Review of Herpetofauna Behaviour correlated with Weather 2012

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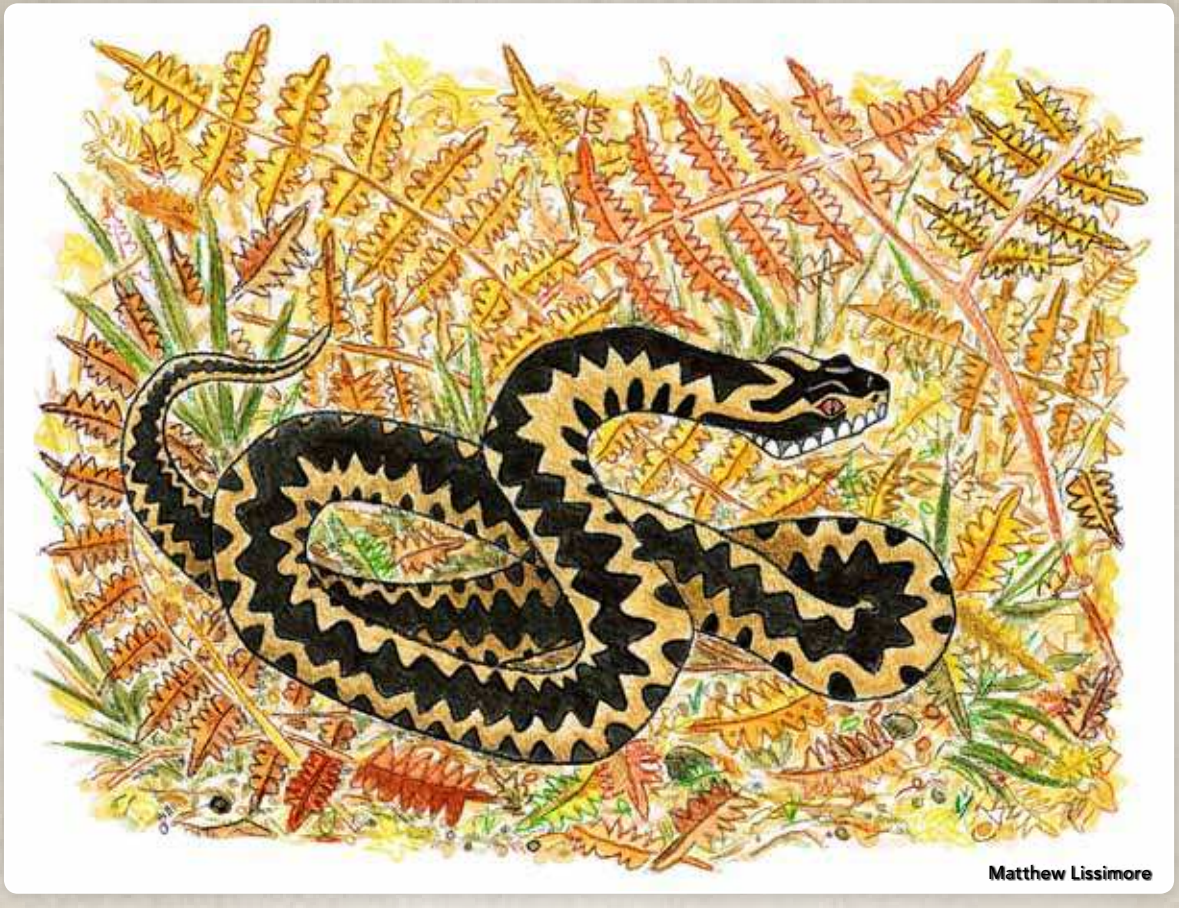

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Daily weather records have been taken at Knowles Mill, since 1981, at 9am GMT. Below average temperatures are frequently recorded, as the Dowles Valley, only some 31 metres above sea level, acts as a frost pocket, with only limited amounts of sunshine, even during the summer months. The year ending December 2011, proved to be the warmest on record and the driest since 1964, and the first 3 months of 2012 continued in a similar vein, with reservoirs very low, and drought conditions announced at the end of March, with everyone now being asked to be economical with their use of water. However, conditions were about to change, as April, June and July were to prove exceptionally wet, culminating in severe floods in July. There was also above average rainfall in September, November and December, making 2012 the wettest year ever recorded at this site.

