream is drier than other areas thus bamboo brakes are dense sprinkling with dry leaves on the ground making it difficult to observe animal signs. Vegetation along Kyaukphyu stream is almost similar to Heinze area but topography is less hilly and undulating at the lower stretches. The tiger survey team travelled up to upper reaches of Meke and Malwanpo streams reaching beyond the previous limits of regular patrols and surveys. The estimated area coverage done by the team is about 25% of the entire Reserve.

The main objective of tiger survey in TNR is no other than but to understand the status of tiger and existing threats to its survival through mapping and analyses on findings and results. Therefore, the following survey techniques were simultaneously used in a limited time frame.

Figure 2: Camera trap locations for tiger survey



11. Methodology

Questionnaire Survey, Track & Sign Survey and Camera Trap Survey were applied and results are comparatively analyzed to understand the status of tigers and its prey base in TNR.

11.1. Questionnaire survey

In order to thoroughly understand the relationship between wildlife and socio-economic surroundings, reconnaissance travels were made to meet knowledgeable local people and explain them about why tigers are important to conserve. During travels accompanying the park warden and education staff, two power point presentations about "Tigers and Biodiversity Conservation in Myanmar" could be given to local people, departmental heads and township level staff at Myitta and Yebyu towns. Experienced villagers with area knowledge were interviewed collecting time and place of animal sighting in the Questionnaire Survey data form. The collected data include distance of the Reserve boundary to village environs, kinds of resources extracted, frequency of trips to forests per month or year, sighted animals, incidents of wild animal attacks on people and domestic cattle, items of wildlife parts used by local people, hunting techniques, cultivated crops, type of crop damaged by wildlife, sighting time and place of tiger sign in the Reserve.

11.2. Track & sign survey

Track and sign of mammals found along the survey routes were collected in data forms. Other signs such as wallow, digging, scrape and scratch were also recorded.

11.3. Camera trapping

Bushnell Trophy Camera Model #119435 was used to take animal pictures automatically. Infrared sensor of the camera detects the movements of animals and triggers the camera to automatically capture the images. Its functions and structure are quite different from the previous model Camtrekker, therefore the instruction manual was firstly translated into Myanmar for immediate and long term use in TNR.

Total (10) camera traps were used to deploy on the stems of trees along natural trails and water ways with animal signs. The camera traps were camouflaged with twigs and leaves to avoid detection by animals. Average spacing of the camera traps was 1-3 km apart leaving in the forest between 15-23 days. The camera delay was kept at minimum (3 second) to maximize the chance of photo-captures of animals travelling in pairs or groups. To be able to cover all potential tiger habitats as much as possible cameras were spread out 1, 2, 3 and 5 groups for deployment at specific areas. Data on set up, retrieval and site positions were accordingly recorded in the prescribed forms. During the survey trips, accompanying local staff had ample chances to learn camera-trapping skills as well as methods on Track & Sign data collection and identification of found animal signs.

11.4. Carnivore scat collection

Scats of big and medium-sized cats found were also measured the diameter and collected. The scat specimens were labeled and registered after drying in the sun. Team members took GPS position of collection site and data on nearby animal signs as well.
Collected scat specimens are being kept at Yangon TNRP office. The WCS Myanmar Program was contacted for the delivery of specimens to the laboratory in the United States in order for DNA test.

12. Results

12.1. Estimating density of tiger

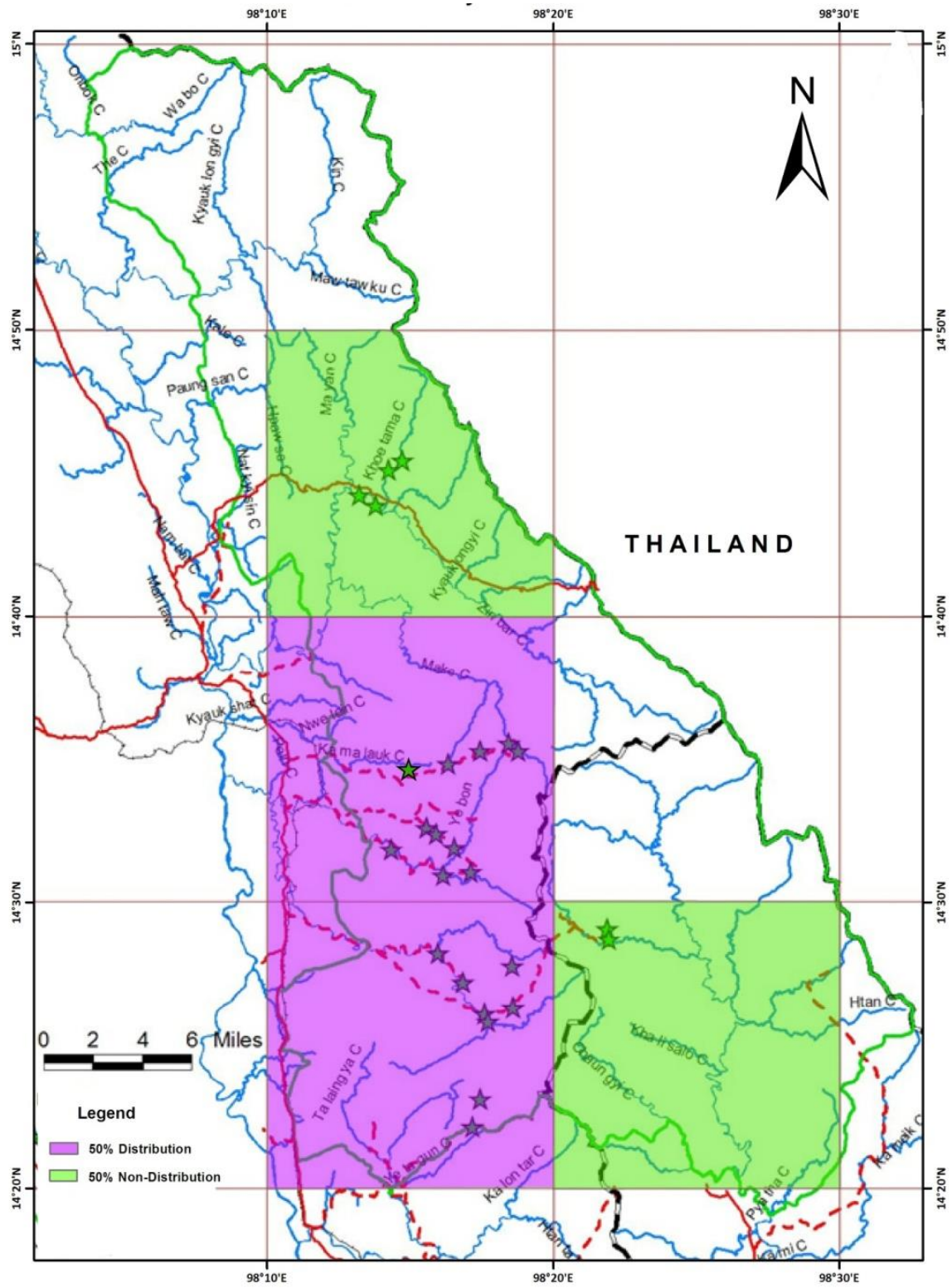
Original sampling design for camera trapping was intended to estimate tiger density applying the basic formula (N=C/P) through capture-mark-recapture approach. In camera trapping, total sampling effort was 551 trap-nights at 24 trap locations in the net survey period 95 days. However, no single tiger photograph was captured while massive photographs of tiger prey were received. Due to low detection probability and density, camera trap could not detect tigers during the 551 trap-nights. Literatures suggested that 10 individual tiger captured as a minimum is necessary to generate abundance with statistically acceptable way (Karanth 1995). Thus, it is fair to conclude that data

received from camera trapping survey did not allow estimating tiger density using capture-mark-recapture approach.

12.2. Estimating naïve occupancy of tiger

On the other hand, naïve occupancy of tiger was estimated. Surveys were conducted in four 300 km grid cells out of seven grids cells which covered the whole TNR. A plaster cast of a tiger track was obtained from Meke upstream. Two tiger tracks were photographed and taken measurements at Kamyauk and Heinze streams. Thus, two grid cells had tiger signs, giving a naïve estimate of 50% Range Occupancy as shown in **Figure 3**.

Figure 3: Map showing tiger occupied and non-occupied grid cells



12.3. Estimating relative abundance indices of tiger prey

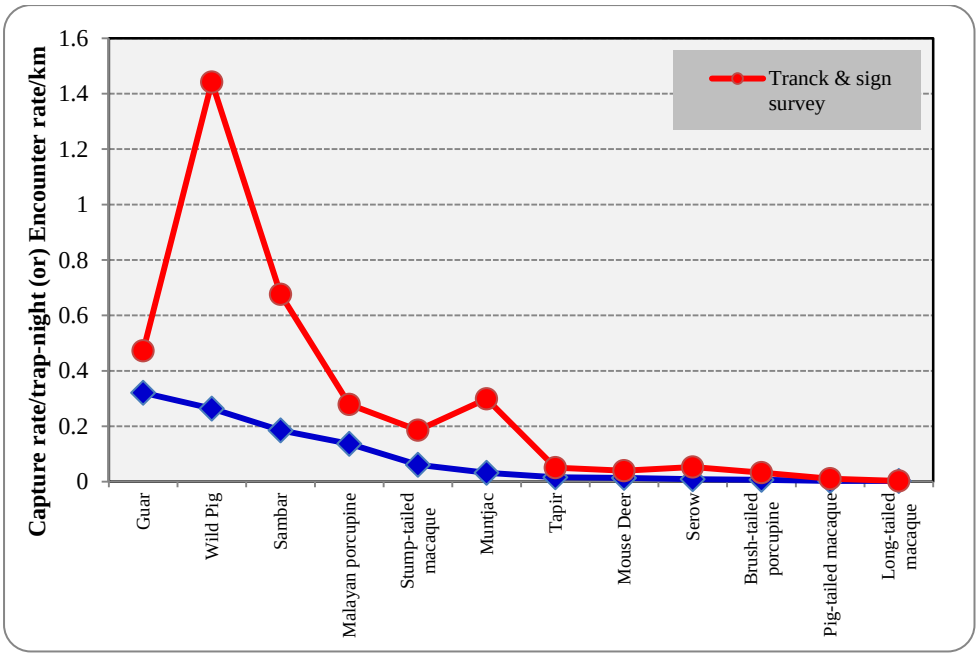
Two relative abundance indices of tiger prey – (1) capture rate per trap-night and (2) encounter rate per km walked – from camera trapping and track and sign

surveys were respectively generated. From camera trapping, 593 pictures of prey mammals were captured with sampling effort of 551 trap-nights. A total of 112 km was walked and track and sign surveys were conducted during six camera trapping surveys covering 4 out of 7 grid cells of the Reserve. Capture rate per trap-nights for each prey species was calculated dividing numbers of pictures captured of that particular prey species by total trap-nights. Similarly, encounter rate per km for each prey species was generated dividing total observations of that particular prey species by total distance walked. As shown in **Table 3**, capture rate per trap-nights and encounter rate per km of main tiger prey are compared. As demonstrated in **Figure 4**, both relative abundance indices – capture rate per trap-night and encounter rate per km - of main tiger prey are fairly consistent. It can imply that Gaur, Wild pig and Sambar are the most abundance tiger prey species in TNR. While total capture rate per trap-night was 1.07, total encounter rate per km was 2.535 for main tiger prey and 0.026 for tiger. Based on educated guess, sufficient prey abundance can be drawn for the existing tiger population.

