BTO RESEARCH REPORT 804

Wild Neroche: a multi-taxa, baseline passive acoustic monitoring survey, 2025

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SUMMARY

Background This report summarises results from the first year of Passive Acoustic Monitoring undertaken at Wild Neroche during spring and summer 2025. The intention is to establish a baseline dataset that will inform future assessments of how active management influences biodiversity across the Neroche area.

Coverage Bird communities were surveyed at ten sites using autonomous recording devices operating in the audible range. During the initial deployment period, audible recordings were collected continuously during both day and night. The same devices were also operated in ultrasonic mode at nine of these sites to monitor bats, small mammals, and bush-crickets; ultrasonic recordings were restricted to night-time only.

Audible recordings were collected on 140 days between April and September, while ultrasonic recordings were obtained on 67 nights between June and August. Devices were placed to survey a range of habitats including mixed deciduous woodland, coniferous woodland, heathland, and mesotrophic grassland.

Results Analysis of ultrasonic data identified 13 species of bat, including the regionally important Barbastelle (*Barbastella barbastellus*) and Bechstein's Bat (*Myotis bechsteinii*), both of which are included on the red list of British Mammals. In addition, three terrestrial small mammal species, four bush-cricket species, and two audible moth species were confirmed.

One standout result of the ultrasonic survey was the exceptional number of detections of Hazel Dormouse (*Muscardinus avellanarius*), with 4,418 triggered recordings across six sites. Dormouse acoustic activity peaked in late July.

In total, 73 species of birds were confirmed, including 35 species listed as Amber or Red on the UK Birds of Conservation Concern list. The repeated detection of Goshawk (*Astur gentilis*) across the survey area is also of particular interest.

1. BACKGROUND

1.1 Wild Neroche

Wild Neroche is one of four of Forestry England's Wilder Forests. The ambition for Wild Neroche is to deliver landscape-scale ecological enhancement in collaboration with partners and neighbours. The reinstatement, acceleration, or replication of natural processes will produce a landscape defined by water; woodland evolving successfully with the changing climate; habitat havens for invertebrates, mosses, and liverworts; thriving communities of lichen and fungi; and dynamic and biodiverse ecosystems where animals and plants move freely across Neroche. The Neroche Wild Area is at an early stage of development, collecting baseline data and conducting feasibility assessments.

To best monitor the impacts of an open ended, process led project like this, Forestry England would like to be as broad as possible with our biodiversity monitoring data.

Given that changes may occur over long timescales, Forestry England would like our monitoring to be easily and accurately repeatable and as resilient as possible into the future.

2. AIMS & OBJECTIVES

The aim of this monitoring was to provide baseline data for the Neroche Wild Area through passive acoustic monitoring, with the aim to capture as broad a range of species as possible. With the eventual goal of providing long-term monitoring data for the project to document changes in wildlife populations.

To provide a balance between comprehensive site coverage, logistical effort and equipment cost, an experimental design was set up to provide the baselining data over two years (2025, and 2026), with 10 and 9 sampling points surveyed, respectively, across both years.

Initially the aims are to focus on surveying birds (diurnal and nocturnal), bats, small mammals and bush crickets. However, the intention is that acoustic data could be reanalysed and sampling could be expanded to additional taxa (e.g. amphibians) as automated classifiers are developed.

3. METHODS

3.1 Static recorder protocol

Passive acoustic recorders (Song Meter Mini Bat) were deployed throughout Wild Neroche and programmed to record birdsong using an acoustic microphone continuously during both day and night during the initial survey period. Subsequently, the devices were programmed to cycle between daytime birdsong recording using the acoustic microphone and night-time recording of bats, small mammals, and bush-crickets using an ultrasonic microphone.

For bird recording, a sample rate of 22,050 Hz was used, with recording blocks of one minute in every fifteen minutes (either continuously or between sunrise and sunset). For bats, a sample

rate 256,000 Hz and a high pass filter of 13,000 Hz defined the lower threshold of the frequencies of interest for the triggering mechanism. Ultrasonic recording was set to continue until no trigger is detected during a 2 second period up to a maximum of 5 seconds and activated to trigger between sunset until sunrise the following day. The recorders were mounted on 2 m poles and deployed at least 1.5 m in any direction from vegetation, water, or other obstructions to avoid ground noise and reduce recordings of reflected calls.

3.2 Survey effort and timing

The survey periods differed between audible and ultrasonic recording. Audible recording was conducted from mid-April to late August 2025, while ultrasonic recordings were undertaken from mid-June to mid-August 2025. Passive acoustic recorders were deployed at ten sites across the Wild Neroche area (Figure 1). Data were successfully recovered from all ten sites for audible recording and from nine sites for ultrasonic recording.

Survey sites were selected to encompass a range of habitats and to provide broad spatial coverage of Wild Neroche, including coniferous and mixed deciduous woodland, grassland-dominated habitat, and lowland heathland.

Across all audible survey sites, a total of 941 complete days of recording effort was obtained (Table 1), spanning 141 days over a 5-month period. Mean audible sampling effort per site was 36.1 ± 16.0 days (mean ± 1sd). Ultrasonic recording effort spanned 325 nights over 3 months (67 different nights), with a mean sampling effort of 36.1 ± 16.0 nights per site.

Table 1: Survey effort at Wild Neroche in 2025.

	Audible recordings			Ultrasonic recordings		
Location	**First day**	**Last day**	**Total days**	**First night**	**Last night**	**Total nights**
1	23rd Apr	30th Jul	99	19th Jun	30th Jul	42
2	23rd Apr	10th Sep	141			0
3	23rd Apr	16th Jul	85	19th Jun	15th Jul	27
4	23rd Apr	27th Jul	96	19th Jun	26th Jul	38
5	23rd Apr	18th Jun	57	19th Jun	26th Jul	38
6	23rd Apr	17th Jul	86	19th Jun	16th Jul	28
7	23rd Apr	5th Aug	105	19th Jun	4th Aug	47
8	23rd Apr	24th Aug	124	19th Jun	24th Aug	67
9	23rd Apr	28th Jun	67	19th Jun	27th Jul	9
10	23rd Apr	17th Jul	86	19th Jun	17th Jul	29

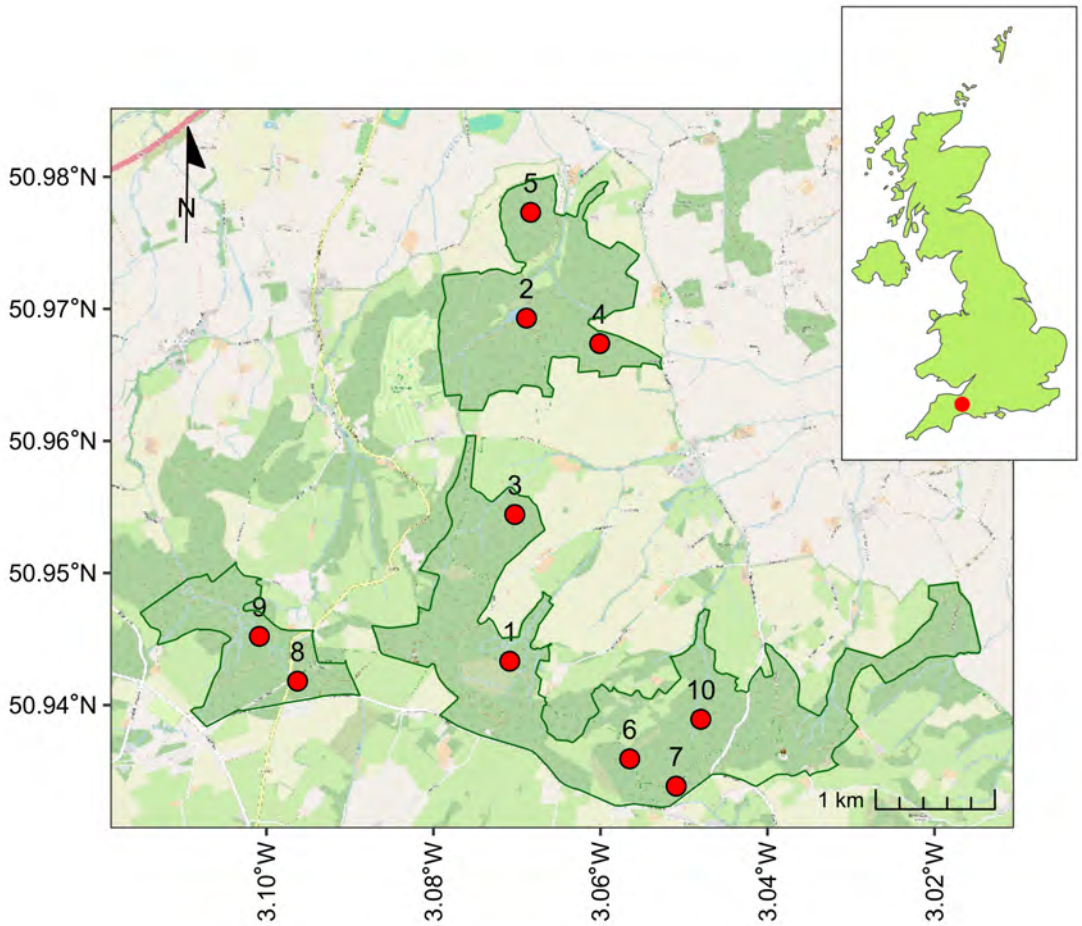


Figure 1: Map of the Wild Neroche study area showing sites where passive acoustic recording devices were deployed in 2025. The overlapping panel in the upper right displays the position of the study area within the United Kingdom. The dark green lines show the boundaries of the Wild Neroche area.

3.3 Processing recordings and species identification

Monitoring on this scale with automated passive real-time recorders can generate a very large volume of sound recordings, the efficient processing of which is greatly aided by a semi-automated approach for assigning recordings to species. Audible recordings and ultrasonic recordings require different methods of analysis and verification, as detailed in the following sections.

3.3.1 Audible recordings

All audible recordings were processed by the BTO. As the BTO Acoustic Pipeline all bird species classifier is still in development (http://bto.org/pipeline), we also processed all recordings through BirdNet, another machine-learning based acoustic classifier developed by Cornell University (Kahl et al. 2021). BirdNET was configured to return all detections with a confidence score of at least 0.5 and no spatial or temporal species filters applied. Positive identifications of each species for each site were then manually verified by one individual. This was done by selecting 100 detections (or as many as possible if fewer detections) of each species for each site with the highest confidence scores. These were checked until at least one true positive detection was found to produce a verified species list for each site and sampling period.