JANUARY was milder and drier than average, with an air temperature of 11°C registered on the 1st, 2nd and 12th. There were 14 days when rain was recorded, the wettest the 25th, with 8.5mm. The coldest night was the 16th, with a temperature of -8°C in the air and -9°C on the ground. The month ended with high pressure dominant, producing several cold frosty nights.

Mean Monthly Maximum 7.3°C.
Mean Monthly Minimum 0.5°C. Rainfall 42.3mm.
Air frosts = 13. Ground frosts = 25. No snow recorded.
Highest Barometric Pressure = 1029/30.38 on the 13th.
Lowest Barometric Pressure = 987/29.14 on the 3rd.

FEBRUARY began much as January had ended, with high pressure again producing cold frosty nights, the coldest was the 4th, with a minimum air temperature of –10°C and a ground reading of –11.4°C. The first substantial snowfall of the year fell on the 4th, which continued for some 9 ½ hours, generating an average depth of 7cm. Cold frosty days and even colder nights were to follow, prolonging this snow cover for a further 10 days. The cold, north east winds eventually eased, with a south westerly on the 17th, bringing much milder conditions. The first MALE ADDER was seen on the 21st in an air temperature of 15°C with a ground reading of 28°C. LIZARDS, SLOW WORMS and GRASS SNAKES were seen on the 25th.

Mean Monthly Maximum 6.2°C.
Mean Monthly Minimum –0.3°C Rainfall 31.3mm.
Air Frosts = 17. Ground Frosts = 22. Snow on 3 days.
Highest Barometric Pressure = 1038/30.65 on the 8th.
Lowest Barometric Pressure = 1003/29.62 on the 18th.

MARCH was very dry, with just under 22mm of rain, (less than 1"). The wettest day was the 3rd with 10.6mm, the first FROGSPAWN was also seen on that day. The first FEMALE ADDER was seen on the 17th, in an air temperature of 11°C, with 21.5°C recorded on the ground. Male adders began to SLOUGH on the 29th. The warmest day of the

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month was the 28th, with an air temperature of 20.5°C. It was also the warmest March since 1957.

Mean Monthly Maximum 12.4°C.
Mean Monthly Minimum 1.8°C. Total Rainfall 20.9mm.
Air Frosts = 11. Ground Frosts = 19. Sleet/Snow on 4th with Fog on 5 days.
Highest Barometric Pressure = 1037/30.62 on the 10th.
Lowest Barometric Pressure = 1006/29.70 on the 17th.

APRIL brought a most unwelcome change in the weather, with conditions cooler and wetter than average. While the month began with 2 days of settled weather, there followed the first of 23 rainy days, though not all consecutive. The wettest day was the 18th, with 16.5mm. of rain. On the few milder, brighter days, males were seen with females, and both courtship and copulation was observed on the 17th, in an air temperature of 11.0°C, with a ground reading of 44.0°C. However, a very cold N.E. wind gave stormy weather on the last 2 days of the month.

Mean Monthly Maximum 11.2°C.
Mean Monthly Minimum 2.7°C. Total Rainfall 109.7mm.
Air Frosts = 8. Ground Frosts = 16. Sleet/Snow on 2 days.
Hail on 3 days.
Highest Barometric Pressure = 1022/30.18 on 16th.
Lowest Barometric Pressure = 971/28.62 on 18th.

MAY began equally cool and unsettled, with a ground frost of –2°C, on several nights, and 12 days with rain, the wettest the 18th, with 10.3mm. However, it was generally a dry month with below average rainfall. The warmest days were the 25th and 27th, both with an air temperature of 26°C.

Mean Monthly Maximum 16.9°C.
Mean Monthly Minimum 6.8°C. Total Rainfall 44.9mm.
Air Frosts = 2. Ground Frosts = 6. Hail on the 15th.
Highest Barometric Pressure = 1036/30.60. on the 12th.
Lowest Barometric Pressure = 998/29.46 on the 10th.

JUNE was dominated by a succession of low pressure systems, each with attendant rainfall, resulting in 22 rainy days, the wettest, on the 14th, with 24.5mm, producing a total monthly rainfall of 159.6mm, and the wettest month of the year, indeed, the wettest for over 100 years. It was also the dullest June since 1929 and much cooler than average, with a ground frost recorded on the 10th, with 0.0°C and an air temperature of only 2.5°C. By contrast, the warmest days were the 27th and 28th, with an air temperature of 22°C. FEMALE ADDERS BEGAN SLOUGHING on the 15th.

