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Population densities of the Common lizard (*Zootoca vivipara*) in restored heathlands

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Conservation Internship

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ABSTRACT

Many heathlands in Europe nowadays are degraded and need management to be restored to their former glory. One of the management options applied a lot on heathlands is grazing by large herbivores like sheep, cattle or horses, to avoid natural succession into forest. Grazing will not only stop the encroachment of grasses, it will rejuvenate the heather and keep the heathland open. Next to effecting the vegetation, it impacts the fauna of the heathland on many different ways. Light grazing increases habitat diversity of which many species can benefit. Grazing might impact fauna both in a direct and indirect way. Loss of structure in the vegetation and a changed microclimate will impact fauna directly, as does disturbance and trampling by large herbivores. Prey availability might be reduced because of excessive grazing and this will impact their predators indirectly. Species respond differently to grazing depending on their ecology and particular adaptations. For reptiles both positive and negative responses have been recorded. In this internship I participated in the monitoring of the Common lizard (*Zootoca vivipara*) in the nature reserve Grenspark De Zoom – Kalmthoutse Heide. Lizards were counted along different transect lines spread out over the area. The different transects were placed in sites with different grazing regimes, ranging from no grazing at all to very intensive grazing. The resulting data was then used to calculate the density of the lizard populations in each of the sites. In the short period of this internship only 15 lizards were encountered. This data was not enough to make reliable density estimates but could uncover some trends. Most individuals were found in the control sites and least in the sites with intensive grazing which might suggest some deleterious effect of grazing. The common lizard shows a decreasing trend both in the Netherlands as in Belgium, though the reasons for this decline are still uncertain. Precautionary principle would advise a review of the management plan of this large heathland area to minimise the impact grazing has on this particular species. The Common lizard and certain other heathland species will benefit more from extensive and low intensity grazing.

INTRODUCTION

The European heathlands developed some 4000 years ago after wide scale forest clearance. The cleared land was then used for grazing stock, burning, cutting of turf and cutting of vegetation for fodder and fuel. With the deep litter system, farmers used a mixture of mowed material and manure to fertilise their agricultural fields. These activities kept the land open and prevented the forest from regenerating. As succession and the structure of the vegetation is determined by humans, heathland is a semi-natural biotope (Webb, 1998). A heathland contains some very different communities: sand dunes, dry heath, wet heath and pools. Differences in species composition are caused by differences in water balance, relief, nutrient level, pH, structure and management of the vegetation and geographical location (Hermy, de Blust, & Slootmaekers, 2004). Many heathlands nowadays are very degraded. The small patches that still exist are surrounded by intensively used land. The majority of heathlands need management to conserve them. They are threatened by atmospheric pollution, overgrazing, excessive wildfires, land use changes, fragmentation and climate change (Heathland and shrubs, BISE). The current management methods widely used for heathlands, consists of mowing, sod cutting, burning and grazing (Hermy, de Blust, & Slootmaekers, 2004).

Grazing of the heathland is done to rejuvenate the heather, to stop grasses from taking over, to have less litter and to avoid natural succession into forest. Selective grazing increases the heterogeneity of the vegetation, which will benefit the biodiversity. Different species of grazers have evolved a different method and preference for certain species and have thus a different effect on the vegetation. Sheep can graze the heathland in a herd with a shepherd that brings the sheep to the area in the morning and brings them back to the stable at night. Another way is to have a moveable grid where the sheep graze day and night for a certain period, which results in high intensity grazing for a short amount of time. Mostly used is a fixed grid that encompasses a large part of the reserve where the sheep can graze freely. This results in a more divers vegetation, where places with very intense grazing alternate with resting places (where all the manure is left) and places that are hardly ever grazed. Intensive grazing of dry heath can result in a persistent and uniform vegetation of heather with a low biodiversity. This will not be beneficial for the insect and spider communities or reptiles. It is therefore discouraged to graze the whole heathland area intensively and advised to only have intensive grazing in certain plots so there is enough alternation with places rich in structure. The density of the grazing animals used is dependent on the productivity of the vegetation. Grazing in different densities can maintain a mosaic landscape with heath, grassland and forest. To maintain or develop a large area of dry heath dominated by heather (*Calluna vulgaris*), grazing will have to be combined with other methods that remove more biomass and nutrients, like sod cutting or top soil removal (Hermy, de Blust, & Slootmaekers, 2004).

