

Electronic supplement material

Description of echolocation call parameters for urban bats in Vietnam as a step towards a more integrated acoustic monitoring of urban wildlife in Southeast Asia

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Table S1. List of recorded species and some notes for specimens

No.	Species	Family	# specimens	External morphology notes	Capturing notes
1	<i>Cynopterus sphinx</i>	Pteropodidae	2	Dog face-like bat, white edge in ear and FA at 72 mm and 71.5 mm	At the indoor parking area in Tra Vinh University
2	<i>Myotis hasseltii</i>	Vespertilionidae	6	Feet large, over one-half of tibia length, with large and strongly curved claws; wing membranes inserted at ankles; Tragus tapered, with maximum width at base.	At a small canal near the headquarter of Southern Institute of Ecology, Ho Chi Minh City. Captured at the same time with <i>Scotophilus kuhlii</i> .
3	<i>Pipistrellus javanicus</i>	Vespertilionidae	3	Ears medium length, with rounded tips and distinctive fold at inward edge; tragus long, straightforward, its apex blunt; penis 8mm in length, shorter than tibia	At the old building in District 1, Ho Chi Minh City, one pregnant (released after the morphological measurement and acoustic recording) in June 2020.
4	<i>Scotophilus kuhlii</i>	Vespertilionidae	3	Ear with long, narrow, and pointed tragus deflected forward; wing membrane attaches to the outer metatarsus (below the ankle) but has not reached to the base of the exterior digit; calcar lobe is not present	1 captured animal at grassland with some trees. 1 captured animal at a small pond in Tra Vinh University 1 animal from the small canal near the headquarter of Southern Institute of Ecology, Ho Chi Minh City.

5	<i>Scotophilus healthi</i>	Vespertilionidae	2	Similar to <i>Scotophilus kuhlii</i> but the pelage are yellowish bases, greater forearm	Dried animals from Tra Vinh University
6	<i>Taphozous melanopogon</i>	Emballonuridae	3	Tail protrudes dorsally from the interfemoral membrane near its midpoint and continues along its upper surface; chin and throat are covered with fur, dark black "beard" in male.	A large group (about 50 individuals) in an abandoned building in Tra Vinh Cities. Many individuals with infant and observed one pregnant in May 2020.

Table S2. Selected morphological parameters (mm; mean and range) and body mass (in g) of the species described in this study. Values are given at mean (Avg), minimum-maximum (Min-max), n. Min-max (n) indicates that the number of examined specimens for that measurement is different from other measurements. - denotes data not available. Abbreviations and definitions for measurements are given in the text of method section

species	location	weight		fa		hb		t		e		tr		hf		ti		n	reference
		avg	range	avg	range	avg	range	avg	range	avg	range	avg	range	avg	range				
<i>Myotis hasseltii</i>	South Vietnam	7.8	7.1-9.0	38.3	37.2-38.8	42.5	39.7-45.1	41.6	35.6-45.8	14.2	13.6-15.6	6.4	6.0-7.1	9.7	8.2-11.6	15.2	14.2-17.2	6	This study
<i>Myotis hasseltii</i>	Southeast Asia	-	7.5-12.5	-	38.0-43.0	-	-	-	-	-	-	-	-	-	10.0-11.0	-	-	-	[1]
<i>Myotis hasseltii</i>	Cambodia	-	13.6-15.4	37.5	-	-	-	-	-	-	-	-	-	-	-	-	-	4	[2]
<i>Myotis hasseltii</i>	South Asia	-	-	-	37.2-40.3	-	52.0-58.0	-	35.0-42.0	-	15.5-16.5	-	-	-	9.0-11.0	-	-	-	[3]
<i>Pipistrellus javanicus</i>	South Vietnam	5.6	4.2-7.4	35.1	32.5-39.1	43.0	42.6-43.4	30.2	30.1-30.3	10.6	10.4-10.9	4.0	3.9-4.1	6.7	6.5-7.0	12.8	12.4-13.4	3	This study
<i>Pipistrellus javanicus</i>	Southeast Asia	-	4.0-7.0	-	30.0-36.0	-	-	-	34.0-40.0	-	10.5-11.5	-	-	-	-	-	-	-	[1]
<i>Pipistrellus javanicus</i>	Vietnam	5.8	4.5-7.6	32.0	30.3-34.5	48.6	40.3-53.0	35.3	31.8-42.5	11.4	10.0-13.5	6.1	5.4-6.7	5.9	5.9-5.9	-	-	17	[2]
<i>Pipistrellus javanicus</i>	South Asia	-	-	-	30.0-36.0	-	40.0-55.0	-	26.0-40.0	-	5.0-15.0	-	-	-	3.0-8.0	-	-	-	[3]
<i>Scotophilus heathii</i>	South Vietnam	-	-	59.8	59.5-60.1	57.2	53.6-60.8	50.9	48.0-53.8	13.3	11.3-15.2	8.6	8.4-8.7	11.1	10.8-11.4	22.6	22.2-23.0	2	This study

species	location	weight		fa		hb		t		e		tr		hf		ti		n	reference
		avg	range	avg	range	avg	range	avg	range	avg	range	avg	range	avg	range				
<i>Taphozous melanopogon</i>	Vietnam	-	23.6-30.7	-	64.3-65.9	-	77.0-81.0	-	27.0-28.0	-	19.8-20.0	-	7.0-7.0	-	-	-	-	2	[2]
<i>Taphozous melanopogon</i>	Vietnam	24.0	-	-	65.3-66.5	-	71.3-77.7	-	24.4-26.7	-	19.0-20.6	-	-	-	11.6-13.0	-	-	-	[4]
<i>Taphozous melanopogon</i>	South Asia	-	-	-	60.0-68.0	-	67.0-86.0	-	20.0-32.0	-	16.5-22.0	-	-	-	8.2-14.2	-	-	-	[3]
<i>Taphozous melanopogon</i>	South Vietnam, Laos, Thailand	-	-	-	64.0-69.0	-	-	-	19.0-30.0	-	20.0-23.0	-	-	-	13.0-15.0	-	-	22	[5]