Mean Monthly Maximum 16.9°C.
Mean Monthly Minimum 9.9°C. Total Rainfall 159.6mm.
No Air Frosts. 1 Ground Frost. 4 Days with Thunder.
Highest Barometric Pressure = 1015/29.96 on 1st.
Lowest Barometric Pressure = 983/29.03 on the 8th.

JULY was also dominated by near constant Low Pressure, from the Atlantic, with heavy rain during the first half of the month causing severe flooding in Scotland, Devon and Dorset, specifically on the 7th. A few days later West Yorkshire was also hit by flash flooding. While locally, overnight on the 13th and 14th, an angry tide of flood water surged through the Dowles Valley. This caused significant damage to both the Mill building and bridge, the power of the water demolishing the garden wall and leaving a huge block of stone and masonry stranded in the brook. The water level soon reached the front doorstep and continued to push across the garden, flattening shrubs and foliage, depositing huge tree trunks, branches and other debris in its wake. Incredibly, it also pushed over my very heavy Stevenson Screen, which finished up on its back. Alien fish species were stranded in the garden, and all the slow worms, along with juvenile Toads and a solitary Great-crested Newt, which had hitherto frequented the refugia in my allotment, swiftly disappeared, presumed washed away. The residents of Town Mill, just downstream, had to be evacuated by the Fire Service, using their rubber dinghy, when, in the early hours, the ground floor of their home was deluged by the rising flood water, after 47mm of rain fell in just a few hours. After 18 days with significant rainfall, developing high pressure, finally brought a respite, giving 10 days of fine weather and lots of warm sunshine. The warmest days fell on the 23rd, 24th, 25th and 27th with air temperatures of 27°C, these were the hottest days of the year. Unsettled weather returned at the end of the month.

Mean Monthly Maximum 20.4°C.
Mean Monthly Minimum 11.1°C. Total Rainfall 136.8mm.
2 Days with Thunder.
Highest Barometric Pressure = 1021/30.15 on the 22nd.
Lowest Barometric Pressure = 1001/29.56 on 6th.

AUGUST was a little warmer but still somewhat unsettled, with thundery showers on the first 5 days, and rain recorded on 20 days of the month. The wettest day was the 15th, with 28mm of rain. The warmest day was the 14th, with an air temperature of 24°C. While in contrast, on the last night of the month, the air temperature dropped to a chilly 3°C.

The Summer, June, July and August, proved to be the wettest for 100 years.

Mean Monthly Maximum 19.3°C.
Mean Monthly Minimum 11.65°C. Total Rainfall 88.2mm.
5 Days with Thunder.
Highest Barometric Pressure = 1025/30.27 on the 31st.
Lowest Barometric Pressure = 994/29.34 on the 25th.

SEPTEMBER began in promising fashion, with 8 days of settled weather, under the influence of welcome high pressure. The warmest day of the month fell on the 8th, with an air temperature of 25°C. However, unsettled weather had returned once again by mid-month, with

torrential rain overnight, on the 23rd and 24th, producing the wettest 24 hours of the year. When 82.3mm of rain, brought another flash flood racing along the Dowles Brook, which quickly overflowed its banks, submerging the adjacent meadows and again entering the Mill, where the various displays and information boards, had to be hastily dismantled, in the face of rising water, and put upstairs, hopefully out of harms way. Several gravid/ pregnant females were observed during the first week of the month, basking in the fine weather and occasionally on pleasant days later in the month, but it was the 27th, before one of these, 'Rosie', WAS SEEN TO HAVE GIVEN BIRTH, apparently to 6 or 7 babies. The air temperature was then 14°C, and the ground reading 38°C. The other females were still swollen with young even at the end of the month.

Mean Monthly Maximum 17.2°C.
Mean Monthly Minimum 6.3°C. Total Rainfall 114.8mm.
1 Ground frost.
Highest Barometric Pressure 1024/30.24 on the 6th.
Lowest Barometric Pressure 979/28.91 on the 25th.

OCTOBER proved rather cool overall, with low pressure bringing rain and wind from the Atlantic. The still pregnant females were observed on most fine days, but were last seen on the 21st, and thus presumed to have entered into hibernation still carrying their young. Although, there were 25 days with rain, on only one day, the 11th, was it substantial, with 17.5mm.