Research has been done to investigate the effect of grazing on the fauna of grasslands and heathlands. Species respond in different ways to grazing, depending on their adaptations and the environmental and historical context in which these adaptations evolved. The response of biodiversity to grazing is thus not to be generalized. Grazing effects depend on many different factors, so there is not one single grazing pressure that is appropriate across all sites, on the same site in different years or for all species – flora and fauna. Consequently, the optimal grazing regime depends greatly on the management objectives and target species, communities, habitats or even landscapes (Rosa García et al., 2013). The implications of grazing for spider communities in grazed grassland is either direct through changes in vegetation structure and microclimate, or indirect through its impact on prey availability. Some species like a more uniform grassland that is the result of mixed grazing while others prefer more heterogeneous grasslands with single species grazing. Diversity generally increases with a more architecturally divers vegetation with large litter depth, created by a low amount of grazing (Bell, Wheater, & Cullen, 2001). In a study on the effects of grazing on ant biodiversity, Bestelmeyer & Wiens (2001) found an effect in only one plot. This plot was laid in a shortgrass steppe site, where the richness in ant species was higher in the un-grazed habitat.

Many species can benefit from the restoration of heathlands with the appropriate grazing management, as it provides a wide range of habitats. For example: open areas are required by e.g. burrowing wasps such as *Ammophila sp.* or the Sand lizard (*Lacerta agilis*) and denser areas are demanded by other groups such as harvestmen (*Oppiliones sp.*). The endangered butterfly species like the Alcon large blue (*Maculinea alcon*) depends on heathland conservation and the correct grazing management for their survival. It only lays eggs on Marsh gentian (*Gentiana pneumonathe*) and has an intimate relationship with ants (*Myrmica sp.*). Low intensity grazing provides favourable conditions for both its host plant and the ants (Rosa García et al., 2013). Excessive grazing might reduce prey species like insects, amphibians or small mammals and so indirectly affect their predatory fauna. The snake *Natrix natrix* suffered when its prey amphibians became scarcer (Offer et al., 2003). Likewise the composition of bird communities can shift after heather loss due to excessive grazing with reductions in e.g. red grouse (*Lagopus lagopus*) and black grouse (*Tetrao tetrix*) and increases in e.g. lapwing (*Vanelus vanellus*) and skylark (*Alauda arvensis*). The excessive grazing causes shifts on the invertebrate communities because of modification to the vegetation. Also for birds variation in the vegetation structure is of utmost importance. It provides cover for nests and chicks and provides enough sources of insect food. This type of variation is only generated under light or moderate grazing pressure (Rosa García et al., 2013).

In most heathlands, reptiles benefit from low intensity grazing and are adversely affected by severe grazing. Concerns have arisen about the effect of grazing on reptiles when it became clear that severe overgrazing lead to the elimination of many reptile species. An appropriate and sensitive grazing regime has benefits for reptiles because it enhances the structural diversity of the reptile habitats. Most reptile species require warm, open habitats with a high structural diversity so it can find enough shelter and food. Overgrazing will reduce this highly needed variation in structure. The benefits that the right grazing regime brings only become available after the livestock has been removed or reduced in numbers. In the years after grazing has reversed succession, those restored parts of the heathland will be colonised by reptiles (Offer et al., 2003). The impacts of grazing on reptiles has been studied in different countries and different habitat types. Although a positive effect was found for the bog turtle (*Glyptemys muhlenbergii*) in the USA (Tesauro & Ehrenfeld, 2007), most studies report a negative (e.g. Romero-Schmidt et al., 1994; Castellano & Valone, 2006; Pelegrin & Bucher, 2012) or neutral impact (e.g. Read, 2002) (see review by Jofré & Reading, 2012).

