

## CHAPTER 4

### BADGER (*Meles meles* L.)

#### Introduction

The Eurasian Badger (*Meles meles* L.) is a member of the family Mustelidae, a group of 55 species and 24 genera split into five sub-families, including the Melinae, which contains eight species in four genera, namely the Indonesian stink badger (*Mydaus javanensis*), the Palawan stink badger (*M. marchei*), the hog badger (*Arctonyx collaris*), four species of the so-called ferret badgers (*Melogale personata*, *M. orientalis*, *M. moschata* and *M. everetti*) and the Eurasian badger (*Meles meles*). All members of the Melinae have an Asiatic distribution, though uniquely in the case of the Eurasian badger, its range includes much of China, Tibet and Iran and south to Palestine, extends west through northern Europe to Britain and north to Scandinavia and European Russia up to the Arctic circle (Macdonald 2001). The Eurasian badger is the only member of the Melinae to have become part of the post-glacial fauna of Britain.

#### Cave and other sub-fossil faunas

Sub-fossil badger remains have been identified in cave sediment and prehistoric archaeological excavations from nine sites representing a range of geological and cultural periods across Yorkshire. However, as with other burrowing species, the practice of dating such evidence in terms of faunal context, or indeed by the carbon dating of associated organic materials, is complicated by the badger's ability to excavate through datable sedimentary horizons.

If one assumes that badgers have died contemporaneously with other fauna within a dated horizon, then it would appear that they became a component of the Yorkshire fauna during arctic conditions of late glacial times. Remains of Badger have been identified amongst late glacial faunas (including brown bear, lynx and reindeer) at Victoria Cave (SD/838650) (Dawkins 1872, Tiddeman 1875, Gascoyne *et al.* 1981, Hedges *et al.* 1992). Badger evidence appears amongst early post-glacial faunas (including brown bear, lynx and aurochs) at Steetley Cave (SK/552790) (Jenkinson 1983) and Teesdale Fissure (Backhouse 1881, Jenkinson 1983). By early post-glacial times, 9,488 years b.p., badger remains were identified at the Mesolithic hunters' encampment at Star Carr on the north shore of Lake Pickering (Fraser & King 1954). At Calf Hole Cave on Malham Moor (SD/964646) badger occurred in deposits which could range from post conquest times back to the Mesolithic (Tiddeman 1894b). At Cave Ha

near Giggleswick (SD/789662) (Hughes *et al.* 1874, Tobin 1955, Pentecost *et al.* 1990) Badger occurred in deposits dated 3,915 years b.p. with fox, deer and various domestic taxa. At Dawkabottom Cave (SD/951689) (Denny 1859, Farrer & Denny 1865, Poulton 1881) and Elbolton Cave (SE/007614) (Jones 1888, 1889, 1890, Davis 1892, Tiddeman 1894a, Gilks 1973), badger occurred with a range of domestic species together with fox, roe and red deer and wild boar, though the presence of wolf suggests a date prior to the end of the 13th century. At Lesser Kelcow Cave, Giggleswick (SD/809646) badger occurred with fox and a range of domestic animals, the presence of rabbit suggesting a post conquest date (Simpson 1950).

The phenomenon of badgers creating setts and excavating into archaeological sites was revealed by Mortimer (1905), who located anachronistic badger remains in several Bronze Age barrows on the Yorkshire Wolds and drew attention to a badger skull found with a human skull at Weaverthorpe (Greenwell 1877). Badger remains were also present at an Iron Age lakeside site at Thornton-le-Dale (Bate 1931).