Table 1: Rainfall at Knowles Mill

Year	Total rainfall mms.	Total rainfall inches	Days with 0.2mm minimum rainfall	Maximum daily rainfall (mm)	Date of maximum rainfall
1990	964.3	38	167	42.5	Jan-28
1991	633.5	24.9	158	33	Apr-30
1992	880.4	34.7	196	42.9	May-28
1993	785.9	30.9	177	38	Jun-10
1994	814	32	198	54.8	Aug-14
1995	625.9	24.6	164	41.3	Jul-10
1996	624.8	24.6	169	17.4	Apr-12
1997	753.7	29.7	161	32	Jun-25
1998	805.4	31.7	195	27.2	Jun-01
1999	968.6	38.1	212	45.6	Sep-19
2000	1011.6	39.9	223	36.8	Oct-29
2001	738.1	29.1	187	40.2	Jul-17
2002	843.7	33.3	191	22.8	Dec-20
2003	560.2	22.1	155	27.3	Oct-30
2004	849.6	33.4	209	46.3	Aug-03
2005	748.8	29.5	183	35.3	Jul-24
2006	652.5	25.7	191	20.1	Nov-24
2007	1046	41.25	184	74.7	Jul-20
2008	930	36.67	197	37.2	Sep-05
2009	724.5	28.6	184	25	Jun-06
2010	659.2	25.99	168	27	Aug-25
2011	498.6	19.66	166	18.7	May-07
2012	1077.1	42.47	202	82.3	May-23/24

Table 2. Weather conditions relating to Adder surveying

	Rainy days (0.2mm or more)		Sunny days (5 hours or more)		Number of Survey Days	
Year	March	April	March	April	March	April
1990	6	12	15	20	21	22
1991	17	14	5	11	18	19
1992	24	18	2	9	18	20
1993	7	17	9	7	21	20
1994	22	15	12	12	22	23
1995	19	5	14	15	18	24
1996	15	15	1	8	9	25
1997	6	6	8	13	22	22
1998	13	25	6	10	20	20
1999	20	23	10	12	18	23
2000	12	21	14	12	22	19
2001	Data incomplete due to FMD					
2002	10	12	14	18	13	20
2003	9	9	21	17	23	24
2004	20	17	9	15	17	20
2005	18	16	8	12	15	25
2006	20	13	7	20	11	24
2007	14	5	15	25	21	23
2008	19	23	15	11	16	23
2009	12	14	19	20	22	19
2010	12	9	15	22	19	25
2011	7	4	20	22	16	25
2012	5	23	17	17	11	17

Mean Monthly Maximum 12.5°C.
Mean Monthly Minimum 5.2°C. Total Rainfall 76.5mm.
Air Frosts = 5. Ground Frosts = 7. 6 Days with Fog.
Highest Barometric Pressure = 1020/30.12 on the 23rd.
Lowest Barometric Pressure = 982/29.0 on the 31st.

NOVEMBER opened with brief spells of heavy rain, albeit, the first half of the month was mainly dry. However, the second half, particularly from the 16th to the 26th, was exceptionally wet, and indeed, the wettest day the 24th, saw 29.7mm of rain falling in just 18 hours. There was also a very cold end to the month.

Mean Monthly Maximum 8.7°C.
Mean Monthly Minimum 1.1°C. Total Rainfall 106.5mm
Air Frosts = 15. Ground Frosts = 18. 3 Days with Fog.
Highest Barometric Pressure = 1021/30.15 on the 14th.
Lowest Barometric Pressure = 971/28.67 on the 1st.

DECEMBER started cold and showery, with sleet on the 1st day of the month, soon followed by a ridge of high pressure, which gave several sharp overnight frosts. The coldest night was the 13th, with an air frost of –8°C and a ground frost of –9.5°C. Nevertheless, the last 18 days, produced a measure of rain in my gauge each and every morning. The wettest being the 14th and 19th, with 15.2mm and 17.1mm, respectively. The December rainfall, when added to the previous 11 months, made it the wettest year ever recorded at Knowles Mill.

Mean Monthly Maximum 6.5°C.
Mean Monthly Minimum 0.3°C. Total Rainfall 145.6mm.
Air Frosts = 16. Ground Frosts = 26. Sleet on 1st.

