

1 **Table S1.** For each habitat category are given the source of the data, and the object with the associated
 2 buffer used for creating the layers.

Habitat category	Source	Object	Buffer
Cereals	Field monitoring	-	-
Root vegetables	Field monitoring	-	-
Pastures	Field monitoring	-	-
Intensive meadows	Field monitoring	-	-
Extensive meadows	Field monitoring	-	-
Wildflower strips	Field monitoring	-	-
		TLM_BODENBEDECKUNG	
Forests	SwissTLM ^{3D}	OBJEKTART = Wald	-
		OBJEKTART = Wald offen	-
		OBJEKTART = Gebueschwald	-
Forest edges	SwissTLM ^{3D}	Buffer around "Forests" layer	10 m
		TLM_STRASSE	
Roads	SwissTLM ^{3D}	OBJEKTART = Autobahn	25 m
		OBJEKTART = Autostrasse	15 m
		OBJEKTART = 10m Strasse	10 m
		OBJEKTART = 8m Strasse	8 m
		OBJEKTART = 6m Strasse	6 m
		OBJEKTART = 4m Strasse	4 m
		OBJEKTART = 3m Strasse	3 m
		OBJEKTART = 2m Weg	2 m
		OBJEKTART = 1m Weg	1 m
Settlements	SwissTLM ^{3D}	TLM_GEBAEUDE_FOOTPRINT	
		OBJEKTART = all	20 m

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8 **Table S2.** Correspondence between habitat classification and official agri-environment schemes (AES) categories. The official AES census performed
9 by the canton Vaud in 2017 was compared to 24 corresponding vegetation maps mapped in this study (selected based on their location and year
10 of mapping). The AES category identifiers correspond to the ones defined by the Federal Office for Agriculture (FOAG): 556 = Floral fallow; 557 =
11 Rotational fallow; 559 = Extensive herbaceous strips; 611 = Extensive meadows; 612 = Low intensity meadows; 617 = Extensive pastures; 852 =
12 Hedges and copses. Percentage of correspondence are indicated with the number of matching parcels in brackets.

	AES category identifiers							non-AES	Total
	556	557	559	611	612	617	852		
Wildflower strips	70.23% (92)	26.72% (35)	2.29% (3)	0.76% (1)	0	0	0	0	131
Extensive meadows	0.17% (1)	0.50% (3)	0.17% (1)	93.68% (563)	1.83% (11)	1.83% (11)	1.32% (8)	0.50% (3)	601
Intensive meadows	0	0	0	5.44% (102)	5.39% (101)	0.96% (18)	0	88.21% (1653)	1874
Pastures	0	0	0	8.96% (82)	0	18.80% (172)	1.09% (10)	71.15% (651)	915

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18 **Table S3.** Number of barn owl individuals included in habitat selection models. For each analysis, poorly
19 estimated coefficients (because the habitat category was absent or too rare) were removed from the
20 models to avoid misestimating the other habitat selection estimates. In total, 134 barn owls were included
21 in the study.

Category	Home range	Roosting site	Perching site	Hunting ground
Cereals	134	134	134	134
Root vegetables	122	128	127	114
Forests	134	134	134	117
Forest edges	134	134	134	131
Intensive meadows	134	134	134	132
Extensive meadows	131	133	132	115
Pastures	132	132	132	118
Wildflower strips	115	104	104	62
Roads	134	134	134	-
Settlements	134	134	134	-

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36 **Table S4.** Correspondence between habitat categories and the three dimensions of the non-metric multi-
37 dimensional scaling (NMDS) performed on hunting selection estimates.

