Using camera traps to assess the population, salt lick feeding ecology, and behavior of Asian elephants in Prey Lang Wildlife Sanctuary

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Contents

Study Overview

- Understanding Asian elephant population dynamics is important to monitor population trends over time and to manage biodiversity effectively and efficiently in protected areas over the long term.

- There are many existing methods to estimate Asian elephant populations. The most reliable technique is genetic analysis by capture recaptured marking through fecal collection.

Study Overview

- Camera traps have become essential tools for studying wildlife diversity, density, and population estimates (Warma et al. 2006; Warma et al. 2012).

- In recent years, Asian elephant populations have been effectively estimated by using camera traps, with increasing ability to identify elephant morphological characteristics (Chaiyarat et al. 2015; Sun et al. 2021; Vidya et al. (2014).

Study Overview

Wild Earth Allies introduced camera trapping techniques in Prey Lang Wildlife Sanctuary to assess the Asian elephant population and track elephant movements and behaviors.

Who We Are

- Wild Earth Allies' mission is to protect vital areas of our natural world for the benefit of wildlife, habitats, and people by inspiring collaborative action.

- In Cambodia's Prey Lang Forest, we work with government and community partners to monitor and protect biodiversity. Our collaborative efforts strengthen habitat management and restoration and enhance community livelihoods.

Prey Lang Forest

- Cambodia's Prey Lang Forest is one of the largest remaining areas of lowland evergreen forests in the Indo-Burma biodiversity hotspot.

- Home to more than 55 threatened wildlife species, including the endangered Asian elephant

- Prey Lang is threatened by illegal logging, forest degradation, and unsustainable land use practices
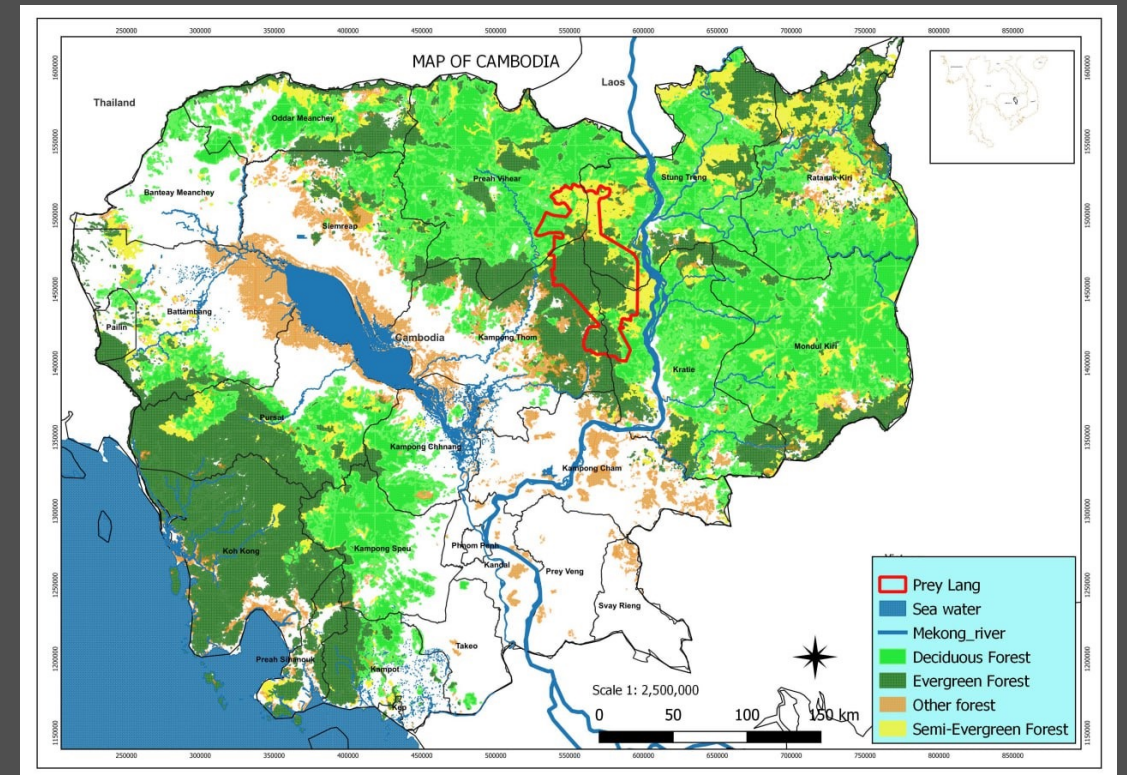
Methods

- 35 Trophy Bushnell camera traps were placed between 2017 and 2022 at different salt lick sites, wallow, and forest trails.