Table 3: 2012 Phenology Data in the Wyre Forest

RECORD	2004	2005	2006	2007	2008	2009	2010	2011	2012
Frogs Croaking	23-Jan	31-Jan	18-Jan	12-Jan	16-Jan	13-Feb	24-Feb	18-Feb	03-Mar
First Frogspawn	16-Feb	09-Feb	26-Feb	15-Feb	09-Feb	18-Feb	26-Feb	22-Feb	03-Mar
First Male adder	04-Mar	15-Feb	15-Feb	14-Feb	12-Feb	16-Feb	20-Feb	12-Feb	21-Feb
First common lizard	25-Mar	15-Feb	22-Feb	07-Mar	12-Feb	02-Mar	07-Mar	12-Feb	25-Feb
First Slow-Worm	16-Mar	18-Mar	25-Mar	07-Mar	01-Mar	25-Feb	18-Feb	17-Mar	25-Feb
First female adder	16-Mar	18-Mar	26-Mar	14-Feb	21-Mar	02-Mar	14-Mar	12-Mar	17-Mar
First grass snake	02-Apr	21-Mar	12-Apr	07-Mar	27-Mar	06-Mar	21-Mar	12-Mar	25-Feb
First grass snake copulation	N/S	04-Apr	N/S	N/S	01-Apr	21-Mar	04-Apr	N/S	N/S
First male adder slough	19-Apr	16-Apr	19-Apr	06-Apr	02-Apr	26-Mar	13-Apr	08-Apr	17-Apr
First adder courtship and combat	24-Apr	27-Apr	25-Apr	12-Apr	22-Apr	03-Apr	14-Apr	08-Apr	17-Apr
First adder mating	25-Apr	27-Apr	26-Apr	12-Apr	23-Apr	11-Apr	14-Apr	08-Apr	17-Apr
Last adder courtship	07-May	06-May	07-May	27-Apr	03-May	29-Apr	05-May	30-Apr	26-Apr
Last adder	05-Oct	16-Oct	20-Oct	02-Nov	21-Oct	26-Sep	23-Sep	16-Oct	05-Nov

Table 4: Cumulative data for Adders

Year	First sighting	Air Temp (°C)	Grass Temp. (°C)	First slough
1990	05-Feb	13	14	08-Apr
1991	23-Feb	14	17	19-Apr
1992	23-Feb	13	15	22-Apr
1993	17-Feb	10.7	12.5	16-Apr
1994	10-Feb	10	15	18-Apr
1995	12-Feb	11.4	11	10-Apr
1996	16-Feb	12.2	15	24-Apr
1997	15-Feb	8.6	11	08-Apr
1998	11-Feb	13.6	12.5	17-Apr
1999	16-Feb	8	9	16-Apr
2000	19-Feb	6.3	12.5	07-Apr
2001	07-Feb	10	11.5	17-Apr
2002	11-Feb	13.5	16	09-Apr
2003	23-Feb	11	23.8	31-Mar
2004	04-Mar	11	17.5	19-Apr
2005	15-Feb	10	14	16-Apr
2006	15-Feb	10	17.3	19-Apr
2007	14-Feb	11.3	19	06-Apr
2008	12-Feb	7	27	02-Apr
2009	16-Feb	11.7	13.7	26-Mar
2010	20-Feb	4	20	13-Apr
2011	12-Feb	11.5	15.6	08-Apr
2012	21-Feb	15	28	17-Apr

No Snow. Fog on 16th.
Highest Barometric Pressure = 1027/30.33 on the 11th.
Lowest Barometric Pressure = 978/28.88 on the 14th.

2012 Weather Summary

2012 was the wettest year ever recorded at Knowles Mill since records began in 1981, and also exceeded any rainfall recorded in Bewdley by the Whitcombe family from 1908 to 1964.

Total Rainfall/Precipitation = 1077.1mm = 42.47".
Rain Days with +0.2mm = 202.
Rain Days with +1.0mm = 156.
Wettest Day, with 82.3mm was on 23/24 May.
Wettest Month with 156.6mm was June.
Warmest Day with 27°C was on 24th and 27th July.
Coldest Night, with an Air Temperature –10°C. on 4th February
and Ground Temperature –11.5°C on 4th February.
There were 5 Days with Snow.
There was snow lying for 15 Days. Highest Barometric Pressure = 1038/30.65 on the 8th February. Lowest Barometric Pressure = 971/28.67 on 18th April and 1st November.