### **Historical occurrence**

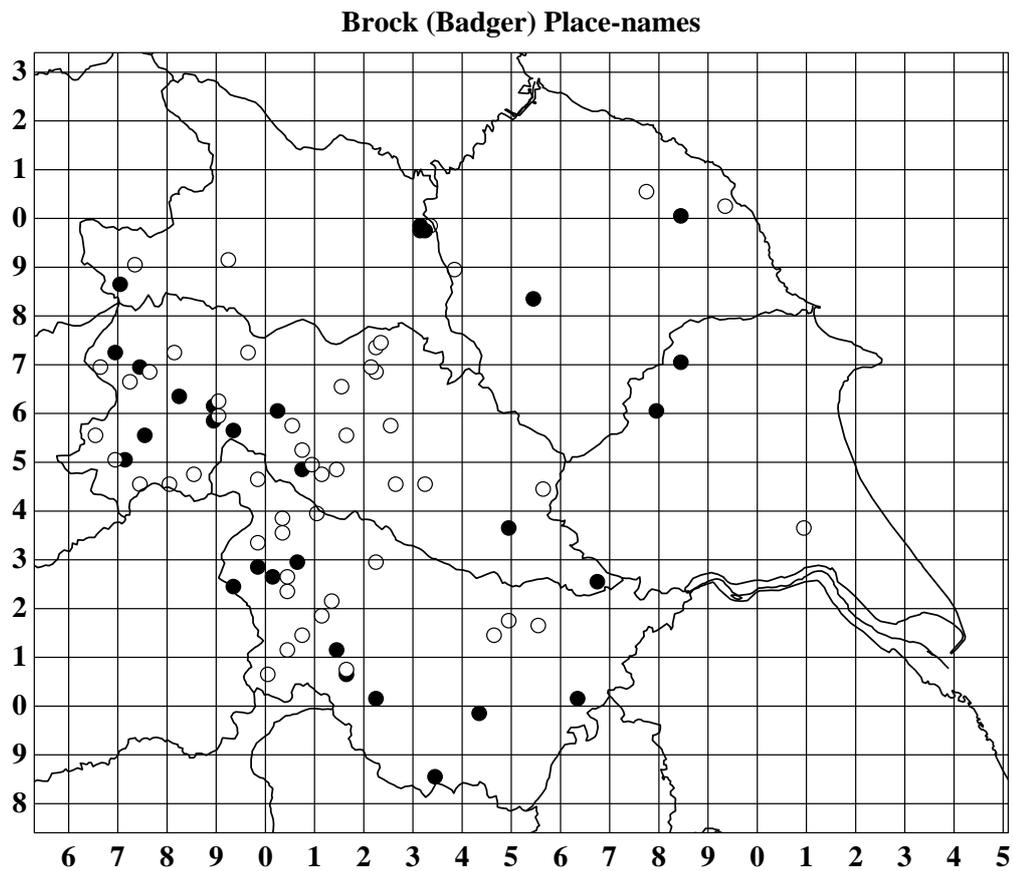
The widespread occurrence and evidently fluctuating abundance and expanding distribution of the badger throughout Yorkshire has been investigated by the use of: a) place-name evidence; b) claims of permission to hunt it as an animal of the ‘chase’ in medieval times; c) through its designation as ‘vermin’, for which bounty payments were recorded in churchwardens’ accounts from the late 16th to the early 19th century; and d) through records from fox hunts of the 18th, 19th and 20th centuries.

#### **a) Place-name evidence**

In England, the modern name badger in the context of *Meles meles* is relatively recent, originally referring to a peddler or salesman, probably of disrepute and with an aggressively persistent bartering technique. The quality of persistence both in defence and in the excavation of its setts seems to be responsible for the transfer of terms. Four other terms encountered are brock, which has Old English origins, bouson (or bowson), pate (or pat) as in pathead, and grey or gray, as in greyhead. Since each term has a considerable antiquity, each has been investigated with a view to locating place-names which are ascribable to badger in the sense of *Meles meles* and which, in the absence of other contemporary evidence, may be used as an indication of the early historic distribution of the badger in Yorkshire.

By examining series of Ordnance Survey maps which cover the Yorkshire area

and the ten volumes of the English Place Name Society dealing with the three Yorkshire Ridings (Smith 1937, 1961-1963, 1969) examples of place names containing the elements badger, brock, bowson, pate, grey and gray have been located. In each case their etymological association with the badger has been confirmed or otherwise by reference to Smith (*loc. cit.*), the results being tabulated in Appendix 4.1, from which a distribution map has been created (Figure 4.1) indicating aggregations of distribution since the Medieval period.



