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Master of Biology: biodiversity, conservation and restoration

Internship report – Tracking smooth snakes (*Coronella austriaca*) in the Grenspark De Zoom, Kalmthoutse Heide using radio-telemetry

Introduction and Project Outline

As part of the Master of Biology: Biodiversity, Conservation and Restoration course, at least 20 days of work with an organisation related to conservation or biology is required. I chose to undertake one of those internships suggested by the university, which involved taking part in a conservation activity for Grenspark De Zoom-Kalmthoutse Heide at the cross-border (Belgium-Netherlands) nature reserve. I was particularly interested in the project involving the capture, tagging and subsequent tracking of smooth snakes (*Coronella austriaca*) via radio-telemetry. One of my reasons for this is that radio-telemetry has always seemed to be a technique often used in conservation, seen regularly in documentaries and special courses often offered in the UK, and by internship and gap year organisations for projects abroad. Personally, I saw this project as an opportunity to gain experience in a potentially useful skill in conservation and to see it practically applied in something conservation-related rather than just learned in a classroom.

Smooth snakes are a species known to prefer living in lowland heath habitats where mature heather with a litter substrate of moss is the dominant vegetation (Braithwaite et al., 1989; Reading and Jofre, 2015). The population at Kalmthoutse Heide lives in a grazed heathland, but is also divided, with a population of snakes living at the edge of a coniferous forest. A road used largely by agricultural vehicles separates the two habitats and populations. Little is known about the behaviour of the snakes in general, specifically little is known about habitat choice, phenology or movement ecology. Some of the specific aims of this project included understanding the movements of these snakes i.e. distance moved per day, the locations to which the snakes choose to move, what habitats they use and whether they are able to move across the road between the forest and the heathland. Furthermore, it is unknown where these snakes hibernate during the winter, but it may be possible to discover this information by tracking the snakes over a whole season. However, my part of the project involved conducting field work, hence the gathering of data in early Spring (April-May): the early part of the snakes' active season. Therefore, I was unable to gather such information in the course of my internship.

In addition to tracking the movements of tagged snakes, the ability to track the snakes also allowed some study of the ‘resting’ behaviour of the snakes. Such behaviour relates primarily to where and how a snake ‘rests’ during the day. Data were gathered in the field related to this which included information on whether snakes were visible/exposed or not and how exposed they were i.e. whether they were fully visible out in the open or somewhat hidden amongst vegetation. Furthermore, the type of cover/substrate the snakes use while resting could be recorded (vegetation, artificial plates or deadwood).

During my time on the project I became interested in the effect of the weather and climate on the movements and behaviour of the snakes. A study in the Netherlands (de Bont, van Gelder and Olders, 1986) noted that smooth snake activity (specifically emergence from and retreat into vegetation) appeared to be linked to a snake’s body temperature and whether the weather was cloudy or sunny. It was reported that snakes emerge and retreat based on a need to maintain a daytime body temperature of between 29-33°C, and would retreat to cool down or emerge to heat

up as necessary. Other studies on this species have suggested a link between temperature and snake activity (Daltry et al., 1998, Peterson,1987). After a discussion with Christoffel Bonte, my supervisor at De Grenspark, it was agreed that an investigation into the effects of the climate on the movements and behaviour of the snakes would be a useful activity for me to carry out. The climate variables to be explored in relation to snake movements and behaviour were to include temperature, humidity, the occurrence of rain and day length.

Data analysis

In order to use the GPS coordinates of the snakes' locations to describe the distances moved between days, the coordinates had to be translated from the WGS84 system to the Belgian Lambert 2008 system. This is in order to translate the coordinates into Cartesian coordinates specific to the Belgium surface scale and variation. These conversions were made using an online coordinate converter (Barbier, n.d.). The distance between 2 locations from one day to the next were calculated using the following equation:

