

on forest cover and landuse, locations of survey sites, drainages, topography, human settlements, roads and other human infrastructure. In the future, the two databases will be linked to allow quick retrieval of information from surveys directly from the spatial database. This GIS could serve as a template for a National Wildlife Database to which other information on biodiversity might be archived in the future.

6.8 Results

6.8.1. *Camera-trap operation.* A total of 4,099 photorecords were made by camera-traps including 3,341 records (88%) of wildlife, 358 records (9%) of humans, and 112 records (3%) of domestic animals (Appendix II). A total of 19 globally threatened species and 7 globally near-threatened species were recorded by camera-traps, and eight CITES Appendix I, three Appendix II, and five Appendix III species. Eighty-three percent were Myanmar protected species, with 40% totally protected species

The mean failure rate per site was $17 \pm 3\%$ (range: 1 – 33, N=15). Camera-traps failed to work for a variety of reasons ranging but were mostly a result of mechanical failure. Extremes of heat, cold and moisture may cause internal circuits and sensors to stop working in the field. Theft or damage from animals, especially elephants, were secondary reasons for trap failure.

6.8.2. *Species richness.* Camera-traps revealed a diverse assemblage of fauna at fifteen sites (Appendix II). Forty-two species of large mammals were recorded with an average 16.4 ± 1.3 species (range: 6 – 22, N=15) per site (Appendix IX). Six species were recorded at MB, the least rich site, while at four sites, AKNP, TMT, RN and SPB, 22 species were documented. In addition, sixteen species of birds, small mammals and reptiles were recorded. However, these fauna were likely to be recorded as accidents of sampling in camera-traps so that the surveys were not representative of their richness.

6.8.3. *Wildlife traffic.* Surveys indicated a range of levels of wildlife traffic across sites. Only large mammal species are considered here. From camera-traps, sites had a mean capture rate of 15.0 ± 2.6 animals/100 trapnights (N=17). MB had the lowest

capture rates (5.7 animals/100 trapnights) with BGY and RN having the highest capture rates (36.2 and 34.2 animals/100 trapnights, respectively). From track and sign surveys, the mean encounter rate of wildlife sign was 4.1 ± 0.5 signs/hr. PPDL had the lowest encounter rates (1.7 signs/hr) with NKM the highest (8.3 signs/hr).

6.8.4. *Human traffic.* Levels of human traffic also varied across sites. From camera-traps, sites had a mean capture rate of 2.1 ± 0.7 photorecords/100 trapnights (N=17). TMT and SRMT had the lowest human traffic (0.15 and 0.18 photorecords/100 trapnights) with PPDL having the highest traffic (11 photorecords/100 trapnights, respectively). From track and sign surveys, mean human traffic was 0.3 ± 0.05 signs/hr. TMT and RER had the lowest encounter rates (<0.1 signs/hr) with TNTY the highest (0.7 signs/hr).

6.8.5. *Occurrence of carnivores.* One or more of the large carnivores – tiger, Asiatic leopard (*Panthera pardus*), Malayan sunbear (*Helarctos malayanus*) and Asiatic black bear (*Selenarctos thibetanus*) and Asian dhole (*Cuon alpinus*) were recorded by camera-traps at all 17 survey sites (Appendix IX.). Sunbear occurred at all but two sites; SRMT and PPDL, making it the most frequently occurring large carnivore species. Dhole occurred at all but four sites; TMT, SRMT, PLG, and MB. Leopard occurred at just over half the sites. Asiatic black bear occurred at just under one-quarter of sites.

6.8.6. *Occurrence of tigers across study sites*

Interviews. A total of 990 local people were questioned about the occurrence of tigers and other wildlife at the 17 sites (Appendix III). These individuals were local villagers, hunters, and government officials living in or around forest areas. Two hundred and thirty eight (24%) individuals interviewed reported having either seen tigers, encountered sign, or heard tigers. One hundred and seven (45%) records were direct sightings. Eighty-seven (81%) of these eyewitness accounts were made after 1990.

Direct survey. Signs of large cats (tiger or leopard) were recorded at all survey sites. Tigers were confirmed by camera-trapping at four of 17 sites; TMT, HKV, MMLK and TNTY (Appendix IX; Fig. 13.).

1. TMT: a single photo of a tiger was recorded during October 1999 along with two sets of tracks during the trap retrieval exercise. After the survey team left the area, a tiger was reported killed by hunters from an area adjacent to the survey site.
2. HKV: Fresh sign was found on both sides of upper and lower Shipak Hka between Tarung Hka and Brangbram Hka, and at Numpraw Hka on 3rd February 2002, during the camera-trap set up exercise. Three photos of tiger were recorded by camera-traps on 11.2.01, 10.3.01, and 11.3.01. Tigers are thought to be resident in the upper Brangbram Hka, upper Tanaing Hka, Maingkwan and surrounding area, and around Shinbwaeyan.
3. MMLK: Fresh tracks were found during the camera-setup (26.9.01 – 4.10.01) and retrieval exercises (7.11.01-14.11.01) and plaster cast records made. A single photo of a tiger was recorded from a camera-trap unit set up on a trail on 10.10.01. Nine of 25 units failed to operate so more photo-records might have been made.
4. TNTY; a set of tracks was encountered during the camera-setup operation (17-20.1.02) and a plaster cast made. Although no photorecords were made local people reported a killing of a tigress on 17.1.02 at Kyachaung Village, 2 mi S of Manoron

Fig. 13. Camera-trap photorecords of tiger from surveys at 17 sites in Myanmar, 1999-2002.



