

Decrease in Bat Diversity Points towards a Potential Threshold Density for Black Cherry Management: A Case Study from Germany

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The supplementary material is grouped into 1. information on the study area and 2. information on the gathered bio-acoustical data. One figure/table is shown per page.

1. Information on the study area



Figure S1. Location of the study area 'Linde': **a)** North-eastern location within Germany; **b)** Location on regional scale: The study area is surrounded by the cities of Rathenow in the west, Brandenburg an der Havel in the south and Berlin in the east.

Sources: a) [URL upload.wikimedia.org/wikipedia/commons/e/ed/Germany_adm_location_map.svg](http://upload.wikimedia.org/wikipedia/commons/e/ed/Germany_adm_location_map.svg) – edited by author; b) GeoBasis-DE/BKG © 2016 Google – edited by author



Figure S2. Distribution of study sites throughout the study area: The research station Linde is located at 12°39'51,314" East and 52°32'41,908" North. Plots 1 and 4-9 are located within the Linde core study area, the plots 2 and 3 in the close surroundings north-eastern of the core study area. Plots 1-3 are classified as pine (*Pinus sylvestris*) monoculture, plots 4-6 as light black cherry (*Prunus serotina*) and plots 7-9 as dense black cherry.

Source: Aerial picture © ESRI Inc, California, United States

Table S1. Batcorder location coordinates.Species: pine (*Pinus sylvestris*); black cherry (*Prunus serotina*)

Forest type	Plot	Batcorder 1	Batcorder 2
Pine monoculture	1	E 12°40'10.227" N 52°32'35.823"	E 12°40'8.615" N 52°32'35.97"
	2	E 12°38'1.62" N 52°33'19.12"	E 12°38'1.056" N 52°33'20.095"
	3	E 12°38'9.814" N 52°33'4.79"	E 12°38'11.381" N 52°33'5.756"
Light black cherry	4	E 12°40'3.999" N 52°32'30.908"	E 12°40'2.386" N 52°32'30.704"
	5	E 12°40'36.997" N 52°32'55.18"	E 12°40'38.042" N 52°32'56.115"
	6	E 12°39'48.727" N 52°32'59.535"	E 12°39'47.331" N 52°32'58.561"
Dense black cherry	7	E 12°39'47.495" N 52°32'22.596"	E 12°39'45.767" N 52°32'23.219"
	8	E 12°41'2.356" N 52°33'4.082"	E 12°41'2.88" N 52°33'2.855"
	9	E 12°39'41.042" 52°32'53.992"	E 12°39'39.647" N 52°32'53.34"

2. Information on the gathered bio-acoustical data

Table S2. General results of species/sonotype identification: Bat diversity and relative abundance based on the total of 3914 identified bat call recordings made during 60 survey nights.

The species/sonotype identification data used for the statistical analysis is marked bold. The relative abundance is based on the total bat call length. The data for the automatically identified 'Nyctaloid' species (software bcIdent; ecoObs GmbH, Nuremberg, Germany; Version 1.5) is calculated with the sonotype 'Nyctaloid' as reference. Only the top five abundant species/ species groups are presented.

Sonotype / Species	Type of identification	Bat call recordings	Bat calls	Total bat call length [ms]	Relative abundance [%]
<i>Myotis myotis</i>	manual	141	877	161.37	3.94
<i>Myotis nattereri</i>	manual	199	1012	160.99	3.93
'Whiskered bats' <i>Myotis mystacinus</i> <i>Myotis brandtii</i>	manual	23	270	36.42	0.89
<i>Myotis daubentonii</i>	manual	133	841	143.65	3.51
'Plecotus' <i>Plecotus auritus</i> <i>Plecotus austriacus</i>	manual	60	186	43.73	1.07
'Nyctaloid'	manual	1008	4918	1030.37	25.17
Nyctaloid (genera <i>Nyctalus</i> , <i>Vespertilio</i> , <i>Eptesicus</i> , <i>Tadarida</i> and <i>Vespertilio</i>)	automatic	311	1626	339.08	32.91
<i>Eptesicus nilssonii</i>	automatic	236	1791	329.37	31.97
Spec. (calls but no species identified)	automatic	347	800	229.52	22.28
<i>Nyctalus noctula</i>	automatic	60	251	56.79	5.51
Nycmi (<i>E. serotinus</i> , <i>V. murinus</i> , <i>N. leiseri</i>)	automatic	20	199	29.59	2.87
Rest (<i>Myotis dasycneme</i> , <i>Barbastella barbastellus</i> , <i>E. serotinus</i> , <i>V. murinus</i> , <i>N. leiseri</i> , <i>Hypsugo savii</i> , <i>P. pipistrellus</i> , <i>P. pygmaeus</i> , <i>P. nathusii</i> , <i>P. kuhlii</i>)	automatic	34	251	46.03	4.47
<i>Eptesicus serotinus</i>	manual	981	7765	1362.24	33.28
<i>Nyctalus noctula</i>	manual	439	1153	295.7	7.22
<i>Pipistrellus pipistrellus</i>	manual	382	2031	371.55	9.08
<i>Pipistrellus pygmaeus</i>	manual	278	1106	225.05	5.50
<i>Pipistrellus nathusii</i>	manual	270	1226	262.34	6.41