This internship contributes to the monitoring of the Common lizard in a heathland in Belgium: Grenspark De Zoom – Kalmthoutse Heide. The heathlands in Flanders today encompass only 5% of the total area of heathlands in Flanders and the Netherlands 150 years ago. The heathland in Kalmthout is one of the largest remaining in Flanders. The density of the Common lizard was investigated in response to different grazing regimes. The Common lizard has the IUCN conservation status of Least Concern but shows a decreasing population trend (Agasyan et al., 2010). Populations have locally declined in parts of its range. In the Netherlands populations have deteriorated strongly in the last ten years because of climate change, dessication, fragmentation and afforestation (van Strien et al., 2007; Levendbarende hagedis, RAVON, 2016). The main hypothesis tested in this work is that lizard densities will be lower in intensively grazed plots in comparison with the control plots and places with lower intensity grazing. This particular lizard species needs a certain level of variation in vegetation that would be destroyed by high intensity grazing. It can thus be predicted that they would prefer to live in plots with low intensity grazing.

MATERIALS AND METHODS

Study species

The Common or Viviparous lizard (*Zootoca vivipara*) belongs to the order of Squamata and the family of Lacertidae. This lizard species is widely distributed throughout Europe and Asia. It is an ovoviviparous species, with exception of some population in the most southern part of their range (Stumpel & Strijbosch, 2012). Their habitat preference is highly varied. This species occupies a wide range of habitats, from wet and dry heathland, moorland and most types of grassland, to coastal dunes, cliffs, hedgerows, old quarries and canal embankments. They prefer great variation in vegetation and in height of the vegetation cover and are mostly found in somewhat damp or wet areas, where there are enough grass tussocks to provide food, shelter, basking and hibernation sites. These lizards can reach high densities in places with enough sunlight and vegetation that is structurally divers and provides enough shelter. It feeds on a variety of invertebrates and is a diurnal species. It can be active from February to November and spends the rest of the year in hibernation (Edgar et al., 2010; Stumpel & Strijbosch, 2012). The Common lizard is threatened by habitat loss and the reduction of structural diversity, the use of chemicals and predation by invasive introduced species like domestic cats (Edgar et al., 2010).

Study site

The fieldwork is done at the heathland in Kalmthout, Belgium. This area is part of Grenspark De Zoom – Kalmthoutse Heide. In 2001, the reserve was established as a large park that crossed the border with The Netherlands and in 2011 the park expanded to 6000 ha. The whole reserve is part of the Natura 2000 network. In this heathland area, the Common lizard prefers the wetter habitats. Therefore all study plots were placed in wet heathland. The correct plots were searched for in areas that have had the same grazing regime since 2014. The heathland in Kalmthout is divided into a grazing grid with different grazing regimes in different blocks. Sheep and cows graze here from the beginning of May until the end of October. In some blocks the animals are free to roam around the grid. Grazing intensity in these blocks is fairly low. In another part of the reserve a shepherd accompanies a flock of sheep along the parcels. Grazing intensity here is high because the whole flock grazes in one specific parcel. Some blocks are reserved for the animals to spend the night or the weekend. With so many animals on a small area, grazing intensity is very high.

Twelve transects were laid out in areas with a different grazing regime. Three transects were laid in sectors with low intensity grazing (transects B, F(1) and F(2)). Three transects were laid in sectors with intensive grazing or sectors were the herd comes (transects GK(1), GK(2) and GK(3)). Three transects were laid out in sectors with high intensity grazing, i.e. evening or night rasters (transects ZintC, Zint1 and Zint2). Three transects were mapped outside of the grid, in similar vegetation types, and served as control plots (transects C1(1), C1(2) and C2). Figure A1 (appendix 2) shows the whole heathland area with its planned grazing regime for this year. The transects were measured to be 200 metres long. All Common lizards sighted or heard were counted within 1,5 meters on both sides of the transect line. Fieldwork was done on sunny days in April and May 2017. Over the twenty days of fieldwork all transects have been visited six times (see Table A1, appendix 1).

