Quarter Update (1st Quarter, 2025)

At the five study sites in Western Sabah, mineral blocks were placed at half of the 60 sampling points, creating 30 artificial saltlicks, while the other 30 points, without mineral blocks, served as control points. This study aimed to examine the effectiveness of using only mineral blocks to attract native terrestrial mammals to designated spots within these five sites. Each artificial saltlick was established by placing a mineral block on a cement block above the ground, covering it with a plastic cover, and securing all three components to the ground using a 1.0 m metal bar **(See Picture 1).** This design intended to minimize weathering of the mineral blocks caused by rainfall and prevent wildlife from displacing them from their designated spots in the field. For this research, 2.0 kg Boslic Mineral Blocks (N.A.M. Pharma Sdn. Bhd.) were applied, due to their easy availability from the supplier (Hi Chem Supplies Sdn. Bhd.). These mineral blocks have a balanced combination of essential elements and trace minerals, making them ideal for establishing artificial saltlicks. Preliminary findings also indicated that the proposed design allowed the blocks to last in the field for over 80 days, exceeding the sampling periods, with no need for replacement at any of the artificial saltlicks during the study. Information on the species count, and also the activity and frequency of each native species detected at the 30 artificial saltlicks were derived from the processed camera trap data. In this research, the camera traps recorded five distinct activities: foraging for food, resting, passing by, sniffing the mineral blocks, and engaging in geophagy at the sampling points **(See Picture 2).** Consequently, the terms "foraging", "passing", "resting", "sniffing", and "geophagy" were employed in subsequent analyses.

Picture 1. Design of the artificial saltlicks established at half of the sampling points

Resting

Passing

Foraging

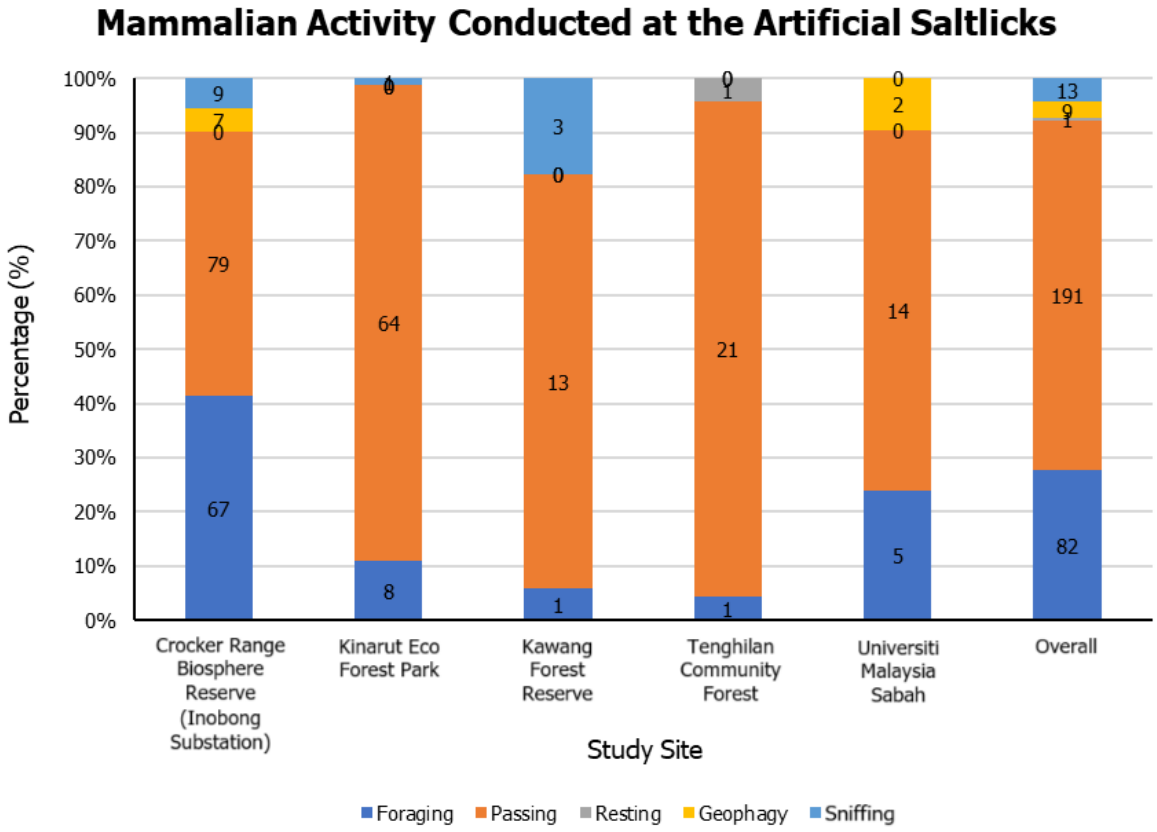
Sniffing

Geophagy (Salt-eating)

