
Notes on the grass snake *Natrix natrix* in the Derwent Valley, County Durham

TERRY COULT

4 Officials Terrace, Malton, Lanchester, County Durham,
DH7 0TH, UK. terrycoult@gmail.com

ABSTRACT - Records of grass snakes *Natrix natrix* in the counties of Northumberland and Durham, northeast England, are assessed in the context of national and regional records. The history of the grass snake on the Gibside Estate in County Durham is documented, along with observations of behaviour and discussion of the provenance of the snakes. The Gibside population of grass snakes is put into context and its future prospects discussed.

THIS paper's primary aim is to document the history of the grass snakes of the Gibside Estate in the lower Derwent Valley, northeast England. Secondary aims are to put the Derwent Valley grass snakes into their regional context and to examine whether the snakes are typical of the *helvetica* subspecies native to England. This paper is based primarily upon survey work and observations carried out between 1985 and 1998, supplemented by a review of archived biological records and further information from other naturalists.

For much of its length the river Derwent forms the county boundary between Durham and Northumberland, the lower Derwent Valley falls within the administrative districts of the modern County Durham and the Borough of Gateshead. For the purposes of this paper the Watsonian Vice County (VC) system will apply. Most of the river Derwent therefore divides VC66 Durham from VC67 South Northumberland. The lower Derwent Valley falls within VC66, including the Gibside Estate, which lies on the southern side of the river. Grass snakes at Gibside have been observed to the north of the river in and around Lockhaugh including a defunct sewage works. The Gibside population should therefore be taken to include both banks of the river Derwent.

The Gibside Estate has a long history as a private country estate, eventually becoming the property of the Bowes-Lyons family before becoming vacant in the 1920s. The derelict house and estate passed to the National Trust in 1993, after which time the whole of the estate became publically accessible. In 1989 much of the estate was declared a Site

of Special Scientific Interest, partially due to the presence of five native amphibian and four native reptile species.

RECORDS AND LITERATURE REVIEW

Records of the grass snake in northeast England are held by the National Biodiversity Network (NBN) and the Environmental Records Information Centre (ERIC) in Tyne and Wear Museums. The data holdings include duplicates, inaccuracies and incomplete records including those with no provenance and in many cases records that cannot now be verified. Historical written records rarely provide a context from which it is possible to determine validity and yet these records have been used to map the distribution of the grass snake within England. All of the records validated in the course of preparing the current paper have been deposited with ERIC.

In Durham and Northumberland grass snake records occur as far north as Crookham (NT9138), within four miles of the Scottish border, with a scattering of other records across the two counties, widely dispersed in time and space. Breeding records are few with only the Derwent Valley, and in particular the Gibside estate, providing a long-term history of grass snakes in the two counties.

Fawcett (1900) provides the first record of the grass snake in the Derwent Valley in 1886 but with no specific locality given. There are no further Derwent Valley records until the 1960s (Table 1). The late Ken Hopper of Wallish Walls farm recorded grass snakes breeding in the farm manure heap circa 1984 and being present on the

Mereburn, 1960	NZ0854
Edmundbyers, 1960	NZ0149
Shotley Bridge, 1970s	NZ0952
Coombe Bridges, 1972	NZ0548
Ebchester, 1980	NZ1055
Gibraltar, 1983	NY9449
Wallish Walls, circa 1984 & 1986	NZ0650
Carricks, 1987	NY9851
Blanchland, 1999	NY9650
Shibdon Pond, 2006	NZ1962
Blackhall Mill, 2006	NZ1156

Table 1. Grass snake records for Derwent Valley away from Gibside held by the Environmental Records Information Centre, Tyne and Wear Museums.

farm during the 1980s (K. Hopper, pers. comm).

Gibside grass snakes make their first entry into the ERIC database in 1979 and are recorded every year until 1998 with the exception of 1997. After 1998 records are sporadic.

Coult (1995) summarised the survey history and the historical distribution of the grass snake in Northumberland and Durham with inconclusive results other than to confirm the presence of breeding snakes on and around the National Trust's, Gibside Estate. Durkin (2010) provides detailed distribution maps and a summary of status for all of the Durham and Northumberland reptiles including grass snake.

Langton (1989) records that in 1983 he found a market stall in Newcastle upon Tyne which was selling grass snakes apparently collected in Tyne and Wear. There is no further information on where these snakes came from or who collected them but in the 1980s the Gibside population was the only viable one in the region and is likely to have been the source population.

The grass snake has been recorded as breeding in Northumberland further north than the Derwent Valley, at Fontburn Reservoir, as recently as 1999 (J. Durkin, pers. comm.) but further work is required to fully determine status there.

OBSERVATIONS OF GRASS SNAKES AT GIBSIDE

The author's involvement with the Gibside snakes began in 1985 after being shown a series of photographs taken at Easter 1984 showing seven snakes presumed to be in a mating chase (E.