Table 3: Comparison between capture rate per trap-night and encounter rate per km of main tiger prey

No.	Species	Camera trapping (Capture rate/trap-night)	Track & sign survey (Encounter rate/km)
1	Guar	0.321	0.151
2	Wild Pig	0.264	1.178
3	Sambar	0.185	0.491
4	Malayan porcupine	0.137	0.142
5	Stump-tailed macaque	0.061	0.125
6	Muntjac	0.032	0.267
7	Tapir	0.016	0.035
8	Mouse Deer	0.014	0.026
9	Serow	0.009	0.044
10	Brush-tailed porcupine	0.007	0.026
11	Pig-tailed macaque	0.003	0.008
12	Long-tailed macaque	0.003	0.000

Figure 4: Comparison between capture rate per trap-night and encounter rate per km of main tiger prey

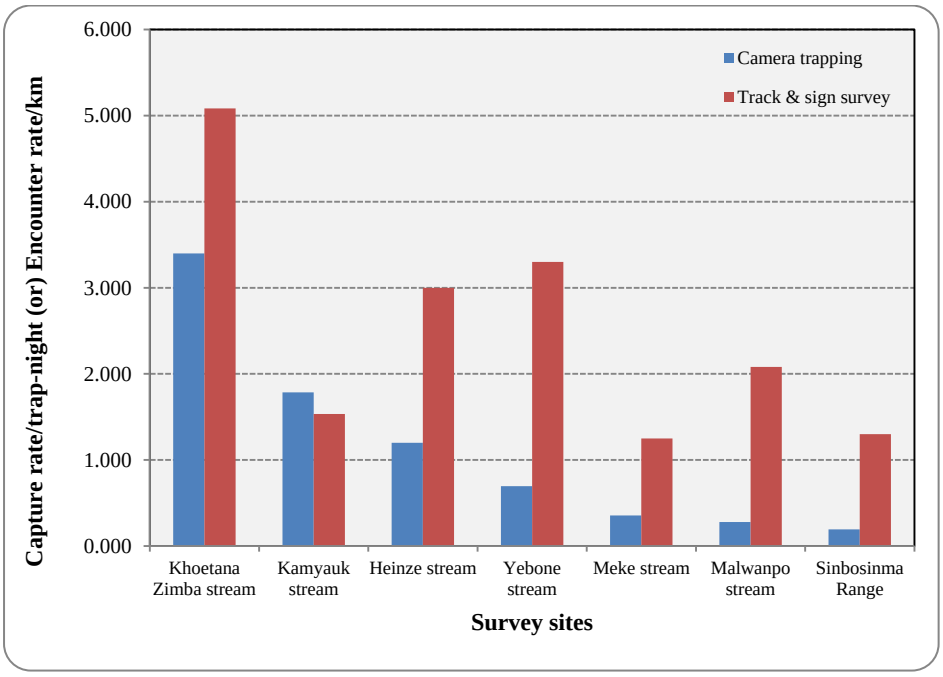


It is also worthwhile to identify the survey sites where main tiger prey is more abundant and they can potentially be source sites. Capture rate per trap-night and encounter rate per km of main tiger prey in seven different survey sites are compared in **Table 4** and **Figure 4**. Both relative abundance indices indicate that Khoetama and Zimba streams area is the potential source site of main tiger prey.

Table 4: Comparison between capture rate per trap-night and encounter rate per km in seven survey sites

No.	Site	Camera trapping (Capture rate/trap-night)	Track & sign survey (Encounter rate/km)
1	Khoetana Zimba stream	3.400	5.083
2	Kamyauk stream	1.786	1.533
3	Heinze stream	1.200	3.000
4	Yebone stream	0.695	3.300
5	Meke stream	0.355	1.250
6	Malwanpo stream	0.280	2.080
7	Sinbosinma Range	0.194	1.300

Figure 5: Comparison between capture rate per trap-night and encounter rate per km in seven survey sites



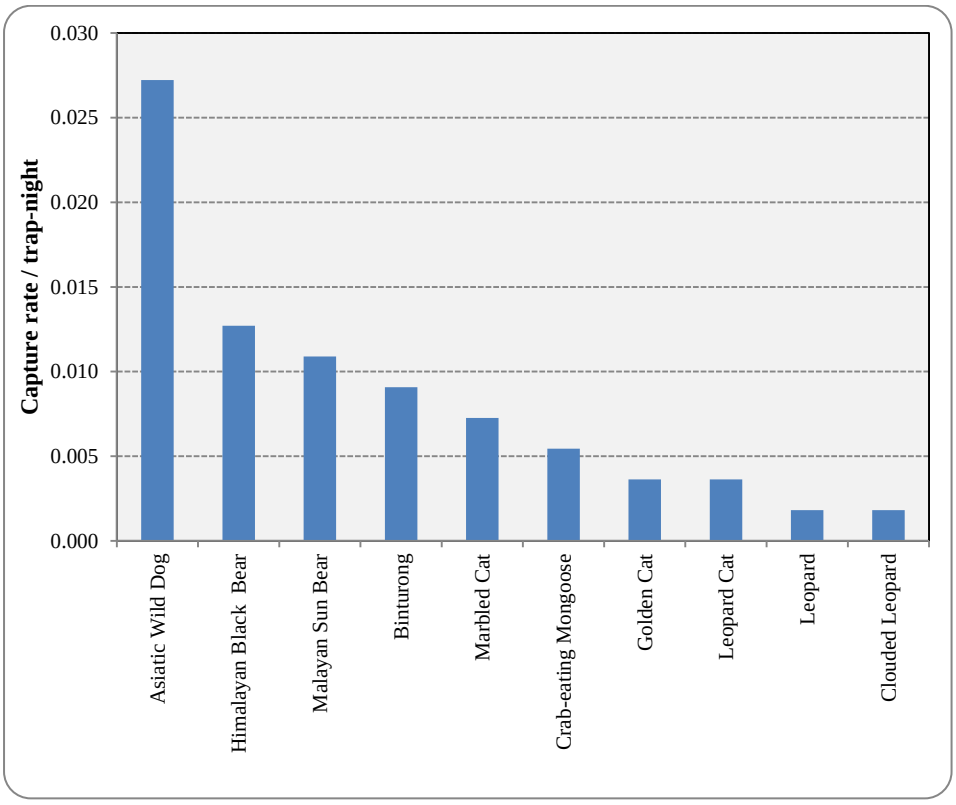
12.4. Estimating relative abundance indices of competitor carnivores

As the relative abundance index of competitor carnivores, only capture rate per trap-night was generated from camera trapping data. As shown in **Table 5** and **Figure 6**, the main competitor carnivores for tigers are Asiatic Wild Dogs, Himalayan Black Bears and Malayan Sun Bears.

Table 5: Capture rate per trap-night of Competitor Carnivores

No.	Competitor carnivore	Camera trapping (Capture rate/trap-night)
1	Asiatic Wild Dog	0.027
2	Himalayan Black Bear	0.013
3	Malayan Sun Bear	0.011
4	Binturong	0.009
5	Marbled Cat	0.007
6	Crab-eating Mongoose	0.005
7	Golden Cat	0.004
8	Leopard Cat	0.004
9	Leopard	0.002

Figure 6: Capture rate per trap-night of Competitor Carnivores



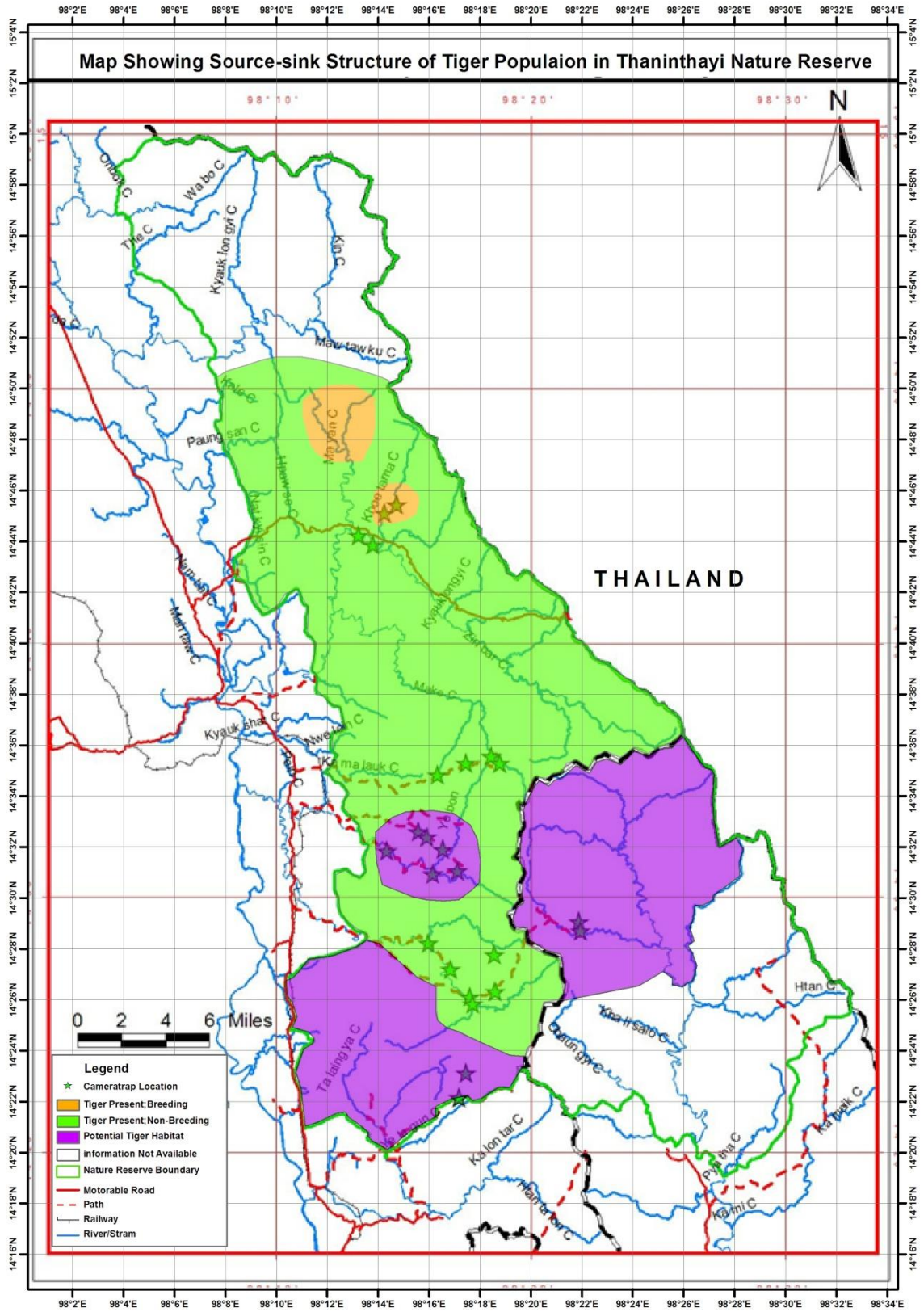
12.5. Source- Sink Structure of the TNR

Based on the interview information, encounter rate and photo-capture rate of prey mammals, sampling areas of the Reserve could be stratified into high, medium, low and no information tiger abundance categories. As shown in **Figure 7**, each category can be defined "Source- Sink Structure of the TNR as follows;

1. two high tiger areas with breeding females,
2. medium central portion with non- breeding tiger presence and
3. three low tiger presence areas with potential habitats.

Current tiger survey reached the upstream of tributaries of Kamoungthwe, Heinze and Kyaukphyu waterways previously thought to be inaccessible thus simultaneously increased enforcement activities up from about 10 to 25% of the total area of the Reserve.

Figure 7: Map showing Source-sink Structure of Tiger Population in TNR



13. Encroachments

Both subsistence and commercial hunting were observed during the surveys.

13.1. Subsistence hunting

Hunting reportedly occurred along the streams e.g. Zinba, Paungsan, Mayanchaung, Khoetama, Kyauklonegyi and Heinze where entry can be normally done using water ways and natural trails across the demarcation lines. Use of locally made guns was seen along cattle smuggling route. Army camps along the pipeline service track regularly hunt tiger prey species like sambar, wild pig, muntjac and langur for food.