Vocal activity (number of calls per unit time) was included in our analyses, but it should be interpreted cautiously because the accuracy of BirdNET varies among species. Specifically, 'precision' (the proportion detections that are truly the correct species) and 'recall' (the proportion of actual vocalisations that are detected) may vary widely among species and across sites, and we did not have the resources to quantify these metrics. We calculated activity for all bird species confirmed as occurring at each site using recordings with a BirdNET confidence score ≥0.7 and then plotted total activity per site as well as seasonal activity patterns for selected species.

3.3.2 Ultrasonic recordings

At the end of a recording session, uncompressed wav files produced by the bat detectors, together with associated information on the survey location, were uploaded volunteers to the BTO's Acoustic Pipeline for processing.

The BTO Acoustic Pipeline uses machine-learning algorithms to detect and classify sound events within uploaded recordings. For each recording, the classifier may assign up to four candidate species identities, each associated with an estimated probability of correct classification. This probability represents the classifier's confidence that the assigned species identification is correct (e.g. a probability of 0.9 indicates a 90% likelihood that the identification is correct, and a 10% likelihood that it is incorrect).

Following recommendations in Barré et al. (2019), species identifications with a probability of correct classification below 0.5 (50%) were discarded. To assess the impact of this threshold, a subset of recordings with probabilities below 0.5 was manually audited, confirming that few valid detections were lost.

For bats and small mammals, where the aim was to derive a measure of activity rather than presence alone, all recordings with probabilities ≥0.5 were manually checked. Exceptions were made for the two most frequently detected species, Common Pipistrelle (*Pipistrellus pipistrellus*) and Soprano Pipistrelle (*Pipistrellus pygmeaus*), for which a random sample of 1,000 recordings were manually verified to check the classification error rate.

For bush-crickets and audible moths where there can be many recordings, often of the same individual, we instead focused on producing an inventory of species presence. For these taxa, the three recordings with the highest classification probability for each site and night were selected for manual auditing.

Verification of species identification was carried out through the manual checking of spectrograms using software SonoBat (http://sonobat.com/) which was used as an independent check of the original species identities assigned by the Pipeline. All subsequent analyses use final identities upon completion of the above inspection and (where necessary) correction steps.

It is important to note that the criteria for distinguishing Whiskered Bat (*Myotis mystacinus*) and Brandt's Bat (*Myotis brandtii*) are very subtle and poorly defined. For this reason, until further ground-truthing of the identification can be carried out, we treat these two species as a species pair.

3.4 Data presentation

For both audible and ultrasonic recordings, we present complete species lists and report the total number of survey sites and days/nights at which each species was detected. We also visualise the temporal and spatial variation in acoustic activity across the survey period for multiple taxa; for birds restricting ourselves to commonly detected species and species of ecological or conservation interest.

Tables include information on the local and global conservation status of each species. For birds, local conservation status follows the Birds of Conservation Concern 5 assessment (Stanbury et al. 2021), which assigns species to Red and Amber lists based on measured population declines and range contractions. Global conservation status for birds is derived from the *IUCN Red List of Threatened Species*. For bats and small mammals, local conservation status is taken from the *UK Mammal Red List* (Mathews & Harrower 2020), global conservation status is based on the global *IUCN Red List*.

4. RESULTS

4.1 General results

4.1.1 Audible recordings

Overall, 125,143 minute-long audible recordings were collected. Following verification, these recordings were found to include 72 unique bird species (Table 2, Figures 2-3), including 17 Amber-listed and 17 Red-listed species. Species richness across the 10 survey sites varied from 31 to 57 species (46.0 ± 6.4 species, mean ± 1sd). Of particular interest was the repeated detection of Goshawk across multiple sites, as well as Nightjar at various heathland sites. Phenological analysis also revealed distinct seasonal patterns in vocal activity for many species (Figure 4). Vocal activity was most pronounced in May and June, with several species showed extended vocal activity into late summer.

Table 2: Bird species detected through audible-range passive acoustic monitoring at Wild Neroche. The table summarises verified species detections, site occupancy, and local (BoCC5) and global conservation status.

Species	Sites (% total)	% Days detected	BoCC5	Global Red List
Barn Owl, *Tyto alba*	6 (60%)	11%		
Blackbird, *Turdus merula*	10 (100%)	65%		
Blackcap, *Sylvia atricapilla*	10 (100%)	60%		
Blue Tit, *Cyanistes caeruleus*	10 (100%)	89%		
Bullfinch, *Pyrrhula pyrrhula*	10 (100%)	77%	Amber	
Buzzard, *Buteo buteo*	10 (100%)	83%		
Carrion Crow, *Corvus corone*	9 (90%)	91%		
Chaffinch, *Fringilla coelebs*	9 (90%)	45%		
Chiffchaff, *Phylloscopus collybita*	10 (100%)	91%		
Coal Tit, *Periparus ater*	10 (100%)	99%		
Common Crossbill, *Loxia curvirostra*	9 (90%)	34%		
Common Sandpiper, *Actitis hypoleucos*	1 (10%)	1%	Amber	
Cuckoo, *Cuculus canorus*	8 (80%)	17%	Red	
Curlew, *Numenius arquata*	2 (20%)	2%	Red	NT
Dunlin, *Calidris alpina*	1 (10%)	1%	Red	NT
Dunnock, *Prunella modularis*	10 (100%)	52%	Amber	
Firecrest, *Regulus ignicapilla*	9 (90%)	73%		
Garden Warbler, *Sylvia borin*	6 (60%)	35%		
Goldcrest, *Regulus regulus*	10 (100%)	98%		
Goldfinch, *Carduelis carduelis*	10 (100%)	61%		
Goshawk, *Accipiter gentilis*	6 (60%)	65%		
Great Spotted Woodpecker, *Dendrocopos major*	10 (100%)	89%		
Great Tit, *Parus major*	10 (100%)	49%		
Green Sandpiper, *Tringa ochropus*	1 (10%)	1%	Amber	
Green Woodpecker, *Picus viridis*	9 (90%)	42%		
Greenfinch, *Chloris chloris*	6 (60%)	46%	Red	
Greenshank, *Tringa nebularia*	1 (10%)	5%	Amber	
Grey Heron, *Ardea cinerea*	7 (70%)	6%		
Grey Wagtail, *Motacilla cinerea*	4 (40%)	18%	Amber	
Hawfinch, *Coccothraustes coccothraustes*	3 (30%)	74%	Red	
Herring Gull, *Larus argentatus*	4 (40%)	1%	Red	
Hobby, *Falco subbuteo*	3 (30%)	1%		
House Martin, *Delichon urbicum*	7 (70%)	33%	Red	
Jackdaw, *Corvus monedula*	10 (100%)	40%		
Jay, *Garrulus glandarius*	10 (100%)	63%		
Kingfisher, *Alcedo atthis*	3 (30%)	13%		
Redpoll, *Acanthis flammea*	1 (10%)	1%	Red	
Linnet, *Linaria cannabina*	6 (60%)	72%	Red	
Little Grebe, *Tachybaptus ruficollis*	2 (20%)	1%		
Little Ringed Plover, *Charadrius dubius*	1 (10%)	3%		
Long-tailed Tit, *Aegithalos caudatus*	9 (90%)	92%		
Magpie, *Pica pica*	1 (10%)			
Mallard, *Anas platyrhynchos*	1 (10%)	2%	Amber	
Marsh Tit, *Poecile palustris*	10 (100%)	81%	Red	
Mistle Thrush, *Turdus viscivorus*	9 (90%)	45%	Red	
Moorhen, *Gallinula chloropus*	8 (80%)	16%	Amber	
Night Heron, *Nycticorax nycticorax*	1 (10%)	4%		

Table 2: Bird species detected through audible-range passive acoustic monitoring at Wild Neroche. The table summarises verified species detections, site occupancy, and local (BoCC5) and global conservation status. *(continued)*

Species	Sites (% total)	% Days detected	BoCC5	Global Red List
Nightjar, *Caprimulgus europaeus*	4 (40%)	33%	Amber	
Nuthatch, *Sitta europaea*	10 (100%)	87%		
Oystercatcher, *Haematopus ostralegus*	1 (10%)	1%	Amber	VU
Pheasant, *Phasianus colchicus*	4 (40%)	6%		
Pied Wagtail, *Motacilla alba*	1 (10%)	1%		
Raven, *Corvus corax*	9 (90%)	64%		
Red Kite, *Milvus milvus*	1 (10%)	1%		
Ringed Plover, *Charadrius hiaticula*	1 (10%)	1%	Red	
Robin, *Erithacus rubecula*	10 (100%)	96%		
Rook, *Corvus frugilegus*	8 (80%)	43%	Amber	
Siskin, *Spinus spinus*	10 (100%)	88%		
Song Thrush, *Turdus philomelos*	10 (100%)	58%	Amber	
Spotted Flycatcher, *Muscicapa striata*	10 (100%)	78%	Red	
Stock Dove, *Columba oenas*	5 (50%)	57%	Amber	
Stonechat, *Saxicola rubicola*	1 (10%)	2%		
Swallow, *Hirundo rustica*	9 (90%)	23%		
Swift, *Apus apus*	6 (60%)	6%	Red	
Tawny Owl, *Strix aluco*	10 (100%)	90%	Amber	
Tree Pipit, *Anthus trivialis*	3 (30%)	56%	Red	
Treecreeper, *Certhia familiaris*	10 (100%)	99%		
Whimbrel, *Numenius phaeopus*	4 (40%)	4%	Red	
Willow Warbler, *Phylloscopus trochilus*	8 (80%)	65%	Amber	
Woodpigeon, *Columba palumbus*	10 (100%)	100%	Amber	
Wren, *Troglodytes troglodytes*	10 (100%)	93%	Amber	
Yellowhammer, *Emberiza citrinella*	1 (10%)	4%	Red	