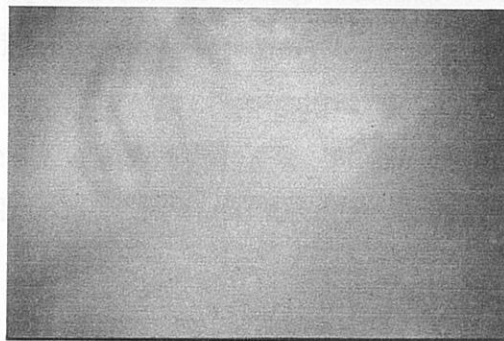
1. Tiger recorded by camera-trap at Htaung Pru Reserve Forest, Tanintharyi Division, 10.10.01



4. Tiger recorded by camera-trap at Hukaung Valley, Kachin State, 11.3.01



2. Tiger recorded by camera-trap at Hukaung Valley, Kachin State, 10.3.01



5. Tiger recorded by camera-trap at Htamanthi Wildlife Sanctuary, Sagaing Division, 10.99



3. Tiger recorded by camera-trap at Hukaung Valley, Kachin State, 11.2.01

6.8.7. *Density of tigers.* (Karanth & Nichols 2000) estimated tiger density for multiple sites in India. One of their study sites – Bhadra – is similar in topography and vegetation to northern Myanmar forests. Using information from single sided captures, tiger density was estimated for the Hukaung Valley, where captures of two individual tigers were made. Using a mark-recapture approach (Karanth and Nichols 1998) and assuming a capture probability for tigers (0.788) and a sampling buffer (2km), densities were estimated for the tiger populations at HTM, HKV and MMLK (Table 7).

6.8.8. *Occurrence of other large mammals.* Large (>1 kg) herbivores were recorded from all survey sites (Appendix IX.). Common muntjak (*Muntiacus muntjak*) was the most abundant species in camera-traps and was found at all sites. Wild cattle were recorded at all sites except SRMT, PPDL, and MMLK. Banteng (*Bos javanicus*), a globally threatened species was found at 3 sites; AKNP, MHM and BGY. Sambar (*Cervus unicolor*) were present at all sites except SRMT, PPDL, and MB. Serow (*Capricornis sumatraensis*) were recorded at just under 50% of sites.

6.8.9. *Human traffic within study sites.* Camera-traps recorded suspected poachers at 8 (47%) of sites (Appendix IX.) with villagers recorded at all but three sites; HKV, SPB, MB. Traps at AKNP recorded park rangers on patrol, while traps at MMLK and TNTY recorded military personnel on patrol.

Table 7. Tiger densities at some rainforest and evergreen forests in Myanmar and neighbour countries.

Country	Site	No. tigers detected	Density est.* (tigers/100km ²)	Min density	Max density
<i>India</i>	<i>Bhadra</i>	7	3.42	2.58	4.26
Thailand	Kaeng Krachan	4	2.82	1.96	3.67
Thailand	Hala	3	2.68	2.42	2.93
Thailand	Bala	2	1.79	1.50	2.07
<i>Malaysia</i>	<i>Temenggor</i> ¹	2	1.78	0.94	2.63
<i>Indonesia</i>	<i>Bukit Berisan</i> ²	9	1.60	1.2	3.2
Myanmar	Hukaung Valley	2	1.10**	0.91	1.29
Myanmar	Myintmoletka	1	0.67**	0.38	0.96
Thailand	Phu Khieo	1	0.62**	0.35	0.88
Myanmar	Htamanthi	1	0.49**	0.28	0.70
Thailand	Khao Yai	1	0.38**	0.22	0.54

* Single sided M-R estimates using Program CAPTURE

** No recaptures. Density (D) = No. tigers (N) /Area, where N = No. tigers detected/p, and p=0.778 (from Badhra, India; Karanth and Nichols, 2000)

¹R. Laidlaw and DWNP (unpublished data)

²O'Brien et al. ms

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1. Alaungdaw Kathapa National Park (AKNP)

Location: lies between Chindwin River floodplain and Myittha River valley in Sagaing Province, approximately 100 miles (160km) west of Mandalay.

Survey area: centred around Mindon Camp covered an area of 244 sq. mi (632 sq.km), approximately 25% of the Park's total area.

Elevation: 100 – 3,440' (30-1048 m).

Description: The area is dissected by a number of high elevation 2000-4000+' (700-1219m) ridges that run in a north-south direction, and is drained by the Patolon and Taungdwin Rivers which flow northwards into the Chindwin River.

Vegetation: varies from dry upper mixed deciduous forest on the high ridges and slopes to moist upper mixed deciduous forest on lower slopes. Bamboos are common in the understory on lower slopes. Semi-indaing forest, high indaing forest or pine forest occur in patches on the tops of some high ridges.

Access: Alaungdaw Kathapa is accessed from the east by road from Yinmarbin, and via a newly constructed road that links India with Mandalay and cuts through the northwest of the park. Walking distance from the nearest road was 1 day.

Rainfall: It is subject to two monsoons, a southwest monsoon which brings most of the yearly rainfall between May and October, and heaviest between August and September. Mean annual rainfall is 58.8" (1,507mm). Water is available year round in the major drainages with smaller tributaries mostly drying up by the end of March.

Human impact and landuse: The park is surrounded almost completely by cultivated land but inside the park the only settlements are of park staff, mahouts and a monastery. Military camps and religious pilgrimages are major threats to wildlife. Other threats are hunting for wildlife trade, extraction of non-timber forest products, livestock grazing and fishing.

2. Thaungdut

Location: Lies in the Homemalin Township, Sagain division and contiguity with Kabaw Valley.