Table 5: Adder numbers

Year	Sites Surveyed	Sites with Adders	Mature Males	Mature Females	Total	Average per Site
1990	56	50	185	55	240	4.8
1991	76	61	211	56	267	4.4
1992	78	55	159	33	192	3.5
1993	80	59	186	70	256	4.3
1994	76	50	153	29	182	3.6
1995	76	44	103	14	117	2.6
1996	80	41	112	32	144	3.5
1997	84	44	102	31	133	3
1998	85	42	103	34	137	3.3
1999	67	35	100	20	120	3.4
2000	87	24	69	13	82	3.4
2001	Data incomplete due to FMD					
2002	20	13	36	17	53	4
2003	20	9	26	10	36	4
2004	47	20	40	19	59	3.6
2005	54	25	40* 65*	16* 38*	56*103*	4.1* 2.4*
2006	38	21	74	26	100	2.1
2007	28	19	67	24	101	5.3
2008	51	24	120	35	155	6.5
2009	55	22	96	30	126	5.7
2010	55	24	83	23	106	4.4
2011	44	20	59	27	86	4.3
2012	27	14	56	19	75	5.3

*Usual Sites without three new sites added
* Total when three new sites were added
FMD- Foot & Mouth Disease
Total number of adders divided by fourteen sites equals the average per site

Discussion

The results of the 2012 visual census, gives even further cause for concern with regard to adder populations in Wyre Forest (see Table 5). There were of course mitigating circumstances this year, as the exceptionally wet summer not only hampered our survey work, but more importantly, also effected, one presumes adversely, the adders themselves. Both the frequency of their feeding forays, and, for the gravid females in particular, now incubating young within, basking opportunities, as warm sunshine this season was strictly limited. In fact, the effect on female adders was soon evident, as in late summer, and indeed, well into autumn, most pregnant females were observed to be still swollen with young.

Table 6: Other reptiles recorded in Wyre during Adder census						
Year	Grass Snakes		Slow-Worms		Lizards	
	Mature	Juvenile	Mature	Juvenile	Mature	Juvenile
1990	30	6	23	3	22	2
1991	16	4	24	11	20	0
1992	22	8	27	8	10	3
1993	45	4	57	5	35	3
1994	18	2	36	10	22	1
1995	19	4	23	13	11	0
1996	18	4	32	16	15	0
1997	25	3	42	11	42	0
1998	20	1	34	8	37	0
1999	26	8	32	9	18	1
2000	11	1	21	3	23	0
2001	Data incomplete due to FMD					
2002	7	2	14	3	14	0
2003	5	0	10	0	26	0
2004	7		18		19	
2005	12/16*		53/71*		58/144*	
2006	11		49		70	
2007	12		45		52	
2008	34		129		169	
2009	18		156		98	
2010	28		124		90	
2011	26		59		117	
2012	16		43		34	
*the total with the three new sites added						
FDM - Foot & Mouth Disease						

While telemetry was again undertaken, the bad weather caused major problems, with the wet vegetation and ground humus, severely undermining the bond of the adhesive tape which held the tiny transmitters in place, and during the course of the active season, several adders lost their 'tags'. However, there were some success stories, as one breeding female, who was re-tagged in July, after sloughing her skin, retained her tag thereafter, and was seen on each and every visit to the main site. She was fully expected to give birth sometime during early September, but the days and weeks passed by, with little sign that this event might be imminent any time soon. On September 27th, three of the four tagged females were located, and all found to be gravid, later, the remaining female, known as 'Rosie', was also tracked down, having moved some 70 metres from her previous position, a favourite basking spot. On this occasion she was seen to be very thin, a positive diagnosis of a recent birth. Upon searching the immediate vicinity, six tiny neonates were soon discovered, and their unique head markings photographed for later identification. A heavy shower then interrupted proceedings and sent us running for cover. We returned to the very same spot about one hour later, only to find that the diminutive reptiles had barely moved, and were still basking close to a main ride, however, there was no sign of the female in this area. Eventually we picked up a strong signal via the radio receiver, and found, quite to our surprise, that Rosie had already left her babies, and moved back to her previous basking spot, about 70 metres away. The neonates would now have to fend for themselves, natural behaviour for most reptile species, and hopefully find a safe place to hibernate before the first winter frosts. The other three tagged females, were monitored daily, or, whenever the fickle weather permitted, and were still swollen with young when last observed on October 21st, perhaps indicating that they would enter hibernation carrying their young, and hopefully give birth the following spring, all being well.

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Female Adder, Wyre Forest, 25 October 2013 Ben Rudlin