$$Distance = \sqrt{(x1 - x2)^2 + (y1 - y2)^2}$$

In this equation, $x2$ represents the Lambert x coordinate registered on the first/previous day with $x1$ being the Lambert y coordinate on the second/next day. Similarly, $y2$ represents the Lambert y coordinate registered on the first/previous day with $y2$ being the Lambert y coordinate on the second/next day. The outcome of this equation provided the distance moved (if any) between the two points in meters. Four meters were subtracted from these values after discussion with my supervisor as a median error value to account for the error of the GPSMAP, which varied in accuracy from between 3-5 meters accuracy on different days. This is because, unfortunately, the accuracy given at each point on any given day was not recorded throughout the project. These daily movement distances were calculated for each of the four snakes which were tagged during my time on the project. The distance moved each day were compared against the climate variables for each snake individual rather than a total or average distance moved by each snake per day due to the low number of snakes tagged.

Unfortunately, the data from temperature loggers in the field were not available to me by the time I left the project. This, the data on weather were obtained from the Koninklijk Nederlands Meteorologisch Instituut weather station at Woensdrecht (Koninklijk Nederlands Meteorologisch Instituut, 2016), which is the nearest weather station to the study location. Unfortunately, data regarding day length and the duration and occurrence of rain, two conditions I'd wanted to explore related to movement and behaviour of the smooth snakes, were not available. Data on mean daily temperature (°C), maximum daily temperature (°C), mean daily humidity (%) and maximum daily humidity (%) were successfully obtained.

The data on snake resting behaviour were obtained from the daily forms filled out by volunteers in the field. These data were made into frequency counts of occurrence for each snake per day and then tallied into a total occurrence for all snakes per day. For example, if two snakes were found 'tussen' or partially hidden in vegetation, then the total occurrence of this behaviour for that day would be '2'. Tests against the use of wood as a substrate were not included in the analysis due to very small incidence (only one snake was seen to use it and only twice).

Z-scores were calculated for all variables in order to standardize the data and compare the different data. Pearson correlation analyses were used to test the relationship between the climate variables and the snakes' movement and resting behaviour. Correlations were considered significant at $p<0.05$. Analyses were conducted using the freely available statistical software R version 3.2.2 using the program's cor.test function.

Results

Table 1 demonstrates the results of comparisons of climate variables against the individual distances moved by each snake. Positive, if slight correlations were found between the movements of snake 1 and daily mean temperature (r=0.076) and maximum daily temperature (r=0.09), neither of which were significant (p=0.572 and p=0.503, respectively). An insignificant negative correlation (r=-0.134, p=0.319) was seen between maximum daily humidity and the distance moved by snake 1. Mean daily humidity was negatively correlated with the distance moved by snake 1 (r=0.258) and could be considered marginally significant (p=0.052). Correlations of mean daily temperature and maximum daily temperature were positive against the distance moved by snake 2 (r=0.213 and r=0.142), though both were insignificant (p=0.11 and p=0.291). Both mean daily humidity and maximum daily humidity were negatively correlated with the distance moved by snake 2 (r=-0.159 and r=-0.201). Neither association was significant (p=0.236 and p=0.133). The distance travelled by snake 3 was positively correlated with daily mean temperature (r=0.232) and maximum daily temperature (r=0.251), but neither correlation was significant (p=0.081 and p=0.059). Correlations between distance moved by snake 3 daily mean humidity, as well as maximum daily humidity were negative (r=-0.285 and r=-0.305) and significant (p=0.031 and p=0.021). Correlations between the distance moved by snake 4 with daily mean temperature and maximum daily temperature were positive (r=0.318 and r=0.262) and were significant (p=0.016 and p=0.05). An insignificant negative correlation was seen when comparing mean daily temperature with the distance moved by snake 4 (r=-0.197, p=0.145). The correlation between maximum daily humidity and the distance moved by snake 4 was negative (r=-0.308) and significant (p=0.02).

Table 1. Results of Pearson correlations of the daily distance moved (m) of individual snakes in relation to the climate.