- Camera traps were set between 0.5 and 1.3 meters above and between a distance of 7 and 12 meters.

- Most camera traps were set on video modes to study sex, behaviors, and characteristics.
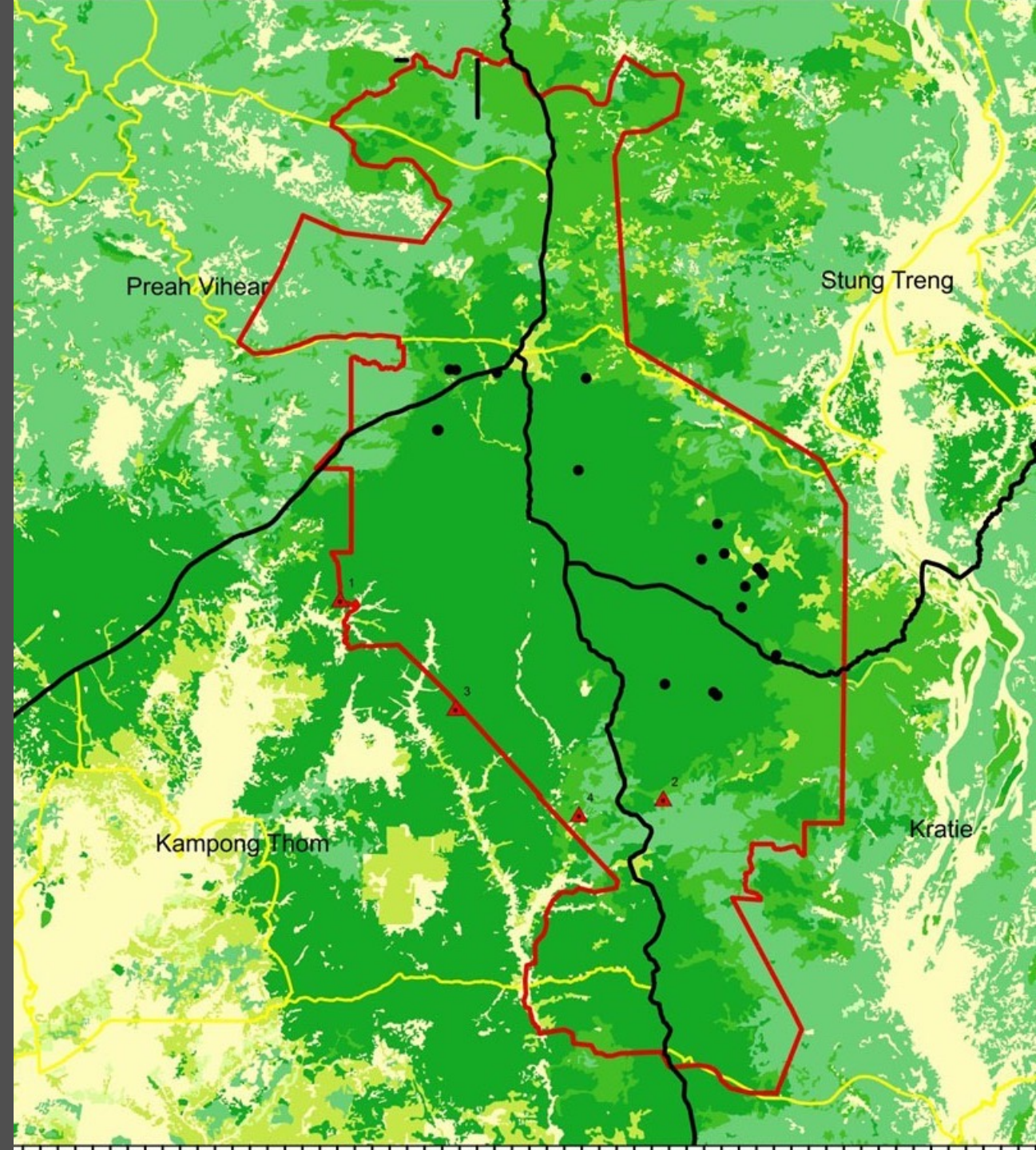
Methods

- Camera traps were generally revisited within two months to retrieve memory cards and data for analysis.

- Individual elephant identification was based on sex and morphological characters (tusk/tush, ears, veins, back shape, tails, brush, and injury, if any).

Camera Trap Locations

Prey Lang Wildlife Sanctuary
35 camera traps were set and moved as new and better sites were found, with a total of 88 sites.