Density Estimation and Statistical Analyses

In order to estimate the density of the Common lizard in the different plots, it was necessary to estimate the perpendicular distance from the transect line at which each individual has been seen. Using the R package Distance (Miller et al., 2016) and the program R 3.3.3 (R Core Team, 2017) distance sampling was performed to estimate abundance and density. A Kruskal-Wallis test was used to test if there is any significant difference in abundance and density between the plots and grazing regimes. This non-parametric test was used because the collected data was not normally distributed.

RESULTS

Over the period of this internship, I encountered 15 lizards in total of which 11 were seen and 4 were only heard (Table 1). In the control sites (C1(1), C1(2) and C2) 3 individuals were heard running away, rustling through the grass and 4 were seen. Along the transects with low intensity grazing (Fext(2) and Bext) 5 individuals were seen and one heard. In the sites where the sheep herd grazes with high intensity, I have seen only one lizard in plot GK1(1). Likewise, along the transects with the highest intensity grazing I only saw one lizard in plot Zint1 (For a full overview of all observations see Table A2 in appendix 3). Of three individuals in sites GK1(1), C1(1) and C1(2) there is no distance measurement as they were seen before starting the transect.

Table 1: Total number of lizards seen and heard in every plot.

Plot	Intensity of grazing	Lizards seen	Lizards heard
C1(1)	No grazing	2	2
C1(2)	No grazing	1	1
C2	No grazing	1	0
Fext(1)	Low	0	0
Fext(2)	Low	2	1
Bext	Low	3	0
GK1(1)	High	1	0
GK1(2)	High	0	0
GK1(3)	High	0	0
Zint1	Very high	1	0
Zint2	Very high	0	0
ZintC	Very high	0	0

With the program R I calculated abundance and density in every plot for the area of the transect (600 m^2). The results can be found in Table 2 and 3. The abundance and density was highest in the first control plot C1(1) and one plot with low intensity grazing Bext. The results of the other plots are very similar. In the six plots with valuable observations, I have not more than three observations which means that any calculation made will not be very reliable. In order to have a good estimation of density, monitoring is needed over a longer period than the twenty days of this internship. Still, the result of this short period might give an idea of ongoing trends.

According to the Kruskal Wallis test there is no significant difference in abundance and density between the different plots (Chi^2 =11, p=0.44) and grazing regimes (Chi^2 =7.08, p=0.07). The abundance and density of viviparous lizards calculated here did not show an effect of the grazing regime. I found no evidence that the Common lizard is affected by high intensity grazing.

Table 2: Abundance estimates of the six transects were the Common lizard was observed. SE = Standard Error, CV = coefficient of variation of estimate, LCL = lower confidence level, UCL = upper confidence level, df = degrees of freedom

Plot	Abundance	SE	CV	LCL	UCL	df
C1(1)	1.215	0.883	0.726	0.252	5.856	6.336
C1(2)	0.405	0.417	1.030	0.049	3.360	5.617
C2	0.405	0.417	1.030	0.049	3.360	5.617
Fext(1)	0	0	0	0	0	0
Fext(2)	0.810	0.550	0.679	0.185	3.543	6.563
Bext	1.215	0.621	0.511	0.402	3.677	8.132
GK1(1)	0	0	0	0	0	0
GK1(2)	0	0	0	0	0	0
GK1(3)	0	0	0	0	0	0
Zint1	0.405	0.417	1.030	0.049	3.360	5.617
Zint2	0	0	0	0	0	0
ZintC	0	0	0	0	0	0

Table 3: Density estimates (per m²) of the six transects were the Common lizard was observed. SE = Standard Error, CV = coefficient of variation of estimate, LCL = lower confidence level, UCL = upper confidence level, df = degrees of freedom.