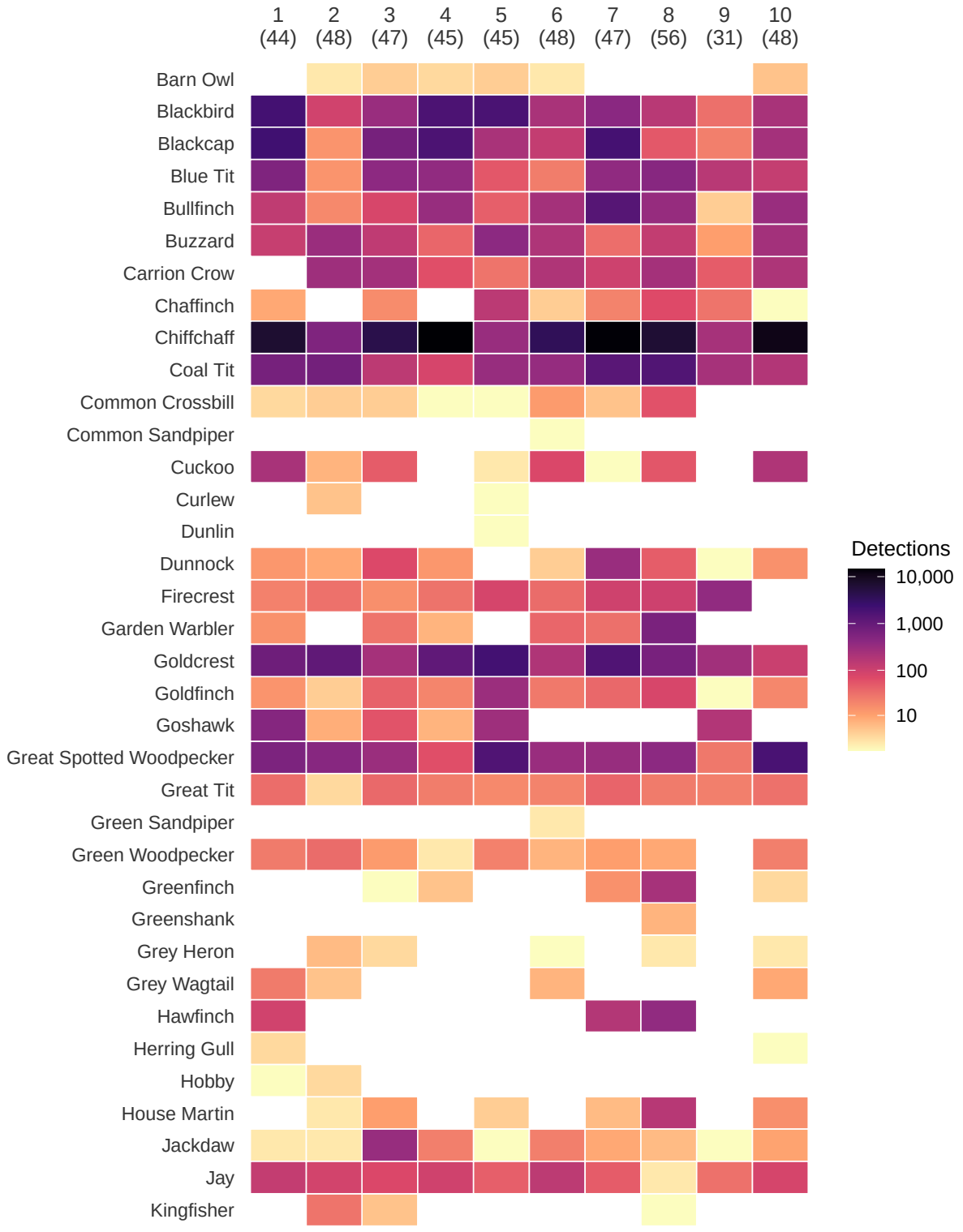
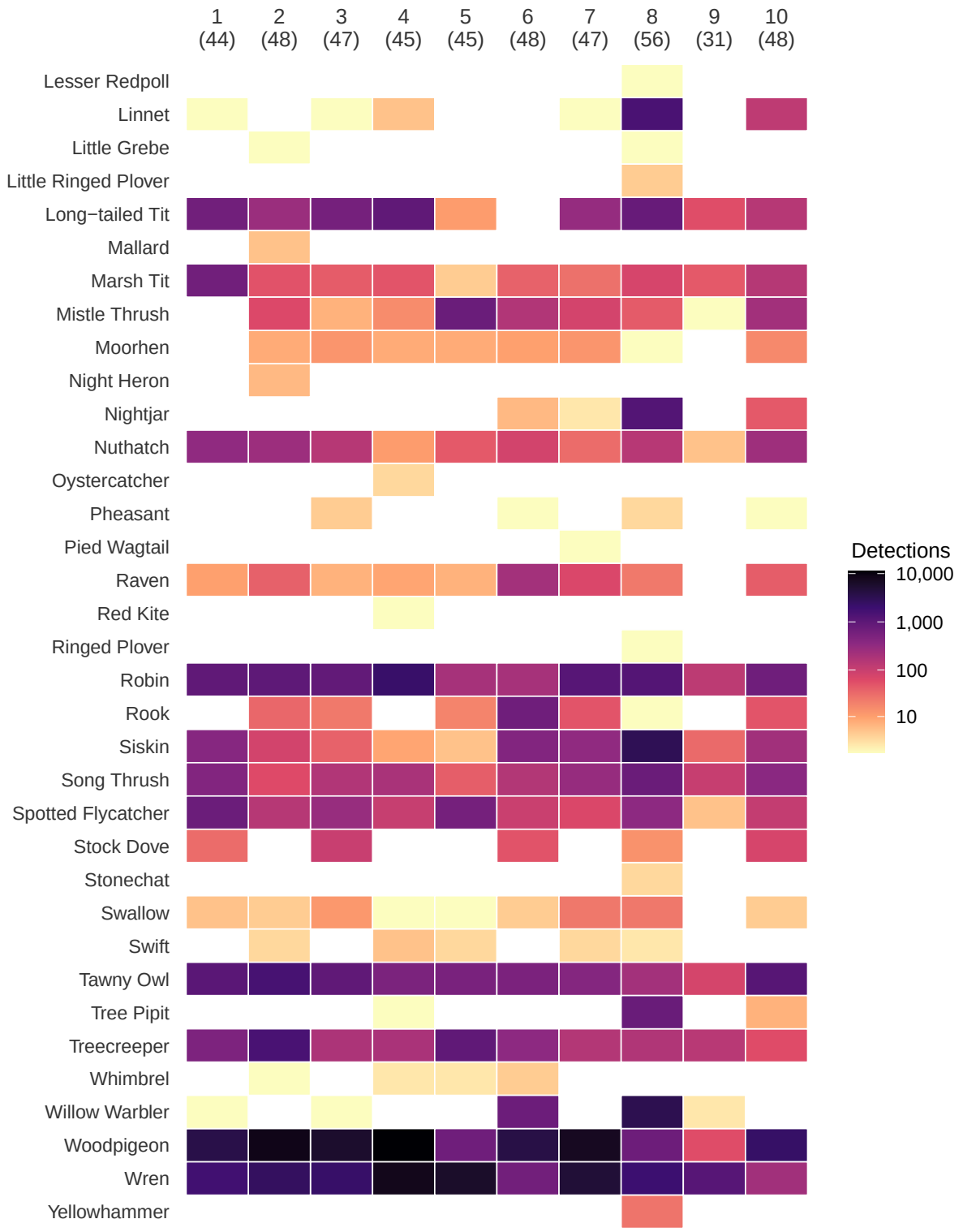


Figure 2: The total species richness and activity of birds detected through passive acoustic recording across all Wild Neroche sites. Coloured boxes indicate that the species was confirmed as present following human verification of the recordings, with the gradient indicating the total (log) number of detections at a given site. The numbers in parentheses indicated the total richness of each site for verified species. Total activity for these verified taxa reflects the raw number of detections with a BirdNET confidence score ≥0.7. Species appearing lower in the alphabet appear in Figure 3.



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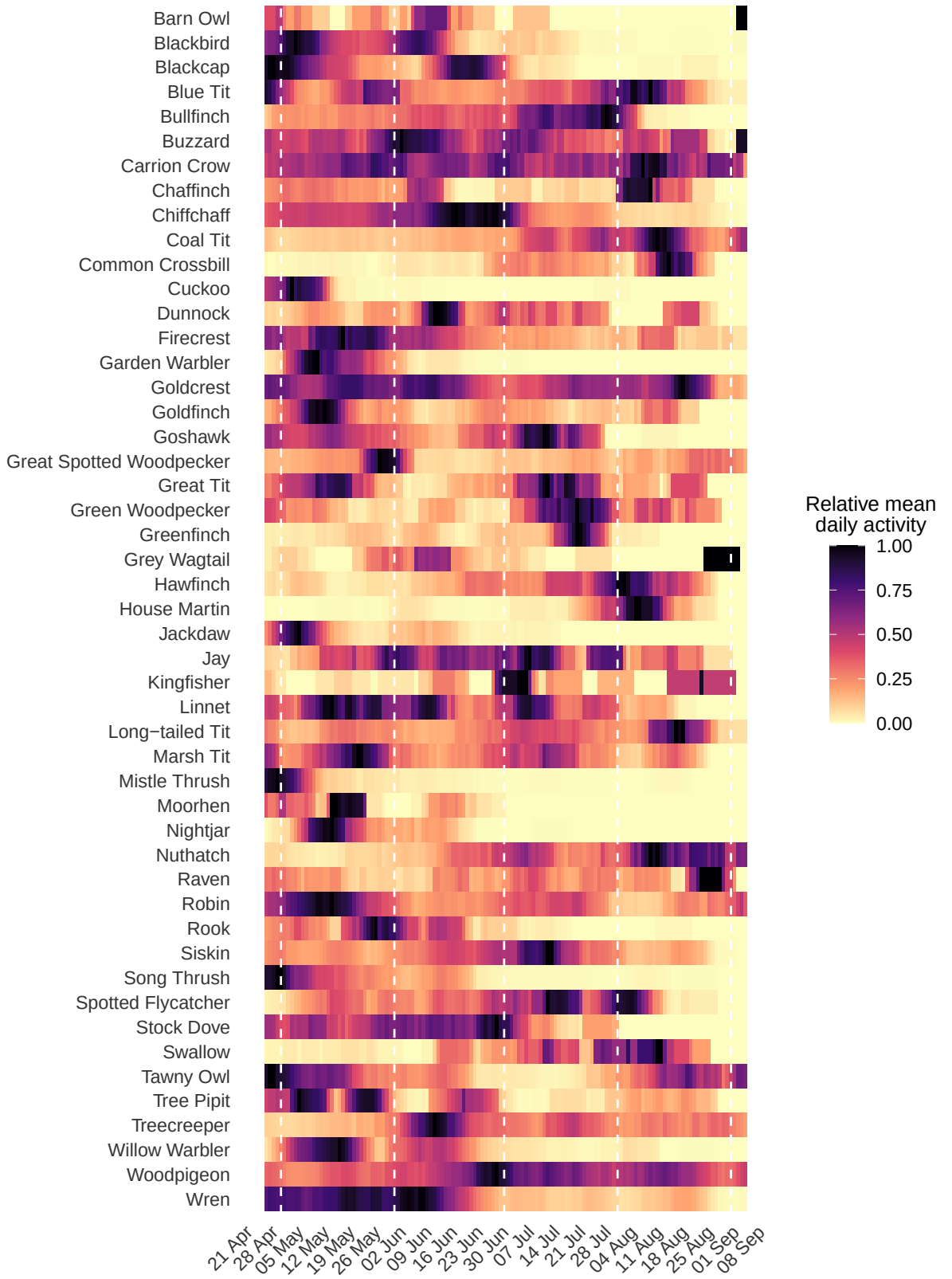