**Figure 4.1. Place-names deemed to refer to badger.**

● = Badger. ○ = Other derivations

Fifteen examples of the use of badger were encountered though most were ascribable to the place of an itinerant dealer or a personal name and none were considered to refer to badger in the sense of *Meles meles*. Place-names containing the element gray was encountered on 12 occasions, grey on 36 occasions, bowson produced three possible candidates and the term pate, a further two; none of these were ascribed to badger. Only the element brock, of which 43 examples were located provided an allusion to badger, 35 examples of which were deemed to refer to *Meles meles*.

Figure 4.1 shows that of the place-names deemed to refer to badger, 18 are distributed along the Pennines or Pennine foothills, mainly at altitudes above the 400ft

contour; two are situated on the north-east Yorkshire uplands and two are situated on the north-western escarpment of the Wolds, all above the 400ft contour. Unlike fox, whose place-name distribution is exclusively upland (Figure 3.1), the badger has two sites on the Magnesian limestone ridge at Womersley and Barkstone Ash and three lowland sites distributed in the northern, central and southern vale of York at Danby Whisk, Drax and Branton respectively and a further lowland site at Swinton in the Dearne Valley.

The earliest dates when these names appeared on manuscripts, maps etc. have been obtained where available from the relevant English Place Name Society volumes and are included in Appendix 4.1. The earliest documentary dates range from 1109 to 1846, and Table 4.1 quantifies the available dates according to the century.

**TABLE 4.1. Numbers of dated place name allusions to badger per century**

Century	Number
11th	0
12th	3
13th	1
14th	5
15th	0
16th	4
17th	4
18th	1
19th	5

#### **b) Vermin bounty payments in churchwardens' accounts**

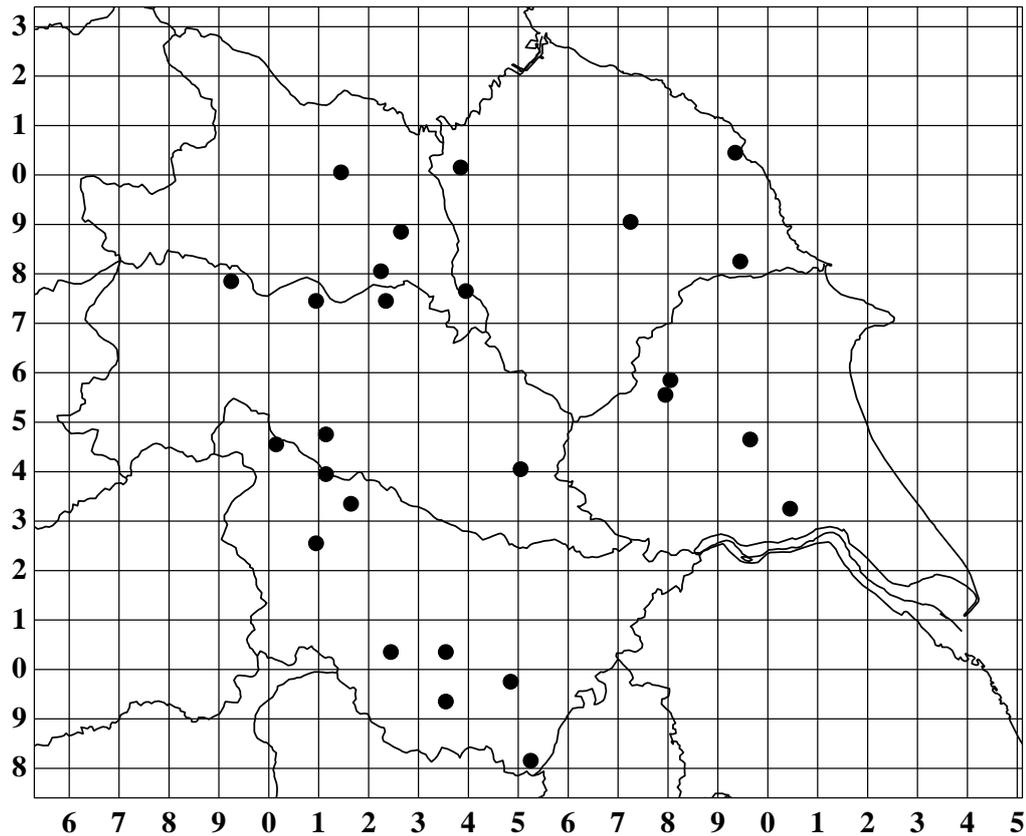
Documentary evidence of badgers, as with all other of Britain's vertebrate fauna, is not readily available prior to the 19th and 20th centuries. However, examination of series of 'vermin' bounty payments contained in the yearly accounts of churchwardens and other parish or township officials relating to the period from the late 16th to the early 19th centuries has produced a number of records. To date, the accounts of 102 Yorkshire parishes have been located which include records of bounty payments for the heads of 'vermin'. Badger, usually at 1 s. per head, featured in the churchwardens' accounts of 38 (37%) parishes. From these positive sets of accounts, payments for 10,582 carnivora taxa have been recorded, of which 704 (6.7%) were for badgers.