Survey area: Thaungdut preserve covered an area of 175 sq.mi. (453 sq.km). Survey area situated at N 24o17', 24o30' and E 94o30', 94o43'.

Description: The area is surrounded by Thaungdut extended Nature reserve in the east, southeast and Kabaw Valley in the north and northwest. The stream namely Nantanyit drain south to north between Minthamee Mountain 1871 feet (570m) and Nantanyit Mountain 3545' (1080m) and enters Chindwin river near Thaungdut village.

Vegetation: Varies from dry upper mixed deciduous forest, Moist upper mixed deciduous forest, Indaing forest. Bamboos such as Myin Wa, Tin Wa, Wa Bo, Wa Nipa, Theik Wa, Kya Khet Wa and ritton are common.

Access: Thaungdut village is accessed by boat along Chindwin river in every season. It takes about 2 days travel by boat from Monywa. From Thaungdut village to the forest can be accessed by elephant or walk. Survey area is 10 miles (16 km) far from Thuangdut village.

Rainfall: (No data available)

Human Impact and Landuse: Timber extraction has occurred in the area for several years, with the Myanmar Timber Enterprise still extracting hard wood,

mainly Teak. Hunting, timber cutting, and intrusions by elephant workers and fishermen are threats to wildlife in this area. There were no signs of human settlements or cultivation in the area.

3. Htamanthi Wildlife Sanctuary (TMT)

Location: The survey area is located at 25°26'N 95°37'E. It is bounded to the N by Nampilin Chaung, to the E and SE by Pali Taung, Temein Taung, and New-tamein Taung 1,000' – 2,000' (304-609m) and the Uyu River, to the S by numerous streams, and to the W by the Chindwin River. The area is drained by the Nampilin, Nam Emo, Nam Ezu, Nam Pagan and Nam Yanyin all of which flow W into the Chindwin River.

Survey area: 830 sq. mi. (2,150 sq. km).

Elevation: 490 – 1,100' (149-335m)

Description: Vegetation is primarily tropical evergreen forest with dense bamboo and rattan undergrowth. Mixed deciduous teak forest is also found on higher slopes in the eastern part of the sanctuary.

Access: The area accessed by boat from Homalin, the nearest town, 57 mi. (91km) and a 2 day journey away.

Rainfall: 136" (3,491mm) per annum

Human impact and landuse: No permanent human settlements exist inside the sanctuary but the area is used by Lisu hilltribes who hunt wildlife, and by local people who fishing and extract non-timber forest products. Oil drilling occurs in the area.

4. Mahamyaing (MHM)

Location: The survey areas lies between 23°30' – 23°43'N and 94°47' – 94°57'E. The area includes parts of Lawthar, Pyaungtha, Maingwan, Mahamyaing and Nonsabai Reserve Forests.

Survey area: 125 sq. mi. (323 sq. km)

Elevation: 226' – 2,071' (68-631m)

Description: The landscape is characterized by evergreen, mixed deciduous and indaing (dipterocarp) forests. The area is drained in the W by the Kaedan Chaung which originates at Honan Taung Dan 2,017' (614m) and flows into the Chindwin River. In the E the Pyaungthwe Chaung drains into the Mu River.

Access: Reached on foot from Aungchanthar Village, 20 mi. (32km) away on the Monywa-Khanti highway

Rainfall: 60" (1,552mm)

Human impact and landuse: Timber extraction from the surrounding areas has taken place since 1973. At present two private companies are extracting dipterocarp from part of the area. Numerous current and old settlements occur in the area. Cattle grazing is taking place. Oil drilling occurred in the past.

5. Nankamu (NKM)

Location: The survey area is located between 24°03'N 94°57'E and 25°15'N 96°12'E between Paungbyin and Pinlebu Townships. It includes parts of Sanda, Kaingshe and Paungbyin Reserved Forests. In the N it is bounded by the catchment of Thetla Chaung, a tributary of the Chindwin River, to the E by Zibu Taungdan 2,319' - 2,910' (706-886m), a catchment of the Mu River, to the S by the Namkawin and Kodan Chaung, tributaries of the Chindwin River.

Survey area: 94 sq. mi. (243 sq. km)

Elevation: 186 – 2,100' (56-640m)

Description: Vegetation is dominated by moist upper mixed deciduous forest, with evergreen forest and indaing forest.

Access: The area is accessible by the newly constructed Pinlebu-Paungbyin Road. Paungbyin Town is 300 mi (482km) from Monywa. The base camp was 25 mi (40km) from from Paungbyin.

Rainfall: 91" (2,342 mm)

Human impact and landuse: Teak extraction occurred in the area 15 years ago. Bamboo and mushroom collecting occurs along trails in the area.

6. Saramati (SRMT)

Location: The survey area is located between 25o20' - 25o43'N and 94o50' - 95o40'E. It is bounded to the N by the Saramati Range to the E by the Chindwin River and Laytin Ridge 5,790'(1,764m) to the S by Lawpe Mountain 8,455'(2,577m) and W by the Myanmar – India border.

Survey area: 406 sq. mi. (1,051 sq. km)

Elevation: 410 – 12,553' (124-3,826m)

Description: Streams in the Saramati and Laytin catchments flow to the Nantalaik River, one of the principal tributaries of the Chindwin River. The survey area is contiguous with India's Shiloi Reserve Forest. Vegetation cover consists of evergreen, pine, moist hill evergreen and sub-tropical evergreen forest with bamboo in the understory.

Access: The area is accessed from Layshi by vehicle in the dry season using an old road, and during the wet season on foot. Mt Saramati, in the N of the survey area is 40 mi (64km) from Layshi, accessible only on foot.