Variables	Pearson Correlation, r	Significance (p-value)	df
Snake 1:Temperature	0.076	0.572	55
Snake 1:Max Temperature	0.09	0.503	55
Snake 1: Humidity	-0.258	0.052	55
Snake 1:Max Humidity	-0.134	0.319	55
Snake 2:Temperature	0.213	0.11	55
Snake 2:Max Temperature	0.142	0.291	55
Snake 2: Humidity	-0.159	0.236	55
Snake 2:Max Humidity	-0.201	0.133	55
Snake 3:Temperature	0.232	0.081	55
Snake 3:Max Temperature	0.251	0.059	55
Snake 3: Humidity	-0.285	0.031	55

Snake 3:Max Humidity	-0.305	0.021	55
Snake 4:Temperature	0.318	0.016	54
Snake 4:Max Temperature	0.262	0.05	54
Snake 4: Humidity	-0.197	0.145	54
Snake 4:Max Humidity	-0.308	0.02	54

Table 2 shows the results of comparisons of climate variables with the daily incidents of different types of resting behaviour of all snakes combined. Slightly positive correlations were found when comparing incidents of snakes being partially hidden between vegetation (tussen) with mean daily temperature (r=0.033) and maximum daily temperature (r=0.069). Neither of these associations were significant (p=0.802 and p=0.608). Correlation of the incidents of snakes being tussen with daily mean humidity was negative (r=-0.072) and insignificant (p=0.593), but positive and insignificant with maximum daily humidity (r=0.143, p=0.285). Negative and insignficant correlations were found with incidents of snakes not being visible or hidden under a substrate (onder) and mean daily temperature (r=-0.191, p=0.154) and maximum daily temperature (r=-0.179, p=0.182). A very slight, highly insignificant correlation existed between incidents of snakes being onder with mean daily humidity (r=0.003, p=0.98), while a negative, insignificant correlation occurred when compared with maximum daily humidity (r=-0.129, p=0.337). Daily mean temperature and maximum daily temperature were positively correlated with incidents of snakes being fully exposed on top of (op) a substrate (r=0.219 and r=0.195), both associations were insignificant (p=0.101 and p=0.144). Mean daily humidity was slightly negatively and insignificantly correlated with incidents of snakes found exposed (r=-0.053, p=0.692). The correlation between incidents of snakes being found full exposed and maximum daily humidity was positive and insignificant (r=0.07, p=0.602).

Table 2. Results of Pearson correlations of the observed resting behaviour on discovery of all snakes in relation to the climate.

Variables	**Pearson Correlation, r**	**Significance (p-value)**	**df**
Tussen:Temperature	0.033	0.802	55
Tussen:Max Temperature	0.069	0.608	55
Tussen: Humidity	-0.072	0.593	55
Tussen:Max Humidity	0.143	0.285	55
Onder:Temperature	-0.191	0.154	55
Onder:Max Temperature	-0.179	0.182	55
Onder: Humidity	0.003	0.98	55
Onder:Max Humidity	-0.129	0.337	55
Op:Temperature	0.219	0.101	55
Op:Max Temperature	0.195	0.144	55
Op: Humidity	-0.053	0.692	55
Op:Max Humidity	0.07	0.602	55

Table 3 contains the results of the correlations of climate variables with the substrate snakes were observed to occupy on a daily basis. Correlations between the use of vegetation as a substrate with mean daily temperature and maximum daily temperature were negative (r=-0.203 and r=-0.126) and insignificant (p=0.128 and p=0.347). Mean daily humidity and vegetation as a substrate were also insignificantly negatively correlated (r=-0.355, p=0.792). Maximum daily humidity was insignificantly positively correlated with vegetation as the observed substrate (r=0.223, p=0.095). The occurrence

of snakes being found under an artificial plate on a given day was positively correlated with both mean daily temperature (r=0.153) and maximum daily temperature (r=0.126). Both correlations were insignificant (p=0.255 and p=0.347, respectively). Mean daily humidity and maximum daily humidity were negatively correlated with incidents of snakes being found under artificial plates (r=-0.24 and r=-0.367). The association of mean daily humidity was insignificant (p=0.071), while that of maximum daily humidity was significant (p=0.004).

Table 3. Results of Pearson correlations of observed substrate use on discovery of all snakes in relation to the climate.