Table S3. Echolocation call parameters of studied species that used for Discriminant Function Analysis. The frequency of maximum energy (kHz) [FMAXE], start frequency [sf], terminal frequency [tf], maximum frequency [hf], minimum frequency [lf]. The frequency range or bandwidth [fr]

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Scotophilus kuhlii</i>	4.5	44.7	76	39	58	43	37	Record in tent
<i>Scotophilus kuhlii</i>	3.2	48.7	78	39.5	60.5	44.5	38.5	Record in tent
<i>Scotophilus kuhlii</i>	4	50.2	89	40	69	47.7	49	Record in tent
<i>Scotophilus kuhlii</i>	2.7	45.7	84.7	39	69.7	44.5	45.7	Record in tent
<i>Scotophilus kuhlii</i>	3	44	76.2	38.5	51.2	44	37.7	Record in tent
<i>Scotophilus kuhlii</i>	6	44.5	69	39	54.2	44.5	30	Record in tent
<i>Scotophilus kuhlii</i>	3.7	44.5	71.5	38.7	49.7	44.5	32.8	Record in tent
<i>Scotophilus kuhlii</i>	4.5	43.7	76	38.7	66.2	41.7	37.3	Record in tent
<i>Scotophilus kuhlii</i>	4.2	40.2	72	37.5	59	39	34.5	Record in tent
<i>Scotophilus kuhlii</i>	3.5	49.2	79	38	71.7	44.7	41	Record in tent
<i>Scotophilus kuhlii</i>	5.2	49	77.5	39	69.5	44	38.5	Record in tent
<i>Scotophilus kuhlii</i>	3.5	49.7	77.5	39	71.7	44.5	38.5	Record in tent
<i>Scotophilus kuhlii</i>	6.2	45.5	79.5	39.7	65.5	43.5	39.8	Record in tent
<i>Scotophilus kuhlii</i>	5.5	50.5	78.7	31.5	64	40.5	47.2	Record in tent
<i>Scotophilus kuhlii</i>	5.5	45.7	85	34.5	67.2	43.5	50.5	Record in tent

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Scotophilus kuhlii</i>	3.2	50.5	81	40.2	52.7	44.7	40.8	Record in tent
<i>Scotophilus kuhlii</i>	3.5	44.7	72	39.5	51.2	42.7	32.5	Record in tent
<i>Scotophilus kuhlii</i>	4.5	45	82.2	38.5	62	44.7	43.7	Record in tent
<i>Scotophilus kuhlii</i>	3.7	51.2	86.7	38	68.7	44.2	48.7	Record in tent
<i>Scotophilus kuhlii</i>	4.5	45.7	77	31	64.7	40.2	46	Record in tent
<i>Scotophilus kuhlii</i>	3.7	44.5	78	36.5	67.7	40.5	41.5	Record in tent
<i>Scotophilus kuhlii</i>	3.2	44.7	83.5	38	64	44.7	45.5	Record in tent
<i>Scotophilus kuhlii</i>	3.5	50	89.2	40.2	70.5	45.2	49	Record in tent
<i>Scotophilus kuhlii</i>	4.7	45	78.5	39.5	60.7	44.7	39	Record in tent
<i>Scotophilus kuhlii</i>	5	49.5	79	38.5	60.7	42.7	40.5	Record in tent
<i>Scotophilus kuhlii</i>	3.7	50.2	90.5	40	71	43.7	50.5	Record in tent
<i>Scotophilus kuhlii</i>	3.7	45	82	37.5	61.2	45.5	44.5	Record in tent
<i>Scotophilus kuhlii</i>	3.2	45.5	76	38.7	48.5	45.2	37.3	Record in tent
<i>Scotophilus kuhlii</i>	6	43.7	79.5	40.5	67.2	42.2	39	Record in tent
<i>Scotophilus kuhlii</i>	4	49	74.5	42	49.2	49.2	32.5	Record in tent
<i>Scotophilus kuhlii</i>	3.5	49.2	79.5	40	70.2	43.7	39.5	Record in tent
<i>Scotophilus kuhlii</i>	3.5	47	78.2	39	67.5	43.5	39.2	Record in tent
<i>Scotophilus kuhlii</i>	4.5	47.5	77.2	41	50.2	46.2	36.2	Record in tent
<i>Taphozous melanopogon</i>	6	28.2	52.5	22	33.2	26	30.5	Record in tent
<i>Taphozous melanopogon</i>	5.2	29.2	56.5	23.7	31	39.2	32.8	Record in tent
<i>Taphozous melanopogon</i>	6	29.2	54.2	22.2	33	37.2	32	Record in tent
<i>Taphozous melanopogon</i>	6	28.2	55	22	33.2	25.7	33	Record in tent
<i>Taphozous melanopogon</i>	4.5	28	44.2	20.7	30.2	24.5	23.5	Record in tent
<i>Taphozous melanopogon</i>	5.7	28.7	57.5	22.7	33	28.5	34.8	Record in tent
<i>Taphozous melanopogon</i>	6.7	29.5	62.2	22.5	31.7	26	39.7	Record in tent
<i>Taphozous melanopogon</i>	6.7	29.5	61.7	22.7	32	26	39	Record in tent
<i>Taphozous melanopogon</i>	5.5	43.2	55	22.5	32	37.5	32.5	Record in tent
<i>Taphozous melanopogon</i>	3.7	39.2	66	23.2	30.2	37.2	42.8	Record in tent
<i>Taphozous melanopogon</i>	5.2	27	65.7	23.2	30.7	25.2	42.5	Record in tent