Figure 4: The phenological activity of birds detected through passive acoustic recording across all Wild Neroche sites. Each row is a species, and each column a day of the recording period, focusing on species that were recorded on at least 10% of all days. Colours indicate relative daily activity (0 = no activity, 1 = peak activity), smoothed using a 10-day moving average, weighted by the number of recorders. The vertical lines indicate the start of sampling months. Activity was estimated for all species that were manually verified at as least one site, using raw detections with a BirdNET confidence score ≥0.7.

4.1.2 Ultrasonic recordings

Overall, 393,391 ultrasonic recordings were collected. Following analyses and verification, the ultrasonic recordings were found to include 127,010 bat recordings and 5131 small terrestrial mammal recordings. The presence of at least 13 bat species, 3 small mammal species, 4 bush-cricket species and 2 audible moth species can be confirmed (Table 3, Figure 5). One standout result from the survey was the exceptionally high number of detections of Hazel dormouse (*Muscardinus avellanarius*, n = 4,418 detections).

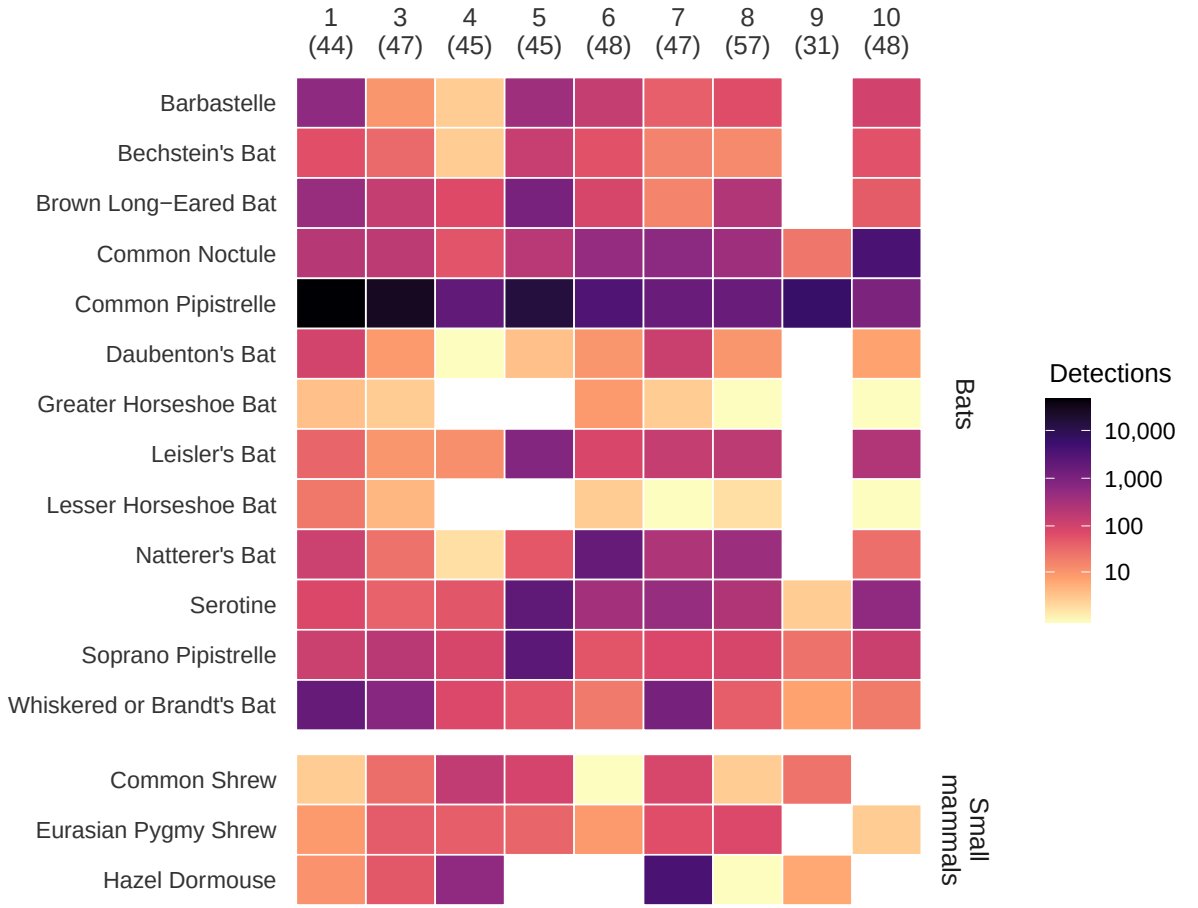

Figure 5: The total species richness and activity of bats and small mammals detected through passive acoustic recording across all Wild Neroche sites. Coloured boxes indicate that the species was confirmed as present following human verification of the recordings, with the gradient indicating the total (log) number of detections at a given site. The numbers in parentheses indicate the total richness of the site.

Table 3: Species (and call type) detected through ultrasonic PAM at Wild Neroche. Table reports the number of recordings of each species following verification, a summary of the spatial scale of recording, and the conservation status of species. 67 nights were surveyed in total.

Species/call type	No. record-ings	Sites (% total)	% Nights detected	GB Red List	Global Red List
Bats - Echolocation calls					
Barbastelle, *Barbastella barbastellus*	1371	8 (89%)	97%	VU	VU
Bechstein's Bat, *Myotis bechsteinii*	394	8 (89%)	78%	VU	
Brown Long-eared Bat, *Plecotus auritus*	2184	9 (89%)	97%		
Common Noctule, *Nyctalus noctula*	5777	9 (100%)	100%		
Common Pipistrelle, *Pipistrellus pipistrellus*	87984	9 (100%)	99%		
Daubenton's Bat, *Myotis daubentonii*	272	8 (89%)	70%		
Greater Horseshoe Bat, *Rhinolophus ferrumequinum*	22	6 (67%)	19%		
Leisler's Bat, *Nyctalus leisleri*	1515	8 (89%)	88%	NT	NT
Lesser Horseshoe Bat, *Rhinolophus hipposideros*	36	6 (67%)	28%		
Natterer's Bat, *Myotis nattereri*	2725	8 (89%)	97%		
Serotine, *Eptesicus serotinus*	3968	9 (100%)	93%	VU	VU
Soprano Pipistrelle, *Pipistrellus pygmaeus*	2336	9 (100%)	87%		
Whiskered or Brandt's Bat, *Myotis mystacinus/brandtii*	3836	9 (100%)	82%		
Bats - Feeding buzzes					
Common Noctule, *Nyctalus noctula*	221	5 (56%)	43%		
Common Pipistrelle, *Pipistrellus pipistrellus*	4571	8 (89%)	76%		
Daubenton's Bat, *Myotis daubentonii*	4	4 (22%)	4%		
Serotine, *Eptesicus serotinus*	3	3 (33%)	4%	VU	VU
Soprano Pipistrelle, *Pipistrellus pygmaeus*	28	3 (33%)	27%		
Bats - Social calls					
Brown Long-eared Bat, *Plecotus auritus*	2	1 (11%)	1%		
Common Noctule, *Nyctalus noctula*	13	2 (22%)	7%		
Common Pipistrelle, *Pipistrellus pipistrellus*	8912	9 (100%)	66%		
Soprano Pipistrelle, *Pipistrellus pygmaeus*	836	9 (100%)	76%		
Small mammals					
Common shrew, *Sorex araneus*	411	8 (89%)	67%		
Eurasian pygmy shrew, *Sorex minutus*	302	8 (89%)	70%		
Hazel dormouse, *Muscardinus avellanarius*	4418	6 (67%)	70%	VU	VU
Bush-crickets					
Dark bush-cricket, *Pholidoptera griseoaptera*	104	8 (89%)	79%		
Long-winged bush-cricket, *Conocephalus fuscus*	2	1 (11%)	3%		
Roesel's bush-cricket, *Roeseliana roeselii*	28	3 (33%)	37%		
Speckled bush-cricket, *Leptophyes punctatissima*	5	1 (11%)	7%		
Moths					
Bird cherry ermine moth, *Yponomeuta evonymella*	4	2 (22%)	3%		
Green silver-lines moth, *Pseudoips prasinana*	1	1 (11%)	1%		