Variables	Pearson Correlation, r	Significance (p-value)	df
Veg:Temperature	-0.203	0.128	55
Veg:Max Temperature	-0.126	0.347	55
Veg: Humidity	-0.355	0.792	55
Veg:Max Humidity	0.223	0.095	55
Plate:Temperature	0.153	0.255	55
Plate:Max Temperature	0.126	0.347	55
Plate: Humidity	-0.24	0.071	55
Plate:Max Humidity	-0.367	0.004	55

Discussion

The correlation of mean daily and maximum daily temperature with the daily distance moved was positive for each of the snakes tracked during my time on the project. However, this association was only significant for snake number 4, the only female tagged during my time on the project. In other words, an increased temperature would appear to facilitate a greater distance travelled on a given day and this can said with more confidence for snake 4. It is known that environmental temperature has an effect on the activity displayed by snakes (Daltry et al., 1998; DeGregorio et al., 2015) with warmer days leading to better physiological conditions (Peterson, 1987), so this may not be an unreliable association. Unfortunately, during the project, the signal from snake 2's transmitter was lost, meaning that data gathering on the movements of this snake ceased at that point. This is unfortunate, as this snake was largely sedentary and remained in one place for much of the project and seemed only to move away from that area as the weather became warmer. I also find it interesting that the only female tagged during my time on the project is the only snake with any significant association between its movements and the environmental temperature. However, differences in the movement between male and female snakes cannot be tested with the currently available data.

Negative correlations were found between mean and maximum daily humidity against the distance moved by all snakes. In snake 3, both of these associations were significant and in snake 4 the association with maximum humidity was significant. This negative association is not what I expected given studies in other snake species show a positive relationship between relative humidity and snake activity (Daltry et al., 1998; George, Thompson and Faaborg, 2015). It is thought that snakes are more inclined to move more with increased humidity so as to reduce water loss as a result of their movements. It may be that the humidity readings taken at the weather station at Woensdrecht do not accurately reflect the humidity in the study area which may be quite different. Alternatively,

it could be that the importance of relative humidity is different in smooth snakes compared to previously studied species.

There was a positive relationship between mean and maximum daily temperature with snakes being found partially (tussen) or fully (op) exposed, while incidents of snakes being completely hidden decreased with increasing temperature. However, none of these associations were statistically significant. Nonetheless, I find it interesting that snakes were more likely to be found when temperatures were higher, which may suggest that snakes emerge when the temperature is higher in order to regulate their body temperature to their preferred level (de Bont, van Gelder and Olders, 1986). With regards to mean daily humidity, associations with snakes being partially or fully exposed were negative, while they were positive in relation to maximum daily humidity. Consequently, incidents of snakes being completely hidden were positively correlated with mean daily humidity and negatively correlated with maximum daily humidity. Again, none of these associations were significant. The increased occurrences of snakes being exposed with increased maximum humidity may be related to evaporative water loss which, may decrease with increased humidity (George, Thompson and Faaborg, 2015). However, I would be hesitant to draw any conclusions from this given the lack of significance and that the measures of humidity may not be accurate to the actual relative humidity in the study area.

The use of vegetation as a substrate was negatively correlated against all climate variables with the exception of maximum humidity. Conversely, the use of artificial plates in the study area has a positive correlation with mean and maximum daily temperature. The use of artificial plates was negatively correlated with mean and maximum daily humidity, significantly so when compared to the maximum daily humidity. These data may suggest a preference of snakes to use the artificial covers as the temperature increases, though the lack of statistical significance makes this difficult to infer. If true though, it may be that the area under the plates is warmer than exposure out in the open or at least the microclimate is more stable beneath the plates. Confirming such is neither within the scope of nor one of the goals of this project, however. The significantly reduced incidents of snakes using artificial plates when maximum humidity is high may mean that the microclimate beneath the plates is less ideal than simple exposure under these conditions. Again I feel caution may be warranted regarding the measures of humidity in this instance, however.