Plot	Density	SE	CV	LCL	UCL	df
C1(1)	0.002	0.001	0.726	4.204e-04	0.010	6.336
C1(2)	0.001	0.001	1.030	8.139e-05	0.006	5.617
C2	0.001	0.001	1.030	8.139e-05	0.006	5.617
Fext(1)	0	0	0	0	0	0
Fext(2)	0.001	0.001	0.679	3.087e-04	0.006	6.563
Bext	0.002	0.001	0.511	6.693e-04	0.006	8.132
GK1(1)	0	0	0	0	0	0
GK1(2)	0	0	0	0	0	0
GK1(3)	0	0	0	0	0	0
Zint1	0.001	0.001	1.030	8.139e-05	0.006	5.617
Zint2	0	0	0	0	0	0
ZintC	0	0	0	0	0	0

DISCUSSION

In many heathlands grazing is an essential part of management. The effects of grazing on fauna and flora are divers (see review by Jofré & Reading, 2012). Species respond in different ways to the various effects of grazing due to their differences in ecology and adaptations. In this internship the effect of grazing on the Common lizard was investigated. The Common lizard is known to be declining in the Netherlands (Levendbarende hagedis, RAVON, 2016), so it is possible that the same is happening in Flanders. From the observations done in the heathland of Kalmthout, this trend is also visible (www.grensparkzk.waarnemingen.be, 2017). The reasons for this decline are still uncertain.

Most lizards were detected in the control areas, but the difference with the sites of low intensity grazing is only one individual and thus negligible. The highest abundance of 1.215 individuals and the highest density of 0.002 ind/m² was calculated for the control plot C1(1) and for one of the plots with low intensity grazing – (Bext). The areas that served as control plots were sites outside of the grazing raster. These sites were dominated by grasses and had trees scattered around the transect. Vegetation was often high and dens. These plots were in the first stages of succession to forest, which is still an ideal habitat for the Common lizard (Strijbosch, 2001), as it likes open spaces but also enough places to hide and find shelter (Soortenstandaard, 2011). As succession continues towards a forest, the open spaces close up and it has been proven that afforestation led to the disappearance of lizard populations (Strijbosch, 2001). Grazing can lower the threat of afforestation and has in this way a positive impact on the lizard populations (Holzhauer & Onnes, 2012).

In the plots with low grazing pressure the vegetation looked very much the same as in the control plots but there were less trees. Still, Common lizards could find a suitable habitat in these plots as there is enough shelter in the high vegetation but also open places to sunbathe. It seems logical that most lizards are found in these structurally divers plots. The sites visited by the sheep herd experienced high grazing pressure and most of these sites showed a lower vegetation. The three sites with very high grazing pressure seemed overgrazed as the level of the vegetation was strongly reduced in comparison with the other sites. Intensive grazing causes the loss of variation in the vegetation and shelter locations (Pronk, 2015). The home range of the Common lizard is limited to a maximum of 500 m² and this species has a rather low dispersal capacity (Soortenstandaard, 2011), so many populations are maintained on small areas that can be seen as a sort of “islands”. Intensive grazing becomes too much very fast and destroys the lizard’s optimal habitat (Strijbosch, 2001; Holzhauer & Onnes, 2012). It can thus be predicted that, as places with high intensity grazing loose their vegetation structure and diversity, the population of Common lizards will also disappear.

My results seem to suggest a negative effect of high intensity grazing, as hardly any lizards were spotted in those sites. Though one lizard was seen in a plot with very high intensity grazing. In his study, Strijbosch (2002) came to a similar conclusion. He found that the population of Common lizard was up to five times higher in un-grazed areas compared to cattle grazed areas. This was probably due to a reduction in prey species resulting from reduced vegetation cover. Though there seems to be a trend in the found results, precaution should be taken in interpreting them. The resulting density and abundance found here is a very broad estimate. The standard error is enormous due to the small sample size. The sample size in a study should be a correct representative of the population. It is one of the features of a study design that influences the detection of significant differences, relationships or interactions (Bartlett et al., 2001). In order to have a correct estimate of density and abundance, sample size must be adequate. A higher sample size will reduce standard error and make calculations more reliable. Unfortunately a larger sample size was not possible over the scope of this internship. In this case sample size was not entirely under control of the researcher, as it depended on how many individuals were found. To increase sample size the transects should have been walked a number of times more, for which there was no time. Future research into the topic of this internship is necessary and it is recommended to spread the data collection and field work over a much longer time to optimise sample size.