13.2. Commercial hunting

According to the respondents of Questionnaire Survey, professional teams such as Milarshikar elephant capturers and tiger hunters with modern assault rifles from Thailand-side occasionally enter the Reserve especially into upper reaches of Zinba, Kamoungthwe and Khoetama streams. During Malwanpo stream survey, hunted remains of Himalayan Black Bear were encountered on the cattle smuggling route. Its gallbladder was not found on the carcass. Ban I Thong, Kaleinaung and Kanbauk were known to be regular bush meat destinations. Some local informants indicated about the existence of tiger focused hunters at Zinba village.

13.3. Wildlife trade

Interview results also indicated that Kaleinaung, Tavoy and Taungthonelone are transit points collecting illegal wildlife parts. Trade routes were observed to be Ye-Tavoy motor road, pipeline service track and Heinze-Htantalone cattle smuggling route. Buying shops at Thailand-side are located at Ban I Thong, Phusuk and Ban Bong Ti Bon. One of the smuggling routes starts from Hnankye village and ends at Moksoe Taung border pass in the east. The route passes through the water-sheds of Heinze and Kamoungthwe streams. The other route runs parallel to the southern boundary from outside starting from Kalonehta village and enters the Reserve at south-east corner near Myaekhanbaw. Thirty three cattle and twenty seven travelers were encountered

during Malwanpo stream survey trip. Acre size patches caused by cutting bamboo clumps to feed cattle bamboo leaves were sporadically found along the route. One cattle driver with a muzzle loader was also met by the survey team. Other types of disturbances caused by trespassers were sighted as fishing, forest fire and human trafficking to neighboring Thailand.

13.4. Quartz mining

Old quartz mining pits found on both sides of Kyaukphyu stream are indicative of regular encroachments into the Reserve. Local price for quality quartz marketable to China is reportedly 5000 kyats per kilogram (1 USD= 850 kyat). At nearby, (5) palm-thatched huts were found as temporary shelters for illegal quartz miners. Wunpo village is known to be collecting point for Chinese merchants. Time spent in the Reserve by illegal miners is used to be 20 days per trip, 3 trips per year.

14. Causes for the decline of tiger population in TNR

The following socio- economic aspects are assumed to be the causes for the decline of tiger population in TNR.

- Less awareness in Forest and Wildlife Laws among the local populace,
- Occurrence of habitat disturbances due to illegal logging, dynamite fishing, hunting and indiscriminate extraction of minor forest products.
- Bush meat consumption is still popular as a local practice,
- Poaching by professional hunters across the border,
- Regular hunting by army camps of pipeline service track for food,
- Holding of illegal hunting guns like muzzle loader is still being deep-rooted in the local tradition,
- Rampant use of cattle smuggling routes for hunting, cattle transportation and human-trafficking,
- Existence of tiger focused hunters in the town ship,
- Increasing demand on wildlife products from China and Vietnam markets,
- Weak trans-boundary cooperation between neighboring countries.

15. Recommended areas to enforce law

15.1. Lawtthai village tract

Situated at the Ye-Yebyu township boundary, area administration is out of hand. Therefore, regular patrol was virtually devoid in the area for the past time. Thus the area seems to have been a paradise for local professional hunters since many decades before the establishment of the Reserve.

15.2. Zinba village and Zinba steam

Zinba is located at the strategic point from which entry and exit through the stream can be easily done. Therefore, various forest crimes e.g illegal logging and fishing have been frequently emerged from the area.

15.3. Heinze Stream, Heinze Village and Hnankye Village

Local people of those villages routinely extract timber and bamboo from the Reserve and nearby forests. People of Hnankye village also used the Reserve areas for hunting and cattle smuggling.

15.4. Kalonehta Village and Kyaukphyu Stream

There are privately owned large scale enterprises such as newly cultivated 3000 acre rubber plantation and a lead mine between Kalonehta and southern boundary. Trespassing of workers, hunting and illegal quartz mining was noted to be localized types of encroachments in the area.

15.5. Myitta, Taungthonelone, Seikphyone and Myaekhanbaw Villages

The area lies on the routes of cattle smuggling and wildlife trafficking. The route starts at Tavoy and ends in Thailand.

16. Recommended area to raise awareness

16.1. Yafu Guard Post Area

Regular patrols cannot be done throughout most of the area due to security constraints. Consequently, school children programs, mobile environmental talks, and distribution of pamphlets and fact sheets describing about the existence of the Reserve and Wildlife Law are suggested to implement in accordance with the annual planning.

16.2. Kaleinaung, Migyaunghlaung and Zinba Villages

Being major destinations of bush meat, timber and other wildlife products, the following awareness campaigns should be carried out in those villages with emphasis. Recommended actions are distribution of brochures about dos and don'ts within core and buffer zones, sticking of placards written about "Animal meat being prohibited by existing laws is not sold at this shop" at restaurants and setting up of more warning signs along the Reserve boundary.

16.3. Hnankye and Shintabe Villages

Those villagers are regularly taking part in cattle smuggling across the Reserve. Illegal activities they commit during their travel include cutting of bamboo for cattle food, burning forest fire, fishing and hunting. Such rampant illegal activities definitely caused unpredictable serious damages to the potential tiger habitat of the Reserve. Frequent visits by mobile education team for awareness talks inclusive of law, rules and regulations of the Reserve are strongly recommended to do for those villages.

16.4. Villages of Myitta Sub- township Town

Regular patrols could not have been done yet since the establishment of the Reserve due to security restrictions. So, it is advisable to do environmental education activities as much as possible throughout the area.

17. Recommended areas for coordination with relevant agencies

Table 5: Recommended areas for coordination with relevant agencies

No.	Area Name	Issues to be resolved
1	Pipeline Service Track	Hunting, Fishing and Transportation of Wildlife Products
2	Tavoy	Trade on Live Wildlife and its Products
3	Western Forest Complex-WEFCOM, Thailand	Cross- border Hunting, Wildlife Trafficking and Trans-boundary Cooperation for Tiger and Elephant
4	CITES Check Point, Kachanaburi and Management Authority of Thailand	Illegal Import and Export of Wildlife Products across the border

17.1. Pipeline service track

Hunting by assigned army units along the service track and transporting bush meat using motorcycles are reportedly taking place. It is one of the most important hunting issues to be resolved by the management authority through not only coordination but also by implementing strategic actions such as establishment of a check point at Ban I Thong and deployment of permanent camera traps with a schedule of regular inspection plus patrol at upstream of Khoetama and Mayanchaung, if tigers of TNR are to be prevented from rapid disappearing.

17.2. Tavoy

Tavoy is a major trading point for wildlife and its parts. Reported collecting items comprise of live turtles, pangolins, otter skins, bear claws, antlers of sambar, bear gallbladder and tiger parts. In order to suppress the illegal wildlife trade, intelligence-led operations should be arranged through coordination with line government departments.

17.3. Western Forest Complex, Thailand

Wildlife parts of TNR as well as from Thailand's Northern Forest Complex are being illegally transported to markets in China and Vietnam by middlemen. It is advisable to initiate the trans-boundary cooperation with Thailand for the joint effective activities in the field of tiger conservation.

17.4. Check Point at Thong Pha Phun, Thailand

Situated on the highway from Three Pagoda Pass to Kachanaburi, the check point is being established and manned by the CITES authority of Thailand. Cooperation can be beneficial in information sharing and establishment of a mechanism to be able to suppress all import and export of wildlife and its parts.

18. Discussions

Initially, (4) respondents out of (25) interviewees described an overall impression about year round encounter of tiger tracks at upstream of Khoetama and Mayanchaung. Two respondents gave confirmation on the sighting of tracks of two tigers along Paungsan stream in December, 2010. The results of Track & Sign and Camera- trapping are indicating that prey mammal abundance is the highest in Khoetama upstream. In accordance with those findings, the grid cell where pipeline service track lies can be assumed as a tiger site with breeding females.

Tiger signs in the form of tracks could have been collected from other parts of the Reserve. But, both evidences from Track & Sign data and photo-trapping records are comparatively low to sufficiently support a breeding tiger population at other parts of the Reserve.

Therefore, it is estimated that two breeding sites occur along the upstream of Khoetama and Mayanchaung. Streams as Zinba, Meke and Heinze are expected to be regularly frequented by tigers. In the mean time, existing of sufficient prey mammals that enable to support a breeding tiger population by the above mentioned Meke, Zinba and Heinze areas is doubtful. (See **Figure 6:** Map showing Source-sink Structure of Tiger Population in Taninthayi Nature Reserve)

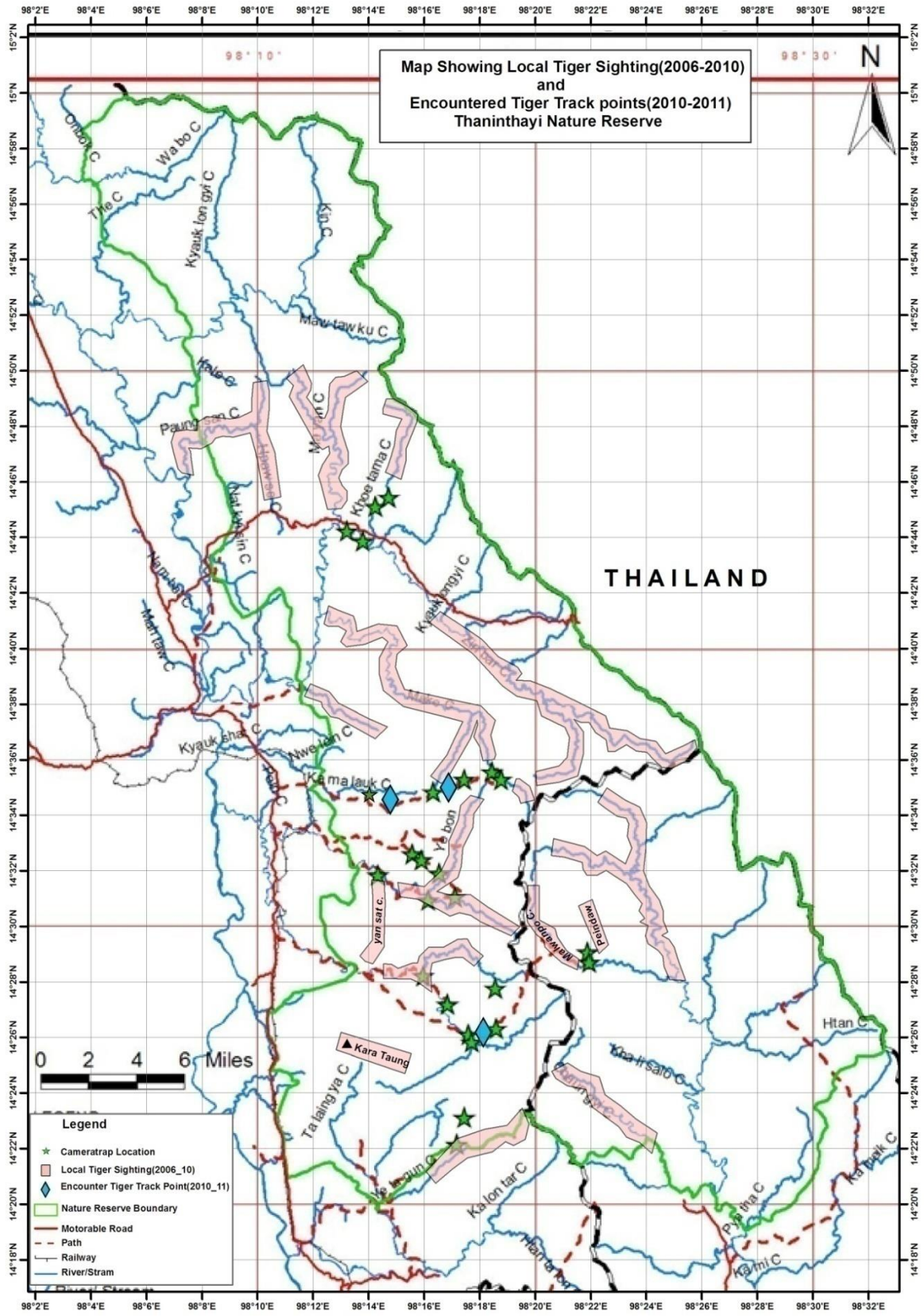
Even though every detail was planned to travel to each corner of the Reserve with recent tiger information, realization could not be fully done due to security constraints. Fortunately, high enthusiasm and team spirit of local staff has greatly contributed to the successful completion of camera-trapping surveys.