Conclusions

At present I believe that there are not enough data to draw reliable conclusions on the effects of climate on the movements or behaviour of the smooth snakes at Kalmthoutse Heide. At the very least I believe that an entire season of tracking is needed to gather sufficient data for a more reliable analysis. Furthermore, during my time on the project, only 4 snakes were tagged and of these, only 1 was female. Since, leaving the project, the number of tagged snakes has increased to 7 individuals with 4 males and 3 females being tracked. The increased number of snakes from which to gather data in combination with the continued gathering of data throughout the Summer may produce different results from what I have been able to produce here and the data overall should be more reliable. In particular, I think it would be interesting to see if the increased number of snakes and longer duration of data gathering will further validate the positive correlations between temperature and the distances moved by the snakes and whether these associations turn out to be significant. Whether instances of snakes being fully, partially or not at all exposed as well as

substrate/plate use in relation to temperature change may also differ with a larger sample size and a longer study duration. To further increase the reliability of the data, snake movements and resting behaviour should be compared against the data gathered by temperature data loggers which were placed in the field throughout the duration of the project. With regards to comparisons of snake movement and behaviour to humidity, I believe it would also be best if measures of relative humidity could be taken at the study location itself for a more reliable analysis. Ultimately, I believe that the results of this project will be more relevant as the study progresses through an entire season of tracking.

Activities and tasks

Before the internship

Before the project officially began and before I began field work, several activities needed to be carried out in preparation. First and foremost, myself and two other students involved in the project were given training on how to carry out radio telemetry correctly. We were taught how to programme the transceivers to track specific tag frequencies in preparation for tagging snakes and how to properly locate a given tag's signal and zone in on its location via triangulation. This training was carried out at campus Drie Eiken of the University of Antwerp and involved locating 3 tags that has been previously hidden by a technician in several spots in an open area of the campus.

Having received the training ourselves, myself and the other students who had been trained were asked to train some of the volunteers who would also be carrying out the telemetry in the field. This was given at De Vroente visitor's centre of De Grenspark in Heide during a day set aside for the training. After a demonstration and explanation on how to carry out the telemetry, 2 tags were hidden in a field near De Vroente and each volunteer was given a chance to seek the tags every time they were hidden in order to give the volunteers some practical experience. I feel this was a useful experience for myself also, as working in Conservation may require working with and the training of members of the public as volunteers in the future. This activity was, therefore, useful practice for developing my interpersonal skills and to give an idea as to what I may be required to do in the future.

After this training, myself and one of the other student volunteers were asked to make simple manuals on the operation of the 2 different types of transceiver that were available to use on the project. For my part I wrote a manual on the use of the Australis transceivers. These manuals were for the other volunteers on the project so that they would have an easier source of reference of relevant information than the official manual. These were made in case volunteers were still unsure of how to use the transceivers or needed to programme them in the field.

During the internship

My primary task throughout the course of my internship was to conduct field work. This involved travelling to the location where tagged smooth snakes were located, and using radio telemetry, pinpoint their location. I usually did this alone after the first day when Christoffel Bonte showed me the way to the location and also roughly where the snakes that were tagged in my absence were located. Thereafter, each day I was available, I would travel to roughly where the snakes' last known positions were and begin my search using the antenna and transceiver to locate them. When

possible their locations were confirmed visually, however, if the snakes were hidden deeply in vegetation, their location was determined based on where the transceiver received the strongest signal.

Once a snake was located, their co-ordinates were logged using a Garmin GPSMAP 60CSx device and logged in the WGS84 system of co-ordinates. Other information collected included whether the snake was seen moving when it was located, whether it could be seen or whether it was hidden (presumed to be under something, usually vegetation), if it could be seen was it fully visible ('o'p) or partially hidden between vegetation ('tussen') and finally the type of substrate in which it was found (vegetation, wood or plate). All of this information was written on a new form each day and stored upon return to De Vroente.