Identification Methods

Characteristics	Selected categories	Description
Sex	Male	Tusks, tushes, testicles, penis
	Female	Visible vulva, swelling breasts, presence of nursing calf
Facing bone	Bone between eyes	Extent of prominence
	Upper margin of eyes	Extent of deep depression
Tusk	Length	Very short/short/long compared with trunk
	Thickness	Thick/normal/slender
	Shape	Straight/bent
	Crack	Yes/no
	Divergence	Yes/no
	Narrow	Yes/no

Identification Methods

Characteristics	Selected categories	Description
Tail	Main tail	Straight, curving, bumping
Tail brush	Standard	Present/both sides/both-continuous
	Nonstandard	Absent/single side/both-discontinuous, ring like
Injury	Entire elephant	Any visible injury

Characteristics

- A-folded, unfolded, forward, backward

- B-folded forward, backward

- Angle between B & C-tears

- C-V, U notches, tears, cups, pigmentation

- Lobe-hole

- Lobe with vein
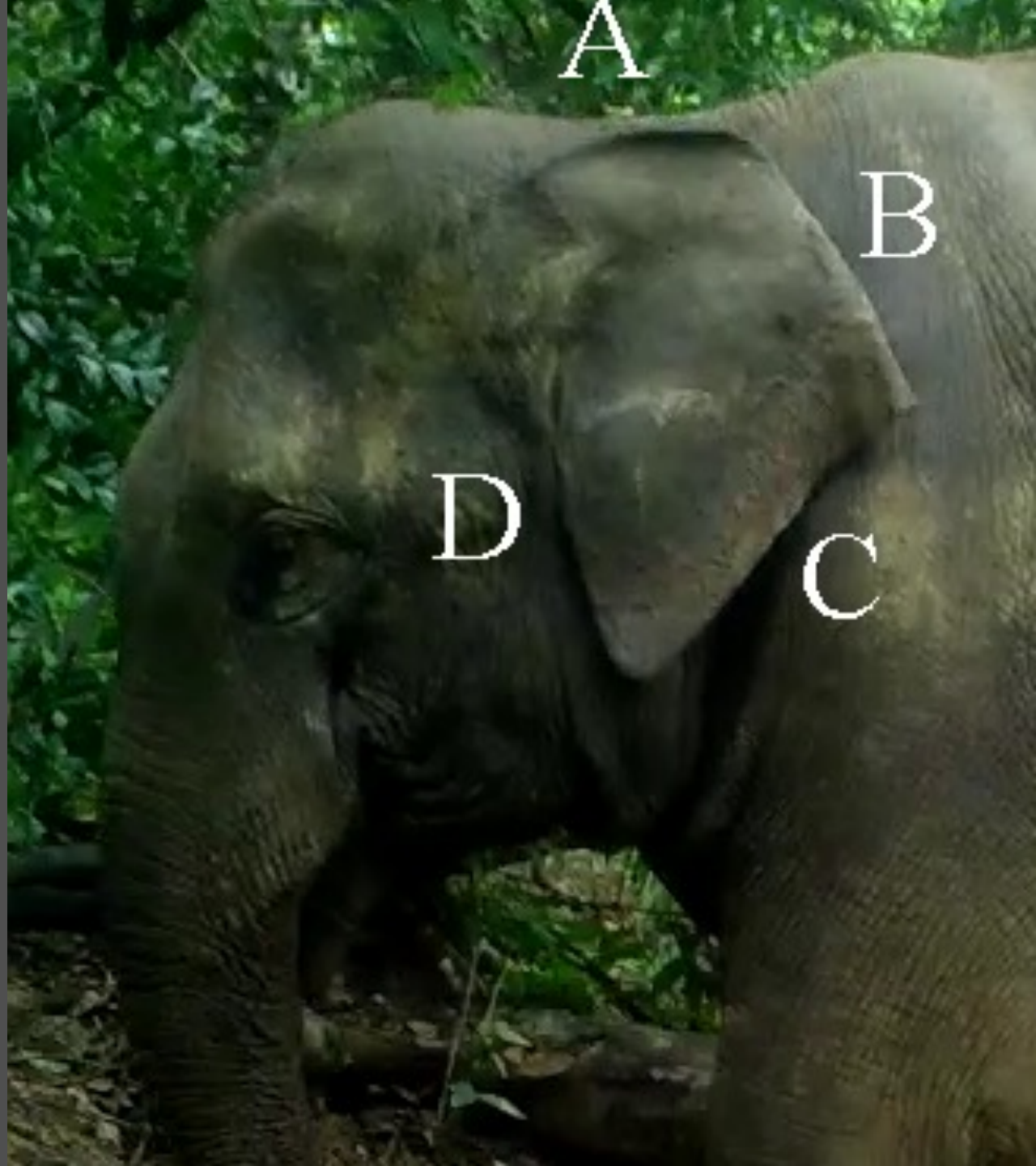
Determination of Social Structures

| Characteristics	Social Structures	Descriptions
	Calf (0−1 years)	Shoulder height below an adult's knee
	Juvenile (1−5 years)	Shoulder height reaches half the height of an adult
Age	Subadult (5−15 years)	Shoulder height reaches an adult's eyes
	Adult (>15 years)	With the highest shoulder height