Habitat	NMDS 1	NMDS 2	NMDS 3
Cereals	-0.033	-0.023	-0.028
Root vegetables	0.146	0.070	0.160
Forests	0.138	-0.150	-0.021
Forest edges	-0.062	-0.011	0.014
Intensive meadows	-0.114	-0.006	-0.012
Extensive meadows	-0.005	0.010	0.004
Pastures	0.092	0.092	-0.081

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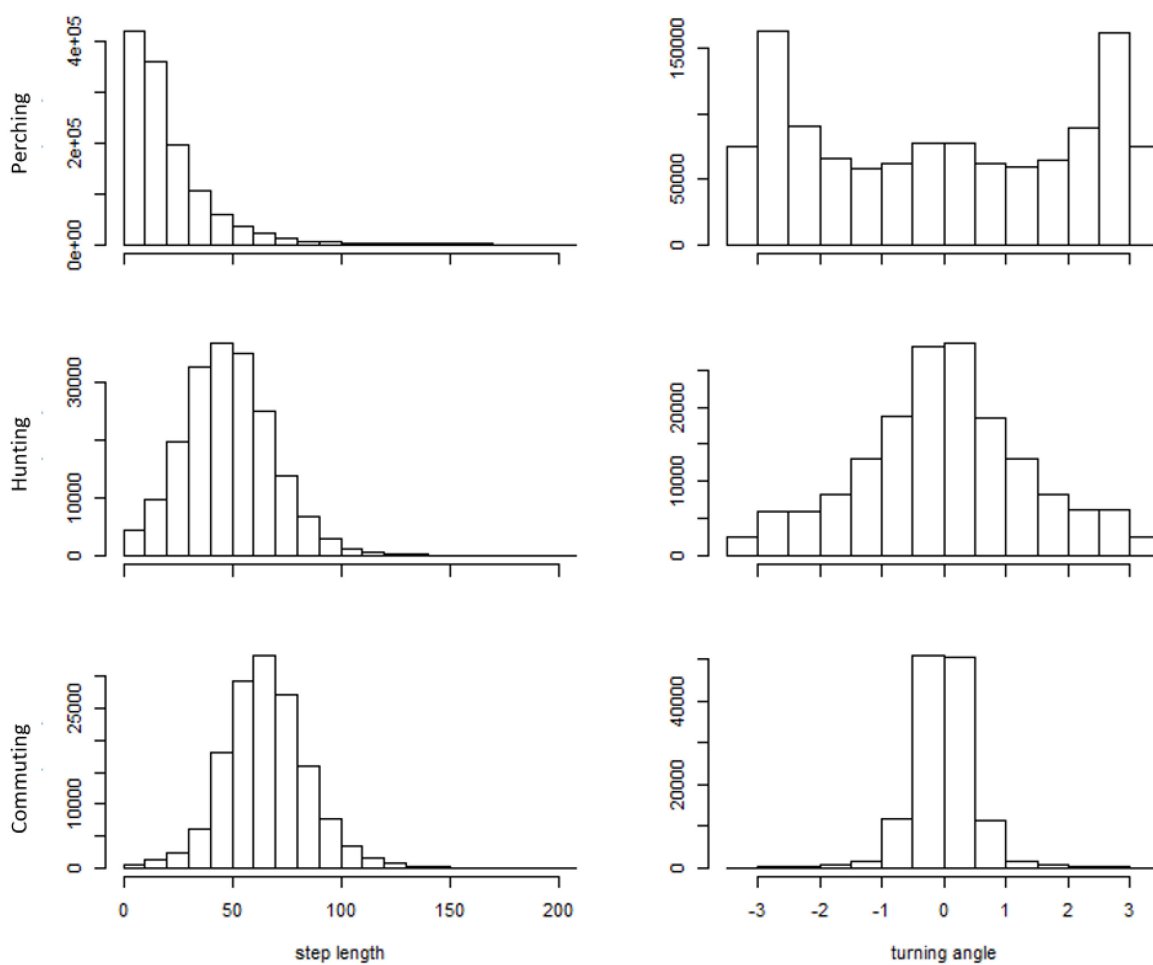
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52 **Fig. S1.** Step length and turning angle distributions for the perching, hunting and commuting behaviours.