For future Presence-Absence or Occupancy Survey in TNR, average (15) trap night per camera trap is recommended (Karanth, K. U, The Science of Saving

Tigers, 2011). Because, 15 day period is enough for prey mammals to revisit the camera site again after the disturbances they encounter during the camera setup operation. Camera trap records of TNR confirmed the interval of animal revisit to the deployment site as average 6 days after the date of setup operations.

Kara Taung Mountain Range, streams as Yebone, Kamaungthwe, Kyaukphyu (Talaingya) is predicted to be potential tiger sites with historical and occasional records of sightings. (See **Figure 8**)

Figure 8: Historical and occasional records of tiger sighting



During camera-trapping efforts (trap night) 551, total (593) animal pictures were captured including (10) prey mammals and (9) competitor carnivores. Camera trap results are supporting the fact that there exists a favorable habitat preference and prey base for the survival of existing tigers of TNR. Encounter of cattle smugglers with guns and hunted bear parts at the far reach of Heinze stream is also indicative of presence of high level of poaching pressure and habitat disturbance along the Reserves' core areas. To face gun holding poachers in the field by patrol staff without any kind of weapon is a serious dilemma for the Reserve in the long run. The legally available help from police also remains a challenge for the management authority of TNR whereas local police stations are always busying with their own routines.

Since 53% of local hunters gave an overall impression to shoot tiger in case of opportunistic encounter (Min Thant Zin, 2009) emphasis should be given in the field of awareness raising along the surrounding villages and towns.
Fundamental causes like existence of market demands for tiger parts, gaining high prices and deep-rooted hunting traditions are factors mainly responsible for the decline of tiger population in TNR. To train patrol staff of TNR as armed militia being assigned at Alaungdawkathapa National Park is recommended in the suggestion. But, there may be unavoidable challenges to be encountered during the implementation process such as how local temporary staff can be recruited into the structure of the militia and existing local security constraints of which should be seriously taken into account in TNR.

Some respondents of Questionnaire Survey described Paungsan, Mayanchaung and Khoetama streams as tiger sites with signs seeable almost all year round. Even though, camera-trapping could not be done due to security constraints. The Taninthayi Nature Reserve might have been exemplifying vulnerability of tiger and its prey base to local depletion caused by poaching, even in areas with suitable habitat and appropriate protection, unless effective management action like arranging functional patrol presence along the potential source site is fulfilled in time. The establishment of the community forests (CFs) along the western periphery has been a proven commitment of conservation being undertaken by the TNR Project not only for wildlife but also to local people. Practically, there is a certainty that community participation alone without patrol presence cannot protect wildlife and its habitats.

The following finding is unexpected animal behavior from which error may come in when frequency count is collected by camera trap users in future. During retrieval, some camera points were observed to become a feeding site for wild pigs and pheasant birds busying in front of camera in search of dead insects attracted by infrared flash whilst capturing night movement of animals.

19. Suggestions

The following recommendations summarize the requirements for an effective continuous monitoring of tigers as well as area protection.

- Deploy camera traps monthly along the upstream of Khoetama, Mayanchaung and Zinba streams,
- Increase patrol efforts at all local operating units (LOUs) making it a functional reality,
- Raise awareness and educational activities at Environmental Education Center and peripheral villages,
- Train the patrol staff as armed militia like in Alaungdawkathapa National Park and equip with appropriate facilities such as camera traps, bag-pack, sleeping bag and binoculars etc.
- Regularly build the capacity of the staff through holding of trainings on modern patrol and monitoring techniques with the help of experts,
- Open new LOUs at Ban I Thong (Nat Ein Htaung) and Talaingya for more patrol presence and coverage,
- Take legal actions against wildlife traffickers by collecting intelligence information in cooperation with line departments,
- Continue use of MIST-Management Information System and GIS-Geographic Information System to overview the progress of patrol and habitat improvement.

20. Conclusions

There are many challenges facing now not only for keeping TNR protected well altogether the recovery of tiger population. Among the challenges, more compliance of local people with wildlife law and cooperation of other line government departments are the most pressing needs for the management authority. It is hoped and believed that the goal of TNR could become nearer at a time when authorities in district and divisional level including local villagers

join in hand in appreciation of the Reserves' values with warden and staff . In addition, the support from local people is a key to successful protection of the area. As a matter of fact, there is no certainty that we can make conflicts of interests to become zero since people have different ideas and different interests. However, if TNR can be successfully managed to reduce the level of conflicts by the attempts of mitigation mentioned above to the acceptable level where community and conservation staff could work together in harmony, win-win situation for human and animal could be created and maintained for ever. Some of its habitats are still almost intact, and if mitigating measures are put into place soon, the representativeness and key attributes of this vast tropical rain forest ecosystem can entirely be conserved in this little known site to the world. It is also envisaged that TNR will substantially fulfill the goal of Myanmar National Tiger Action Plan "doubling the current tiger population in 2022" if existing management practices can be accelerated with enthusiasm and commitments from all stakeholders concerned.

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Appendix 1: Photographic records of survey activities and mammals

Plaster cast of a tiger track from Meke upstream

A Leopard from Sinbosinma Mountain

Tapir from Khoetama upstream

A Marbled Cat from Sinbosinma Mountain

Panorama seen on the divide between Yebone and Heinze streams

A Serow from Sinbosinma Mountain

A Sun Bear from
Sinbosinma Mountain

A Herd of Gaur Captured by Camera Trap at Khoetama Upstream

A Hunter Captured by Camera Trap at the middle stretch of Khoetama Stream

A Male Sambar Captured by Camera Trap at the Middle Stretch of Khoetama Stream

A Cattle Smuggler Captured by the Camera Trap at the Far Reach of Heinze Stream

Presenting “Tiger and Biodiversity Conservation in Myanmar” at Yebyu Town

Demonstrating Camera Trap Deployment at Yebone Guard Post

Appendix 2: Map Showing Prey Mammal Distribution

Appendix 3: Encounter rate per km of track and sign data

No	Location	Date	Distance (km)	Wild Dog	Sambar	Wild Pig	Himalayan Black Bear	Malayan Sun Bear	Barking Deer	Asiatic Brush-tailed Porcupine	Greater Oriental Chevrotain	Asian Elephant	Hog Badger	Pig-tailed macaque	Clouded leopard	Mongoose	Civet Spp
1	Heinze Stream	25-Nov-10 26-Nov-10	10	6	6	14	1	-	2	4	-	-	-	-	-	-	-
2	Yebone Stream	01-Dec-10 04-Dec-10	20	-	15	30	4	-	5	2	3	3	1	1	1	-	1
3	Kamyauk Stream	12-Dec-10	5	-	-	21	-	-	-	2	-	-	-	-	-	-	-
4	Khoetana Zinba Stream	11-Jan-11 12-Jan-11	17	-	-	23	-	-	8	4	-	-	-	-	-	1	9
5	Sinbosinma Range	21-Jan-11 23-Jan-11	20	-	-	13	5	3	5	-	-	-	-	-	3	-	5
6	Meke Stream	20-Jan-11 22-Jan-11	20	-	3	10	5	-	5	4	-	-	-	-	-	-	5
7	Malwanpo Stream	05-Feb-11 12-Feb-11	25	5	6	21	5	-	5	-	3	-	-	-	2	1	5
	Total		**112**	**11**	**30**	**132**	**20**	**3**	**30**	**2**	**6**	**3**	**1**	**1**	**56**	**2**	**25**
	Encounter Rate/km			0.098	0.267	1176	0.178	0.026	0.267	0.017	0.053	0.026	0.008	0.008	0.053	0.017	0.222

Encounter rate per km of track and sign data (continued)

No	Location	Date	Distance (km)	Guar	Otter spp.	Gibbon	Malayan Porcupine	Serow	Stump-tailed macaque	Tapir	Tiger	Dusky Leaf	Leopard	Golden Cat	Total Animal Traffic	Villager	Other	Total Human Traffic
1	Heinze Stream	25-Nov-10 26-Nov-10	10	-	-	-	-	2	-	-	-	-	-	-	29	2	2	4
2	Yebone Stream	01-Dec-10 04-Dec-10	20	3	-	-	-	-	-	2	-	-	-	-	68	4	-	4
3	Kamyauk Stream	12-Dec-10	5	-	-	-	-	-	-	-	1	-	-	-	22	-	-	-
4	Khoetana Zinba Stream	11-Jan-11 12-Jan-11	17	14	-	-	-	-	-	-	-	-	-	2	60	4	-	4
5	Sinbosinma Range	21-Jan-11 23-Jan-11	20	-	-	-	5	3	-	-	-	-	3	-	45	-	-	-
6	Meke Stream	20-Jan-11 22-Jan-11	20	-	-	-	5	-	2	-	-	2	-	-	37	-	-	-
7	Malwanpo Stream	05-Feb-11 12-Feb-11	25	-	3	2	3	-	-	2	2	-	-	4	69	27	33	60
	Total		**112**	**17**	**3**	**2**	**13**	**3**	**2**	**4**	**3**	**2**	**3**	**6**	**339**	**37**	**35**	**72**
	Encounter Rate/km			0.151	0.026	0.017	0.115	0.026	0.017	0.035	0.026	0.017	0.026	0.053	2.94			0.64

Appendix 4: Capture rate per trap night of camera trapping data

No	Locations	No of Camera Traps	Period	Trap Night	Tiger	Guar	Sambar Deer	Barking Deer	Mouse Deer	Long-tailed macaque	Wild Pig	Pheasant	Serow	Pig-tailed macaque	Stump-tailed macaque	Malayan porcupine	Brush-tailed porcupine	Himalayan Black Bear	Malayan Sun Bear	Leopard
	Heinze Stream	2	26-Nov-10 21-Dec-10	50	-	-	-	-	-	-	16	-	3	-	6	21	-	-	-	-
	Yebone Stream	6	01-Dec-10 29-Dec-10	151	-	-	5	1	6	-	72	-	-	-	13	5	3	1	-	-
	Kamyauk Stream	1	12-Dec-10 01-Jan-11	14	-	-	-	-	-	-	25		-	-	-	-	-	-	-	-
	Khoetana Zinba Stream	4	11-Jan-11 02-Feb-11	100	-	177	97	8	1	-	9	-	-	2	-	37	-	-	-	-
	Sinbosinma Range	2	22-Jan-11 25-Feb-11	67	-	-	-	-	-	1	-	21	2	-	10	-	-	1	1	1
	Meke Stream	3	21-Jan-11 17-Feb-11	76	-	-	-	-	-	-	18	15	-	-	5	4	-	3	5	-
	Malwanpo Stream	5	06-Feb-11 01-Mar-11	93	-	-	-	10	1	-	6	-	-	-	-	9	-	2	-	-
	Total			**551**	**-**	**177**	**102**	**19**	**8**	**1**	**146**	**36**	**5**	**2**	**34**	**76**	**3**	**7**	**6**	**1**
	Capture rate/trap night					0.321	0.185	0.034	0.015	0.002	0.265	0.065	0.009	0.004	0.062	0.138	0.005	0.013	0.011	0.002

Capture rate per trap night of camera trapping data (continued)