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Taphozous melanopogon</i>	6.7	37.7	65.2	22.7	31.5	37	42.5	Record in tent
<i>Taphozous melanopogon</i>	8.2	39.7	55	22.2	30.2	37.2	32.8	Record in tent
<i>Taphozous melanopogon</i>	6.7	30.2	64.2	21.5	31.2	34	42.7	Record in tent
<i>Taphozous melanopogon</i>	6.7	29	67.2	22.5	30	36.7	44.7	Record in tent
<i>Taphozous melanopogon</i>	7.5	29	64.5	21.5	30.2	23.5	43	Record in tent
<i>Taphozous melanopogon</i>	8.2	40	55	22.2	30.2	37.2	32.8	Record in tent
<i>Pipistrellus javanicus</i>	4.2	50.5	89.5	43	66.2	48.7	46.5	Record in tent
<i>Pipistrellus javanicus</i>	3.5	66.5	88	43	68	49.7	45	Record in tent
<i>Pipistrellus javanicus</i>	3.5	67.7	88.2	44.5	68.2	50.5	43.7	Record in tent
<i>Pipistrellus javanicus</i>	4.7	49.5	84.7	42.5	67.2	50.2	42.2	Record in tent
<i>Pipistrellus javanicus</i>	4.5	50.2	90.7	44.2	69	50	46.5	Record in tent
<i>Pipistrellus javanicus</i>	4.5	49.5	88	41.2	70.5	48.5	46.8	Record in tent
<i>Pipistrellus javanicus</i>	4.5	53.7	85.5	45.5	68.7	50.5	40	Record in tent
<i>Pipistrellus javanicus</i>	4.7	54.2	92	45.7	69.2	49.7	46.3	Record in tent
<i>Pipistrellus javanicus</i>	4.7	50	83	43.5	68.5	50.2	39.5	Record in tent
<i>Pipistrellus javanicus</i>	4.2	49	85.7	43.5	68.2	49.2	42.2	Record in tent
<i>Pipistrellus javanicus</i>	4.2	59.5	82.5	44	66.7	50.7	38.5	Record in tent
<i>Pipistrellus javanicus</i>	4.5	49.5	89.5	43.2	68.2	49.5	46.3	Record in tent
<i>Pipistrellus javanicus</i>	4.5	54.2	86.2	42.5	67	49.7	43.7	Record in tent
<i>Pipistrellus javanicus</i>	4.2	53.5	90.7	45	69.2	49.7	45.7	Record in tent
<i>Pipistrellus javanicus</i>	4.7	50.7	87.2	42.7	66	50	44.5	Record in tent
<i>Pipistrellus javanicus</i>	5	50.7	88	39.5	67.5	44.7	48.5	Record in tent
<i>Pipistrellus javanicus</i>	4.7	49.5	88.7	39	67.7	44.7	49.7	Record in tent
<i>Pipistrellus javanicus</i>	3.7	49.5	86.5	42.7	71	46.5	43.8	Record in tent
<i>Pipistrellus javanicus</i>	3.7	46.5	88.5	41.5	66.5	46.5	47	Record in tent
<i>Pipistrellus javanicus</i>	3.2	50.2	85.5	40	69	44.2	45.5	Record in tent
<i>Pipistrellus javanicus</i>	4.7	50	87.5	39.2	66	45	48.3	Record in tent
<i>Pipistrellus javanicus</i>	4.7	49.5	88.2	40	67.5	45.5	48.2	Record in tent
<i>Pipistrellus javanicus</i>	3.5	47.2	90	39.7	66.7	45.2	50.3	Record in tent