Table S3. Number of bat call recordings per hour per species per forest type.The data was gathered in 60 survey nights. Species: pine (*Pinus sylvestris*); black cherry (*Prunus serotina*)

Species/nonotype	Pine monoculture	Light black cherry	Dense black cherry
<i>Myotis myotis</i>	3.88 median 0.00	8.34 median 0.00	0.09 median 0.00
<i>Myotis nattereri</i>	6.5 median 0.08	8.94 median 0.09	0.99 median 0.00
'Whiskered bats'	0.82 median 0.00	1.27 median 0.00	0
<i>Myotis daubentonii</i>	2.44 median 0.00	9.47 median 0.00	0
'Plecotus'	1.81 median 0.00	3.24 median 0.00	0
'Nyctaloid'	35.33 median 0.00	56.38 median 0.00	0.553 median 0.00
<i>Eptesicus serotinus</i>	29.88 median 0.00	60.10 median 0.08	0.47 median 0.00
<i>Nyctalus noctula</i>	11.18 median 0.08	27.43 median 0.08	0.07 median 0.00
<i>Pipistrellus pipistrellus</i>	19.70 median 0.20	13.81 median 0.08	0
<i>Pipistrellus pygmaeus</i>	11.11 median 0.00	13.08 median 0.04	0
<i>Pipistrellus nathusii</i>	7.89 median 0.00	15.59 median 0.09	0