Table 4.2 provides a gazetteer of parishes from which carnivore bounty payments have been located, showing the estimated altitude of the parish (i.e. of the

parish church), the date range of the records, number of badger bounties, total carnivora bounties and badger as a % of the bounties per parish.

<b>TABLE 4.2. Gazetteer of parishes from which badger bounty payments have been located (*figures not quantified)</b>						
<b>PARISH</b>	<b>National Grid Ref.</b>	<b>Altitude (ft)</b>	<b>First and last records</b>	<b>Badger</b>	<b>Total Carnivora bounties</b>	<b>Badger as % of bounties</b>
<b>Addingham</b>	SD0749	80	1674 -	*		
<b>Bedale</b>	SE2688	150	1691	11	119	9.24
<b>Bingley</b>	SE1139	492		*		
<b>Bishop Wilton</b>	SE7955	228		*		
<b>Bradford (Shipley)</b>	SE1633	278	1676	1	34	2.94
<b>Brompton-by-Sawdon</b>	SE9482	120	1797 1664 -	1	156	0.64
<b>Cottingham</b>	TA0432	15	1692	18	1314	1.36
<b>Deighton</b>	NZ3801	256	1712 -	*		
<b>Ecclesfield</b>	SK3593	300	1714	8	72	11.11
<b>Fylingdales</b>	NZ9304	250		*		
<b>Halifax</b>	SE0925	545		*		
<b>Holme on the Wolds</b>	SE9646	131		*		
<b>Hooton Roberts</b>	SK4897	120	1756	6	21	28.57
<b>Hubberholme</b>	SD9278	814		*		
<b>Hudswell</b>	NZ1400	658	1698	1	7	14.28
<b>Ilkley</b>	SE1147	393	1669 -	*		
<b>Kildwick</b>	SE0145	180	1767	49	832	5.88
<b>Kirby Malzeard</b>	SE2374	453	1587	2	5	40
<b>Kirby Underdale</b>	SE8058	400		*		
<b>Kirby Wharfe</b>	SE5040	26		*		
<b>Lastingham</b>	SE7290	424		*		
<b>Masham</b>	SE2280	260	1594 - 1676	193	1866	10.34
<b>Middlesmoor</b>	SE0974	819		*		
<b>Peniston</b>	SE2403	537	1696 1699 -	1	53	1.88
<b>Thorp Salvin</b>	SK5281	169	1773	43	267	16.1
<b>Topcliffe</b>	SE3976	91		*		
<b>Worsbrough</b>	SE3503	178	1710 - 1751	3	329	0.91

Figure 4.2, compiled from this gazetteer, reveals evidence of the geographical distribution of badgers across Yorkshire during the 16th to 18th centuries, showing a distribution across Yorkshire extending from Pennine uplands in the west to the north sea coast in the east and from the north-western Dales to the southern Wolds of East Yorkshire.