Rainfall: 91" (2,342 mm)

Human impact and landuse: Though sparsely populated, shifting cultivation occurs as high up as 7,000' (2,133m) elevation.

7. Paunglaung Catchment (PLG)

Location: The survey area is located between 19o15'N 96o20'E and 20o30'N 96o40'E in Pyinmana Township, Mandalay Division. It is bounded to the N by Yamethin Township, to the E by Pinlaung Township, to the S by Pyinmana Township, and to the W by Tatkan Township.

Survey area: 214 sq. mi. (554 sq. km)

Elevation: 500 – 6,252' (152-1,905m)

Description: Riverine evergreen and moist upper mixed deciduous (MUMD) forest occur in the lowlands whith dry upper mixed deciduous (DUMD), Indaing (dipterocarp), grassland and alpine forest at higher elevations. The entire catchment is 1,779 sq. mi. (4,608 sq.km). A rugged mountain range dissects the area.

Access: Two days walk from Taunggya to the center of the study area across a 6,000' (1,828m) mountain range.

Rainfall: 80" (2,058 mm)

Human impact and landuse: Numerous villages occur near the study area. Shifting cultivation occurs in the area, encroaching on the reserve forest area. The area is sparsely populated owing to difficult access.

8. Panlaung Pyadalin Cave Wildlife Sanctuary

Location: lies in Ywa Ngan Township, Shan State and 21 miles (33km) far from Kinda Dam and Hydro Power Project.

Survey area: It is situated in Kinda Dam area and covered with two nature preserve areas such as Panlaung preserve area 117 sq.mi. (303 sq.km) and Pyadalin preserve area 11 sq.mi. (28 sq. km).

Description: The area is surrounded by Kinda Dam in the north, Ywa Ngan Township in the east, Thazi township in the south and Wan Twin Township in the west respectively.

Vegetation: Kanyin, Thinkan, Thinkadu, Leza, Taungthayet, Myaukngo, Myaukchaw, Bamboo, rattan can be seen in Riverine evergreen forest. Hard wood plant and many species of bamboo can be seen in Moist deciduous forest. Padauk, Thit ya, Ingyin, Thitsay, Lunpo, Yone are seen in Dry deciduous forest and Thit ae, Thit Ya and Wet Thit Cha are seen in 3,000' (914m) an elevation.

Access: Panlaung-Pyadalin is accessed by road from Kume village, Myittha Township to Kinda Dam and 1 hour by boat from the Dam and then one hour walk to research area.

Rainfall: No data available

Human Impact and Landuse: Temporary human settlements occur in the area. Bamboo collection for making chop sticks is practiced. Timber extraction, non-timber extraction, fishing, hunting and cultivation are threats to wildlife. Roads passing through the wildlife sanctuary are used for extracting timber and moving cattle.

9. Bago Yoma (BGY)

Location: The survey area is located between 19o00'N 95o47'E and 19o25'N 96o15'E, and included parts of Sabyin, West Swa and Kabaung Reserved Forests. It is bounded to the N and E by the Sabyin River, to the E by the Swa River, to the W by the Bago Yoma Range 1,865' (568m), and to the S by the Pyu Mountain 1,537' (468m) and the Kabaung River catchment.

Survey area: 209 sq. mi. (541 sq. km)

Elevation: 330' – 1,885' (100-574m)

Description: The area is drained by the Sittaung River and its tributaries. Vegetation is characterized by dry upper mixed deciduous forest, moist upper mixed deciduous forest and evergreen forest. Bamboos are common in the understory.

Access: The area can be reached by 3 days walk from Swa Dam which is located to the west of Swa Town on the Yangon-Mandalay highway about 200 mi. (320km) from Yangon by road.

Rainfall: 126" (3,235 mm)

Human impact and landuse: Large scale extraction of teak and other hardwood, and other signs of human encroachment including bamboo and rattan collection, hunting and fishing was observed during the study period. No evidence of cultivation or permanent human settlement was observed in the study area.

10. Northern Rakhine (RN)

Location: The survey area 288 sq. mi.(746 sq.km) is located at 21o00'N and 92o24'E and contains the northern Kalapanzin River catchment, Saingdin Ridge and northern Mayu Range.

Survey area: 111 sq. mi. (287 sq. km)

Elevation: 710' – 2,494' (216-760m)

Description: The area is bounded to the N by the Myanmar –Bangladesh border, with the Saingdin River to the E, the Obru and Pairwan Rivers to the S, and the Mayu Range in the W. Vegetation is characterized by sporadic evergreen forest in ravines with extensive Kayin bamboo patches. Forest covers approximately 40% of the survey area. Bamboo is more common in shifting cultivation areas at lower altitudes with dry evergreen forest at higher elevations. Due to logging and bamboo cutting, degraded secondary growth occurs on undulating slopes.

Access: The survey area is accessible by boat along the Mayu and Kalapanzin Rivers, and during the dry season by 6' wide paths cleared by the UN.

Rainfall: (no data available)

Human impact and landuse: A number of tribal settlements occur in areas fringing the forest. The lower Kalapanzin River valley is fertile and supports large villages (100-1000 households) of Bengali people. Hunting, shifting cultivation and extraction of non-timber forest products all occur in the area.

11. Southern Rakhine Elephant Range (RER)

Location: The survey area is located between 17o38'N 94o36'E and 18o22'N 94o55'E on the western side of the Rakhine Yoma Range.