The fact that not as many lizards were found as expected, may also be due to the warm and dry spring of this year (Rolf van Leeningen, RAVON, personal communication). The Common lizard is not a real heat-loving species and prefers humid areas so they will be less found in areas that have dried out because of the weather (Edgar, 2010; van Strien et al., 2007). However, a bias of an unexperienced observer cannot be excluded.

CONCLUSION

The data collected in this internship seems to suggest that grazing of the heathland could be detrimental for the Common lizard. However, the number of lizards found was very low and so further monitoring and research is necessary to confirm any trends that have come forward in this internship. As the heathland requires some amount of grazing for its management, complete abandonment of grazing is not possible. It will thus be important to take into account the response of the lizard when devising a grazing plan, especially now, when the species is already declining. It will benefit from a management plan with more extensive and low intensity grazing. Further monitoring is needed and will surely be done to follow up with the population of Common lizard in this particular area.

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Kalmthoutse Heide © Laure Vanlauwe

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APPENDIX 1

Table A1: Time table of the internship

Date	Hour	Activity
06/04/2017	11:00 – 17:00	Exploration of the heathland to find the correct places to lay out the transects
12/04/2017	15:00 – 17:00	Meeting + further exploration
13/04/2017	11:00 – 17:00	Measuring and placing of transects C1(1), Zint2 and GK1(1).
14/04/2017	11:00 – 17:00	Measuring and placing of transects GK1(2) and GK1(3).
19/04/2017	11:00 – 17:00	Measuring and placing of transects C2, Fext(1), Fext(2), ZintC and Bext.
20/04/2017	14:00 – 17:00	Measuring and placing of transect Zint1.
21/04/2017	14:00 – 17:00	Measuring and placing of transect C1(2). Test run of transect C1(1).
06/05/2017	11:00 – 16:00	Walking of transects C1(2), C1(1), Zint2, GK1(1) and Zint1.
09/05/2017	10:00 – 16:00	Walking of transects GK1(2), GK1(3), C2, Fext(1), Fext(2), ZintC and Bext.
10/05/2017	11:00 – 16:00	Walking of transects C1(2), C1(1), Zint2, GK1(1) and Zint1.
16/05/2017	11:00 – 16:00	Walking of transects GK1(2), GK1(3), C2, Fext(1), Fext(2), ZintC and Bext.
22/05/2017	11:00 – 15:00	Walking of transects C1(2), C1(1), Zint2, GK1(1) and Zint1.
23/05/2017	11:00 – 16:00	Walking of transects GK1(2), GK1(3), C2, Fext(1), Fext(2), ZintC and Bext.
24/05/2017	12:00 – 15:30	Walking of transects C1(2), C1(1), Zint2, GK1(1) and Zint1.
25/05/2017	12:00 – 16:30	Walking of transects GK1(2), GK1(3), C2, Fext(1), Fext(2), ZintC and Bext.
26/05/2017	10:00 – 13:00	Walking of transects C1(2), C1(1), Zint2, GK1(1) and Zint1.
30/05/2017	10:00 – 12:00	Walking of transect GK1(2)
31/05/2017	10:00 – 16:00	Walking of transects GK1(3), C2, Fext(1), Fext(2), ZintC and Bext, C1(2), C1(1) and Zint1.
01/06/2017	10:00 – 11:00	Walking of transects Zint2 and GK1(1)
02/06/2017	10:00 – 14:30	Walking of transects GK1(2), GK1(3), C2, Fext(1), Fext(2), ZintC and Bext.