No	Locations	No of Camera Traps	Period	Trap Night	Clouded leopard	Golden Cat	Marbled Cat	Leopard Cat	Large Indian Civet	Small Indian Civet	Common Palmed Civet	Civet Spp	Binturong	Small Asian Mongoose	Wild Dog	Unidentified	Tapir	Total Animal Traffic	Villager	Other	Total Human Traffic
	Heinze Stream	2	26-Nov-10 21-Dec-10	50	-	-	-	-	-	-	-	-	-	-	1	17	-	64	2	-	2
	Yebone Stream	6	01-Dec-10 29-Dec-10	151	-	2	-	1	-	-	-	-	-	-	-	13	-	122	-	-	-
	Kamyauk Stream	1	12-Dec-10 01-Jan-11	14	-	-	-	-	-	-	-	-	-	-	-	5	-	30	-	-	-
	Khoetana Zinba Stream	4	11-Jan-11 02-Feb-11	100	-	-	3	-	-	-	4	-	-	1	-	-	9	348	1	-	1
	Sinbosinma Range	2	22-Jan-11 25-Feb-11	67	1	-	1	-	-	10	-	-	-	-	-	-	-	49	-	-	-
	Meke Stream	3	21-Jan-11 17-Feb-11	76	-	-	-	1	1	-	35	-	4	-	-	-	-	91	-	-	-
	Malwanpo Stream	5	06-Feb-11 01-Mar-11	93	-	-	-	-	13	-	-	-	1	2	14	-	-	58	3	29	32
	Total			**551**	**1**	**2**	**4**	**2**	**14**	**10**	**39**	**-**	**5**	**3**	**15**	**35**	**9**	**762**	**6**	**29**	**35**
	Capture rate/trap night				0.002	0.004	0.007	0.004	0.025	0.018	0.071		0.009	0.005	0.027	0.064	0.016	1.383	0.011	0.053	0.064

Appendix 5: Capture rate per trap night of tiger prey

No	Location	Period	Distance	Guar	Sambar	Muntjac	Mouse Deer	Wild Pig	Serow	Tapir	Stump-tailed macaque	Pig-tailed macaque	Malayan Porcupine	Brush-tailed porcupine	Total	Encounter
	Heinze Stream	25-Nov-10 26-Nov-10	10	-	6	2	-	14	2	-	2	-	4	-	30	3
	Yebone Stream	01-Dec-10 04-Dec-10	20	3	15	5	3	30	-	2	3	1	2	2	6.6	3.3
	Kamyauk Stream	12-Dec-10	5	-	-	-	-	21	-	-	-	-	2	-	23	1.5333
	Khoetana Zinba Stream	11-Jan-11 12-Jan-11	12	14	10	8	-	23	-	2	-	2	4	-	61	5.0833
	Sinbosinma Range	21-Jan-11 23-Jan-11	20	-	-	5	-	13	3	-	5	-	-	-	26	1.3
	Meke Stram	20-Jan-11 22-Jan-11	20	-	3	5	-	10	-	-	2	-	4	1	25	1.25
	Malwanpo Stream	05-Feb-11 12-Feb-11	25	-	21	5	3	21	-	-	2	-	-	-	52	2.08
	Total		**113**	**17**	**55**	**30**	**3**	**132**	**5**	**4**	**14**	**1**	**16**	**3**	**284**	
	Encounter Rate			0.151	0.49	0.27	0.03	1.18	0.04	0.04	0.125	0.008	0.142	0.026	2.535	

Appendix 6: List of Respondents from Questionnaire Survey with sighting time and place of tiger

No.	Name	Residence	CG Strm	HZ Strm	KMT Strm	KR Taung	KTZB Strm	MYC Stream	MMB Strm	MK Strm	PS Strm	SB Taung	YZ Strm	YB Strm	Zinba
1	Kyaw Aye	Zinba							Dec. 10	Feb. 09	0	0	0	0	0
2	Sein Tun Tin	Zinba								2009					2008
3	Min Aung	Mayan Ch.									Sept. 10				
4	Aung Min	Yebone												Dec. 09	
5	Min Aung*	Yebone			Mar. 09								Feb. 10		
6	Ba Win*	Khoetama						Dec. 10							
7	Tin Aung*#	Kyauklonegyi									Dec. 10				
8	Win Khaing*	1500 Point			Aug. 10										
9	Kyaw Lin	Yebone								2007					
10	Hla Win	Yebone												2008	
11	Saw Htee Khu#	Migyaunghlaung									Dec. 10				
12	Saw Lay Lon#	Shintabe				Feb. 04									
13	Po Thee	Heinze		2006											
14	Thar Me	Hnankye		2007	2007										
15	Kyaw Soe Lin	Talaingya		2008	2009										
16	Min Lwin	Talaingya	2010												
17	Soe Thein	Kyaukshat								2009					
18	Myint Shein	Heinze										2009			
19	Saw Roe Mey	Shintabe		2009											
20	Thein Myint	Othayan				Feb,07									
21	Saw Phee Yaw	Yafu									2010				
22	Saw El Wa	Yafu									Dec.10				
23	Win Naing	Yafu									2009				
24	Saw Nay Myo	Yafu									2008				
25	San Aye	Zinba													1989

Notes:

Strm= Stream, HZ= Heinze, KMK= Kamyauk,

KR= Kara, KTZB= Khoetama-Zinba, MYC= Mayanchaung,

MMB= Meinmaban, MK= Meke, PS= Paungsan,

SB= Sinbosinma, YZ= Yanzat, YB= Yebone,

ZB=Zinba
tiger

*Respondents with sighting experience of year round tiger signs

Respondents with sighting experience of tiger sign in pairs

Appendix 7: First Interim Report on Tiger Survey in TNR

1. Background

In January-July, 2008, three National Consultants conducted mammal surveys in TNR and gave management recommendations that included species specific research programs on the status of tiger, elephant, rhinoceros and tapir. The consultancy reports also informed the occurrence of mammals such as gaur, sambar, muntjac, wild pig and serow. Then, the reports highlighted the existence of outside pressures and threats on wildlife and its habitats along with the diverse tropical ecosystems of the Reserve. In such situation, the study about distribution, abundance and ecology of a top carnivorous animal like tiger can help make effective management decision for the management authority. Therefore, a National Consultant was hired to study the status of tigers in TNR.

2. Questionnaire Survey

Total (15) local people from peripheral villages of Yafu, Kyaukshat, Mayanchaung and army camps of Khoetama and Kyauklonegyi were met and asked about recent tiger information. Through interviews tiger frequented areas are known to be streams namely Zinba, Khoetama, Mayanchaung, Yebone, Heinze, Talaingya, Sinbosinma Mountain and some Myitta township areas.

1.1. Other Mammals

Together with tiger, elephant, rhinoceros, tapir, gaur, sambar, serow, wild pig, wild cattle, barking deer and greater oriental chevrotain are reportedly inhibiting in the area.

1.2. Competitor Carnivores

Signs of competitor carnivorous species for tiger namely leopard, clouded leopard, golden cat and Asiatic wild dog are observable in the Reserve.

1.3. Hunting

The results from the Questionnaire Survey are indicating that there remains both subsistence and commercial hunting using muzzle loader, loop traps and pit traps throughout the Reserve.

3. Tiger Survey with Camera Traps

From second week of November to first week of December, 2010, total (8) camera traps which digitally operate with infrared beam as trigger have been deployed along Heinze and Yebone streams.

Camera sites were carefully selected to be natural trails and water ways regularly frequented by animals. Camera traps will be retrieved after average (21) days from the setup date.

4. Findings

No definitive tiger sign was encountered during the previous survey period. But, the evidences from the track and sign are supporting the fact that considerable prey mammal species occur in the area. Signs of encountered mammal species are as follows:

Sl. No.	Common Name	Scientific Name
1	Asian Elephant	*Elephas maximus*
2	Sambar Deer	*Cervus unicolor*
3	Wild Pig	*Sus scrofa*
4	Clouded Leopard	*Pardofelis nebulosa*
5	Tapir	*Tapirus indicus*
6	Barking Deer	*Muntiacus muntjak*
7	Greater Oriental Chevrotain (Mouse Deer)	*Tragulus napu napu*
8	Asiatic Black Bear	*Ursus tibetanus*
9	Asiatic Wild Dog	*Cuon alpinus*

5. Training the Staff in the Field

The following skills and experience could be shared to the accompanying TNR staff during the survey trips.

-Skills on manipulation of digital camera trap model # 119435 and trapping techniques

-Data collection skill on track and sign using forms and mammal track guide

-Sharing experience on information gathering during Questionnaire Surveys

6. Next Schedules to be implemented

The following activities will be carried out in continuation to fulfill the objectives.

-Conduct opportunistic camera-trapping surveys at areas with recent tiger information

-Mold tiger tracks using POP (Plaster of Paris) by travelling to areas with recent tiger information

-Deploy camera traps along the streams e.g. Zinba, Meke, Khoetama, Kyauklonegyi and Paungsan

-Enter data and analyze the captured animal pictures in computer

-Compile mammal distribution maps including tiger

-Submit the completion report

Survey Team in Search of Track & Sign

Setting up a Camera Trap

Appendix(7a)

Taninthayi Nature Reserve

Questionnaire Survey Form for Monitoring Tiger and its Prey

Name---------- Date----------
Age---------- Residence----------
Occupation----------

1.When did you live in this Village?

---.

2. Ethnicity?

---.

3. From where do you collect timber and bamboo etc…for house repair?

---.

4. If from forest, how for is it from the village?

---.

5. How many times do you go to the forest? (Within a month and a year)

---.

6. Have you seen wild animals?(If--------)

No.	**Name of animal**	**No. of animal**		**Forest thpe**		**Human Encroachment**		**Remark**
		Rare	Abundant	Un-Classed	R.F	Presence	Absence	
1								
2								
3								
4								
5								

7. Are there wild animal attacks on domestic animals around this Place?

No.	**Wild Animal**	**Domestic Animal Attacked**					**Time**	**Place**	**Remark**
		Buff-alo	Cow	Goat	Pig	Other			
1									
2									
3									
4									

8. How wildlife parts are used in this area?

No.	**Name of animal**	**Parts**				**Area of Utilization**			**Marketing Situation**			**Rem-ark**
		Meat	Bone	Skin	Antler	Medicine	Food	Tradition	Market	Consumer	Price	
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

9. How animals are hunted in this area?
   Which weapons? What kind of preys?

No	Prey	Hunting Technique				Weapon					
		Track	Sniff	bait	Information	Gun	Cross Bow	Arrow	Dog	Trap	Pit
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

10. (If you do farming---) Acre? Crop damaged by animals?
    Which animals?

No	Crop	Acre			Total acre	Animal	Time of Damage		Remark
		Paddy	Dry Crop	Extension			Day	Night	
1									
2									
3									
4									
5									
6									
7									
8									

11. Have you seen tiger or tiger sign?
    (Yes/No, Place----------Time, Size of animal or its sign----------)
12. Are there trade for tiger parts?
    ----------.
13. Please, Point out if you have seen the animals in this chart?
    ----------.