Survey area: 91 sq. mi. (235 sq. km)

Elevation: 252' – 3,416' (77-1,041m)

Description: The area is dissected by a series of tall ridges running north to south range from 2000' – 4000'. The area is drained by the Tandwe Chaung, Salu Chaung and Kyeintali Chaung that flow westwards into the Bay of Bengal. Vegetation includes semi-evergreen, mixed deciduous and secondary tropical moist forest, and bamboo brake.

Access: Gwa Town is located at the NW of Yangon city and 180mi (289km) from Yangon by car. The study area was 3 days walk from Bogale Village, which is 48 mi. (77km) from Gwa by road.

Rainfall: (no data available)

Human impact and landuse: Thirty-three villages surround the Elephant Range consisting of Rakhine tribes (82%) and Chin tribes (18%). They farm rice and groundnut, practice shifting cultivation, and are engaged in commercial hunting of wildlife.

12. Hukaung Valley (HKV)

Location: The survey area lies between 26o16'N x E and 26o45'N and 96o54'E in the newly declared Hukaung Valley Wildlife Sanctuary (2,493 sq. miles; 6,459 sq.km).

Survey area: 525 sq.mi. (840 sq. km)

Elevation: 193' – 1,307' (59-398m)

Description: To the N an upland area 6,758'(2,060m) divides the Tarung-Tawan watershed and Gedu River catchment, with the Kumon Mountains to the E, the Nambyu and Nampyek River catchments in the S and the Tarung River and old Ledo Road to the W. Vegetation is predominantly dense lowland evergreen forest interspersed with meadows.

Access: The area lies 20 miles (32km) N of Tanaing and can be accessed during the wet season by boat and during the dry season by baggage elephant. The Ledo Road is paved for 90 miles (149km) of its length providing year-round access from Myitkyina.

Rainfall: 91" (2,339 mm)

Human impact and landuse: Apart from a 5 acre shifting cultivation area near Tawang River there were no human settlements in the area.

13. Kaunglaungpu (KLP)

Location: The survey area is located in the Kran River and Phet River catchments between 26o40'N 97o30'E and 27o20'N 98o30'E.

Survey area: 204 sq. mi. (528 sq. mi.)

Elevation: 200' - 9,080' (61-2,767m)

Description: These rivers along with the Shinyan and Hteei Rivers drain the area. The area is covered in natural forest (40%) consisting of tropical evergreen, subtropical hill, warm and cool temperate rainforest and alpine. The remainder (60%) is secondary forest damaged by shifting cultivation in former times. These areas are dominated by bamboo, teat trees, phetwin, and old woody lianas. Extraction of some hard woods was taking place.

Access: This area is reached from Putao by road to Magweza (63mi.; 101km). The survey area is accessed by a 63mi. (8 day) walk on foot passing Sunnochat Mountain.

Rainfall: (no data available)

Human impact and landuse: Intensive shifting cultivation has transformed natural forests into secondary forests. Threats to tigers and prey include a new road built from the China border, timber extraction, non-timber forest product extraction, mining, subsistence hunting and wildlife trade with China.

14. Sumprabum (SPB)

Location: The survey area lies 9mi. (15km) east of the Kumon Range and 10 mi. (17km) W of Sumprabum at 26o33'N 97o25'E.

Survey area: 209 sq. mi. (541 sq. km)

Elevation: 460'-4,950' (140-1,508m)

Description: It is bounded to the N by the Chaukan pass and hills that receive snow in winter. The Hukaung Valley lies to the W, with Myitkyina Township to the S. The area is drained by the Hpungchan, Hpung-in and Mali Rivers in the east and northwest, and from the south by the Magyeng River. Vegetation is tropical evergreen, sub-tropical moist hill forest, and subtropical wet hill forest. Bamboos and rattan species occur in the understory. Some swampland occurs in the area.

Access: The area is reached on foot from Sumprabum. Myitkyina is 131 miles (210km) S by road from Sumprabum.

Rainfall: 91" (2,339mm)

Human impact and landuse: The area is sparsely populated (3.8 people/sq. mi.; 2.5/sq.km), with local people practicing shifting cultivation.

15. Momeik-Mabein (MB)

Location: The survey area is located between 27o05'N 97o35'E and 27o30'N 97o55'E and includes parts of Manpon, Nampa and Namme Reserved Forests.

Survey area: 213 sq. mi (551 sq. km)

Elevation: 426'-1,965' (130-599m)

Description: It is drained by the Maingthar and Namme Rivers. Alluvial plains dominate the survey area with some rugged, rocky peaks in the area including Parhoke Mountain 3,101' (945m), Wantu Mountain 3,003' (915m) and Kweanung

Mountain 2,393'(729m). Vegetation comprises evergreen, moist upper mixed deciduous and indaing (dipterocarp) forest.

Access: Mobeik is 156mi. (251km) from Mandalay. Mabein is 38mi. (61km) by ferry from Mobeik. From Mabein the study area is accessed by boat (18 mi.; 29km), then by cart (12 mi.; 19km), then on foot (18mi.; 29km).

Rainfall: 52" (1,338mm)

Human impact and landuse: Development of roads and infrastructure for gold mining has taken place since 1988 resulting in forest disturbance and pollution of natural drainages. Four goldmines in the forest are inhabited by over 300 residents. In the dry season, miners turn to bamboo and rattan cutting and resin tapping.

16. Myintmoletkat (MMLK)

Location: The survey area lies in the Htaung Pru Reserve Forest between 11o45'N, 99o07'E and 11o38'N and 99o03'E in Tanintharyi and Bokpyin Townships, Myeik District.