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Pipistrellus javanicus</i>	3.2	65.2	88	40.5	67	65.7	47.5	Record in tent
<i>Pipistrellus javanicus</i>	4.5	50	85	40	66.5	45.2	45	Record in tent
<i>Pipistrellus javanicus</i>	5	50	89.2	40.7	68.7	46.2	48.5	Record in tent
<i>Pipistrellus javanicus</i>	4.2	49.7	89.2	40.5	68	50	48.7	Record in tent
<i>Pipistrellus javanicus</i>	4.5	50.2	92.5	41	72.2	45.2	51.5	Record in tent
<i>Pipistrellus javanicus</i>	3.7	46.7	90	41.2	68.7	45	48.8	Record in tent
<i>Pipistrellus javanicus</i>	4	50.2	90.7	40	69	44.7	50.7	Record in tent
<i>Pipistrellus javanicus</i>	3.5	46.7	83.7	39.5	68.2	46.7	44.2	Record in tent
<i>Pipistrellus javanicus</i>	4.7	45.2	86.5	41	70	44.7	45.5	Record in tent
<i>Pipistrellus javanicus</i>	4.5	45	85.7	41	69.5	44	44.7	Record in tent
<i>Pipistrellus javanicus</i>	3.5	45.5	86.5	41.5	69.2	45.5	45	Record in tent
<i>Myotis hasseltii</i>	3.5	49.7	90.5	38	72.2	50.2	52.5	Record in tent
<i>Myotis hasseltii</i>	3.2	48.7	84.2	35.5	65.7	43.5	48.7	Record in tent
<i>Myotis hasseltii</i>	3.5	49.7	86	40.7	69	50.2	45.3	Record in tent
<i>Myotis hasseltii</i>	3.2	50.2	88.7	37.7	69.5	50	51	Record in tent
<i>Myotis hasseltii</i>	3.2	50.2	88.2	37.7	66.2	48.2	50.5	Record in tent
<i>Myotis hasseltii</i>	3.5	50	91.2	38.5	69.5	50	52.7	Record in tent
<i>Myotis hasseltii</i>	3	48.5	88.2	37.7	68.2	48.7	50.5	Record in tent
<i>Myotis hasseltii</i>	3.7	48.2	89.2	38	66	50.7	51.2	Record in tent
<i>Myotis hasseltii</i>	3	48.5	84.5	39.7	69.2	48	44.8	Record in tent
<i>Myotis hasseltii</i>	3.2	51.2	90.7	39.2	71.5	48.7	51.5	Record in tent
<i>Myotis hasseltii</i>	3.2	49.7	87	38	70.5	49.7	49	Record in tent
<i>Myotis hasseltii</i>	3	57	90	40.7	68.7	51	49.3	Record in tent
<i>Myotis hasseltii</i>	3.5	49.5	87	32.7	70.5	44	54.3	Record in tent
<i>Myotis hasseltii</i>	3	47.2	81.7	34.2	66	42	47.5	Record in tent
<i>Myotis hasseltii</i>	2.2	48.7	87	37	66.2	48.7	50	Record in tent
<i>Myotis hasseltii</i>	4.2	46.2	88.7	37.7	69	46.2	51	Record in tent
<i>Myotis hasseltii</i>	2.7	48.7	84.5	35.5	60.7	43.7	49	Record in tent
<i>Myotis hasseltii</i>	3.7	49	86.7	37.2	58.7	49	49.5	Record in tent

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Myotis hasseltii</i>	4	49.7	88	38.7	66	50.2	49.3	Record in tent
<i>Myotis hasseltii</i>	4	49.2	86.5	36	69.7	45.2	50.5	Record in tent
<i>Myotis hasseltii</i>	3.2	49.5	94	36.5	68.7	44.7	57.5	Record in tent
<i>Myotis hasseltii</i>	3.2	48.5	88.7	35.7	69.7	48	53	Record in tent
<i>Myotis hasseltii</i>	3.5	48	84.5	36.5	68	47.5	48	Record in tent
<i>Myotis hasseltii</i>	3.2	47.7	78.7	30.5	65	43	48.2	Record in tent
<i>Myotis hasseltii</i>	3	57	80.7	38.5	66.2	48.5	42.2	Record in tent
<i>Myotis hasseltii</i>	3.7	59	87.2	39.2	70.5	48	48	Record in tent
<i>Myotis hasseltii</i>	3	47.7	79.7	35.2	68.5	47.5	44.5	Record in tent
<i>Myotis hasseltii</i>	3.2	49.7	84.5	37.2	66.5	50.2	47.3	Record in tent
<i>Myotis hasseltii</i>	3.2	51	87.7	39.2	69.2	47.5	48.5	Record in tent
<i>Myotis hasseltii</i>	3	56.2	85	38.7	65.2	50.5	46.3	Record in tent
<i>Myotis hasseltii</i>	2.7	55.5	85.7	40	69.2	51	45.7	Record in tent
<i>Myotis hasseltii</i>	3.5	57	86.7	40	70.7	49.5	46.7	Record in tent
<i>Myotis hasseltii</i>	2.7	50	78.5	40.5	69.2	50	38	Record in tent
<i>Myotis hasseltii</i>	3.2	50	79.5	38.5	69.5	49	41	Record in tent
<i>Myotis hasseltii</i>	3.7	48.2	82.2	35.7	68	47.2	46.5	Record in tent
<i>Myotis hasseltii</i>	3	48.7	79	36.7	69.7	48	42.3	Record in tent
<i>Myotis hasseltii</i>	3.7	48.2	87	39.2	68.2	48.2	47.8	Record in tent
<i>Myotis hasseltii</i>	3.2	47.7	87.2	37.5	66.5	47.7	49.7	Record in tent
<i>Myotis hasseltii</i>	3.5	46.7	87	34.7	69.5	48.5	52.3	Record in tent
<i>Myotis hasseltii</i>	3.7	49.5	89.5	36.2	67.5	48	53.3	Record in tent
<i>Myotis hasseltii</i>	3.5	49.5	87.2	36	68.7	47	51.2	Record in tent
<i>Myotis hasseltii</i>	3.2	50.5	81	34.2	69	45.2	46.8	Record in tent
<i>Myotis hasseltii</i>	3.5	50.7	89.7	37.7	68.7	49.7	52	Record in tent
<i>Myotis hasseltii</i>	3.2	47.5	90.7	37	68.7	47.2	53.7	Record in tent
<i>Myotis hasseltii</i>	3	50	92.5	36.2	71.5	48.7	56.3	Record in tent
<i>Myotis hasseltii</i>	3.2	48	80.7	37	68.5	47.5	43.7	Record in tent
<i>Myotis hasseltii</i>	3	50.2	87	37	68	48	50	Record in tent