Appendix (7b)

Camera Trap Data Sheet (TNRP)

Date: 26, Nov.-4, Dec.2010 **Locality; Heinze, Yebone&Kamyauk Streams**

Date/Time	Camera I.D.	Location	GPS Position	Frame No.	Remark
26,Nov.10 /11:35	HZ-1	Nwun See Chaung	N 14° 27′5.6" E 98°17′15.7"	B100704034	Wild Pig Track
26,Nov.10 /15:15	HZ-2	Kaung Hmu Bin Aing	N 14° 27′55.3" E 98° 16′32.6"	B100701829	Wild Dog Scat
1,Dec.10/ 14:30	YB-1	Byaikkathan	N 14° 32′31.6" E 98° 15′6.6"	B100720940	No Sign
2,Dec.10/ 08:59	YB-2	Yebu Phyar	N 14° 32′7.0" E 98° 16′26.8"	B100720955	No Sign
2,Dec.10/ 15:03	YB-3	Sakan Gyi	N 14° 31′29.7" E 98° 17′19.6"	B100720942	No Sign
3,Dec.10/ 09:29	YB-4	Laykyawsone	N 14° 30′40.3" E 98° 17′54.1"	B100704070	Muntjac Tracks
3,Dec.10/ 13:49	YB-5	Chaungchauk	N 14° 30′32.2" E 98° 16′55.2"	B100720967	Bear Tracks
4,Dec.10/ 10:25	YB-6	Yebuwa	N 14° 31′27.3" E 98° 15′6.9"	B100701813	Sambar Tracks
12,Dec.10	KM-1	Kamyauk Chaung	N14°34′37.5" *E*98°13′40.7"	B100704012	Wild Pig Tracks

Camera Trap Data Sheet (TNRP)

Date; 11, Jan.-12, Jan.2011 **Locality; Khotama &ZinbaStreams**

Date/Time	Camera I.D.	Location	GPS Position	Frame No.	Remark
11,Jan.11 /10:47	KTZB-1	Kotama Yeboke	N 14° 45′3.7" E 98°1523.9"	B100704070	Gaur Tracks
12,Jan.11/12:40	KTZB - 2	Hsat Kwin	N 14° 44′46.6" E 98° 14′48.4"	B100701813	Samba Tracks
12,Jan.11/13:30	KTZB - 3	The' Byant	N 14° 43′49.1" E 98° 13′55.0"	B100720940	Samba Tracks
12,Jan.11/15:59	KTZB - 4	The' Chaung	N 14° 43′36.6" E 98° 14′18.8"	B100720957	Samba Tracks

Appendix 8: Second Interim Report on Tiger Survey in TNR

1. Background

In November – December, 2010, study on the status of tiger in TNR was conducted by implementing Questionnaire survey and Track &Sign surveys accordingly.

During the surveys, track &sign of (8) tiger prey mammals and (4) competitor Carnivore species ware found and recorded. First interim report has been submitted to the TNRP office.

2. Camera Deployment

Total (8) camera traps were set up along Heinze and Yebine Streams. A single camera trap was deployed at Kamyauk stream where tiger track information was received. Probably, track of a transient tiger with an avoidance behavior was manually photo -graphed and taken measurements (L=115 mm, PW= 78 mm)

3. Collection of Carnivore Scats

Carnivore Scat collection was done along Heinze and Yebine streams during camera retrieval operations. Scat data were recorded in the prescribed forms.

4. Findings

Total (9) camera traps captured the pictures of (8) tiger prey mammals and (4) carnivorous species. Captured mammals are as follows:

4-1. Mammals

No.	Common Name	Scientific Name
(a)	Barking Deer	*Muntiacus muntjac*
(b)	Greater Oriental Chevrotain (Mouse Deer)	*Tragulus napu napu*
(c)	Sambar Deer	*Cervus unicolcr*

(d)	Common Wild Pig	*Sus scrofa*
(e)	Asiatic Brush-tailed Porcupine	*Artherurus macrourus*
(F)	Malayan Porcupine	*Hystrix brachyura*
(g)	Serow	*Capricornis sumatrensis*
(h)	Stump-tailed Macaque	*Macaca artoides*

4-2. Carnivores

(A)	Asiatic Wild Dog	*Cuon alpinus*
(b)	Golden Cat	*Felix tammincki*
(c)	Leopard Cat	*Felis bengalensis*

5. Next Plans

The following schedules will be implemented to fulfill the objectives of the survey.

(a) Deploy (2) reserved camera traps by travelling to areas with recent tiger Information.

(b) Mold tiger tracks using PoP (Plaster of Paris)

(c) Set up camera traps along streams of Meke, Khoetama, Kyauklonegyi, Paungsan, Mayanchaung, and Kyaukkyan.

(d) Conduct Data entry of captured pictures into forms and computer.

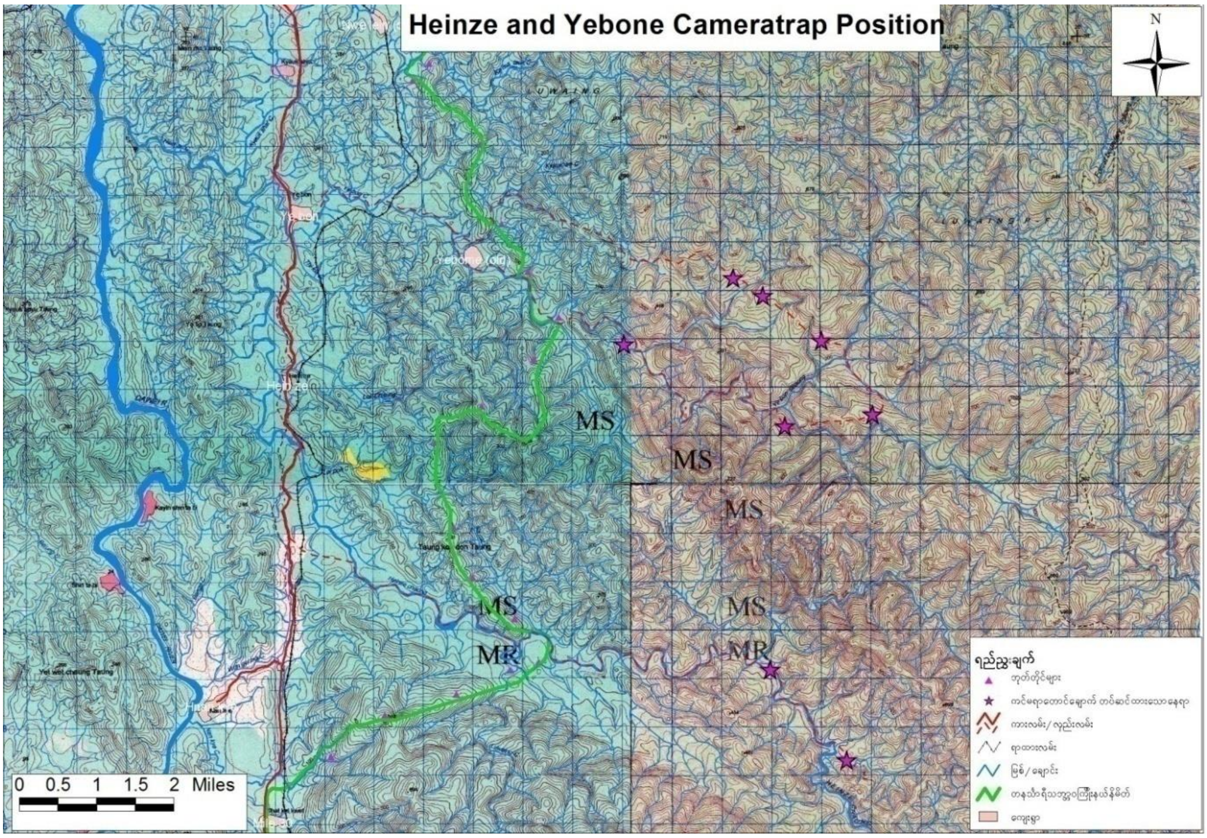
(e) Compile evidences on tiger sighting during past and present.

(f) Record the causes for the decline of tiger and identify specific areas for educational and patrolling activities.

(g) Submit completion report.

A Sambar Deer from Yebone Stream

A Wild Pig Captured by Camera Trap from Yebone Stream


Heinze and Yebone Cameratrap Position
N
MS
MS
MS
MS
MS
MR
MR
0 0.5 1 1.5 2 Miles
ရည်ညွှန်းချက်
တုတ်တိုင်များ
ကင်မရာထောင်ချောက် တပ်ဆင်ထားသောနေရာ
ကားလမ်း/လှည်းလမ်း
ရထားလမ်း
မြစ်/ချောင်း
တနင်္သာရီသဘာဝကြိုးဝိုင်းနယ်နိမိတ်
ကျေးရွာ

Appendix 9: Camera Trap Data Sheets (TNRP)

Locality; Heinze &Yebone Streams

Date; 26, Nov.-4, Dec.2010

Date/Time	Cam I.D.	Location	GPS Position	Frame No.	Remark
26,Nov.10 (11:35)	HZYB-1	Nwan See Chaung	N 14° 27′5.6" E 98°17′15.7"	B100704034	Wild Pig Tracks
26,Nov.10 (15:15)	HZYB-2	Kaung hmu bin Aing	N 14° 27′55.3" E 98° 16′32.6"	B100701829	Wild Dog Scat
1,Dec.10 (14:30)	HZYB-3	Byaikkathan	N 14° 32′31.6" E 98° 15′6.6"	B100720940	No Sign
2,Dec.10 (08:59)	HZYB-4	Yebu Phyar	N 14° 32′7.0" E 98° 16′26.8"	B100720955	No Sign
2,Dec.10 (15:03)	HZYB-5	Sakan Gyi	N 14° 31′29.7" E 98° 17′19.6"	B100720942	No Sign
3,Dec.10 (09:29)	HZYB-6	Laykyawsone	N 14° 30′40.3" E 98° 17′54.1"	B100704070	Muntjac Tracks
3,Dec.10 (13:49)	HZYB-7	Chaungchauk	N 14° 30′32.2" E 98° 16′55.2"	B100720967	Bear Tracks
4,Dec.10 (10:25)	HZYB-8	Yebuwa	N 14° 31′27.3" E 98° 15′6.9"	B100701813	Sambar Tracks
12,Dec.10 (10:05)	HZYB-9	Kamyauk Chaung	N 14° 34′37.5" E 98° 13′40.7"	B100704022	Wild Pig Tracks

CAMERA SETUP AND RETRIEVAL DATA FORM

Field Site: Heinze Chaung **Data Form No. 001/TNR-Tiger/10-11**

Observer: Myint Maung/Kyi Oo/Chit Saw /Soe Min Htun **Sample No. HZYB-1-2**

Unit No.	Date	Time	Location	Exposure Details					Events		Remark
				Cam No.	SD No.	ST	CL	EXPS	ST	CL	
HZ YB1	Setup 26,Nov.10	12:15	Nwansee Chaung	B1007 04034	001	67	138	189	117	188	
	Check 21,Dec.10	07:50									
HZ YB2	Setup 26,Nov.10	15:15	Kaungh mubin Aing	B1007 01829	002	02	86	86	32	74	
	Check 21,Dec.10	10:32									

Unit No. = Camera Equipment ID Number **Events**

Cam No. =Camera ID Number **ST=Starting event number**

SD=SD Card Number **CL=Closing event number**

ST=Starting Frame number of the SD

CL=Closing Frame Number of the SD

EXPS=Number of Exposures during the trap period

Captured Animal Data

Setup Date: 26, Nov.10 **GPS Position: N 14°27′05. 6"** **Data Form No.:03/TNR-Tiger/10-11**

Retrieval Date: 21, Dec.10 **E 98°17′15. 7"**

Location: Nwansee Chaung **Camera ID: HZYB-001** **Sample No. HZ-1**

Microhabitat: Riverine evergreen **Animal Sign: Fresh Wallows and Tracks of Wild Pig**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Malayan Porcupine	Hystrix brachyura	14	
2	Stump-tailed Macaque	Macaca artoides	5	
3	Common Wild Pig	Sus scrofa	15	
4	Asiatic Wild Dog	Cuon alpinus	1	
5	Serow	Capricornis sumatrensis	3	
6	Unidentified		10	
6	Hunter		2	
7	Fail Trip		27	

Captured Animal Data

Date: 21, Dec.10 **GPS Position: N 14°27′55. 3"** **Data Form No.: 04/TNR-Tiger/10-11** **E 98°16′32. 6"**

Location: Kaunghmubin Aing, Heinze Chaung **Camera ID: HZYB-002** **Microhabitat: Stream Bed**

Animal Sign: Scat of Wild Dog

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Malayan Porcupine	Hystrix brachyura	7	
2	Stump-tailed Macaque	Macaca arctoides melanota	1	
3	Common Wild Pig	Sus scrofa	1	
4	Unidentified		7	
5	Fail Trip		27	
	Total		43	