Morton, pers. comm). A notable feature was that some snakes were atypical in coloration having a pair of pale dorsolateral stripes. Subsequently this colour form was found to make up a substantial proportion of the Gibside population. From 1985 to 1998 the author installed and monitored a manure heap as an egg-laying site on the southern edge of Snipes Dene (NZ183589). Many subsequent observations were made there.

The core area of distribution is approximately the northern half of the National Trust's Gibside land holdings including Snipes Dene, Park Farm and the Lady Haugh along with Lockhaugh, part of Derwent Walk Country Park, Hollin Hill Farm and a disused sewage works (Fig. 1). Durkin (2010) considers the 2006 records at Blackhall Mill and Shibdon Pond to be snakes from the Gibside population, the linking habitat being the River Derwent. There is, however, no evidence of snakes moving between these locations.

Behaviour

Little is recorded of the behaviour of snakes at Gibside. Most of the author's observations were made near the manure heap or by the lily and fish ponds within the estate. Incidental reports record snakes swimming across the River Derwent (K. Gardner, pers. comm.). Snakes with prey bulges have been seen by the ponds having presumably captured prey there.

Breeding

There are two records of mating chases and mating; the mating chase already referred to in 1984 and the author's record of an autumn mating on the 23 September 1989 (Coult, 1989). This latter observation involved a tied pair of snakes and three other males making frenzied passes around the mating pair, within two metres of the manure heap. The snakes were watched for ten to fifteen minutes with the observation finishing at 11.40 am and several photographs taken (e.g. Fig. 2). When the pair finally broke up the other males repeatedly visited the mating spot, rapidly tongue-flicking the ground.

On the 6 June 1990, 27 grass snake eggs were found in the manure heap; most were shriveled but some were fully formed. When cut open one egg

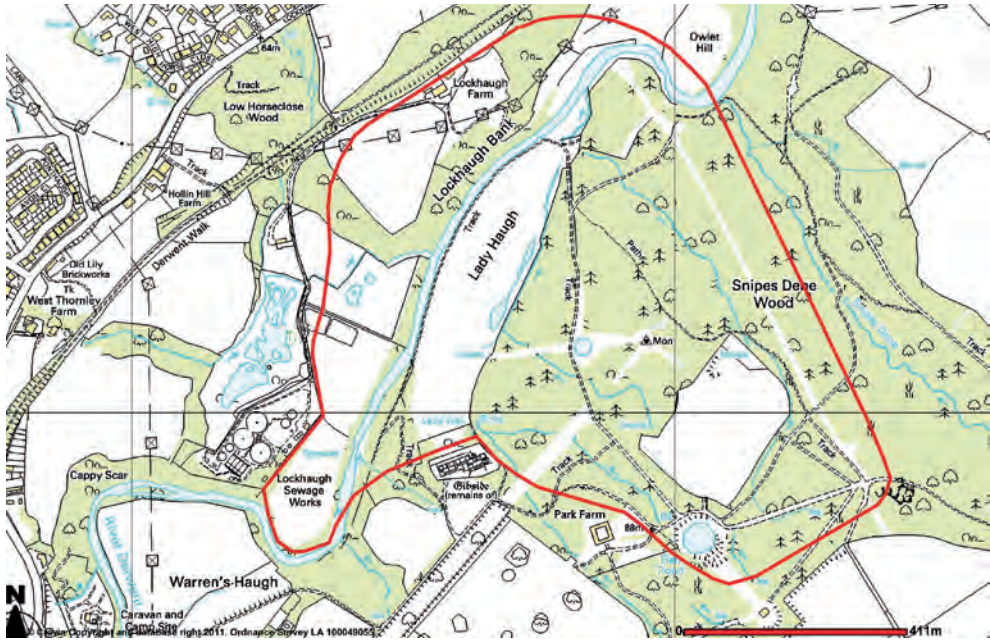


Figure 1. Approximate core distribution area of grass snakes at Gibside.

contained a fully formed dead snake. Grass snakes normally mate in April or May, laying eggs in June or July which hatch in late August or September (Beebee & Griffiths, 2000). June is therefore very early for eggs of that year to contain fully formed young. It is tempting to speculate that these were the failed eggs from the mating of the previous autumn. In captivity autumn matings in grass snakes have resulted in the production of eggs early in the following year (Bolam, 1922; Stein, 1924 in Smith [1954]). Nevertheless, it seems unlikely that this could occur under cooler conditions in the wild, so these eggs may simply have been the result of a

spring-time mating, deposited but failing to hatch in the previous year.

On the 30 August 1985 six snakes were seen on the manure heap, five of which were striped, with individuals ranging in length from approximately 23 to 90 cm. Beebee & Griffiths (2000) state that one-year-old grass snakes reach a length of between 25 and 30 cm, in which case the smallest snakes observed indicate that successful breeding took place in 1984.

On 12 October 1985 a single snake was found at a depth of about 13 cm in the manure heap, whether this was a late egg laying effort or an attempt at



Figure 2. Autumn mating, Gibside 1989. A typical and a faintly striped snake are locked in coition with heads together in the centre of the picture and a striped male snake is on the right.