Results

- 88 locations utilized

- Deployed for 39,441 trap nights

- Obtained 93,666 photographs and 50,779 videos

- Of these, 7,393 images/videos featured Asian elephants

- From 7,393 footages, we generated 526 snapshots

- Recognizable Asian elephant individuals: 13 males and 13 females identified

Number of recognized individual events

Individuals	Sex	Age structure	2017	2018	2019	2020	2021	2022	Total
AECT01	Male tusker	Adult	5	5	10	11	14	2	47
AECT02	Female	Adult	4	3	6	1	8	0	22
AECT03	Male tuskless	Subadult	2	1	1	2	8	0	14
AECT04	Male tuskless	Adult	2	1	6	4	`	0	13
AECT05	Female	Adult	4	4	12	3	11	0	34
AECT06	Female	Subadult	3	5	5	4	10	0	27
AECT07	Male tuskler	Subadult	3	4	18	8	12	1	46
AECT08	Female	Adult	2	1	10	4	6	0	23
AECT09	Female	Subadult	0	1	6	3	4	0	14
AECT10	Male tusker	Subadult	6	2	12	7	9	0	36
AECT11	Female	Adult	4	1	3	3	9	0	20
AECT12	Male tuskless	Subadult	0	0	1	2	10	0	13
AECT13	Male	Adult	0	4	7	9	10	3	33
AECT14	Female	Adult	2	3	1	6	18	5	35
AECT15	Female	Adult	0	1	1	8	11	4	25
AECT16	Female	Subadult	1	7	0	2	0	0	10
AECT17	Male tuskless	adult	0	2	0	0	0		2
AECT18	Male tuskless	Adult	2	8	3	8	7	3	31
AECT19	Female	Adult	0	4	0	8	9	5	26
AECT20	Female	Adult	0	7	1	10	14	0	32
AECT21	Female	Juvenile	0	3	0	0	2	4	9
AECT22	Male	Subadult	0	1	1	4	7	0	13
AECT23	Female	Subadult	0	9	0	0	0	0	9
AECT24	Male	Subadult	0	0	2	0	7	1	10
AECT25	Male	Adult	0	0	5	0	0	0	5
AECT26	Male	Adult	1	0	0	3	1	1	6
Total			**41**	**77**	**111**	**110**	**187**		**526**
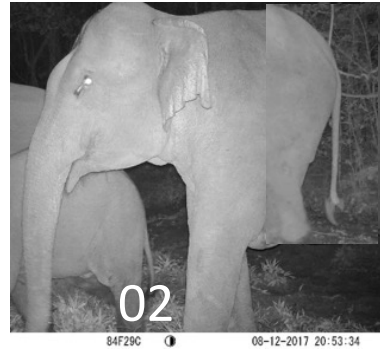
1 juvenile, 10 subadult, 15 adult (absence of calf)

Description Based on Morphology

- AECT13-Adult female

- Back shape-flat, slightly concave

- Right ear: A-folded into a flat fold

- B-folded backward

- Tear at angle between B & C

- Prominent vein paralleling to C-margin

- Right ear: similar to left ear except absence of vein, two notches along C-margin, two tears at angle between B & C

- Tail bumpy

- Injury above vulva (may have caused when giving birth)

Feeding Ecology

- Asian elephants need salt licks to supplement dietary nutrients and detoxicate secondary compounds (Klaus et al. 1998; Ning, 2017)

- Some suggest mineral licks help detoxicate unpalatable compounds in the diet (Chandrajith et al. 2009).

- The need of mineral licks require Asian elephants to move between salt lick sites.

Feeding Ecology

- Asian elephants stay at one salt lick from arrival to nearly five days in a row.

- Asian elephants spend up to 6 hours in one salt lick site.