CAMERA SETUP AND RETRIEVAL DATA FORM

Field Site: Yebone Chaung **Data Form No. 002/TNR-Tiger/10-11**

Observer: Myint Maung/Kyi Oo/Chit Saw **Sample No. HZYB-3-9**

Unit No.	Date	Time	Location	Exposure Details					Events		Remark
				Cam No.	SD No.	ST	CL	EX PS	ST	CL	
HZ YB3	Setup 1,Dec.10	14:16: 50	Byaikkat han Chaung	B1007 20940	003	1	85	37	33	69	
	Check 27,Dec.10	11:05: 59									
HZ YB4	Setup 2,Dec.10	8:58:1 3	Yebu Phyar	B1007 20955	004	1	45	26	12	37	
	27, Dec.10	13:48: 01									
HZ YB5	Setup 2,Dec.10	13:32: 34	Sakan Gyi	B1007 20942	005	2	128	111	11	121	
	Check 27,Dec.10	16:28: 41									
HZ YB6	Setup 3,Dec.10	09:33: 39	Lay Gyaw Sone	B1007 04070	006	1	27	13	9	21	
	Check 28,Dec.10	08:00: 14									
HZ YB7	Setup 3,Dec.10	13:54: 11	Chaung Chauk	B1007 04070	007	2	32	14	10	23	
	Check 28,Dec.10	11:55: 53									
HZ YB8	Setup 4,Dec.10	13:58: 10	Yebu Wa	B1007 01813	008	1	33	19	12	30	

	Check 29,Dec.10	16:45:25									
HZ YB9	Setup 12,Dec.10	10:05:46	Kamyauk Chaung	B100704022	009	1	48	25	18	44	
	Check 1,Jan.11	08:47:32									

Unit No.=Camera Equipment ID Number **Events**

Cam No. =Camera ID Number **ST=Starting event number**

SD=SD Card Number **CL=Closing event number**

ST=Starting Frame number of the SD, CL=Closing Frame Number of the SD, EXPS=Number of Exposures during the trap period

Captured Animal Data

Setup Date: 1, Dec.10 **GPS Position: N 14°32′ 23.2”** **Data Form No.:05/TNR-Tiger/10-11**

RetrievalDate: 27, Dec.10 **E 98°15′19. 9"**

Location: Byaikkathan Chaung **Camera ID: HZYB-003**
Sample No. HZYB-3

Microhabitat: Open Hill Evergreen **Animal Sign: No Sign**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Asiatic Brush-tailed Porcupine	Atherurus macrourus	1	
2	Stump-tailed Macaque	Macaca artoides	6	
3	Leopard Cat	Felis bengalensis	1	
4	Golden Cat	Felis temmincki tristi	1	
5	Himalayan Black Bear	Selenarctos thibetanus	1	
6	Unidentified		1	
7	Fail Trip		27	
	Total		38	

Captured Animal Data

Setup Date: 2, Dec.10 GPS Position: N 14°31′45.4" E 98°16′26.8"
Data Form No.:06/TNR-Tiger/10-11
RetrievalDate: 27, Dec.10

Location: Yebu Phyar Camera ID: HZYB-004
Sample No. HZ-4

Microhabitat: Hill evergreen Animal Sign: No Sign

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Malayan Porcupine	Hystrix brachyura	14	
2	Stump-tailed Macaque	Macaca artoides	5	
3	Common Wild Pig	Sus scrofa	15	
4	Golden Cat	Felis temmincki tristi	1	
5	Asiatic Wild Dog	Cuon alpinus	1	
6	Serow	Capricornis sumatrensis	3	
7	Unidentified		10	
8	Hunter		2	
9	Fail Trip		27	
	Total		78	

Captured Animal Data

Setup Date: 2, Dec.10 GPS Position: N 14°31′30.8" Data Form No.:07/TNR-Tiger/10-11

Retrieval Date: 27, Dec.10 E 98°17′19.4"

Location: Sakan Gyi Camera ID: HZYB-005 Sample No. HZ-5

Microhabitat: Open Hill evergreen Animal Sign: No Animal Sign

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Malayan Porcupine	Hystrix brachyura	1	
2	Asiatic Brush-tailed Porcupine	Atherurus macrourus	2	
3	Common Wild Pig	Sus scrofa	65	
4	Mouse Deer	Tragulus napu napu	2	
5	Stump-tailed Macaque	Macaca artoides	3	
6	Unidentified		1	
7	Fail Trip		37	
	Total		111	

Captured Animal Data

Setup Date: 3, Dec.10 **GPS Position: N 14°30′ 40. 4"** **Data Form No.:08/TNR-Tiger/10-11**

Retrieval Date: 28, Dec.10 **E 98°17′54. 8"**

Location: Lay Gyaw Sone **Camera ID: HZYB-006** **Sample No. HZ-6**

Microhabitat: evergreen **Animal Sign: Scat of Barking Deer**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Mouse Deer	Tragulus napu napu	14	
2	Common Wild Pig	Sus scrofa	1	
3	Himalayan Black Bear	Selenarctos thibetanus	1	
4	Unidentified		3	
5	Fail Trip		8	
	Total		24	

Captured Animal Data

Setup Date: 3, Dec.10 **GPS Position: N 14°30′37. 7"** **Data Form No.:09/TNR-Tiger/10-11**

Retrieval Date: 28, Dec.10 **E 98°17′01. 8"**

Location: Chaung Chauk **Camera ID: HZYB-007**
Sample No. HZ-7

Microhabitat: Stream Bed **Animal Sign: Tracks of Asiatic Black Bear**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Stump-tailed Macaque	Macaca artoides	5	
2	Unidentified		6	
3	Fail Trip		4	
	Total		15	

Captured Animal Data

Setup Date: 4, Dec.10 **GPS Position: N 14°31′28.5" Data Form No.:10/TNR-Tiger/10-11**

Retrieval Date: 29, Dec.10 **E 98°16′07.0"**

Location: Yebu Wa **Camera ID: HZYB-008**
Sample No. HZ-8

Microhabitat: Riverine evergreen **Animal Sign: Fresh Tracks of Wild Pig and Sambar**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Sambar Deer	Cervus unicolor	4	
2	Barking Deer	Muntiacus muntjac	1	
3	Common Wild Pig	Sus scrofa	3	
4	Unidentified		2	
5	Fail Trip		9	
	Total		19	

Captured Animal Data

Setup Date: 21, Dec.10 **GPS Position: N 14°31′45.1" Data Form No.:11/TNR-Tiger/10-11**

Retrieval Date: 1, Jan.11 **E 98°16′16.1"**

Location: Kamyauk Chaung **Camera ID: HZYB-009** **Sample No. HZ-9**

Microhabitat: Riverine evergreen **Animal Sign: Fresh Wallows and Tracks of Wild Pig**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		10	
2	Common Wild Pig	Sus scrofa	25	
3	Unidentified		-	
4	Fail Trip		9	
5	Finish Picture		4	
	Total		38	

Camera Trap Data Sheet (TNRP)

Date; 11, Jan.-12, Jan.2011 **Locality; Khotama &Zinba Streams**

Date/Time	Camera I.D.	Location	GPS Position	Frame No.	Remark
11,Jan.11/10:47	KTZB-1	Kotama Yeboke	N 14°45′3.7" E 98°15′23.9"	B100704070	Gaur Tracks
12,Jan.11/12:40	KTZB-2	Hsat Kwin	N 14°4′46.6" E 98°14′48.4"	B100701813	Samba Tracks
12,Jan.11/13:30	KTZB-3	The' Byant	N143′49.1" E98°13′55.0"	B100720940	Samba Tracks
12,Jan.11/15:59	KTZB 4	The' Chaung	N 143′36.6" E 9814′18.8"	B100720957	Samba Tracks

Camera ID; KTZB-1 **Captured Animal Data** **Microhabitat; Saltlick**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		37	
2	Barking Deer	Muntiacus muntjac	8	
3	Common Wild Pig	Sus scrofa	3	
4	Malayan Porcupine	Hystrix brachyura	9	
5	Gaur	Bos gaurus	177	
6	Tapir	Tapirus indicus	9	
7	Sambar Deer	Cervus unicolor	25	
8	Unidentified		29	
9	Fail Trip		18	
	Total		364	

Camera ID; KTZB-2 **Captured Animal Data** **Microhabitat; Saltlick**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		19	
2	Common Wild Pig	Sus scrofa	1	
3	Malayan Porcupine	Hystrix brachyura	32	
4	Crab Eating Mongoose	Herpestes urva	1	
6	Pig-tailed Macaque	Macaca nemestrina	2	
7	Sambar Deer	Cervus unicolor	68	
8	Hunter		1	
9	Unidentified		2	
10	Fail Trip		33	
11	Finish Picture		15	
	Total		174	

Camera ID; KTZB-3 Captured Animal Data Microhabitat; Stream bed

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		27	
2	Common Wild Pig	Sus scrofa	8	
3	Sambar Deer	Cervus unicolor	3	
4	Unidentified		2	
5	Fail Trip		21	
6	Finish Picture		16	
	Total		77	

Camera ID; KTZB-4 Captured Animal Data Microhabitat; Stream bed

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		21	
2	Barking Deer	Muntiacus muntjac	1	
3	Marbled Cat	Felis marmorata	3	
4	Common Palm Civet or Toddy Cat	Paradoxurus hermaphroditus	4	
5	Sambar Deer	Cervus unicolor	1	
6	Unidentified		1	
7	Fail Trip		8	
8	Finish Picture		14	
	Total		53	

Camera ID; MK-1 Captured Animal Data Microhabitat; -

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		17	
2	Barking Deer	Muntiacus muntjac	1	
3	Common Wild Pig	Sus scrofa	18	
4	Asiatic Brush Tail Porcupine	Atherurusmacrourus	2	
5	Binturong	Arctictis binturong	4	
6	Large Indian Civet	Viverra zibetha	1	
7	Common Palm Civet or Toddy Cat	Paradoxurus hermaphroditus	27	
8	Stump- tailed Macaque	Macaca artoides	4	
9	Pheasant	-	6	
10	Unidentified		5	
12	Fail Trip		45	
13	Finish Picture		2	
	Total		132	

Camera ID; MK-2 **Captured Animal Data** **Microhabitat; -Open Evergreen**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		27	
2	Asiatic Brush Tail Porcupine	Atherurus macrourus	1	
3	Malayan Porcupine	Htstrix brachyura	2	
7	Common Palm Civet or Toddy Cat	Paradoxurus hermaphroditus	8	
8	Leopard Cat	Felis bengalensis	1	
9	Pheasant	-	9	
10	Unidentified		3	
12	Fail Trip		22	
13	Finish Picture		2	
	Total		75	

Camera ID; MK-3 **Captured Animal Data** **Microhabitat; -Open Evergreen**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		15	
2	Stump- tailed Macaque	Macaca artoides	1	
3	Malayan Sun Bear	Helarctos malayanus	5	
4	Unidentified		-	
5	Fail Trip		5	
6	Finish Picture		2	
	Total		28	

Camera Trap Data Sheet (TNRP)

Date; 21, Jan.-24, Jan.2011 **Locality; Sinbosinma Mountain**

Date/Time	Camera I.D.	Location	GPS Position	Frame No.	Remark
22,Jan.11/16:00	SBSM-1	Southern Boundary	N 14°21′51.5" E 98°17′40.5"	B100704034	No Sign
23,Jan.11/08:25	SBSM-2	North Tributary	N 14°22′58.4" E 98°18′03.5"	B100704022	Wild Pig Tracks

Camera ID; SBSM-1 Captured Animal Data Microhabitat; -Open Evergreen

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		13	
2	Long Tail Macaque	Macaca fascicularis	1	
3	Himalayan Black Bear	Selenarctos thibetanus	1	
4	Serow	Capricornis sumatrensis	2	
5	Leopard	Panthera pardus	1	
6	Marbled Cat	Felis marmorata	2	
7	Stump-tailed Macaque	Macaca ardoites	10	
8	Pheasant	-	21	
9	Unidentified		12	
10	Fail Trip		85	
11	Finish Picture		2	
	Total		150	

Camera ID; SBSM-2 Captured Animal Data Microhabitat; -Open Evergreen

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		16	
2	Malayan Sun Bear	Helarctos malayanus	1	
3	Unidentified		-	
4	Fail Trip		8	
5	Finish Picture		4	
	Total		29	