**Figure 4.2. Distribution of parishes where badger bounty payments were made.**

### **Pre-19th century distribution and regional density**

In an attempt to investigate former variation in the relative abundance of badgers across Yorkshire's varied topography, parish data from Table 4.2 have been aggregated according to broad regions based on six topographical regions of the Natural/Character areas as described by English Nature (undated) and Selman *et al.* (1999). These are described here as North-east Yorkshire uplands, Yorkshire Dales, Pennine South and West Yorkshire, the Southern Magnesian limestone ridge, Vale of York and the Humberhead Levels, and East Yorkshire (including the Wolds and Holderness). Table 4.3 provides the mean figures for the earliest record of badger, number of parishes sampled, and badger as a % of total carnivore bounties within the sampled parishes and the badger as a % of the total carnivore bounties within these topographical regions. In plotting the mean % frequencies of badger bounties in the clusters of parishes, Table 4.3, shows possible regional variations in the relative abundance of badgers.

In terms of % of all carnivore bounties, badgers were more frequently persecuted and therefore possibly more numerous in the eastern fringes of the Yorkshire Dales (Bedale, Hudswell, Kirkby Malzeard and Masham) and along the Permian ridge

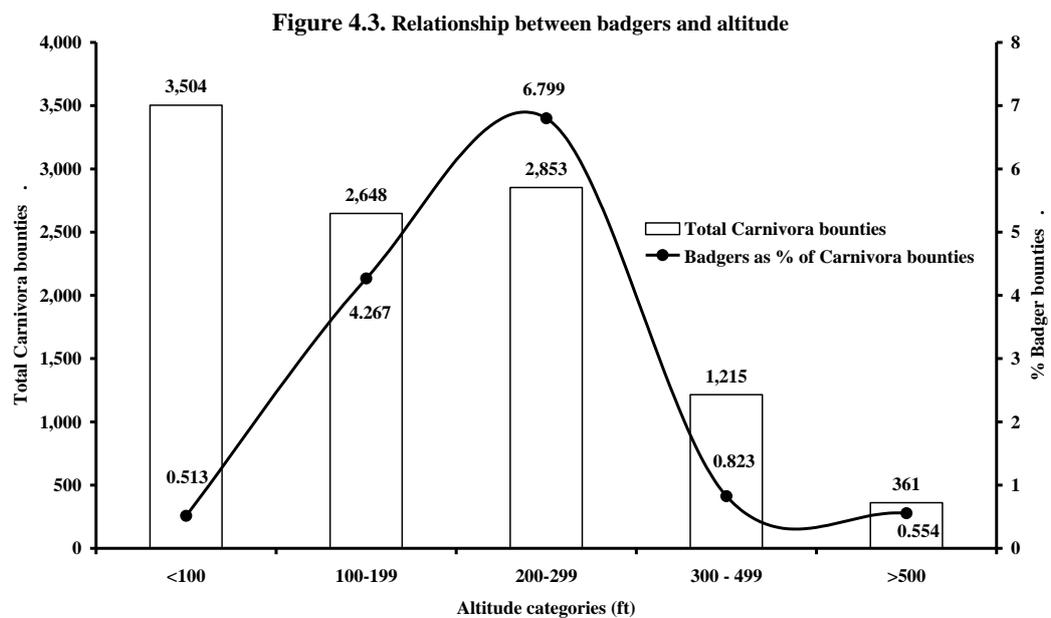
<b>Table 4.3. Comparison of badger bounty payments in six Yorkshire regions</b>			
<b>Region</b>	<b>Mean earliest record</b>	<b>No. of parishes sampled</b>	<b>% Badger</b>
<b>Yorkshire Dales</b>	1653	4	10.36
<b>Southern Magnesian Limestone Ridge</b>	1646	5	7.43
<b>Pennine South &amp; West Yorkshire</b>	1697	15	2.4%
<b>East Yorkshire</b>	1664	8	0.97
<b>North-east Yorkshire</b>	1797	7	0.07
<b>Lowland Southern Vale of York</b>	-	8	0.0