APPENDIX 2

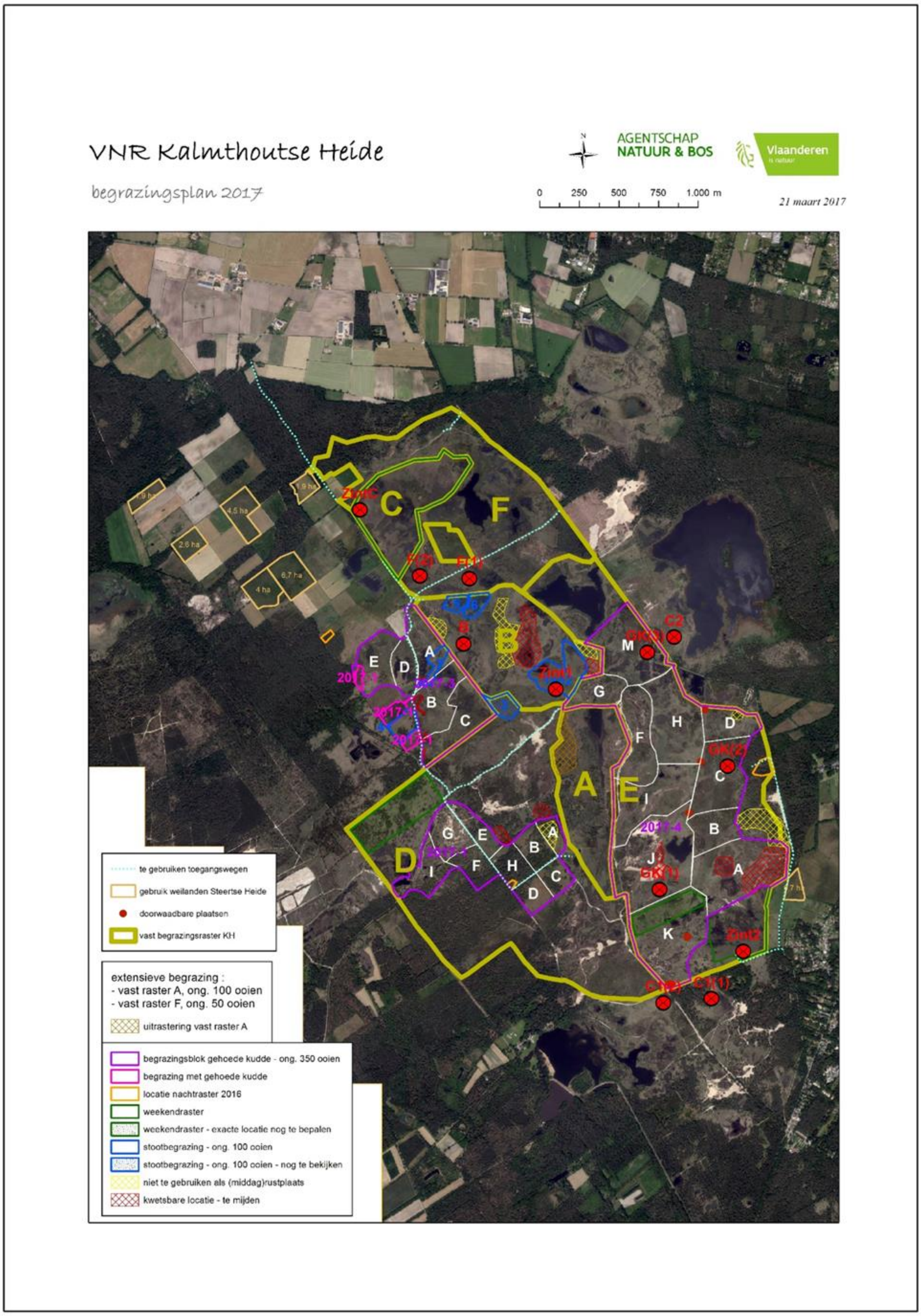

Figure A1: Grazing plan for Kalmthoutse Heide for the year 2017. Red dots show the position of the transects.

APPENDIX 3

Table A2: Overview of all observations.