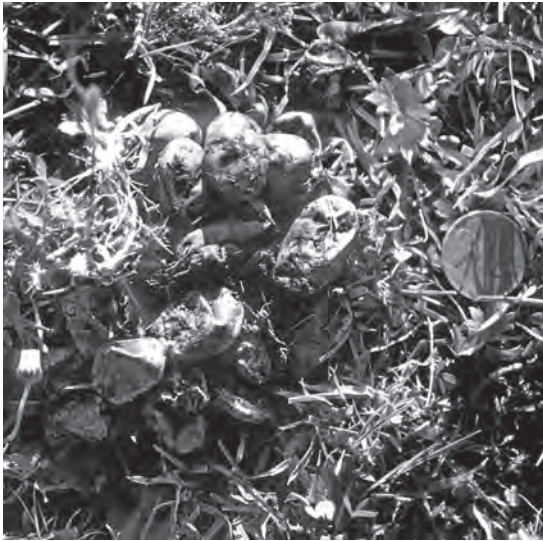


Figure 3. Grass snake eggs, Gibside 6 June 1990.



Figure 4. Gibside grass snake showing pale stripes.

hibernation is not known. In August 1988 three snakes were seen at the manure heap, one large individual had noticeable skin folds, indicating that egg laying had taken place.

DESCRIPTION

Typical grass snake coloration is an olive-green to brown background colour with a row of vertical black bars along either side of the body, although this may vary to some extent between individuals. Grass snakes have a distinct yellow and black collar just behind the head, varying in size and shape, which is the source of its older name, the ringed snake. This collar may, in older females disappear altogether.

Some of the Gibside grass snakes showed a different colour pattern, having a pair of pale dorsolateral stripes (Fig. 4), noted above, and in some cases either no discernible collar or an indistinct collar. The largest snake seen, captured and measured was 98 cm in length, very dark in colour with no discernible collar and very faint dorsolateral stripes.

Similarly marked grass snakes have been found elsewhere in England. Sunderland (2003) reported a population centred on the Esholt Estate, near Shipley, Bradford in West Yorkshire. Subsequent genetic study determined that these snakes most likely originated from eastern Romania (Nash,

2011). Beebee & Griffiths (2000) record a population in Surrey, which they conclude was probably the descendants of snakes from southern Europe which had escaped from a biological supplies station. Vaughan (2007) records his study of a grass snake population at an unnamed site in southern England, which included a proportion of individuals with stripes. He also records his release of a striped female grass snake purchased in a London market in 1973 into his study area some twenty years before the study began and concludes that interbreeding with native snakes took place.

In 1986 the author corresponded with Dr. Roger Thorpe, then of the Department of Zoology, University of Aberdeen. In his letter of reply he relates that it was then unknown for striped grass snakes to be found west of the Po Valley in northern Italy and that it was possible that escaped pets of an eastern origin had interbred with the native population at Gibside and that from photographs supplied the stripes appeared to be consistent with the eastern form.

It seems likely, therefore, that there is a genetic mix of eastern and western grass snakes in the Gibside population. Nash (2011) predicts that interbreeding at Esholt would result in the loss of the non-native genotype through overwhelming dilution and that population fitness may change as a result. If there is a genetic interchange between

grass snake populations along the Derwent Valley then it is possible that the eastern genotype will be similarly diluted at Gibside. Alternatively, if the Gibside population is isolated, as seems likely, then a hybrid population may result. Further surveys should be carried out to test Durkin's hypothesis that the population extends along the valley to Blackhall Mill and to Shibdon Pond. If biological material is available it would be informative to have DNA analysis carried out to determine the genetic provenance of the Gibside grass snakes.

CURRENT STATUS OF GIBSIDE GRASS SNAKES

Since monitoring stopped at the site in 1998 records from Gibside have been sparse. Grass snakes were recorded in 2002, with a possible maximum of eight seen but no evidence of breeding or young snakes (Durkin, 2006). A comprehensive survey of the estate was carried out between 2008 and 2009 on behalf of the National Trust. Only two snakes were found, in June 2009, both with typical markings (John Grundy, pers. comm.).

The Gibside SSSI was classified as "unfavourable recovering" in its 2011 condition assessment, partly due to the status of the reptile species for which it is partially designated; adder and slow-worm were not found and grass snake numbers were decreasing (Natural England, 2011). Surveys for the other reptile species should therefore be implemented.

Durkin (2006) speculated that the population is under threat due to the large rise in the number of visitors to the Gibside estate since it was wholly opened to the public and the increase in areas of the estate important to the snakes which are now busy with visitors. He concluded that the population will become extinct in the near future unless remedial action is taken. The recent scarcity of snakes (John Grundy pers. comm.) seems to support this conclusion. A management plan for the Gibside Estate has been produced (Searle, 2007), which seeks to harmonise visitor requirements, estate

management and the habitat requirements of the grass snakes. It remains to be seen whether the delicate balance required between people and snakes can be achieved and this most important northern population of grass snakes be retained.

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