of the southern Magnesian limestone (from the eastern Dales fringes in the north to Thorpe Salvin in the south) where they accounted for 10.3% and 7.4% of bounties respectively. In the 15 sample parishes of Pennine West and South Yorkshire from Skipton in the north to Harthill in the south, badgers constituted 2.4% of carnivora bounties. In the eight East Yorkshire parishes sampled, badgers were absent from the lowland Holderness Clays and Humber marsh parishes, and present in only one of the Wold escarpment parishes (Cottingham), with badgers forming just 0.9% of carnivora bounties. Curiously, in the seven sampled parishes of the Cleveland and Howardian Hills and north-east Yorkshire uplands, with an abundance of exposed Jurassic limestone and sandstone strata, providing a high potential for badger sett creation, only one set of bounty payments was located (Brompton-by-Sawdon) which included badger. Here they formed 0.07% of carnivore bounties. This paucity could suggest that badgers were indeed scarce in these regions during the 17th to 18th centuries, and were not regarded as a pest species. Relative to the other regions, the earliest date for a badger bounty in north-east Yorkshire was as late as 1797. This may suggest that badgers were formerly scarce or absent from or north-east Yorkshire prior to the 18<sup>th</sup> century. Interestingly the scarcity of place-name evidence (Figure 4.1) may imply confirmation of this. Like the parishes of the Holderness and Humber clays of east Yorkshire, none of the eight parishes sampled from the lowland Vale of York and the Humberhead Levels provided any evidence of badgers.

### **Relationship with altitude**

Though relatively sparse, parishes recording badger bounty payments are widespread across the Yorkshire region (Figure 4.2) with altitudes ranging from 15 ft at Cottingham at the southern foot of the Yorkshire Wolds to 814 and 819 ft respectively in the Dales

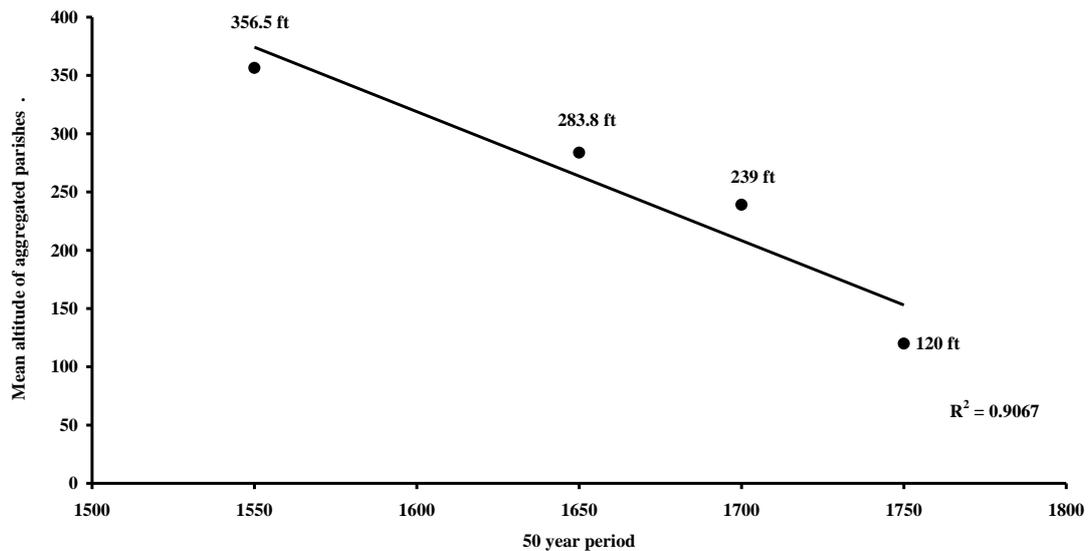
parishes of Hubberhome and Middlesmoor; however, Figure 4.3 suggests topography may be significant in determining badger density. By calculating badger bounty payments as a % of all carnivore bounty payments for parishes in different altitude classes, Figure 4.3 shows that the % frequency of badger bounties rises to a peak of 6.8% in parishes (or whose parish churches) are situated at 200 to 299 ft. The figure falls sharply to below 1% in parishes above this altitude. Since the altitude figures are based for convenience on that of the parish church (as the parish church is often likely to nestle within village situated in the more sheltered part of the parish), these findings may represent an underestimation of the true elevation of the badger habitat within the parish. This likely under estimation may be confirmed by what appears to be an upland orientation suggested by badger place-name distribution (Figure 4.1). Here, the majority of ‘brock’ place-names which the etymologists regard as referring to *M. meles* are largely above 400 ft.