Survey area: 120 mi. (310 sq. km)

Elevation: 110'-2,264' (33-690m)

Description: The eastern portion is drained by the Naukpyan, La Mu, Tabalat, and Ngawun Streams which flow into the Little Tanintharyi River. To the west the Monoron Stream flows into the Lenyar River to the south. The area is partially low-lying with swamp and grassland that is annually flooded, interspersed with mixed evergreen - bamboo forest groves on higher ridges. The area lies on both sides of the new Tanintharyi-Bokpyin highway, and is partially under cultivation for rice and areca palm with some shifting cultivation.

Access: By road from Myeik (58mi).

Rainfall: The area has two monsoons with a prolonged wet season from June – November, and annual rainfall of around 160" (4,127 mm).

Human impact and landuse: Base camp was situated 3 miles (5km) S of Htaung Pru Village containing 15 households, with a further 38 households in adjacent Manoron Village.

17. S. Tanintharyi (TNTY)

Location: The survey area lies in the Pe River Valley at 13o30'N and 98o38' in Thayetchaung Township, Dawei District.

Survey area: 110 mi. (285 sq. km)

Elevation: 208'-2,010' (63-612m)

Description: Pe River Valley is bounded to the N by the Mintha Reserve Forest, to the E by Myintmoletkat Mountain 6,801'(2,072m) to the S by the fork of the Pe and Plauk Rivers and on the W by Pe Mountain 2,720'(829m). Vegetation is characterized by a mosaic of riverine evergreen forest (30%) with sporadic secondary growth (30%) and shifting cultivation and orchard (40%). Areca palm and catechu plantations dominate the cultivated areas.

Access: The area is accessible from the Dawei-Myeik Highway, 53 mi. (85km) south of Thayetchaung, and on foot 15 mi. (24km) east of Pedat.

Rainfall: The area has two monsoons with a prolonged wet season from June – November, and annual rainfall of around 161" (4,127 mm).

Human impact and landuse: Due to the security situation, permanent settlements no longer exist in the area and farmers are permitted only weekly access to maintain and harvest their lands.

Appendix II. Wildlife recorded by camera-trap surveys at 17 sites in Myanmar 1999-2002

Species	Scientific name	IUCN Status	CITES	Myanmar Status	No. records
Tiger	<i>Panthera tigris</i>	EN	App I	TP	5
Leopard	<i>Panthera pardus</i>	LR	App I	TP	92
Clouded leopard	<i>Neofelis nebulosa</i>	VU	App I	TP	50
Golden cat	<i>Catopuma temminckii</i>	LR/VU	App I	TP	34
Marbled cat	<i>Pardofelis marmorata</i>	DD	App I	TP	15
Leopard cat	<i>Prionailurus bengalensis</i>	EN	App II	P	80
Wild dog	<i>Cuon alpinus</i>	VU	-	P	34
Small indian civet	<i>Viverricula indica</i>	-	App III	TP	6
Large Indian civet	<i>Viverricula zibetha</i>	-	App III	P	135
Large spotted civet	<i>Viverricula megaspila</i>	-	-	P	1
Common palm civet	<i>Paradoxurus hermaphroditus</i>	VU	App III	P	14
Three-striped palm civet	<i>Arctogalidia trivirgata</i>	EN	-	P	1
Masked palm civet	<i>Paguma larvata</i>	-	App III	P	3
Spotted Linsang	<i>Prionodon pardicolor</i>	-	App I	TP	2
Banded Linsang	<i>Prionodon linsang</i>	-	App II	TP	5
Binturong	<i>Arctictis binturong</i>	VU	App III	P	15
Malayan sunbear	<i>Harlarctos malayanus</i>	DD	App II	TP	72
Himalayan black bear	<i>Ursus thibetanus</i>	VU	App I	P	17
Yellow-throated marten	<i>Martes flavigula</i>	-	-	P	16
Wild Pig	<i>Sus scrofa</i>	VU	App I	-	443
Hog badger	<i>Arctonyx collaris</i>	-	-	-	33
Myanma ferret badger	<i>Melogale personata</i>	-	-	-	1
Mongoose species	<i>Herpestes spp</i>	-	-	P	1
Crab-eating mongoose	<i>Herpestes urva</i>	-	-	P	22
Elephant	<i>Elephas maximus</i>	EN		TP	81
Gaur	<i>Bos gaurus</i>	VU		TP	265
Banteng	<i>Bos javanicus</i>	EN		TP	38
Tapir	<i>Tapirus indicus</i>	VU		TP	3
Sambar	<i>Cervus unicolor</i>	-		P	166
Serow	<i>Naemorhedus sumatraensis</i>	VU		TP	25
Common muntjac	<i>Muntiacus muntjak</i>	-		SP	847
Leaf deer	<i>Muntiacus putaoensis</i>	-		TP	2
Larger mouse deer	<i>Tragulus napu</i>	EN		TP	9
Lesser mouse deer	<i>Tragulus javanicus</i>	-		TP	9
Malayan porcupine	<i>Hystrix brachyura</i>	VU		-	128