53 The step length is in meters and the turning angle in radians, with a time interval between each location

54 of 10 seconds.



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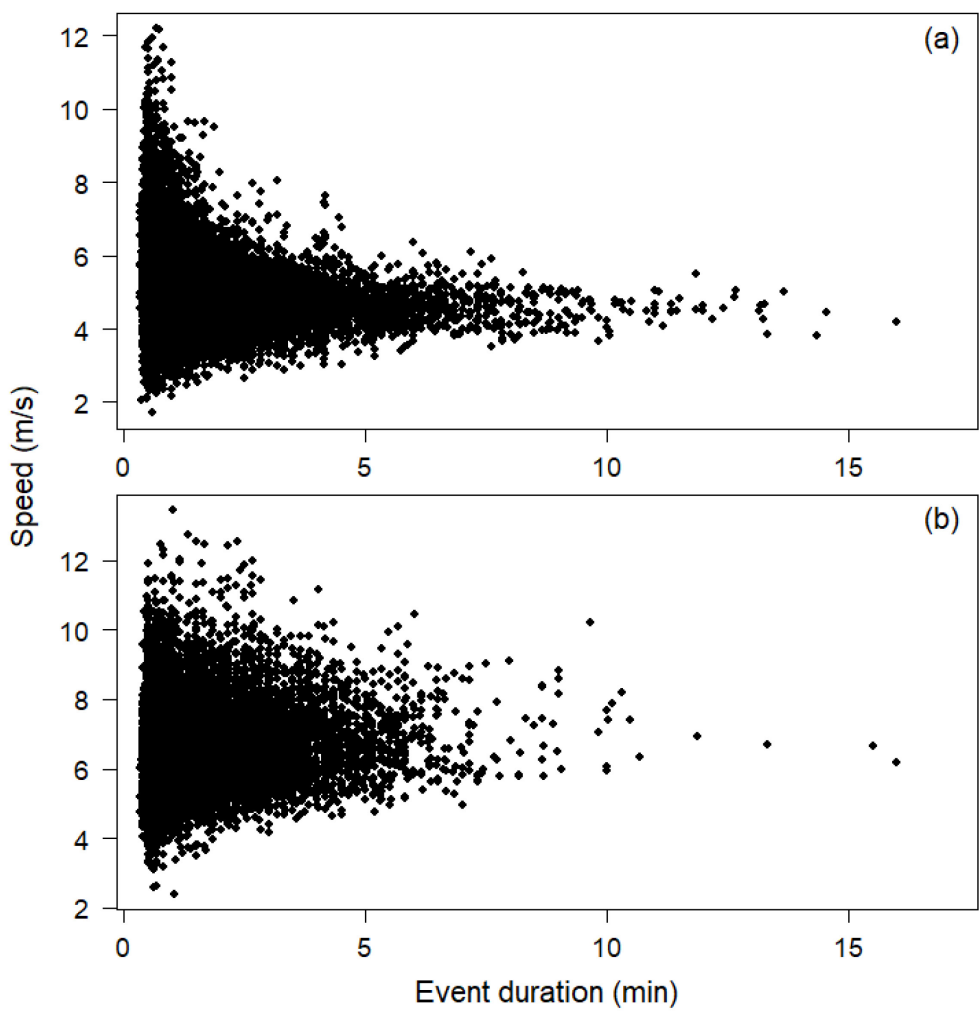
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60 **Fig. S2.** Relation between a) hunting and b) commuting flight speeds and the behavioural event duration.



