Supplemental Material

Day and night camera trap videos are effective for identifying individual wild Asian elephants

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Table S1:
24 characteristics and the traits for identifying individuals

Characteristics adapted from Goswami et al. (2007); de Silva et al. (2013); Vidya et al. (2014). The combination column indicates that there could be two different traits on the right or left (R/L) side of the elephant (similar to Vidya et al., 2014). N/A was used if poor picture quality did not allow the trait to be determined or if only one side of the elephant was visible in videos.

Characteristic	Trait States	Combination
Sex	Male	
	Female	
	N/A	
Age class	A	
	B	
	C	
	D	
	N/A	
Body condition	0	
	1	
	2	
	N/A	
Presence of tusks/tushes	None	
	Both	
	R only	
	L only	
	N/A	
Tusk Symmetry	Even	
	Uneven	
	N/A	
Tusk arrangement	Parallel	
	Convergent	
	Splayed	
	N/A	
Tusk angle	Straight ahead	R/L
	Intermediate	
	Pointed down	
	N/A	
Ear top fold	None	R/L
	Forward slightly	
	Forward rolling fold	
	Forward flat fold	
	Backward	
	N/A	
Ear side fold	Forward	R/L
	Backward	
	N/A	
Ear lobe shape	L-angular	R/L

	V-acute	
	U-rounded	
	N/A	
Ear tears	None	R/L
	At side fold	
	Before side fold	
	After side fold	
	On top fold	
	N/A	
Ear holes	None	R/L
	At side fold	
	Before side fold	
	After side fold	
	On top fold	
	N/A	
Ear depigmentation	Present- Slight	R/L
	Present- Prominent	
	None	
	N/A	
Tail length	Stump (above abdomen)	
	Below genitals, above knee	
	Below knee, above ankle	
	At knee	
	At ankle	
	N/A	
Brush type	No hair	
	Short anterior	
	Short posterior	
	Short both	
	Short anterior normal posterior	
	Normal anterior short posterior	
	Normal anterior	
	Normal posterior	
	Normal both	
	N/A	
Back shape	Flat	
	Concave	
	Humped	
	N/A	
Depigmentation on body	Present on trunk	
	Present on body	
	Both	
	None	
	N/A	

Table S2:
Age classes and the trait state definitions

Age	Trait State Definitions
Age Class	*Adults (A):* around 15 years of age or older and, if female, had enlarged breasts or calves present
	Subadults (B): typically, 50-100% the size of adults or the same height without enlarged breasts and were approximately seven to fourteen years of age.
	Calves (C): identified if they could fit under the adults' belly or were within 50% of an adult's height and were approximately one to six years of age
	Infants (D): typically, less than a year in age and fit under the belly of an adult
	N/A: where age was not able to be determined due to quality of video or if genitalia was not visible

Table S3:
Body condition characteristic and trait state definitions

Body Condition	Trait State Definitions
Body Condition	*0*: the ribs, shoulder and pelvic girdles were prominent.
	1: ribs were not visible, shoulder and pelvic girdles were visible. Backbone was visible and pronounced
	2: shoulders and pelvic girdles were not visible, neck rolls, and plump. Backbone was not prominent.

Table S4:
Tusk characteristics and trait state definitions

Tusks/Tushes	Trait State Definitions	Examples
Presence of Tusks	*Both*: when an elephant had both of their tusks or tushes	Figures S1B-D
	Right only: when an elephant only had a right tusk or tush	Figure S1A
	Left only: when an elephant only had a left tusk or tush	
	None: when there were no tusks or tushes present for males or tushes present for females. If *none* was provided, the other tusk characteristics did not apply	
Tusk Symmetry	*Even*: when tusks were growing at an even rate	Figure S1D
	Uneven: when tusks were growing at an uneven rate or when one was broken (one tusk may be longer or shorter than the other)	Figure S1A, S1C
Tusk Arrangement	*Parallel*: tusks growing at the same angle, straight out, and pointing forward.	
	Splayed: tusks pointed outward (not parallel) from each other	Figure S1D
	Convergent: tusks growing out but inward, potentially resulting in tusks crossing over each other	Figure S1C
Tusk Angle	*Straight ahead*: tusks growing out parallel to a horizontal plane	Figure S1C, S1E
	Intermediate: tusks directed diagonally and not straight (parallel) or down (perpendicular)	
	Pointed down: tusks growing downward, perpendicular to the horizontal plane	Figure S1B