Brush-tailed porcupine	<i>Atherurus macrourus</i>	EN	-	32
Pangolin	<i>Manis javanica</i>	LR/NT	TP	2
Rhesus macaque	<i>Macaca mulatta</i>	LR/NT	P	97
Pig-tailed macaque	<i>Macaca nimestrina</i>	VU	P	59
Capped leaf monkey	-	-	-	2
Phayres langur	<i>Prebytis phayrei</i>	-	P	1
Dusky leaf monkey	<i>Semnopithecus obscurus</i>	LR/NT	TP	1
Squirrel	<i>Ratufa spp</i>	-	-	11
Other small mammal species	-	-	-	24
Blue Whisting Thrush	<i>Myiophoneus caeruleus</i>		SP	1
Green magpie	<i>Cissa chinensis</i>		P	1
Indian pied hornbill	<i>Anthracoceros albirostris</i>		TP	1
Jungle fowl	<i>Gallus gallus</i>		-	80
Laughingthrush species	<i>Garrulax spp</i>		P	1
Orange bellied leafbird	<i>Chloropsis hardwickii</i>		SP	17
Owl	<i>Strigiformes spp</i>		TP	2
Parrot	-		P	4
Pheasant species	-		TP	163
Black Stock	<i>Ciconia nigra</i>		-	2
Quail	<i>Coturnix spp</i>		-	2
Monitor lizard	<i>Varanus spp</i>		P	1
Tortoise	-		P	1
Green viper	<i>Trimeresurus spp</i>		P	1
Unidentified				165
<i>Human sign</i>				
Domestic elephant				10
Domestic buffalo				29
Domestic cow				46
Domestic dog				27
Villagers				242
Suspected poacher				61
Military				30
Government staff				25
			Total	3811

Appendix III. Results of interview surveys for tigers at 17 sites in Myanmar

Site	Direct observation (sighting)	Track and sign	Heard	Total observ.	Date of most recent direct observation
AKNP	3	5	9	17	1998
BGY	2	10	1	13	1998
HKV	9	10	0	19	2001
KLP	6	21	0	27	Oct 2000
MB	16	1	1	18	2001
MHM	2	5	0	7	Dec 1998
MMLK	14	6	0	20	Oct 2001
PLG	9	20	1	30	Apr 2000
PPDL	6	7	1	14	2000
RER	6	1	3	10	Jun 2000
RN	7	4	0	11	Jan 2000
SPB	6	10	0	16	1998
TD	3	3	1	7	2000
TMT	4	5	1	10	1996
TNTY	14	4	1	19	Feb 2002
Totals	107	112	19	238	



Appendix IV. Historical Records of tiger in Myanmar

Record	Name of site	Latitude	Longitude	Date	Level of evidence	Class of evidence
1	Shwe Dagon Pagoda, Yangon	16.7667	96.1333	3.3.1903	confirmed	Shot tiger
2	Pitaung WS, Myitkyina District	25.5	97.1667	1935	confirmed	Sighting
3	Pitaung WS, Myitkyina District	25.5	97.1667	1936-7	provisional	Sighting ?
4	Pitaung WS, Myitkyina District	25.5	97.1667	Sept, 1953	confirmed	Livestock kill, Tigers killed
5	Pitaung WS, Myitkyina District	25.5	97.1667	Jan, 1952	confirmed	Tiger killed
6	Pitaung WS, Myitkyina District	25.5	97.1667	May, 1959	confirmed	Sighting ?
7	Coupe no. 7, Nam Nar RF, Bahmo District	24.25	97.2333	1951	provisional	Heard
8	Near Bhamo Myo, Bhamo District	24.25	97.2333	1958	provisional	?
9	Nambu and Sinbo village, Kachin State,	24.7667	97.0167	Oct '45 - Feb '46	confirmed	Tiger kills people, shot tige.
10	Betw Gyipin Lahar village Insein District	16.9	96.0833	1954	provisional	Reports villager sighting
11	Sitagaung, Rakhine Yoma, Lushe Taungdan	22.9333	93.1333	1946	confirmed	Tiger caught
12	Taunggoke, Rakine Yoma	18.85	94.2333	Oct, 1986	confirmed	Tiger trapped
13	Mintup and Matupi Myo, Chin District	21.5833	93.4333	1959	confirmed	Sighting
14	Shwe U Daung Taung WS	23	96.4167	1962	provisional	Sighting?
15	Indawgyi Naungmon Camp, Mokaung District	25.2667	96.9333	Nov, 1997	provisional	track and sign
16	Htmanthi WS	25.4833	95.5	1995	confirmed	track and sign
17	Mayan Chaung Village logging camp, Bago Yoma	17.2583	96.2583	1998	confirmed	Tiger shot
18	Pyinnyaung on the Thazi Lakaw railway	20.7583	96.4167	1932	confirmed	Tiger kills buffalo, shot
19	Kyawedatson village on the Thazi-Kalaw railway	20.75	96.3333	1932	confirmed	Tigers eat kill
20	Eastern bank of Irrawaddy, Singu Township	20.9167	94.8333	12.6.1932	confirmed	Tiger kills livestock shot
21	Yinmabin, Lower Chindwin District	22.0833	94.84	1932	confirmed	Tiger killed
22	Thayetchaung, Tavoy District	13.8417	98.2533	1961	confirmed	Tiger killed
23	Prome to Taungup Pass	18.85	94.3333	Jan, 1942	confirmed	Sighting
24	Prome to Taungup Pass	18.75	94.4167	Feb, 1946	confirmed	Sighting
25	Prome to Taungup Pass	18.5917	94.6667	May, 1955	confirmed	Tigers shot
26	Taungup to Prome, Padaung District	18.6667	94.9167	Sept, 1945	confirmed	Sighting
27	Sinde Village, Prome District	18.7583	95.175	1946-7	confirmed	Sighting
28	Prome District	18.8167	95.2167	1958	confirmed	Tiger shot
29	Namti Village, Kachin State,	25.3167	97.1667	1945	confirmed	Tiger shot
30	Bawni village, Pegu District	17.7	96.4833	1962	confirmed	Tiger shot
31	Hpakan, Myitkyina District	25.5833	96.25	Aug, 1951	confirmed	Tiger kill mules
32	Saramati and Naga Hills	25.6667	95.0833	1959	confirmed	Sighting
33	Bankachon, Tenasserim	10.1333	98.6333	25.5.1915	confirmed	Tiger shot
34	S. Zamayi Reserve, S. Pegu Forest Division	18.2833	96.1	14.12.1933	confirmed	Tiger shot
35	90 miles from Kawthaung	10.0833	98.5833	Nov, 2000	confirmed	Sighting
36	24 miles north of Kawthaung	10	98.5833	1997	confirmed	Tiger shot
37	Packchan River	10.0833	98.5833	<1878	confirmed	Tiger killed
38	Hukaung Valley	26.6781	96.8151	May, 1999	provisional	Report from hunter
39	Kaserdoo WS (Karen)	13.5	99		provisional	Report from local people
40	Shwe U Daung	23	96.4167	Jul-Aug, 1959	confirmed	Tracks
41	Chaukan Pass	27.0833	97.1667	Jan-March, 1960	confirmed	Tracks
42	Mansun, Chindwin Rv area	26.45	96.2167	Jan 21st, 1935	confirmed	Tracks
43	Pidaung WS	25.5	97.1667	1959	provisional	Estimated number
44	Chauklongyi Chaung, Tenasserim	12.0833	98.9167	Feb 26, 1960	confirmed	Tiger kill, tracks
45	Ratbaw, N. Myanmar	27.4333	97.9167	1993	provisional	Tiger shot
46	Hkakabo-Razi PA	28.3333	97.5	1997	extinct	Tiger absent
47	Alaungdaw Kathapa NP	22.3333	94.4167	1982	confirmed	Tiger observed
48	Kyatthin WS	23.5833	95.6667	1982	extinct	Tiger not found
49	Pegu Yomas proposed PA	18.2833	96.1333	1982	confirmed	Tiger sign
50	Shwessetaw	20.1667	94.8333	1982	extinct	Tiger not reported >1974
51	Taungghyi WS	20.7667	97.0833	1983	extinct	Tiger not reported
52	Natma Taung, Mount Victoria	21.2167	93.9167	1982	confirmed	Tiger kill human
53	Irrawaddy Delta	16.1833	94.85	1983	extinct	Not reported
54	Lampi Island	10.8333	98.25	April, 1982	extinct	Lack of sign
55	Maymyo Game Sanctuary	22.0833	96.4667	26-27 Mar, 1983	extinct	Lack of sign
56	Mu-Chindwin Watershed	24.0833	94.75	11 Nov-4 Dec, 82	confirmed	Tracks
57	Southern Arakan	16.2833	94.2333	27 Dec - 7 Jan 83	confirmed	Tracks
58	Tanlwe-Ma-e Chaung, Central Arakan	16.2833	94.2333	2-12 Feb, 1983	confirmed	Individuals or sign
59	Taungup Pass, Arakan Yoma	18.5833	94.6667	24 Jan - 16 Feb, 83	provisional	Report
60	Kyaukpandaung, Arakan	21.4833	93.0167	27 Jan - 12 Feb 83	provisional	Report
	Whole Burma, tigers reported shot			1928-1938	confirmed	997 tigers shot
	Whole Burma			1958	provisional	?