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Myotis hasseltii</i>	3	50	86.5	36.7	70	50.2	49.8	Record in tent
<i>Myotis hasseltii</i>	3.5	50.5	88	36.2	70	50.2	51.8	Record in tent
<i>Myotis hasseltii</i>	3.7	48.7	78	36.2	68	44	41.8	Record in tent
<i>Myotis hasseltii</i>	2.7	47	79.2	36	67.2	47	43.2	Record in tent
<i>Myotis hasseltii</i>	3	48.5	85.5	34.7	69.5	44.5	50.8	Record in tent
<i>Myotis hasseltii</i>	4.5	47.2	78.2	36.2	68.5	48.2	42	Record in tent
<i>Myotis hasseltii</i>	3.2	48.5	79	35.5	65.7	43	43.5	Record in tent
<i>Myotis hasseltii</i>	3.2	49.5	84.7	36.7	68.7	49.7	48	Record in tent
<i>Myotis hasseltii</i>	3.7	49	78	41.7	69	48.2	36.3	Record in tent
<i>Myotis hasseltii</i>	3.7	56.2	89.2	38.2	71.2	48.5	51	Record in tent
<i>Myotis hasseltii</i>	4.7	50.5	75.7	37.5	66.2	51.2	38.2	Record in tent
<i>Myotis hasseltii</i>	3.7	49.5	87.7	38.5	69.7	48.2	49.2	Record in tent
<i>Myotis hasseltii</i>	3.7	49	89	37	70.5	46.2	52	Record in tent
<i>Myotis hasseltii</i>	4	56.5	87.7	40.2	67	50	47.5	Record in tent
<i>Myotis hasseltii</i>	4	49	86.7	41.2	68.2	48.2	45.5	Record in tent
<i>Myotis hasseltii</i>	4.5	49.2	87.5	41.5	69	48	46	Record in tent
<i>Myotis hasseltii</i>	4.7	48	77.2	40.5	67.5	46.7	36.7	Record in tent
<i>Myotis hasseltii</i>	4.5	49	79.5	39.7	68	49	39.8	Record in tent
<i>Myotis hasseltii</i>	4	49.7	88.2	43.7	70.7	48.2	44.5	Record in tent
<i>Taphozous melanopogon</i>	6	41.5	65.7	22.5	31.7	37.2	43.2	Record in tent
<i>Taphozous melanopogon</i>	5	39.7	63.5	21.7	31.2	25.2	41.8	Record in tent
<i>Taphozous melanopogon</i>	6	29	58.5	23	32	30	35.5	Record in tent
<i>Taphozous melanopogon</i>	5.7	42	61.5	22	32.2	31.5	39.5	Record in tent
<i>Taphozous melanopogon</i>	5.2	41.7	65.7	23.2	32	38	42.5	Record in tent
<i>Taphozous melanopogon</i>	4.7	39.5	65.7	22	31.7	36.2	43.7	Record in tent
<i>Taphozous melanopogon</i>	6.5	30	61	22.2	32.2	29.5	38.8	Record in tent
<i>Taphozous melanopogon</i>	5.2	28.5	47.5	21.7	31.5	25	25.8	Record in tent
<i>Pipistrellus javanicus</i>	6	46.7	98.7	43	74.7	46.7	55.7	Record in field
<i>Pipistrellus javanicus</i>	6	44.5	85.7	40.5	70.2	44.5	45.2	Record in field