Table S5:
Back shape characteristics and trait state definitions

Back Characteristics	Trait State Definitions	Examples
Back Shape	*Flat:* where the majority of the back was more or less a straight line	Figure S2B, S2C
	Concave: where the back dipped in the center	
	Humped: where the back was elevated, primarily in the middle, but humps can occur throughout the back as well	Figure S2A

Table S6:
Tail characteristics and trait state definitions

Tail Characteristics	Trait State Definitions	Examples
Tail Length	*Stump (above abdomen):* a short and stubby tail that ended above the abdomen	Figure S3F
	Below genitals: above knee: a tail that extended between the genital area and above the knee	Figure S3D
	Below knee, above ankle: a tail that extended anywhere between the knee and the ankle	Figure S3A, S3G
	At knee: a tail that extended around the back of the knee	Figure S3C
	At ankle: a tail that extended to the ankle (before the leg becomes wider, forming the foot pad)	Figure S3B
Brush Type	*No hair:* there was no visible hair on the end of the tail	Figure S3C, S3F
	Short anterior: hair stubble, not long enough to naturally curve, on the side closest to the body	
	Short posterior: hair stubble, not long enough to naturally curve, on the side farthest from the body	
	Short both: hair stubble on both sides of the tail	
	Short anterior, normal posterior: hair stubble on the side closest to the body and normal hair length on the side farthest from the body	
	Normal anterior, short posterior: normal hair length on the side closest to the body and short/stubble hair on the side farthest from the body	
	Normal anterior: tail hair that is long enough to form its natural curve on the side closest to the body	Figure S3D, S3E, S3H
	Normal posterior: tail hair that is long enough to form its natural curve on the side farthest from the body	
	Normal both: tail hair that is long enough to form its natural curve on both sides of the tail	Figure S3A, S3B, S3G

Table S7:
Body depigmentation and trait state definitions

Depigmentation on Body	Trait State Definitions
Depigmentation on body	*Present on Trunk:* depigmentation was viewed on the trunk of the elephant
	Present on Body: depigmentation was viewed on the body of the elephant
	Both: depigmentation was viewed on both the body and trunk
	None: depigmentation was not found

Table S8:
Interrater reliability results of elephant characteristic categorization

Reliability was calculated for a subset of 30 videos of different individuals (19 daytime, 11 night); two data points from each video were included in the calculation for characteristics that were recorded on both the left and right side of an individual's body. The interpretation of level of agreement is based on benchmarks suggested by Landis & Koch (1977).

Characteristic	Cohen's kappa	Level of agreement
Presence of tusks	1	Excellent
Sex	0.81	Excellent
Tusk symmetry	0.74	Good
Tail brush	0.67	Good
Tusk angle	0.65	Good
Tusk arrangement	0.65	Good
Side fold	0.59	Moderate
Ear hole	0.58	Moderate
Ear lobe	0.54	Moderate
Tail length	0.53	Moderate
Top fold	0.47	Moderate
Ear tear	0.38	Fair
Ear depigmentation	0.36	Fair
Body condition	0.23	Fair
Back shape	0.15	Poor
Body depigmentation	0.13	Poor

Table S9:
Elephant count and calculation results for p_{max}^2 for all adult elephants (n=72), including most to least common characteristic and trait state option, excluding back shape and depigmentation on body