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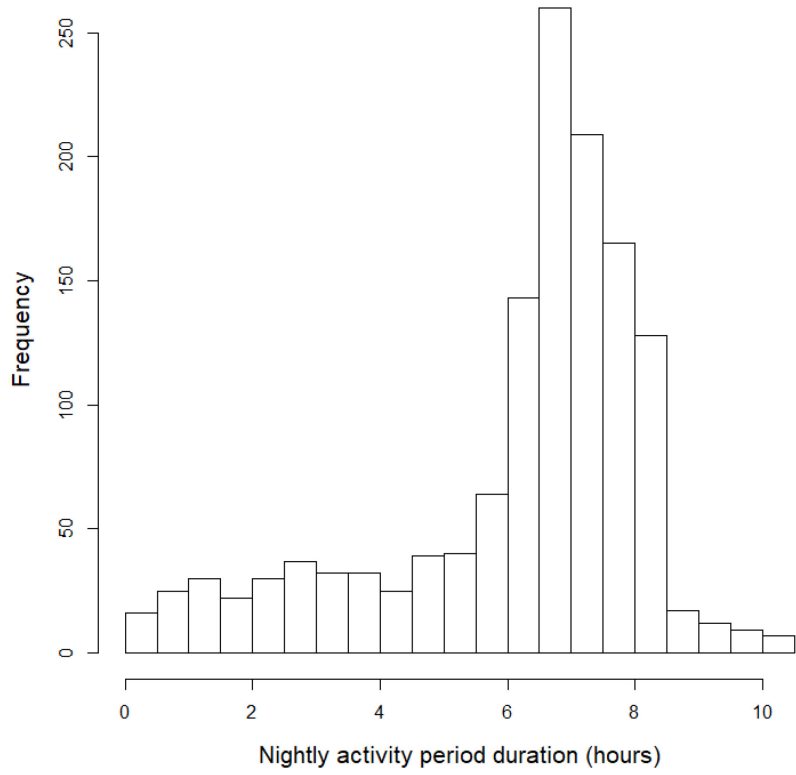
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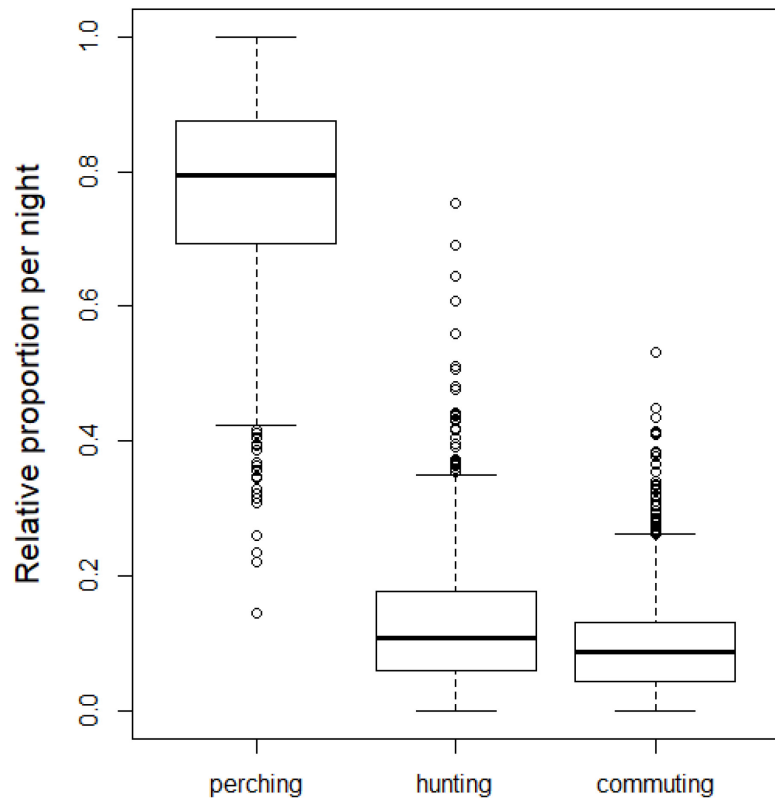
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67 **Fig. S3.** Distribution of night activity period duration, defined as the time between two daylight roosting
68 events.



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77 **Fig. S4.** Proportion of activity time per night spent perching, hunting or commuting.