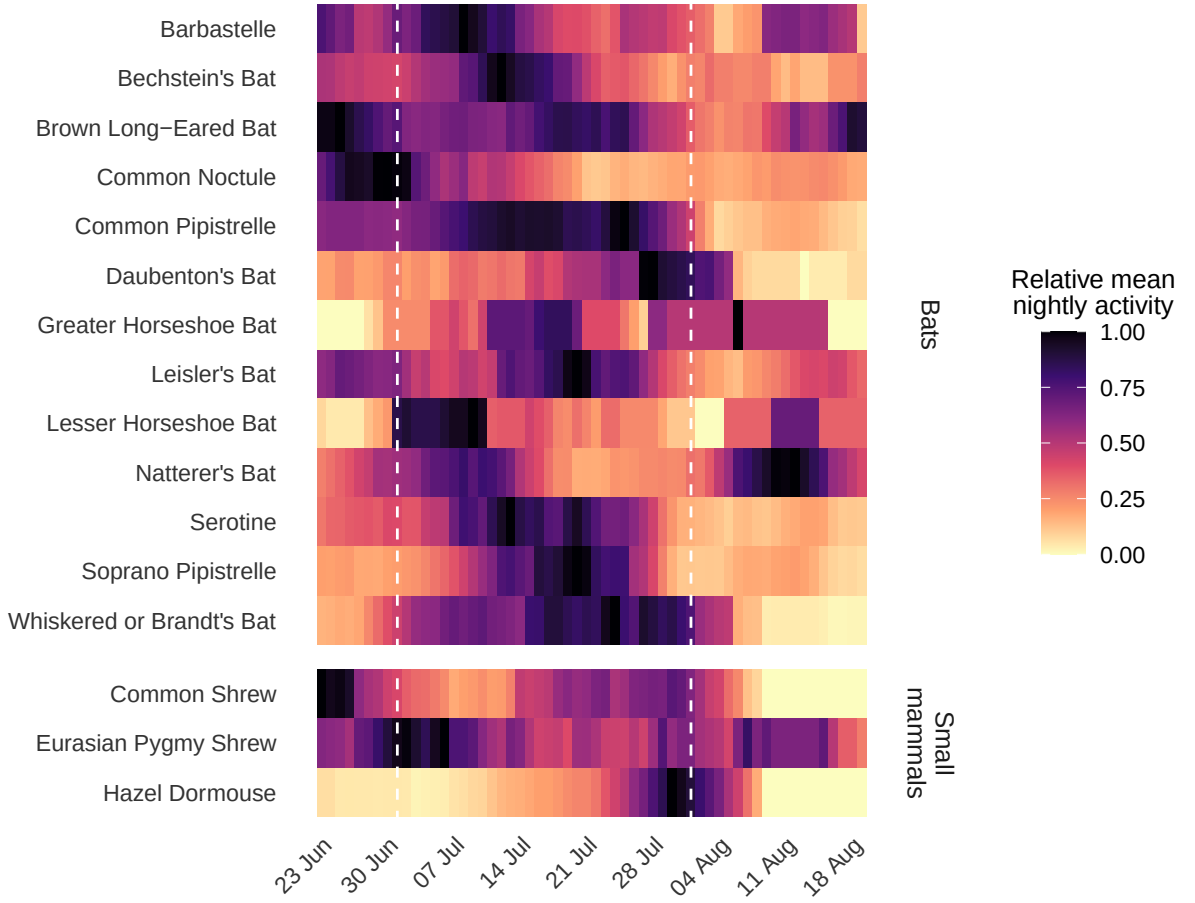

Figure 6: Mean nightly activity patterns of bats and small mammals, scaled within each species to highlight the timing of peak vocal activity across sites. Each row represents a species, and each column represents a day of the recording period. Colours indicate relative daily activity (0 = no activity, 1 = peak activity), smoothed using a 10-day moving average, weighted by the number of recorders. The vertical lines indicate the beginning of sampling months.

4.2 Species richness by site and habitat

All sites detected more than three bat species per night, on average, but most detected 7 or 8 species per night (Figure 7). Overall, 10.3 ± 2.2 bat species were detected across all sites each night (mean ± 1sd) across the full survey season, and 7.4 ± 2.7 bats were detected on average each night by each recording device (i.e. per site). The total amount of bat activity also varied widely across sampling sites, varying from an average of 50.6 detections per night at Point 8 to 1,159 at Point 1.

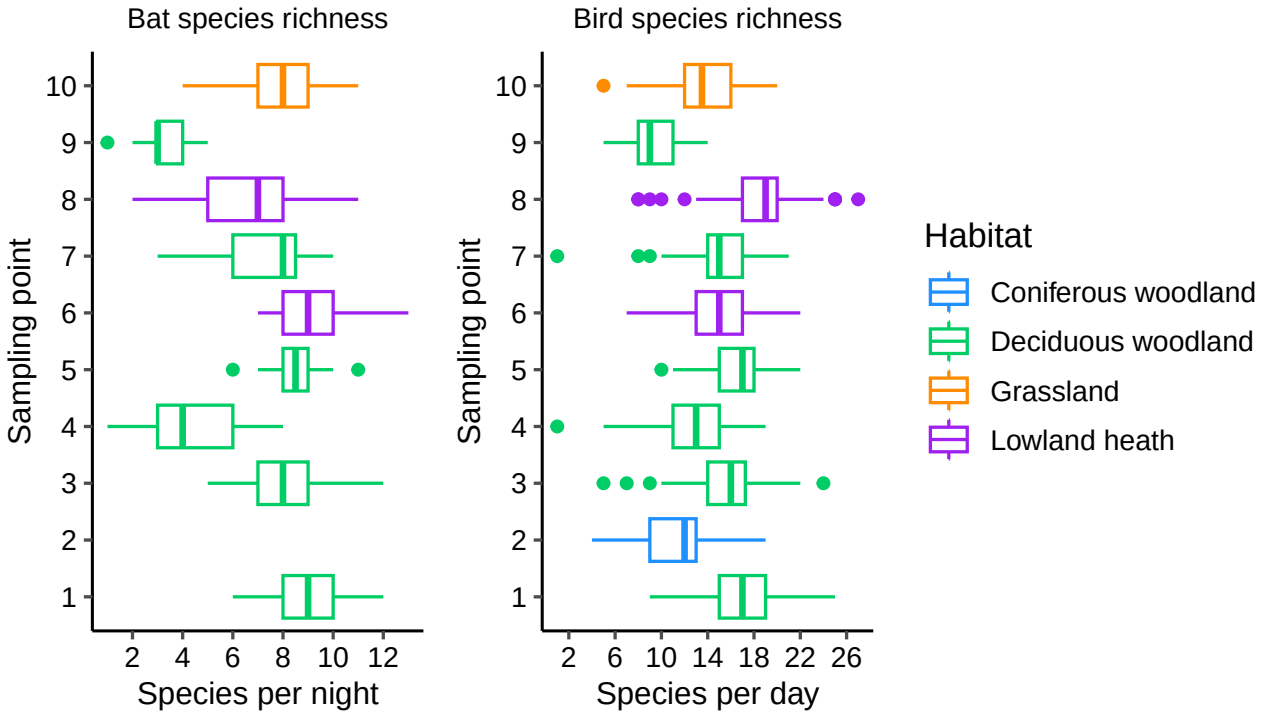

Figure 7: The daily/nightly average species richness of birds/bats at each point location across their sampling periods and in relation to their main habitat type. Boxplots show the quartiles (lower, median, and upper), with lines extending to 1.5 times the interquartile range and small dots showing outliers. For bats, richness was based on fully verified records, whereas for birds it is based on a filtering of BirdNET outputs with confidence scores ≥0.7 for those species that were manually verified as being present at each site.

4.3 Species-specific spatial results

4.3.1 Birds

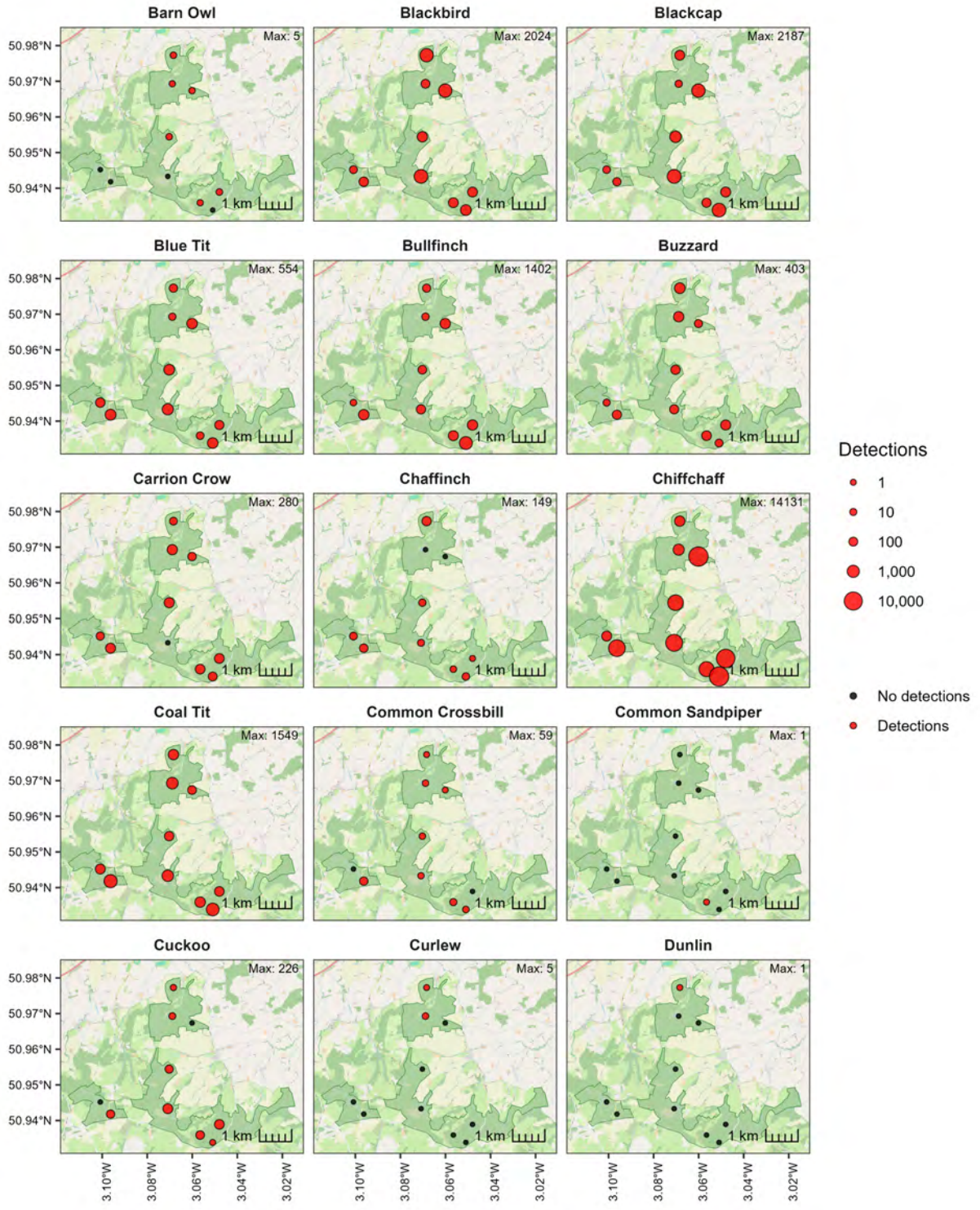

Figure 8: Spatial activity patterns of bird detections across the Wild Neroche survey area. Points are sized according to the total number of detections, retaining all detections with a BirdNET confidence score ≥0.7 and where the species was known to occur at a given site following manual verification. Black points indicate survey locations without detections. Figures 9-12 replicate the figure for additional species.