Camera Trap Data Sheet (TNRP)

Date; 5, Feb.-11, Feb.2011 **Locality; Malwanpo&Heinze Streams**

Date/Time	Camera I.D.	Location	GPS Position	Frame No.	Remark
9,Feb.11/ 13:41:24	MLPHZ-1	Peindaw Confluence	N 14°28′ 47. 4" E 98°22′25. 5"	B100701813	Wild Pig&Sambar Tracks
10,Feb.11/ 08:54:01	MLPHZ -2	Peindaw Chaung (Thabyubin)	N 14°28′19. 9" E 98°22′36. 0"	B100720940	Wild Pig, Samba&Bear Tracks
10,Feb.11/ 16:22:47	MLPHZ -3	Kyaukm attat Ridge	N14°27′28. 7" E98°19′06. 9"	B100720927	Nil
11,Feb.11/ 11:00:00	MLPHZ -4	Yebote Confluen ce	N 14°26′02. 0" E 98°19′09. 8"	B10070942	Samba,Muntjac &Wild Pig Tracks
11,Feb.11/ 11:00:00	MLPHZ-5	Heinze Far reach	N 14°25′33. 4" E 98°18′15. 9"	B100720957	Wild Pig&Sambar Tracks

Camera ID; MLPHZ-1 **Captured Animal Data** **Microhabitat; -Close Evergreen**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		7	
2	Himalayan Black Bear	Selenarctos thibetanus	2	
3	Unidentified		-	
4	Fail Trip		-	
5	Finish Picture		9	
	Total		18	

Camera ID; MLPHZ-2 Captured Animal Data Microhabitat; -Close Evergreen

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		7	
2	Malayan Porcupine	Htstrix brachyura	4	
3	Large Indian Civet	Viverra zibetha	12	
4	Binturong	Arctictis binturong	1	
5	Asiatic Wild Dog	Cuon alpinus	14	
6	Hunter	-	3	
7	Domestic Dog	-	3	
3	Unidentified		-	
4	Fail Trip		7	
5	Finish Picture		18	
	Total		68	

Camera ID; MLPHZ-3 Captured Animal Data Microhabitat; -Open Evergreen

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		2	
2	Common Wild Pig	Sus scrofa	6	
3	Barking Deer	Muntiacus muntjac	5	
4	Crab Eating Mongoose	Herpestes urva	2	
3	Unidentified		-	
4	Fail Trip		44	
5	Finish Picture		2	
	Total		61	

Camera ID; MLPHZ-4s Captured Animal Data Microhabitat; -Close Evergreen

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture	-	17	
2	Unidentified	-	-	
3	Fail Trip	-	1	
4	Finish Picture	-	9	
	Total		27	

Camera ID; MLPHZ-5 **Captured Animal Data** **Microhabitat; -Riverine Evergreen**

Sl. No.	Name of Species	Scientific Name	No. of Frame	Remark
1	Test Picture		26	
2	Malayan Porcupine	Htstrix brachyura	5	
3	Large Indian Civet	Viverra zibetha	1	
4	Barking Deer	Muntiacus muntjac	5	
5	Mouse Deer	Tragulus napu napu	1	
6	Cattler Smuggler	-	14	
7	Cattle	-	12	
3	Unidentified	-	1	
4	Fail Trip	-	13	
5	Finish Picture	-	5	
	Total	-	23	

Appendix10. Carnivore Scat Data Collection Sheet

Observer: Myint Maung **Field Site: Hein Stream**

Date: 20, Dec.10 **Weather: Sunny** **Page No. 1**

Start Time: 09:00 **End Time: 16:20** **Sample Walk No. 1**

Start Location: TNR Boundary& Luwaing Chaung **End location: Compartment-40 Stream**

Sl. No.	Specimens.	Time of Collect-ion	GPS Position of Location	Predator (Tiger,Leopard,Unknown)	Evidence (Size,Scrape, Track)	Scat Diameter (mm)	Prey ID
1	HZCS1A	10:44	N14°27'54.6"	Wild Dog	Nil	-	Wild Pig
			E98°14'36.8"				
2	HZCS2A	10:50	N14°27'54.6"	Wild Dog	Nil	20	Wild Pig
			E98°14'36.8"				
3	HZCS3A	12:11	N14°28'8.1"	Wild Dog	Track	-	Wild Pig
			E98°15'51.9"				
4	HZCS4A	12:17	N14°28'8.1"	Wild Dog	Track	-	Wild Pig
			E98°15'51.9"				
5	HZCS5A	15:18	N14°27'54.6"	Wild Dog	Nil	24	Wild Pig
			E98°14'36.8"				

N.B; HZ=Heinze, CS=Carnivore Scat, 1, 2, 3=Site Number, A=Numeric Value

Carnivore Scat Data Collection Sheet

Observer: Myint Maung **Field Site: Heinze Stream**

Date: 21, Dec.10 **Weather: Sunny** **Page No. 1**

Start Time: 08:10 **End Time: 09:25** **Sample Walk No. 2**

Start Location: Confluence of Nwansee & Heinze Chaungs; **End location: Compartment-40 Stream**

Sl. No.	Specimen No.	Time of Collection	GPS Position of Location	Predator (Tiger, Leopard, Unknown)	Evidence (Size, Scrape, Track)	Scat Diameter (mm)	Prey ID
1	HZCS1A	09:21	N14°27'54.6"	Wild Dog	Nil	22	Wild Pig
			E98°14'36.8"				

N.B; HZ=Heinze, CS=Carnivore Scat, 1, 2, 3=Site Number, A=Numeric Value

Carnivore Scat Data Collection Sheet

Observer: Saw Thaw Tu Htoo **Field Site: Yebone Stream**

Date: 28, Dec.10 **Weather: Sunny** **Page No.2**

Start Time: 06:30 **End Time: 12:25** **Sample Walk No. 3**

Start Location: Sakan Gyi **End location: Chaung Chauk**

Sl. No.	Specimen No.	Time of Collection	GPS Position of Location	Predator (Tiger, Leopard, Unknown)	Evidence (Size, Scrape, Track)	Scat Diameter (mm)	Prey ID
1	YBCS1A	06:55	N14°31'17.9"	Unknown	Nil	-	Wild Pig
			E98°17'19.2"				
2	8/YBCS8A	07:06	N14°31'15.3"	Unknown	Nil	-	Unknown
			E98°17'22.1"				

Carnivore Scat Data Collection Sheet

Observer: Myint Maung **Field Site: Heinze Stream**

Date: 20, Dec.10 **Weather: Sunny** **Page No. 2**

Start Time: 09:00 **End Time: 16:20** **Sample Walk No. 4**

Start Location: TNR Boundary **End location: Compartment-40 Stream**

Luwaing Chaung

Sl. No.	Specimens.	Time of Collect-ion	GPS Position of Location	Predator (Tiger,Leopard,Unknown)	Evidence (Size,Scrape, Track)	Scat Diameter(mm)	Prey ID
1	1/HZCS1A	10:44	N14°27'54.6"	Wild Dog	Nil	-	Wild Pig
			E98°14'36.8"				
2	2/HZCS2A	10:50	N14°27'54.6"	Wild Dog	Nil	20	Wild Pig
			E98°14'36.8"				
3	3/HZCS3A	12:11	N14°28'8.1"	Wild Dog	Track	-	Wild Pig
			E98°15'51.9"				
4	4/HZCS4A	12:17	N14°28'8.1"	Wild Dog	Track	-	Wild Pig
			E98°15'51.9"				
5	5/HZCS5A	15:18	N14°27'54.6"	Wild Dog	Nil	24	Wild Pig
			E98°14'36.8"				

Carnivore Scat Data Collection Sheet

Observer: Myint Maung **Field Site: Heinze Stream**

Date: 21, Dec.10 **Weather: Sunny** **Page No. 3**

Start Time: 08:10 **End Time: 09:25** **Sample Walk No. 5**

Start Location: Confluence ofNwansee& Heinze Chaungs **End location: Compartment-40 Stream**

Sl. No.	Specimen No.	Time of Collection	GPS Position of Location	Predator (Tiger, Leopard, Unknown)	Evidence (Size, Scrape, Track)	Scat Diameter (mm)	Prey ID
1	6/HZCS6A	09:21	N14°27'54.6"	Wild Dog	Nil	22	Wild Pig
			E98°14'36.8"				

Carnivore Scat Data Collection Sheet

Observer: Saw Thaw Tu Htoo **Field Site: Yebone Stream**

Date: 28, Dec.10 **Weather: Sunny** **Page No. 3**

Start Time: 06:30 **End Time: 12:25** **Sample Walk No. 6**

Start Location: Sakan Gyi **End location: Chaung Chauk**

Sl. No.	Specimen No.	Time of Collection	GPS Position of Location	Predator (Tiger, Leopard, Unknown)	Evidence (Size, Scrape, Track)	Scat Diameter (mm)	Prey ID
1	7/YBCS7A	06:55	N14°31'17.9"	Unknown	Nil	-	Wild Pig
			E98°17'19.2"				
2	8/YBCS8A	07:06	N14°31'15.3"	Unknown	Nil	-	Unknown
			E98°17'22.1"				

Carnivore Scat Data Collection Sheet

Observer: Myint Maung **Field Site: Malwanpo Stream**

Date: 5, Feb.11-11, Feb.11 **Weather: Sunny** **Page No. 4**

Start Time: 14:00 **End Time: 13:18** **Sample Walk No. 7**

Start Location: Heinze Upstream **End location: Malwanpo Stream**

Sl. No.	Specimen No.	Time of Collection	GPS Position of Location	Predator (Tiger, Leopard, Unknown)	Evidence (Size, Scrape, Track)	Scat Diameter (mm)	Prey ID
1	1/MLPHZ/CS1A	14:00	N14°27'55.6"	Unknown	Nil	15	Unknown
			E98°14'21.4"				
2	2/MLPHZ/CS1A	07:57	N14°26'33.1"	Unknown	Nil	18	Unknown
			E98°16'23.2"				
3	3/MLPHZ/CS1A	08:30	N14 .43327785°	Unknown	Nil	-	Unknown
			E98 .31322253°				
4	4/MLPHZ/CS1A	10:45	N14 .45360899°	Unknown	Nil	18	Unknown
			E98 31862986°				
5	5/MLPHZ/CS1A	10:59	N14°27′53.9"	Golden Cat	Track	20	Unknown
			E98°20'13.8"				
6	6/MLPHZ/CS1A	13:18	N14°25'59.8"	Unknown	Nil	18	Unknown
			E98°18'54.6"				

Carnivore Scat Data Collection Sheet

Observer: Myint Shein **Field Site: Sinbosinma Taung**

Date: 20, Feb.11 **Weather: Sunny** **Page No. 5**

Start Time: 14:20 **Sample Walk No. 8**

Start Location: Confluence ofKyaukphyu &Talaingya Streams **End location: Sinbosinma**

Sl. No.	Specimen No.	Time of Collection	GPS Position of Location	Predator (Tiger, Leopard, Unknown)	Evidence (Size, Scrape, Track)	Scat Diameter (mm)	Prey ID
1	1/SBSM/ CS1A	14:20	N14°19’32.2”	Unknown	Nil	24	Unknown
			E98°13’30.2”				

Carnivore Scat Data Collection Sheet

Observer: Saw Thaw Tu Htoo **Field Site: Meke Stream**

Date: 23, Jan.11 **Weather: Sunny** **Page No. 5**

Start Time: 08:03 **End Time: 09:25** **Sample Walk No. 9**

Start Location: Nwelein Range **End location: Meke Upstream**

Sl. No.	Specimen No.	Time of Collection	GPS Position of Location	Predator (Tiger, Leopard, Unknown)	Evidence (Size, Scrape, Track)	Scat Diameter (mm)	Prey ID
1	1/MK/CS1A	09:21	N14°34’59.2”	Unknown	Nil	22	Unknown
			E98°19’19.7”				