My time in the field was not restricted to just finding the snakes that had already been tagged, however. I also always had to search for other smooth snakes. I would do this by always keeping an eye to the ground, especially along the road side in between or after finding the already tagged snakes. Additionally, I always had to check the various plates that had been laid out in the heathland and at the edge of the forest in case any snakes were using them for shelter. In the event that a new snake was discovered, several measurements had to be taken, preferably while in the field. These measurements included the length between the head and the base of the tail (marked by the cloaca), the tail length, the total length (based on the previous two measurements) and the number of scales below the cloaca counted (usually from a photograph of this area). In additon, a photo of the back of the snake's head was taken as the pattern on the back of the head and neck area can be used to identify individuals. These measurements could assist in determining age; identifying individuals; and establishing the sex of the snakes. The latter can be determined fairly accurately in adult snakes by dividing the tail length by the head to base of the tail length (normally if this figure was 0.20 or higher it is likely a male, for example). Throughout most of the study it was females that were sought after for tagging, so if I found an individual I could confirm with high certainty was a male, I would leave it where I found it.

As well as the day-to-day field work, on occasion I was asked to take new volunteers into the field and demonstrate to them how to properly carry out field work. This included training them in the use of radio telemetry, showing them where each of the plates were in the area, and also answering any further questions they had regarding the work. Normally I would do this by finding the first snake myself to demonstrate the general technique and then offer for them to take over and find the other snakes themselves. Another task that also occasionally came up was interactions with the members of the public who were curious about what I was doing and about the project. In such cases I'd explain the project as clearly as I could and answer any questions they had. I found this to be a welcome task, as members of the general public are often stakeholders in conservation activity and I feel it is important to communicate clearly with them, feed their interest in conservation and generally leave a good impression upon them regarding conservation research and actions. Practising such interactions I feel was another unexpected, but useful task in the course of my internship.

Journal of daily tasks

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Below I have provided a day-to-day account of my experience in the field during the course of this project. These accounts serve as record of how long I'd spend in the field each day, what I did in that time and also detail any particular incidents or experiences that occurred on a given day and also, where applicable, personal notes on incidents I found to be of interest.

Day 1 (14/04/2016)

Approximately 5 hours spent conducting field work with Christoffel Bonte. 1 new snake (believed to be female) was found on the roadside (heathland side) habitat and I was trained on what measurements to take, how and assisted in the tagging of the new individual.

Day 2 (15/04/2016)

Approximately 2 and a half hours spent conducting field work alone. Snake 4 remained in hiding in a grassy tussock she had moved to post-release the previous day.

Day 3 (16/04/2016)

Approximately 2 and a half hours spent conducting field work alone. Snake 4 remained in hiding place.

Day 4 (17/04/2016)

Approximately 2 and a half hours spent conducting field work alone. Snake 3 moved several metres deeper into the woods since previous day. Snake 4 remained in hiding place.

Day 5 (21/04/2016)

Approximately 2 and a half hours spent conducting field work alone. Snake 4 had finally moved from its hiding place and travelled several meters away. A snake was successfully found on this day; I took its measurements and returned it to De Vroente in case tagging was required.

Day 6 (22/04/2016)

Approximately 2 and a half hours spent conducting field work alone. Snake 4 moved further back closer to its original location. I observed Snake 3 moving through vegetation before settling amidst a growth of trees. Snake 1 had moved several meters from its usual area.

Day 7 (23/04/2016)

Approximately 4 hours spent in the field with Loic Van Doorn and a photographer interested in the project. The snake was not one which had been captured before. It was photographed and added to the database of known snakes. The snake was a male and thus was not tagged. We released the snake at site of capture and then proceeded to track the tagged snakes. Snake 1 was discovered to have travelled approximately 80 meters from its location the previous day. A male snake was found, measured and photographed and determined to be a previously unknown individual.

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Day 8 (24/04/2016)

Approximately 2 and a half hours spent conducting field work alone. All snakes bar no. 2 had moved at least a meter from their place the previous day.

Day 9 (29/04/2016)

Approximately 2 hours spent conducting field work alone. Snake number 2 remains in its original location. Snake 4 made her way into the Southern heathland from her roadside habitat.

Day 10 (30/04/2016)

Approximately 2 and a half hours spent conducting field work alone. Snake 2 remains unmoving. Sighted snake 4 between heather vegetation; appeared to be basking in brief sunny spell.