Picture 2. Five activities performed by the native terrestrial mammals at the 30 artificial saltlicks established in this study

Of the 27 native terrestrial mammal species observed across the five study sites, 25 species (92.6 %) were sighted at the 30 artificial saltlicks a total of 296 times (49.0 %). Nonetheless, local native species were primarily observed passing by (n = 191 or 64.5 %) and foraging (n = 82 or 27.7 %) near the mineral blocks at all five study sites. Only one instance of mammal resting was recorded (0.34 %), where a leopard cat (*Prionailurus bengalensis*) rested for 1.680 hours at ASL15 in TCF (4.35 %). Additionally, native species

were found sniffing the mineral blocks at close range without contact at the Inobong Substation in the Crocker Range Biosphere Reserve (CRBR: n = 9 or 5.56 %), Kinarut Eco Forest Park (KEFP: n = 1 or 1.37 %), and Kawang Forest Reserve (KFR: n = 3 or 17.7 %). The native species engaged in geophagy on nine occasions (3.04 %), with detections at three artificial saltlicks in CRBR (n = 7 or 4.32 %) and at ASL11 in Universiti Malaysia Sabah (UMS: n = 2 or 9.52 %). Henceforth, the percentages of the five activities carried out by these species were verified to differ significantly across the five sites **(See Picture 3)**, based on the results of the chi-square test (X^2_{16} = 160.7, p < 0.001).



Picture 3. Five activities performed by native terrestrial mammals at the 30 blocked artificial saltlicks established across the five study sites in Western Sabah

Moreover, the effectiveness of the mineral blocks in attracting native terrestrial mammals to the 30 artificial saltlicks was evaluated by estimating the percentages of both species count and the frequency of each native species engaging in geophagy at the saltlicks, plus the percentage of saltlicks utilized by these species for geophagy. Subsequently, a three-point rating system was employed to classify each of the three computed percentages, and average rating scores were calculated for the saltlicks at each site, categorizing effectiveness into three levels: 1 = low (0 % to 33.3 %), 2 = moderate (33.3 % to 66.7 %), and 3 = high (66.7 % to 100.0 %). At CRBR, 16 out of the 22 recorded native species were found at the five artificial saltlicks a total of 162 times. However, only the southern red muntjac (*Muntiacus muntjak*) and the southern pig-

tailed macaque (Macaca nemestrina) (9.09 %) engaged in geophagy seven times (4.32 %) at ASL28, ASL29, and ALS30 during the sampling period (60.0 %). At UMS, four out of the eight recorded native species were observed at the six artificial saltlicks a total of 21 times. Nevertheless, only the long-tailed macaque (*M. fascicularis*) (12.5 %) exhibited geophagy twice at ASL11 (9.52 %) during the sampling period. At the other three study sites, no native species engaged in geophagy at the local artificial saltlicks (0 %). As a result, only four saltlicks (13.3 %) were used by three native species (11.11 %) a total of nine times (3.04 %) for mineral intake in this study. These results indicate a low species count and frequency of native terrestrial mammals engaging in geophagy (Score = 1) during the sampling periods at the 30 artificial saltlicks across all five study sites. Additionally, native species used a medium number of saltlicks at CRBR (Score = 2) and a low number at UMS (Score = 1), resulting in average rating scores of 1.0 for most sites, except for CRBR, which had an average score of 1.333. Subsequently, these findings highlight that the mineral blocks were consistently ineffective in attracting a higher frequency and diversity of native terrestrial mammals throughout the sampling periods across all five study sites in Western Sabah **(See Table 1).**

Table 1. Results of the diversity t-test examining the significance of variations in species diversity richness and distribution evenness among the five study sites

Assessment Criteria	Study Site					
	CRBR	**KEFP**	**KFR**	**TCF**	**UMS**	**Overall**
Detection Frequency (n)	7 (4.32 %)	0 (0 %)	0 (0 %)	0 (0 %)	2 (9.52 %)	9 (3.04 %)
Species Count	2 (9.09 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (12.5 %)	3 (11.1 %)
Number of Artificial Saltlick	3 (60.0 %)	0 (0 %)	0 (0 %)	0 (0 %)	1 (16.7 %)	4 (13.3 %)
Effectiveness level (Score)	1.333 (Low)	1.0 (Low)	1.0 (Low)	1.0 (Low)	1.0 (Low)	1.0 (Low)

Note: n = number of independent sighting; % = Percentage; CRBR = Crocker Range Biosphere Reserve (Inobong Substation); KEFP = Kinarut Eco Forest Park; KFR = Kawang Forest Reserve; TCF = Tenghilan Community Forest; and, UMS = Universiti Malaysia Sabah