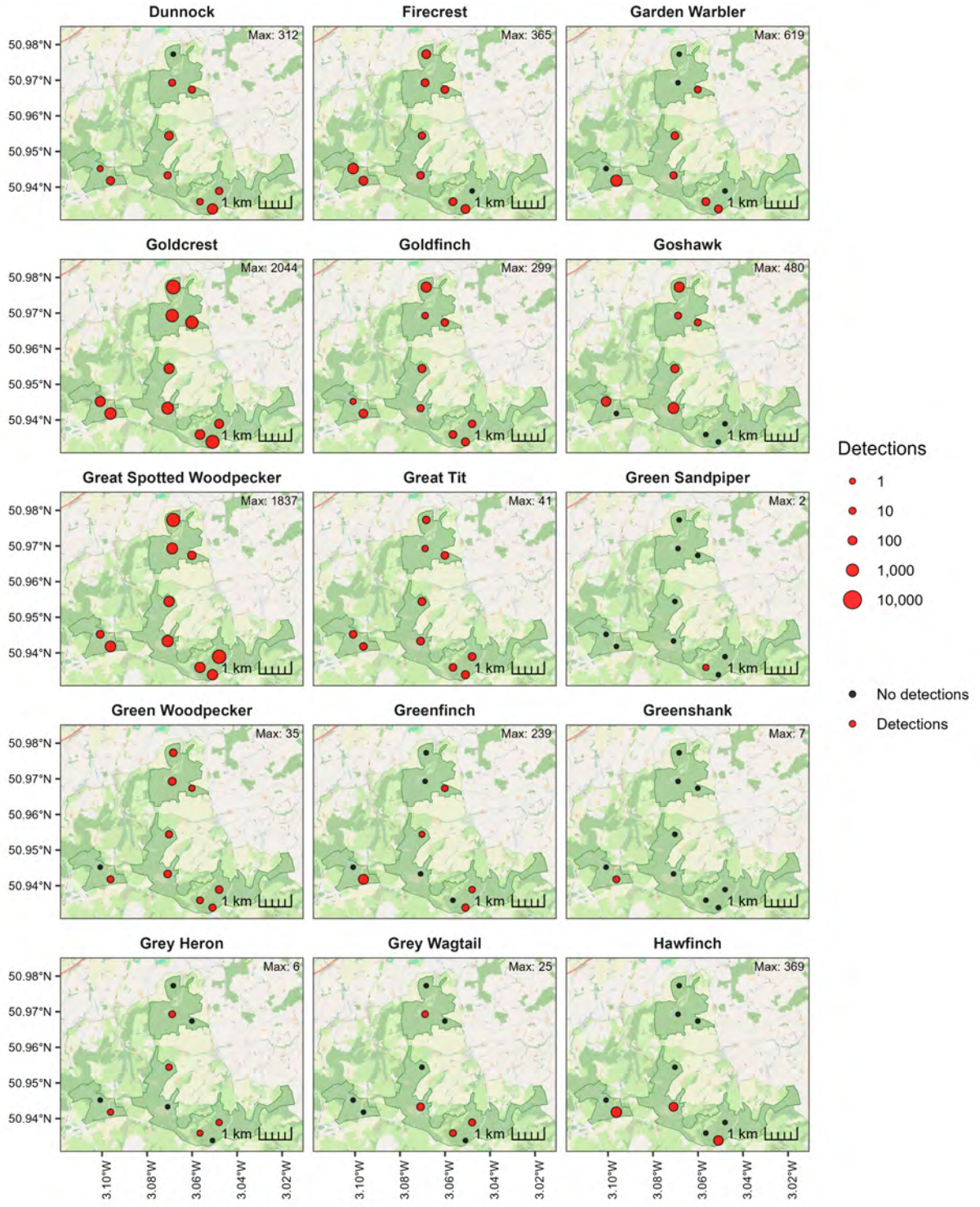

Figure 9: Spatial activity patterns of bird detections across the Wild Neroche survey area. See Figure 8 legend for more detail.

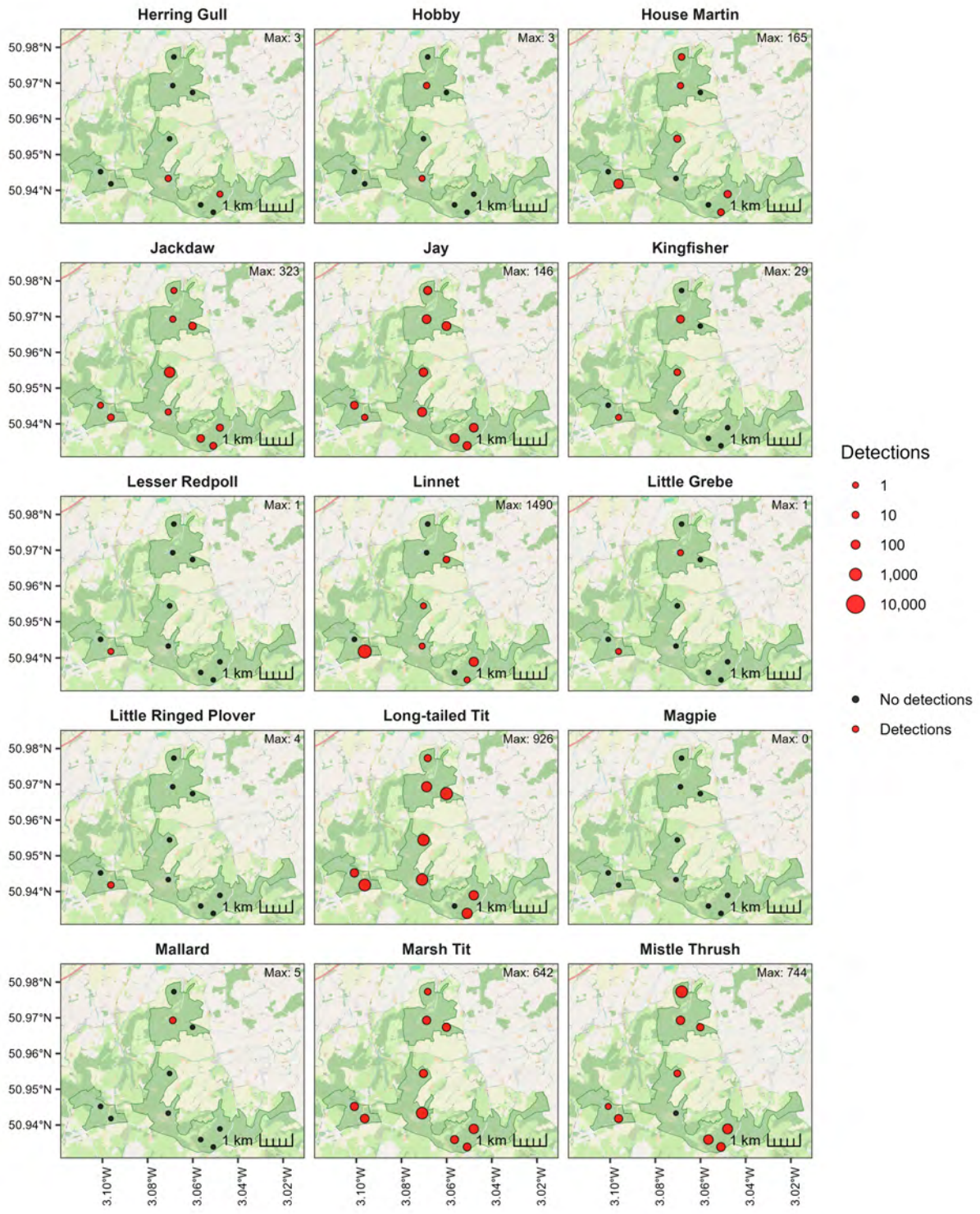

Figure 10: Spatial activity patterns of bird detections across the Wild Neroche survey area. See Figure 8 legend for more detail.