Ranked Characteristics	Majority Trait State	Number of elephants with trait	Proportion	Number of elephants with combination	p_{max}	p_{max}^2
Presence of tusks/tushes	None	63	0.875	63		
L ear hole	None	61	0.847	54	0.857	0.735
Tail length	Below knee, above ankle	58	0.8556	43	0.697	0.485
L ear side fold	Backward	56	0.778	35	0.698	0.487
R ear hole	None	56	0.778	28	0.557	0.311
R ear side fold	Backward	55	0.764	27	0.673	0.453
R ear depigmentation	Present-Prominent	53	0.736	21	0.434	0.188
Sex	Male	52	0.722	14	0.449	0.201
Body condition	1	49	0.681	11	0.341	0.116
L ear depigmentation	Present-Prominent	48	0.66	11	0.449	0.201
R ear lobe shape	V-acute	47	0.653	6	0.186	0.035
L ear lobe shape	V-acute	46	0.639	6	0.449	0.201
Brush type	Normal both	42	0.583	5	0.155	0.24
R ear tear	At side fold	37	0.514	2	0.179	0.032
L ear top fold	Forward rolling fold	31	0.431	2	0.155	0.24
R ear top fold	Forward rolling fold	31	0.431	2	0.179	0.032
L ear tear	At side fold	29	0.403	1	0.077	0.006
Tusk symmetry	Uneven	5	0.069	0	0	0
R tusk angle	Straight ahead	5	0.069	-	-	-
L tusk angle	Straight ahead	4	0.054	-	-	-
Tusk arrangement	N/A	3	0.042	-	-	-

Table S10:
Elephant count and calculation results for p_{max}^2 for adult male elephants (n=52), including most to least common characteristic and trait state option

Ranked Characteristics	Majority Trait State	Number of elephants with trait	Proportion	Number of elephants with combination	p_{max}	p_{max}^2
Back shape	Humped	46	0.885	46		
Presence of tusks	None	43	0.827	37	0.804	0.647
L ear hole	None	42	0.808	30	0.717	0.514
Tail length	Below knee, above ankle	42	0.808	23	0.617	0.380
Depigmentation on body	Both	41	0.788	18	0.561	0.315
L ear side fold	Backward	40	0.769	16	0.548	0.300
R ear depigmentation	Present-Prominent	38	0.731	12	0.421	0.177
R ear side fold	Backward	37	0.712	12	0.548	0.300
R ear hole	None	37	0.712	10	0.351	0.123
L ear depigmentation	Present-Prominent	33	0.635	10	0.548	0.300
Body condition	1	31	0.596	8	0.281	0.079
R ear lobe shape	V-acute	31	0.596	5	0.343	0.117
L ear lobe shape	V-acute	29	0.558	5	0.281	0.079
R ear tear	At side fold	29	0.558	3	0.206	0.042
Brush type	Normal both	28	0.538	2	0.187	0.035
R ear top fold	Forward rolling fold	24	0.462	2	0.206	0.042
L ear top fold	Forward rolling fold	23	0.442	2	0.187	0.035
L ear tear	At side fold	23	0.442	1	0.103	0.011
Tusk symmetry	Uneven	5	0.096	0	0	0
R tusk angle	Straight ahead	5	0.096	-	-	-
L tusk angle	Straight ahead	4	0.077	-	-	-
Tusk arrangement	N/A	3	0.058	-	-	-

Table S11:
Elephant count and calculation results for p_{max}^2 for adult male elephants (n=52), including most to least common characteristic and trait state option, excluding back shape and depigmentation on body