Date	Plot	T (°C)	Time	Seen	Heard	Distance (cm)
06/05/2017	C1(2)	16	12:28	0	1	50
06/05/2017	C1(1)	16	13:28	0	1	30
06/05/2017	C1(1)	16	13:28	0	1	10
06/05/2017	Zint2	19	14:16	0	0	
06/05/2017	GK1(1)	19	14:51	0	0	
06/05/2017	Zint1	21	15:45	0	0	
09/05/2017	GK1(2)	11	11:21	0	0	
09/05/2017	GK1(3)	13	12:13	0	0	
09/05/2017	C2	13	13:06	0	0	
09/05/2017	Fext(1)	14	14:15	0	0	
09/05/2017	Fext(2)	14	14:50	0	0	
09/05/2017	ZintC	14	15:10	0	0	
09/05/2017	Bext	14	15:45	0	0	
10/05/2017	Zint1	13	12:02	0	0	
10/05/2017	GK1(1)	13	13:10	0	0	
10/05/2017	Zint2	14	13:45	0	0	
10/05/2017	C1(1)	14	14:19	1	0	100
10/05/2017	C1(2)	14	15:00	0	0	
16/05/2017	Bext	23	11:50	1	0	10
16/05/2017	ZintC	25	12:41	0	0	
16/05/2017	Fext(2)	25	13:41	0	1	
16/05/2017	Fext(1)	25	14:10	0	0	
16/05/2017	C2	25	14:48	1	0	20
16/05/2017	GK1(3)	26	15:20	0	0	
16/05/2017	GK1(2)	26	15:52	0	0	
22/05/2017	C1(2)	21	11:25	0	0	
22/05/2017	C1(1)	21	12:05	0	0	
22/05/2017	Zint2	22	12:54	0	0	
22/05/2017	GK1(1)	22	13:25	1	0	
22/05/2017	Zint1	24	14:15	1	0	30
23/05/2017	GK1(2)	18	11:40	0	0	
23/05/2017	GK1(3)	19	12:35	0	0	
23/05/2017	C2	19	13:09	0	0	
23/05/2017	Fext(1)	19	13:50	0	0	
23/05/2017	Fext(2)	19	14:25	1	0	60
23/05/2017	ZintC	19	14:49	0	0	
23/05/2017	Bext	20	15:23	0	0	
24/05/2017	Zint1	20	12:15	0	0	
24/05/2017	GK1(1)	21	13:25	0	0	
24/05/2017	Zint2	21	14:00	0	0	
24/05/2017	C1(1)	21	14:25	0	0	

24/05/2017	C1(2)	21	14:56	0	0	
25/05/2017	Bext	20	12:15	0	0	
25/05/2017	ZintC	20	13:00	0	0	
25/05/2017	Fext(2)	20	13:35	0	0	
25/05/2017	Fext(1)	21	14:05	0	0	
25/05/2017	C2	23	14:45	0	0	
25/05/2017	GK1(3)	23	15:25	0	0	
25/05/2017	GK1(2)	23	16:00	0	0	
26/05/2017	C1(2)	19	10:25	1	0	
26/05/2017	C1(1)	21	11:00	0	0	
26/05/2017	Zint2	21	11:32	0	0	
26/05/2017	GK1(1)	21	12:00	0	0	
26/05/2017	Zint1	23	12:48	0	0	
30/05/2017	GK1(2)	19	10:45	0	0	
31/05/2017	GK1(3)	18	10:54	0	0	
31/05/2017	C2	20	11:39	0	0	
31/05/2017	Fext(1)	20	12:25	0	0	
31/05/2017	Fext(2)	20	13:05	1	0	37,5
31/05/2017	ZintC	22	13:23	0	0	
31/05/2017	Bext	22	13:55	1	0	25
31/05/2017	Zint1	22	14:34	0	0	
31/05/2017	C1(2)	22	15:26	0	0	
31/05/2017	C1(1)	22	15:50	1	0	
01/06/2017	Zint2	18	9:46	0	0	
01/06/2017	GK1(1)	18	10:06	0	0	
02/06/2017	Bext	23	10:42	1	0	75
02/06/2017	ZintC	23	11:11	0	0	
02/06/2017	Fext(2)	23	11:32	0	0	
02/06/2017	Fext(1)	23	11:56	0	0	
02/06/2017	C2	25	12:24	0	0	
02/06/2017	GK1(3)	25	13:10	0	0	
02/06/2017	GK1(2)	25	13:47	0	0	