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Pipistrellus javanicus</i>	6	50.7	93	46.7	69.2	50.7	46.3	Record in field
<i>Pipistrellus javanicus</i>	4.5	45.7	79.5	31.7	46.2	45.7	47.8	Record in field
<i>Pipistrellus javanicus</i>	6	49.2	92	47	73.2	49.2	45	Record in field
<i>Pipistrellus javanicus</i>	6	56.7	88.7	43.7	66.5	56.7	45	Record in field
<i>Pipistrellus javanicus</i>	4	51.2	85.7	45.5	67.7	51.2	40.2	Record in field
<i>Pipistrellus javanicus</i>	6	49.7	92	47	69.5	49.7	45	Record in field
<i>Pipistrellus javanicus</i>	6	47.2	97.7	44.5	74.2	47.2	53.2	Record in field
<i>Pipistrellus javanicus</i>	7	47.5	91.7	41.7	66.7	47.5	50	Record in field
<i>Pipistrellus javanicus</i>	6	46.5	90.5	40.5	72.5	46.5	50	Record in field
<i>Pipistrellus javanicus</i>	5.5	47	86.2	42.5	60.2	47	43.7	Record in field
<i>Pipistrellus javanicus</i>	5.5	45.7	84.7	42.5	68.5	45.7	42.2	Record in field
<i>Pipistrellus javanicus</i>	6.5	46.2	91	44	75	46.2	47	Record in field
<i>Pipistrellus javanicus</i>	8	46.5	85.5	45.7	67.2	46.5	39.8	Record in field
<i>Pipistrellus javanicus</i>	6.5	48.5	89.7	44.5	70.2	48.5	45.2	Record in field
<i>Taphozous melanopogon</i>	6	28.5	58.5	22.7	30.2	25.5	35.8	Record in field
<i>Taphozous melanopogon</i>	6.5	28.5	59	26.2	33.5	28	32.8	Record in field
<i>Taphozous melanopogon</i>	7.5	29.2	59.2	23.5	34.2	29.5	35.7	Record in field
<i>Taphozous melanopogon</i>	6.5	29.2	59.2	24.5	33.5	29.7	34.7	Record in field
<i>Taphozous melanopogon</i>	8.5	27.5	50.2	24.7	32.5	29	25.5	Record in field
<i>Taphozous melanopogon</i>	5.5	41.5	59	25	26.7	28	34	Record in field
<i>Taphozous melanopogon</i>	8.5	29.5	61.2	24.5	45	29.7	36.7	Record in field
<i>Taphozous melanopogon</i>	7.5	29.2	60.7	24.5	44.7	28.5	36.2	Record in field
<i>Taphozous melanopogon</i>	7.5	43.5	59	23.7	35.7	28.5	35.3	Record in field
<i>Taphozous melanopogon</i>	7	29.2	59.7	25.2	36.2	42.5	34.5	Record in field
<i>Taphozous melanopogon</i>	6	43	59	24.2	35.2	29	34.8	Record in field
<i>Taphozous melanopogon</i>	7.5	29	58.7	24.7	34.5	28.2	34	Record in field
<i>Taphozous melanopogon</i>	6.5	43.2	60	24.7	34.2	37.5	35.3	Record in field
<i>Taphozous melanopogon</i>	7	29.2	60.7	23.2	30.2	28.2	37.5	Record in field
<i>Taphozous melanopogon</i>	8	29.7	60.5	24.7	31	28.7	35.8	Record in field

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Taphozous melanopogon</i>	8	37.2	57	23.7	32.5	38	33.3	Record in field
<i>Taphozous melanopogon</i>	6.5	28.5	58.7	24.5	33.5	28	34.2	Record in field
<i>Taphozous melanopogon</i>	7.5	29	50.5	24.7	35	29.2	25.8	Record in field
<i>Scotophilus kuhlii</i>	5	48	71.5	40.7	53.7	44.5	30.8	Record in field
<i>Scotophilus kuhlii</i>	5	48.5	77	41.7	59.7	43.5	35.3	Record in field
<i>Scotophilus kuhlii</i>	9	42.7	71	40.5	54.2	40.2	30.5	Record in field
<i>Scotophilus kuhlii</i>	6.5	44.2	73.2	40	55.7	40	33.2	Record in field
<i>Scotophilus kuhlii</i>	7	46.5	73	41.7	59.2	41	31.3	Record in field
<i>Scotophilus kuhlii</i>	9.5	42.7	64.7	40.2	53.2	37.5	24.5	Record in field
<i>Scotophilus kuhlii</i>	11.5	43.2	67.2	41	55.2	37.7	26.2	Record in field
<i>Scotophilus kuhlii</i>	6.5	40.5	73.7	37.7	59	38.2	36	Record in field
<i>Scotophilus kuhlii</i>	8.5	39.7	66	37.5	53.5	37.2	28.5	Record in field
<i>Scotophilus kuhlii</i>	8	45.2	76.5	43.5	62.2	45.2	33	Record in field
<i>Scotophilus kuhlii</i>	7.5	45	72.7	42.7	56.7	44.2	30	Record in field
<i>Scotophilus kuhlii</i>	8.5	44	73.7	39.7	69.5	45.2	34	Record in field
<i>Scotophilus kuhlii</i>	12	42.7	66.5	40.7	55	42.7	25.8	Record in field
<i>Scotophilus kuhlii</i>	11	43.2	63.7	39.7	53.5	36.5	24	Record in field
<i>Scotophilus kuhlii</i>	9	35	60	33.7	49.7	34	26.3	Record in field
<i>Scotophilus kuhlii</i>	7	41.7	72.5	37	55.2	35.2	35.5	Record in field
<i>Myotis hasseltii</i>	4	58.2	92.7	43.5	70.7	51	49.2	Record in field
<i>Myotis hasseltii</i>	4.5	56.2	85	43.2	68.7	50	41.8	Record in field
<i>Myotis hasseltii</i>	4	54	96.2	43.7	69.7	49.2	52.5	Record in field
<i>Myotis hasseltii</i>	5.5	47.7	81.2	40.5	67.2	49.5	40.7	Record in field
<i>Myotis hasseltii</i>	4.5	51.2	97	40.2	70.5	49.2	56.8	Record in field
<i>Myotis hasseltii</i>	4.5	50	85.5	44.5	69.5	49.5	41	Record in field
<i>Myotis hasseltii</i>	4.5	56.2	89.5	46.2	69.2	50.2	43.3	Record in field
<i>Myotis hasseltii</i>	4.5	50.7	92.7	42.2	70.2	48.5	50.5	Record in field
<i>Myotis hasseltii</i>	4.5	48	85.2	40.5	69.2	47.7	44.7	Record in field
<i>Myotis hasseltii</i>	5	48	69.7	41.2	55.7	43	28.5	Record in field