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Appendix V Tiger Interview Protocol.

1. How long have you been in this village?
2. What is your ethnicity?
3. Where do you get bamboo and wood to repair your house?
4. (If you get them from forest) How far from your house to the forest?
5. How many times do you go into the forest per month?
6. Have you ever seen wild animals when you go inside the forest?

If yes,

Sr.	Animal (Prey)	Quantity		Forest		Human disturbance		Remark
		Many	Few	Unclassified	Reserved	Yes	No	

Sr.	Animal (Predator)	Quantity		Forest		Human disturbance		Remark
		Many	Few	Unclassified	Reserved	Yes	No	

7. Do have any experience with predators attacking human or livestock?

Sr	Predator	Livestock						Time occur	Place occur	Remark
		Human	Buffalo	Cow	Goat	Pig	Others			

8. How do people use wild animal products in this area?

Sr	Animal	Products				Usage			Market situation			Remark
		Meat	Bone	Skin	Horn	Medicine	Food	Traditional	Place	User	Price	

9. What hunting methods do people use? What kinds of tools do they use for hunting?

Sr	Prey	Hunting methods				Tools						
		Trac-king	Sme-lling	Remnants of food	Inf o	Gun	Cross bow	Bow	Dogs	Snare	Trap	Digging hole

10. (If he/she does cultivation) How much land do you use? What kinds of crops do you plant? Do wild animals destroy your crops? If yes, what animals are they?

Sr	Crops	Acres			Total acres	Animal that destroyed crops	Time occur		Remarks
		paddy field	Shifting cultivation	Extended land			Day	Night	

11. What kinds of animals do you raise? How do you raise livestock?

(Free grazing/ farming) How far from village to grazing field? How many acres used for grazing? (estimate)

12. Have you ever seen a tiger?

(Yes - No Place...../ Time...../ Size.....)

Have you ever heard a roar of tiger?

13. Have you ever seen track, scratch, and faeces of tiger?

If yes, how big is it?

(Showing a track of tiger) Have you ever seen a track like this?

14. Have you ever seen a leopard? Size? Color pattern?

15. What is your opinion about the usages of tiger product medicine?

16. How do you think how many tigers live around this region?

17. Is there any tiger product trade around this region?

18. How is your feeling and opinion about tiger?

19. Please show animals that you have ever seen on these pictures.

20. Please tell about tiger that your parents and grand father/mother talked about?

General notes

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