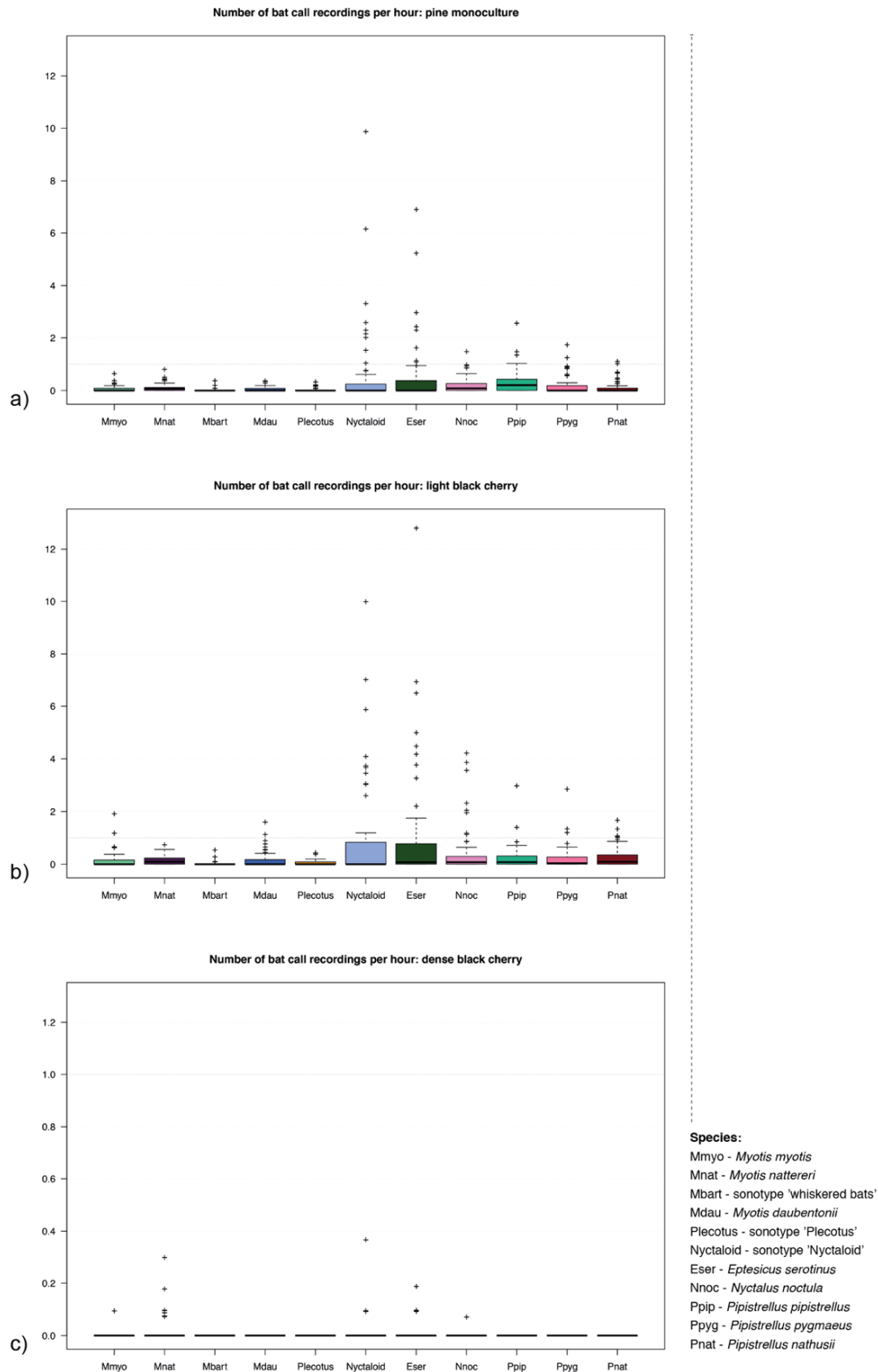


Figure S3. Number of bat call recordings per hour per species in comparable scale: a) Pine monoculture; b) Light black cherry; c) Dense black cherry. For comparability, the value of 1 bat call recording per hour is marked with a grey line.

Species: pine (*Pinus sylvestris*); black cherry (*Prunus serotina*)

Table S4. Bat diversity and relative abundance in the pine (*Pinus sylvestris*) monoculture forest. Monocultural pine $\cong$ 0 to 5% black cherry coverage. N = 60 survey nights. The relative abundance is based on the total bat call length.

Sonotype/Species	Bat call recordings	Bat calls	Total bat call length [ms]	Relative abundance [%]
<i>Myotis myotis</i>	43	331 median 5	51.33 median 1.03	3.47
<i>Myotis nattereri</i>	81	440 median 2	65.95 median 0.60	4.46
‘Whiskered bats’	9	118 median 14	15.31 median 1.78	1.03
<i>Myotis daubentonii</i>	27	205 median 4	29.79 median 0.91	2.01
‘Plecotus’	22	56 median 2	13.98 median 0.46	0.95
‘Nyctaloid’	385	1843 median 3	390.21 median 0.79	26.03
<i>Eptesicus serotinus</i>	325	2300 median 5	429.45 median 0.16	29.03
<i>Nyctalus noctula</i>	136	224 median 1	71.68 median 0.47	4.85
<i>Pipistrellus pipistrellus</i>	225	1170 median 3	214.09 median 0.80	14.47
<i>Pipistrellus pygmaeus</i>	126	508 median 3	104.95 median 0.72	7.09
<i>Pipistrellus nathusii</i>	89	456 median 4	92.58 median 0.87	6.26

Table S5. Bat diversity and relative abundance in the pine (*Pinus sylvestris*) forest with light black cherry (*Prunus serotina*) in the understory.

Light black cherry $\pm$ 6 to 60% black cherry coverage. N = 60 survey nights. The relative abundance is based on the total bat call length.

Sonotype/Species	Bat call recordings	Bat calls	Total bat call length [ms]	Relative abundance [%]
<i>Myotis myotis</i>	97	543 median 5	109.23 median 1.03	4.21
<i>Myotis nattereri</i>	106	535 median 3.5	86.91 median 0.66	3.35
‘Whiskered bats’	14	152 median 8.5	21.11 median 1.29	0.81
<i>Myotis daubentonii</i>	106	636 median 4	113.87 median 0.98	4.34
‘Plecotus’	38	130 median 3	29.75 median 0.71	1.15
‘Nyctaloid’	617	3061 median 3	636.33 median 0.74	24.50
<i>Eptesicus serotinus</i>	651	5454 median 7	929.14 median 1.34	35.77
<i>Nyctalus noctula</i>	302	928 median 1	223.56 median 0.46	8.61
<i>Pipistrellus pipistrellus</i>	157	861 median 3	157.46 median 0.71	6.06
<i>Pipistrellus pygmaeus</i>	152	598 median 2	120.11 median 0.61	4.62
<i>Pipistrellus nathusii</i>	181	770 median 2	169.76 median 0.69	6.54

Table S6. Bat diversity and relative abundance in the pine (*Pinus sylvestris*) forest with dense black cherry (*Prunus serotina*) in the understory.

Dense black cherry $\triangleq$ 61 to 100% black cherry coverage. N = 60 survey nights. The relative abundance is based on the total bat call length.

Sonotype/Species	Bat call recordings	Bat calls	Total bat call length [ms]	Relative abundance [%]
<i>Myotis myotis</i>	1	3	0.82	4.83
<i>Myotis nattereri</i>	12	37 median 1.5	8.12 median 0.52	48.12
‘Whiskered bats’	0	0	0	0
<i>Myotis daubentonii</i>	0	0	0	0
‘Plecotus’	0	0	0	0
‘Nyctaloid’	6	14 median 1.5	3.83 median 0.60	22.69
<i>Eptesicus serotinus</i>	5	11 median 2	3.65 median 0.72	21.62
<i>Nyctalus noctula</i>	1	1	0.46	2.74
<i>Pipistrellus pipistrellus</i>	0	0	0	0
<i>Pipistrellus pygmaeus</i>	0	0	0	0
<i>Pipistrellus nathusii</i>	0	0	0	0