Species	duration	FMAXE(kHz)	hf (kHz)	lf (kHz)	sf (kHz)	tf (kHz)	fr (kHz)	Note
<i>Myotis hasseltii</i>	4.5	50	82.7	43.2	69.7	49.5	39.5	Record in field
<i>Myotis hasseltii</i>	6	49	74	43.7	64.7	45	30.3	Record in field
<i>Myotis hasseltii</i>	6	50.2	76.7	44.7	68.5	46	32	Record in field
<i>Myotis hasseltii</i>	4.5	49.7	76.2	40.2	57	50	36	Record in field
<i>Myotis hasseltii</i>	4.5	47.7	78.2	38.7	63.7	47.5	39.5	Record in field
<i>Myotis hasseltii</i>	4.5	48	84	42.2	64.7	45.7	41.8	Record in field
<i>Myotis hasseltii</i>	5.5	51.2	82.7	42.7	67.2	46.2	40	Record in field
<i>Myotis hasseltii</i>	6	51	86.5	43.7	72.7	47.5	42.8	Record in field
<i>Myotis hasseltii</i>	6	56	83	43.7	68.5	48.2	39.3	Record in field
<i>Myotis hasseltii</i>	4.5	49	74.7	43.7	55.2	44.7	31	Record in field
<i>Myotis hasseltii</i>	6.5	43.7	74	38	59.7	41.7	36	Record in field
<i>Myotis hasseltii</i>	4.5	46	86.2	36.2	61	48.7	50	Record in field
<i>Myotis hasseltii</i>	5.5	49.2	79.2	40.5	65.7	48	38.7	Record in field
<i>Myotis hasseltii</i>	5.5	42.7	71.2	38	51	41.5	33.2	Record in field
<i>Myotis hasseltii</i>	6	54.5	81.5	47.7	71	48.5	33.8	Record in field



(a)



(b)



(c)



(d)

Figure S1. The lateral view of captured bat species: *Pipistrellus javanicus* (a); *Scotophilus kuhlii* (b); *Myotis hasseltii* (c); *Taphozous melanopogon* (d)

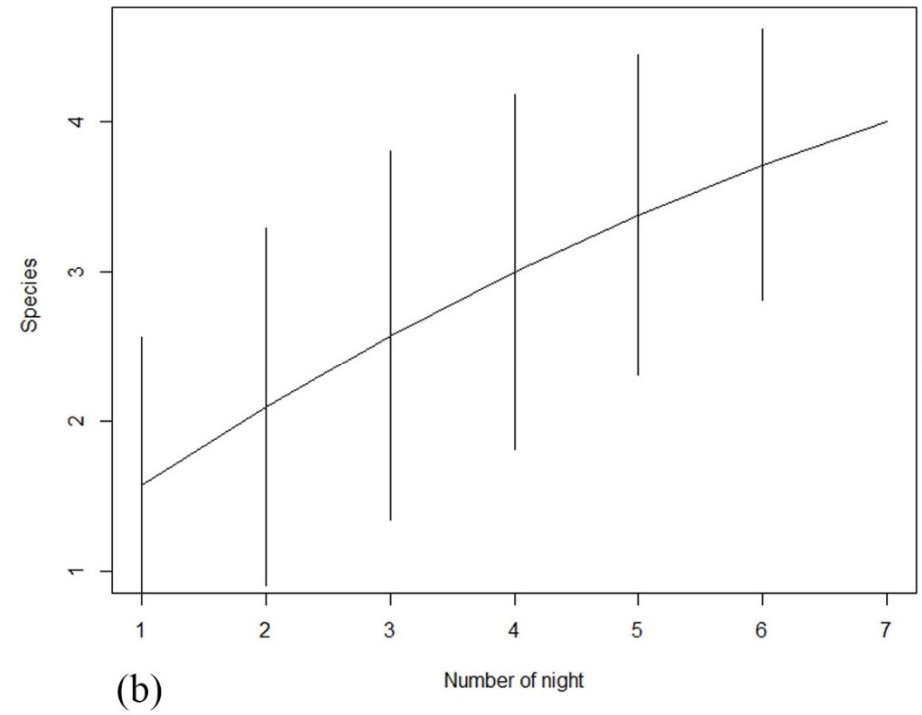
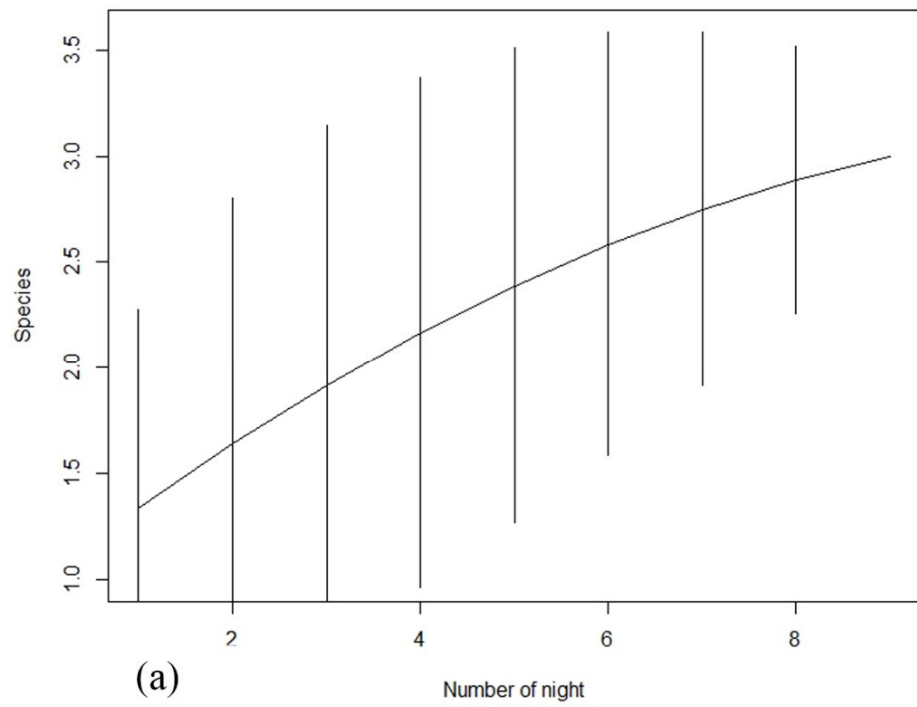