Ranked Characteristics	Majority Trait State	Number of elephants with trait	Proportion	Number of elephants with combination	p_{max}	p_{max}^2
Presence of tusks	None	43	0.827	43		
L ear hold	None	42	0.808	35	0.814	0.663
Tail length	Below knee, above ankle	42	0.808	28	0.662	0.438
L ear side fold	Backward	40	0.769	24	0.698	0.487
R ear depigmentation	Present-Prominent	38	0.731	17	0.469	0.220
R ear side fold	Backward	37	0.712	16	0.657	0.431
R ear hole	None	37	0.712	14	0.410	0.168
L ear depigmentation	Present-Prominent	33	0.635	14	0.657	0.431
Body condition	1	31	0.596	11	0.322	0.104
R ear lobe shape	V-acute	31	0.596	6	0.358	0.128
L ear lobe shape	V-acute	29	0.558	6	0.322	0.104
R ear tear	At side fold	29	0.558	3	0.179	0.032
Brush type	Normal both	28	0.538	2	0.215	0.046
R ear top fold	Forward rolling fold	24	0.462	2	0.179	0.032
L ear top fold	Forward rolling fold	23	0.442	2	0.215	0.046
L ear tear	At side fold	23	0.442	1	0.090	0.008
Tusk symmetry	Uneven	5	0.096	0	0	0
R tusk angle	Straight ahead	5	0.096	-	-	-
L tusk angle	Straight ahead	4	0.077	-	-	-
Tusk arrangement	N/A	3	0.058	-	-	-

Table S12:
Elephant count and calculation results for p_{max}^2 for adult female elephants (n=20), including most to least most common characteristic and trait state option

Ranked Characteristics	Majority Trait State	Number of elephants with trait	Proportion	Number of elephants with combination	p_{max}	p_{max}^2
Presence of tusks/tushes	None	20	1.00	20		
L ear hole	None	19	0.95	19	0.950	0.903
R ear hole	None	19	0.95	18	0.947	0.898
Body condition	1	18	0.90	16	0.844	0.713
R ear side fold	Backward	18	0.90	15	0.888	0.789
Back shape	Humped	17	0.85	13	0.732	0.536
L ear lobe shape	V-acute	17	0.85	10	0.683	0.467
L ear side fold	Backward	16	0.80	9	0.659	0.434
R ear lobe shape	V-acute	16	0.80	8	0.683	0.467
Tail length	Below knee, above ankle	16	0.80	8	0.585	0.343
L ear depigmentation	Present-Prominent	15	0.75	5	0.427	0.182
R ear depigmentation	Present-Prominent	15	0.75	5	0.585	0.343
Brush type	Normal both	14	0.70	4	0.342	0.117
L ear tear	None	11	0.55	2	0.439	0.193
Depigmentation on body	Both	11	0.55	2	0.228	0.052
R ear tear	None	10	0.50	1	0.220	0.048
L ear top fold	Forward rolling fold	8	0.40	0	0	0
R ear top fold	Forward slightly	8	0.40	-	-	-

Table S13:
Elephant count and calculation results for p_{max}^2 for adult female elephants (n=20), including most to least most common characteristic and trait state option, excluding back shape and depigmentation on body

Ranked Characteristics	Majority Trait State	Number of elephants with trait	Proportion	Number of elephants with combination	p_{max}	p_{max}^2
Presence of tusks/tushes	None	20	1.00	20		
L ear hole	None	19	0.95	19	0.950	0.903
R ear hole	None	19	0.95	18	0.947	0.898
Body condition	1	18	0.90	16	0.844	0.713
R ear side fold	Backward	18	0.90	15	0.888	0.789
L ear lobe shape	V-acute	17	0.85	12	0.676	0.456
L ear side fold	Backward	16	0.80	10	0.740	0.548
R ear lobe shape	V-acute	16	0.80	10	0.676	0.456
Tail length	Below knee, above ankle	16	0.80	9	0.666	0.444
L ear depigmentation	Present-Prominent	15	0.75	6	0.450	0.203
R ear depigmentation	Present-Prominent	15	0.75	6	0.666	0.444
Brush type	Normal both	14	0.70	5	0.375	0.141
L ear tear	None	11	0.55	4	0.533	0.284
R ear tear	None	10	0.50	3	0.281	0.079
L ear top fold	Forward rolling fold	8	0.40	0	0	0
R ear top fold	Forward slightly	8	0.40	-	-	-

References Cited in Supplemental Tables

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