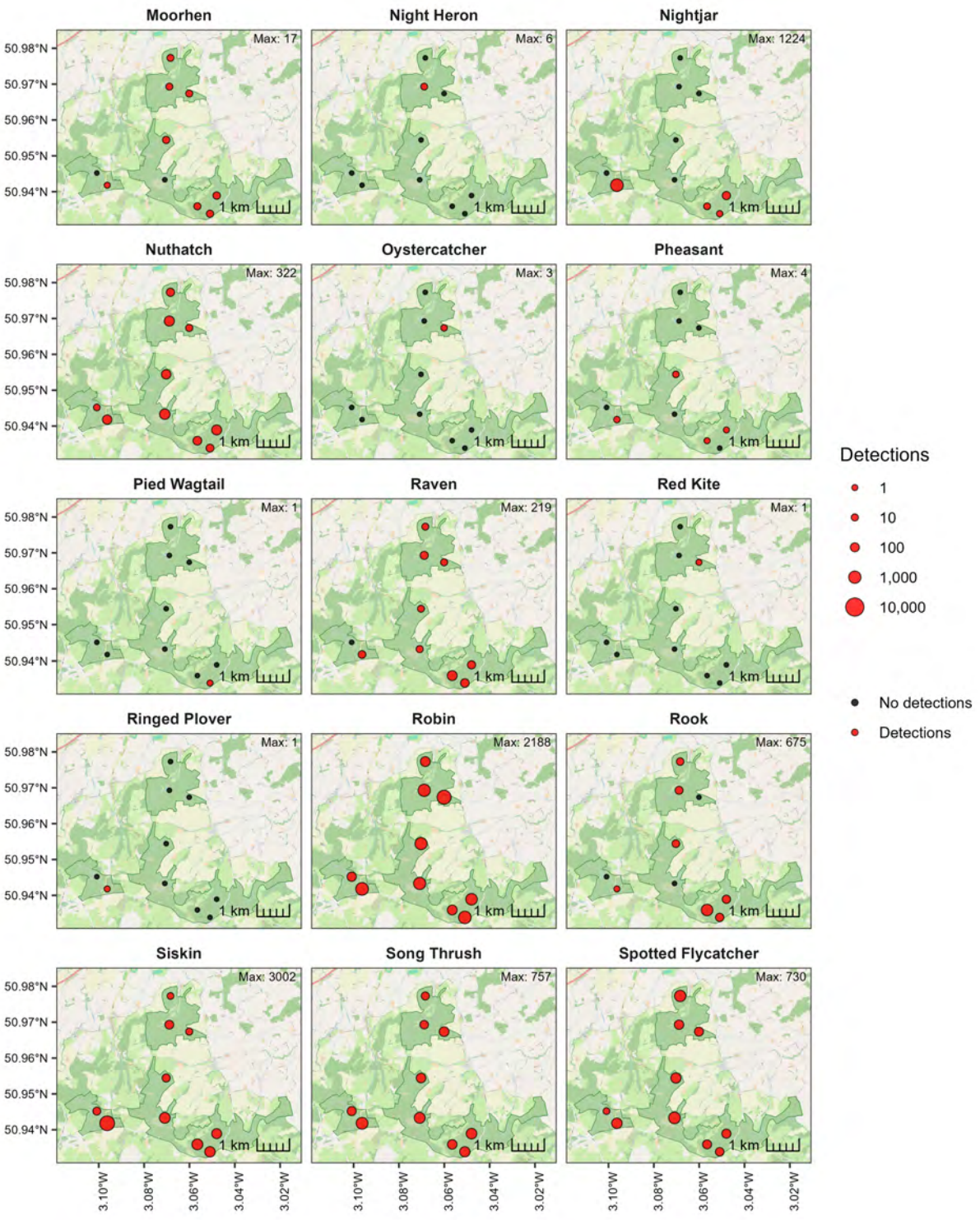

Figure 11: Spatial activity patterns of bird detections across the Wild Neroche survey area. See Figure 8 legend for more detail.

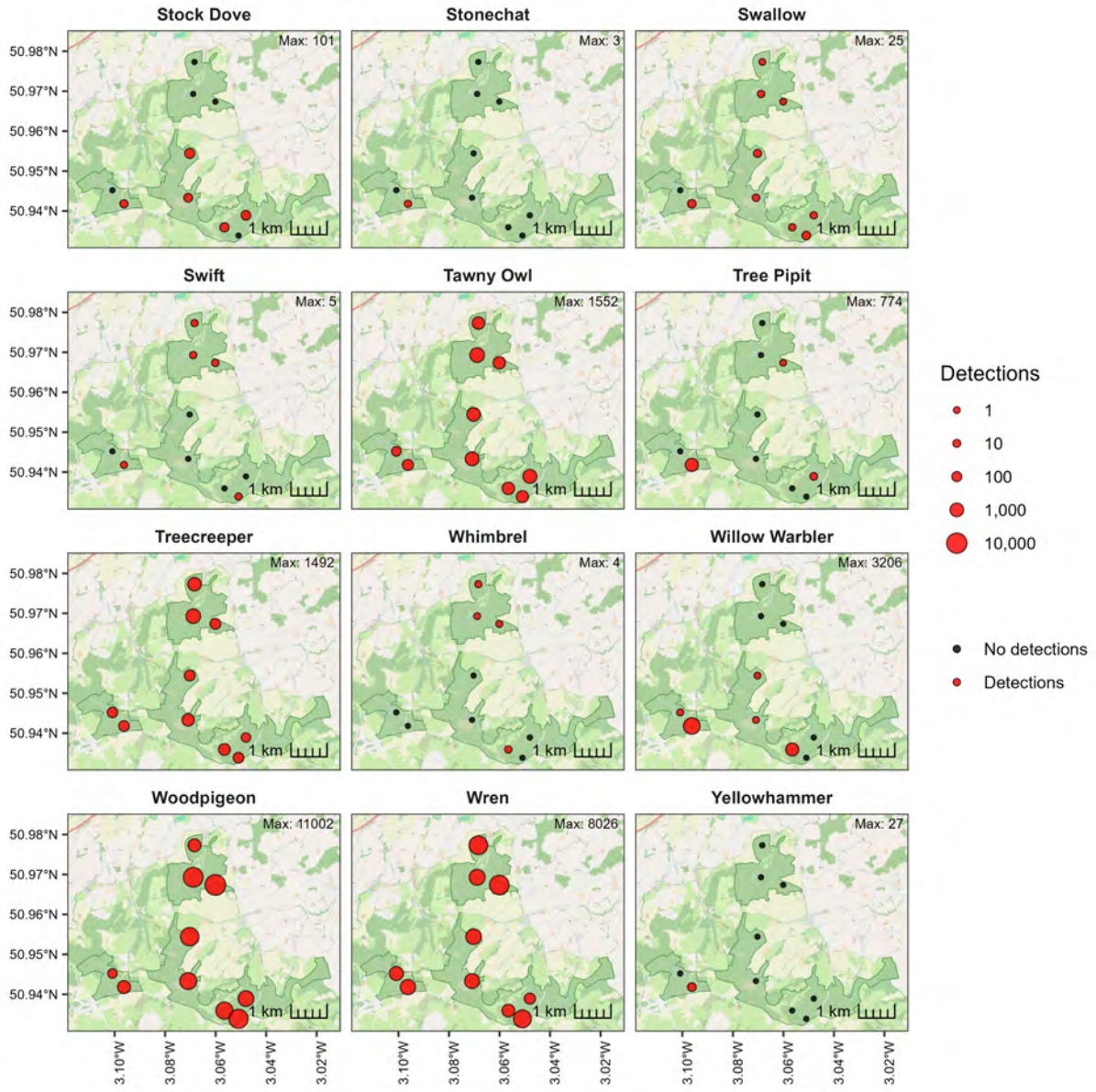

Figure 12: Spatial activity patterns of bird detections across the Wild Neroche survey area. See Figure 8 legend for more detail.

4.3.2 Bats

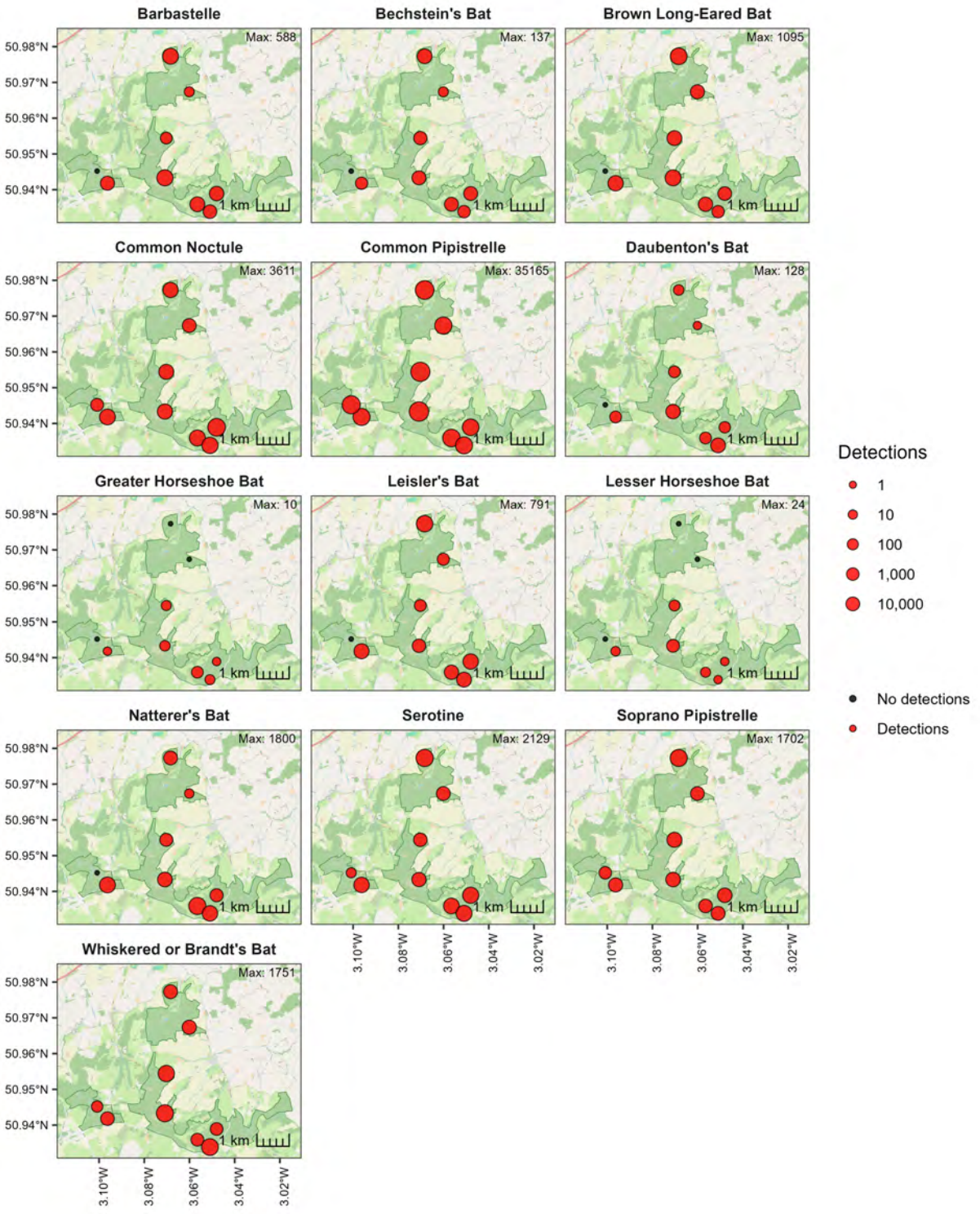

Figure 13: Spatial activity patterns of the echolocation calls of all bat species across the Wild Neroche survey area. Points are sized according to the log-number of total verified detections. Black points indicate survey locations without detections.