Main Camera Trap Locations

1	O' Thmor	9
2	Choam Moinkork	40
3	O' Khdouch	11
4	O' Laork	4
5	Ace's resin block	2
6	Along road (Ace)	2
7	Srolao	12
8	Tumpor	37
9	SomePen	2
10	O'Thmor Leu	4
11	Bun Theun'resin block	4
12	Chongkran100_1	1
13	Choamtakung	1
14	Khnachthom	1

Movement Records
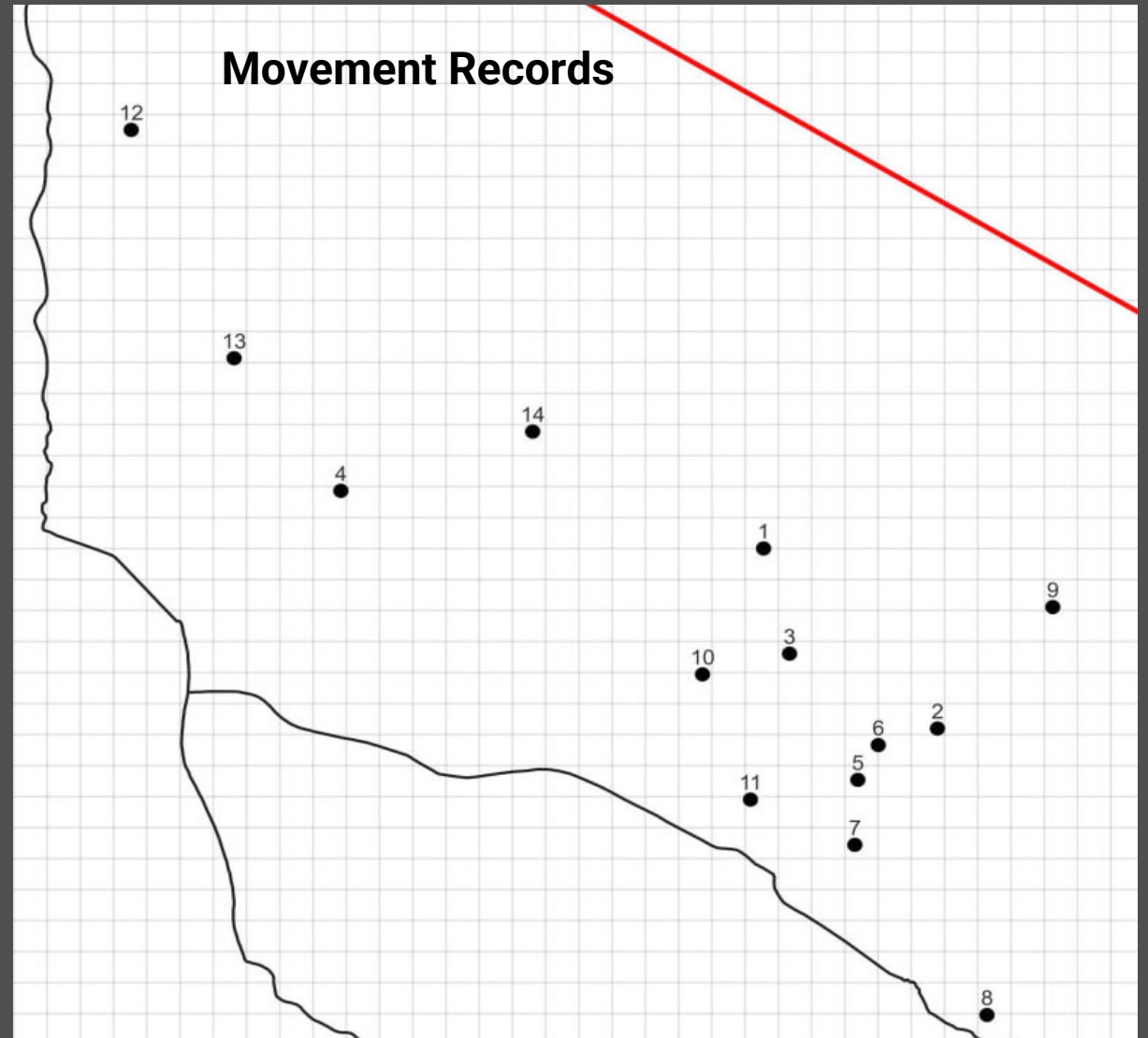
Behavior

- Younger elephants respect elders for space

- Mothers take care of calf/baby in general

- Mothers let their babies take naps with care and wait for them

- Mothers hesitate to wake up napping babies when their groups move away from salt lick sites

- Adult elephants may knock younger elephants down

- Young/babies move freely under adult bellies without harm

- Young males fight for the best position to eat mineral licks

Discussion

Our findings indicate that camera trap footage can be used to identify Asian elephant individuals based on their distinct morphological characters—at least in small populations.

However, because characters can be similar, this method may not be easily applied for large populations.

Discussion

Our results also provide valuable baseline information on the Prey Lang elephant population and are being used to guide conservation strategies and protected area management.

Thank you

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