Day 11 (01/05/2016)

Approximately 2 hours and 15 minutes spent in the field with two volunteers. On this day I was training two external volunteers of the Grenzpark on the use of radio telemetry. Initially, I demonstrated how to use the equipment to locate snake 1, who was sighted between heather vegetation (possibly basking) before he retreated under the moss growing under the vegetation. I then showed them how to note down the GPS co-ordinates of the snakes and fill out the daily form correctly. After this, I handed the equipment to the volunteers in order to give them the opportunity to track the remaining snakes themselves. While searching for the tagged snakes, I also showed them the locations of all the mats I had knowledge of so that they could also check them when they were in the field in future.

Day 12 (05/05/2016)

Approximately 2 hours and a half hours spent conducting field work alone. Spotted snake 3 moving, took co-ordinates at spot of last sighting. Snake 2 had finally moved. Snake 4 had moved into the southern heathland proper.

Day 13 (06/05/2016)

Approximately 2 hours spent conducting field work alone. Snake 3 moved out woodland and crossed metal plates into felled commercial woodland.

Day 14 (07/05/2016)

Approximately 1 hour and 45 minutes spent conducting field work alone. Snake 3 remains in commercial woodland.

Day 15 (08/05/2016)

Approximately 2 hours and 10 minutes spent conducting field. Field work was unexpectedly performed with a small group of volunteers who'd decided to search for snakes in their own time. A snake was found, its measurements taken, but was released again as it was determined to be male. Snake 3 appeared to be hiding underneath iron plates used by foresters.

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Day 16 (11/05/2016)

Approximately 3 hours and 10 minutes spent conducting field work alone. As of Monday Snake 2 has been missing so greater sampling effort was needed to try and locate the lost snake. Unfortunately my search was unsuccessful.

Day 17 (12/05/2016)

Approximately 3 hours and 10 minutes spent conducting field work alone. The search for snake 2 continued this time covering ground that had not been searched as of then. Unfortunately the snake remained missing.

Day 18 (14/05/2016)

Approximately 1 hour and 30 minutes spent conducting field alone. The search for snake 2 continued and time was spent covering the area previously searched on day 16 again. Unfortunately the snake remained missing.

Day 19 (18/05/2016)

Approximately 1 hour and 30 minutes spent conducting field work alone. The search for snake 2 continued on a similar path as on days 16 and 18 after a suggestion by a volunteer. Unfortunately the snake remained missing.

Day 20 (19/05/2016)

Approximately 1 hour and 30 minutes spent conducting field work alone. Also, demonstrated to a new volunteer how to conduct field work. Discovered that Snakes 1 and 3 are close to shedding and informed project leaders to discuss whether the snakes need to be recaptured, allowed to shed and then retagged.

Additional 2 days (21/05/2016 and 22/05/2016)

Spent several hours over both days of the weekend with Loic Van Doorn locating and recovering snakes 1 and 3 which were very close to shedding. Additionally over this weekend we found 4 new snakes to be tagged and tracked in the future. This included 3 females and an additional male that was close to shedding. One female that was tagged while in the field, turned out to be a female which Loic had previously accidentally released and which appears to have travelled several hundred meters from its original position.

Summary

All-in-all I feel as though my time working for the project was a very worthwhile experience and I thoroughly enjoyed taking part. In particular, the fieldwork has been a joy to carry out and while I understand such work is but a very small part of working in the field of conservation, I feel it is good to finally have some experience in what, for me, has always seemed synonymous with conservation. Furthermore, I value the unexpected experience of being involved in the training of volunteers and interactions with members of the public.

On a note of personal relevance, I found this latter experience to sometimes be good practice in the Dutch language. Having been involved in the project's beginnings I am very much interested in the progress the project might make beyond my involvement and how the results may evolve beyond my own short analysis here. If my resources should allow it, I'd like to continue some involvement in the project, even if that should just be occasionally conducting field work or processing data when it is within my abilities. For now, I am grateful to have been involved in something so conservation related and to have been made to feel as though I'm a welcome member of a team.

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