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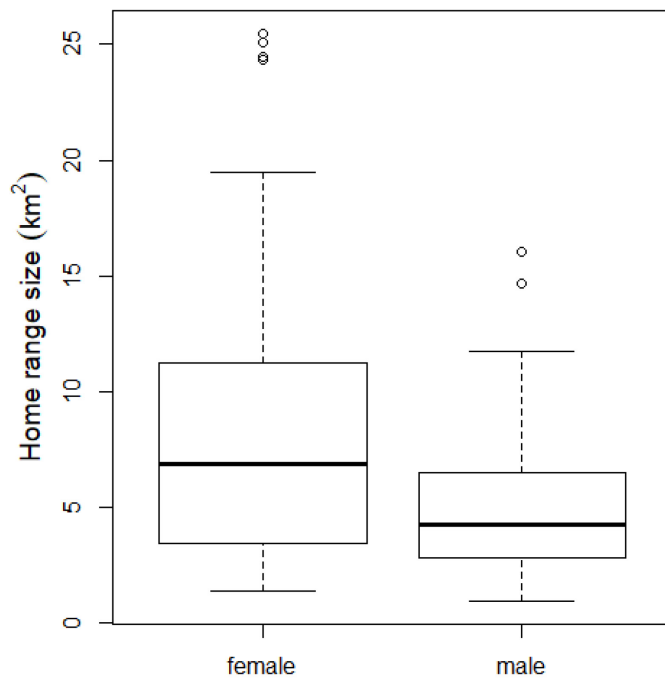
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85 **Fig. S5.** Home range size in relation to barn owl sex.



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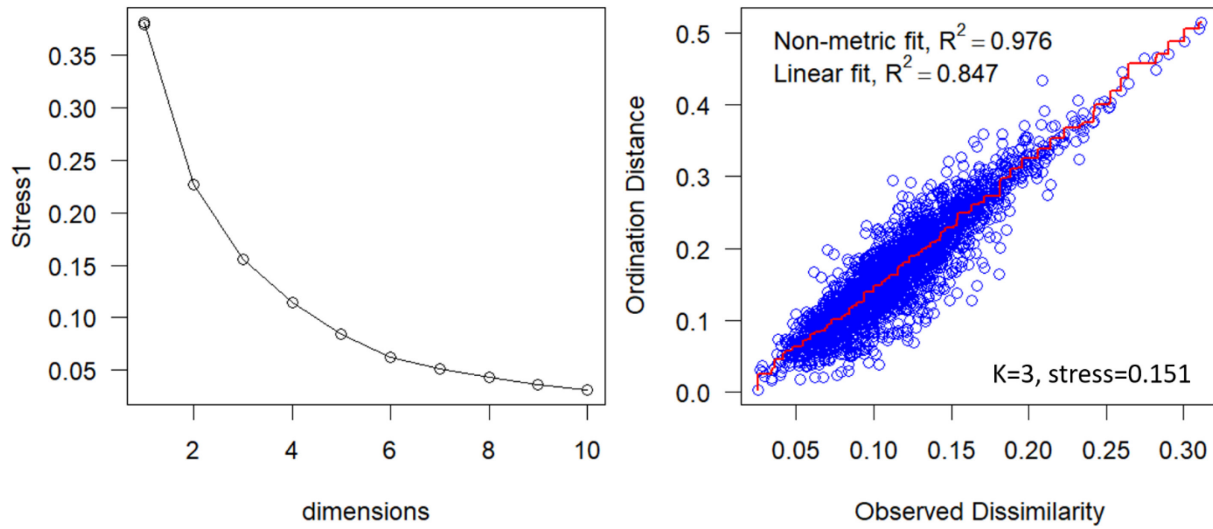
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94 **Fig. S6.** Non-metric multi-dimensional scaling (NMDS) model parametrization. NMDS was built in three
95 dimensions, resulting in a stress value of 0.15 and an acceptable fit.



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