4.3.3 Terrestrial small mammal species

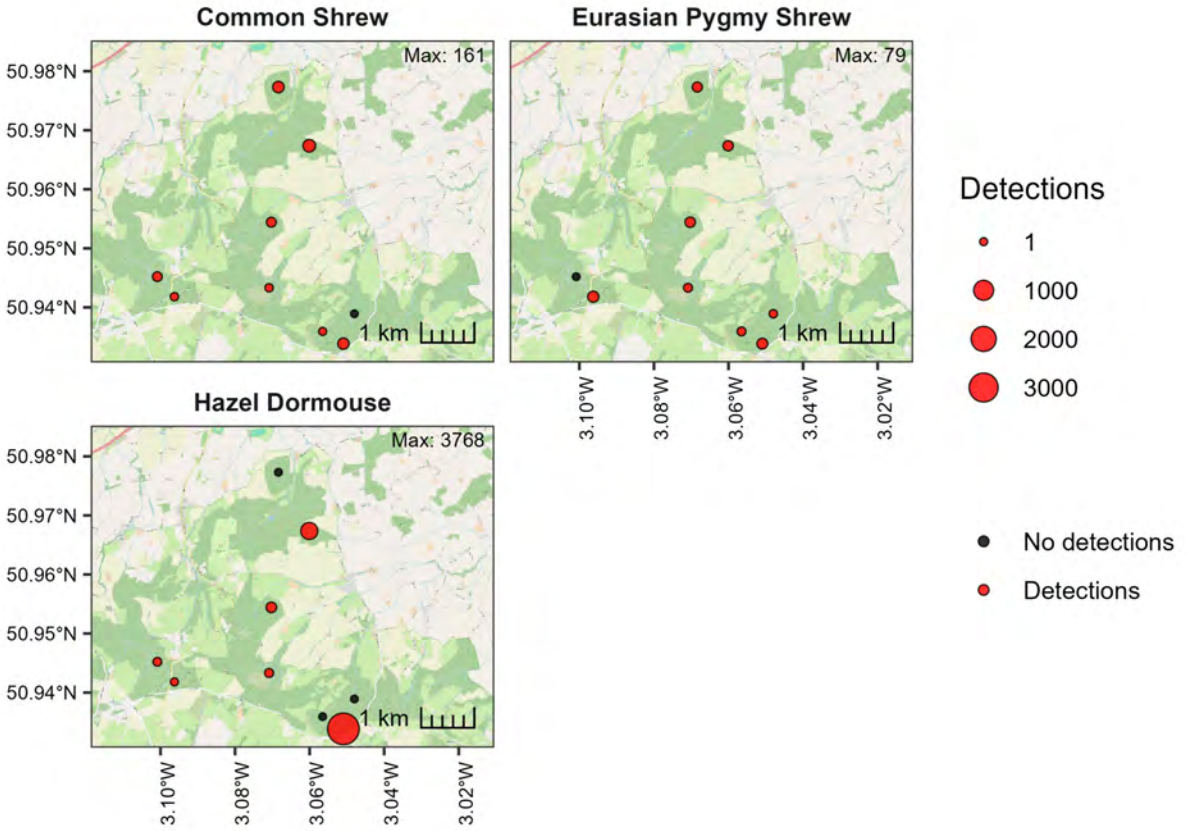

Figure 14: Spatial activity patterns of the ultrasonic vocalisations of small mammal species across the Wild Neroche survey area. Points are sized according to the number of total verified detections. Black points indicate survey locations without detections.

4.3.4 Bush-crickets

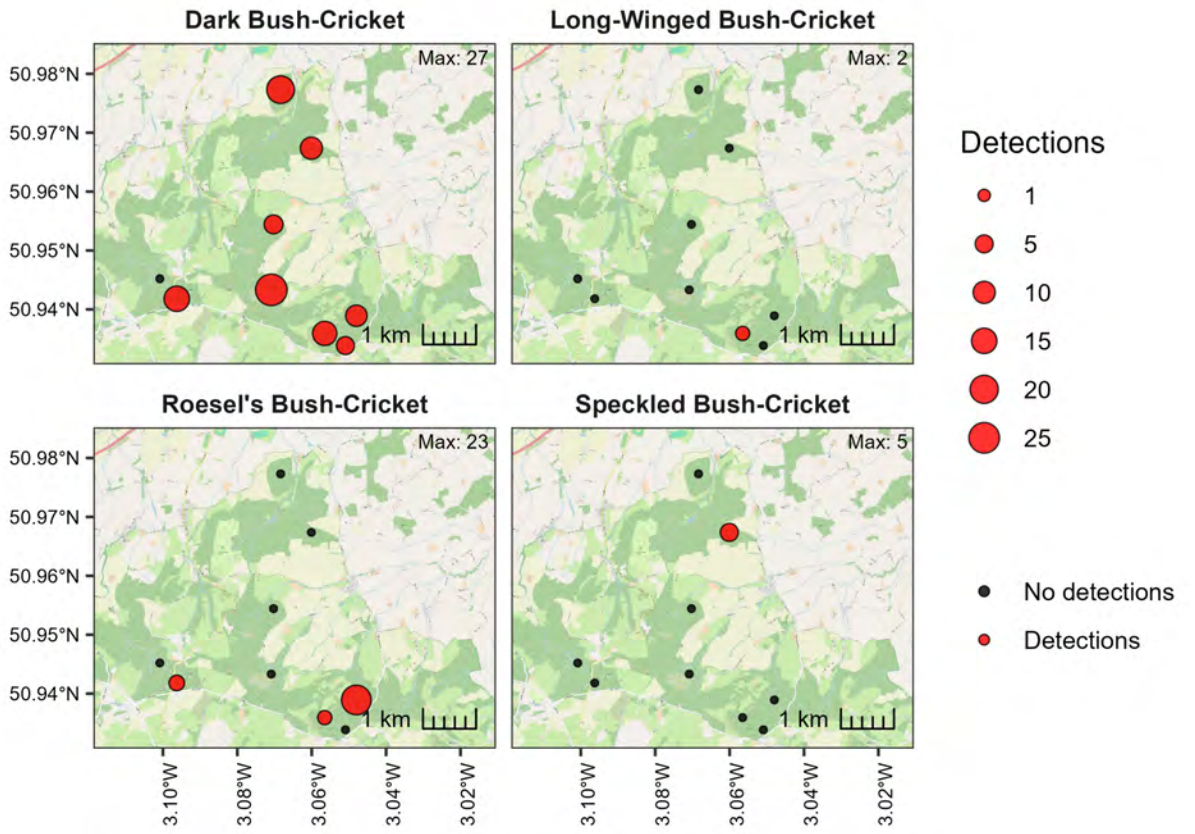

Figure 15: Spatial activity patterns of the ultrasonic vocalisations of bush-cricket species across the Wild Neroche survey area. Points are sized according to the number of nights (differing from other taxa in Figures 8 and 9) with a verified species detection as acoustic activity (number of calls/night) is highly impacted by temperature and therefore, not a reliable indicator of abundance. Black points indicate survey locations without detections.

5. DISCUSSION

The first year of passive acoustic monitoring at Wild Neroche has successfully established a comprehensive baseline dataset encompassing birds, bats, small mammals, and invertebrates. The deployment of autonomous recording devices has proven highly effective in documenting biodiversity across a range of habitat types, with several findings of particular conservation significance.

5.1 Bats and small mammals

The detection of 13 bat species, including regionally important red-listed species such as Barbastelle and Bechstein's Bat, confirms Wild Neroche as an area of high conservation value for bat populations. The concentration of these rarer species in woodland sites with mature tree cover highlights the importance of maintaining and enhancing such habitats within the landscape.

Perhaps most significant is the exceptionally high number of Hazel Dormouse detections (4,418 recordings across six sites). This represents one of the most comprehensive acoustic datasets for this species collected to date and demonstrates the effectiveness of passive acoustic monitoring for detecting this elusive and declining species. For context, long-term monitoring in Britain has shown that Hazel Dormouse numbers have declined by around 50–70% since 2000 (Goodwin, Hodgson, et al. 2017), including continued downward trends at a majority of sites (People's Trust for Endangered Species 2023). These declines are attributed to habitat loss and fragmentation, changes in woodland management, and climate-related impacts on hibernation and breeding (Goodwin, Suggitt, et al. 2018). The high activity levels recorded at Wild Neroche suggests a healthy population that could act as a source for suitable neighbouring habitat. The peak in dormouse activity during late July aligns with known patterns of summer foraging activity and suggests healthy, active populations across multiple woodland sites.

The distribution patterns of Wood Mouse and Bank Vole indicate that suitable small mammal habitat is widespread across the survey area, likely supporting the broader woodland food web.

5.2 Birds

The confirmation of 73 bird species, including 35 species of conservation concern, demonstrates the ornithological importance of Wild Neroche. The repeated detection of Goshawk is particularly noteworthy, as this species is scarce in the region and its presence suggests suitable breeding and foraging habitat. The detection of Nightjar at heathland sites further emphasises the habitat diversity present.The phenological patterns observed provide valuable baseline data against which future changes can be assessed.

5.3 Bush-crickets and moths

The detection of four bush-cricket species and two audible moth species, while representing a modest component of the overall biodiversity recorded, contributes to the broader understanding of some invertebrate communities within Wild Neroche. These data provide additional baseline information for future monitoring.

5.4 Implications for management

This baseline dataset will prove valuable for assessing the impacts of future management interventions across Wild Neroche. The success of this initial deployment suggests that continued passive acoustic monitoring, potentially at a subset of core sites, would provide robust long-term monitoring data. Such data could be used to evaluate the effectiveness of habitat management, track population trends of key species including Hazel Dormouse and Goshawk, and detect the arrival of new species or changes in community composition.

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Front cover: Spotted Flycatcher, by Liz Cutting; back cover: Goshawk, by Edmund Fellowes

Wild Neroche: a multi-taxa, baseline passive acoustic monitoring survey, 2025

This report summarises results from the first year of Passive Acoustic Monitoring undertaken at Wild Neroche during spring and summer 2025. The intention is to establish a baseline dataset that will inform future assessments of how active management influences biodiversity across the Neroche area.

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