Figure S2. The species accumulation curve based on sampling effort by night of sampling for survey in Tra Vinh City (a) and Ho Chi Minh City (b) shows the continuously growing of the species richness in two survey sites.

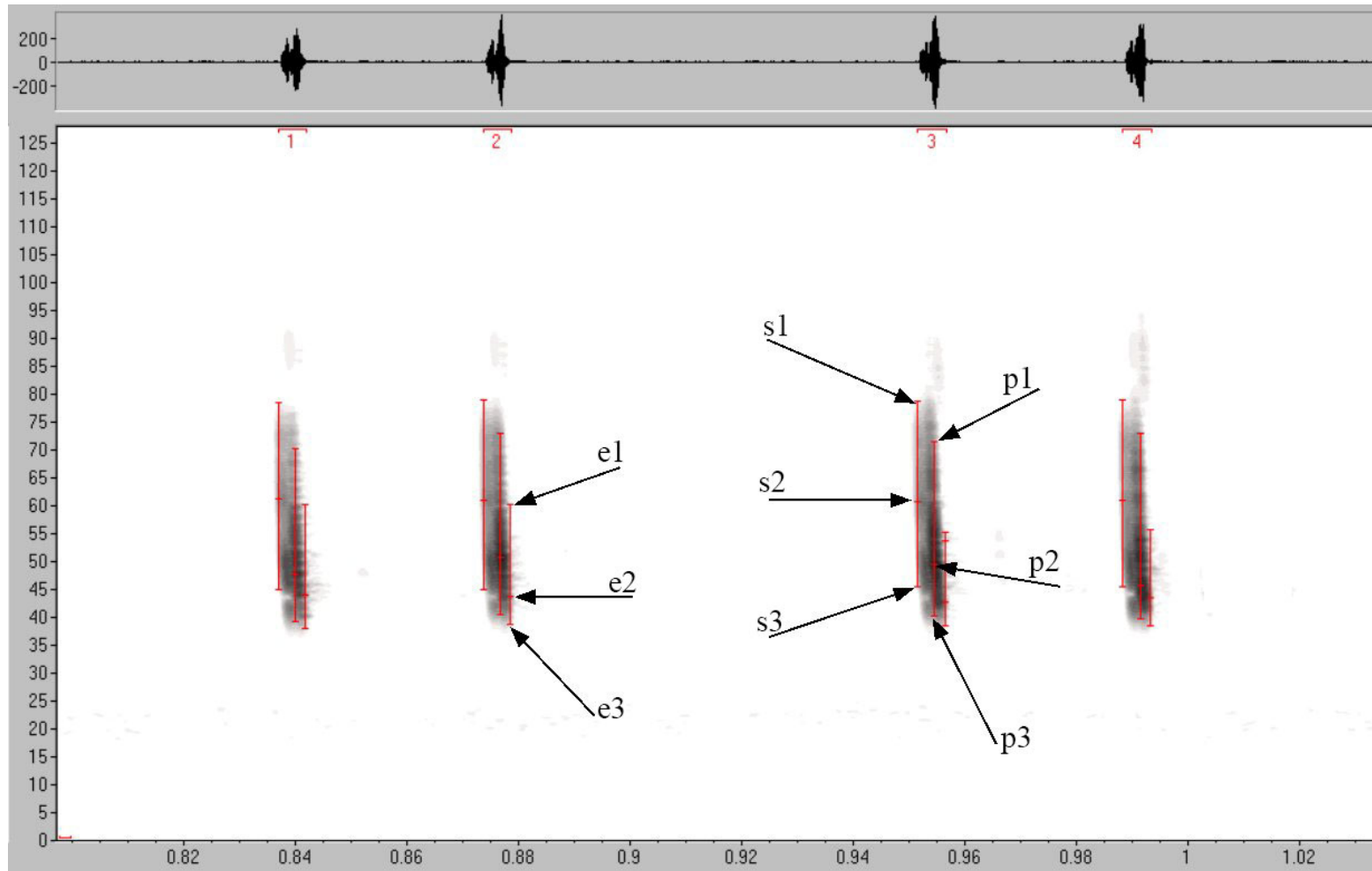


Figure S3. The illustration of automatic parameter measurements by the software. The spectrum-base parameters that were measured including max frequency (1), peak frequency (2) and min frequency (3) at three points of start (s), maximum energy (p), and end of the call (e).

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