### Status changes from the 16th to 18th centuries

By arranging the church wardens’ accounts data chronologically according to the first dates when badger bounties appeared in parish accounts and calculating the average first recorded date and the mean altitudes of the parishes concerned per 50-year period during 1550 to 1799, Figure 4.4 shows a strong relationship between the first dates and the mean altitudes of the parishes. Like the findings for fox (Figure 3.3), this analysis suggests that badgers may have been either moving into or becoming progressively more predominant in lowland regions during the three centuries monitored by church wardens’ accounts.

**Figure 4.4. Relationship between mean earliest dates of badgers in parish records and mean altitude (ft) of parish from 1550 to 1799**



### c) Anecdotal evidence of status changes from the end of the 18th century

In an attempt to reveal status and distributional changes for the period for which published sources exist, an archive of 1,420 records has been amassed for this study from a range of local sporting, topographical and natural history sources (Appendices 4.2, 4.3 and 4.4 a to d).

Anecdotes referring to declining status or extinctions (Appendix 4.4a), introductions and sett preservation (Appendix 4.4b) and status improvement (Appendix 4.4c and d) were counted per 5-year period and form the basis of Figure 4.5; this indicates that badgers were perceived to exist in ‘good numbers’ in 1790 and 1815, but from the 1880s to the 1920s the literature is dominated by allusions to decline and local extinction. It also provides evidence that landowners appear to have been concerned about this unnecessary situation and made a concerted effort to reintroduce badgers and to preserve occupied setts on their land. Possibly as a result of this change of attitude, partly encouraged by the belief that badgers were of benefit to fox hunting country, in creating excavations which could be used as mange-free earths (Talbot 1906, Blakeborough & Pease 1914), the anecdotal evidence indicates a progressive increase in the status of badgers throughout the Yorkshire region. From the 1960s to the mid-1970s, evidence of significant declines again became apparent in connection with a major upsurge in badger persecution through the sport of badger digging. The development of a series of badger protection laws and the formation of local badger conservation groups during the 1980s, whose primary activity was to enable the Police and animal welfare

organisations to enforce the badger protection legislation (Appendix 4.2), began to have positive effects and this is reflected in the final entry in Figure 4.5.

### **Late 18th and early 19th century abundance**

Specific references to badger occurrence during the 18th century are rare, though authors referring to scarcity and absence of badgers during the late-19th century frequently alluded to a period of former abundance. More specifically Pease (1887), referring to historical records of the Cleveland Hunt, noted that in 1790 badgers were plentiful in the woods especially at Kilton (NZ/7017). From another fox hunting source, Simpson (1927) noted that during cub hunting at Bramham (SE/4242) on 28 December 1819, the bag of the day consisted of two foxes and a badger, both of which were very plentiful in the woods.

### **Review of 19th century badger persecution**

The apparent abundance of allusions to badger persecution during the 19th century, and the relative paucity in recent times need not reflect actual levels of persecution or indeed of badger populations, but is perhaps an indication of changing public attitude. In the 19th centuries, the defeat of a badger was viewed as a heroic and skilful act by both man and dog, to be noised abroad. The following accounts relate to the varied forms of badger persecution described for the Yorkshire region.

#### ***Badger Digging***

Hatfield (1866) reveals that in the Doncaster region during the mid-19th century, the badger ‘was held to be so obnoxious a pest that the law of trespass was not maintainable for following the badger into the ground of a stranger, digging it out and accomplishing its death’. The merits of badger digging as a means of proving the qualities of a good terrier are exemplified by Sir Arthur Pease (1896) who writes of the ‘long-sustained conflict and labour’ of badger digging ‘for which you require perseverance, wit, patience and the courage and endurance that a good terrier will display when needs requires before such a foe, will fill his owner’s heart with joy and pride. A good terrier is a veritable treasure; the price of a sure, game and determined one is far above rubies’. Confirming the enthusiasm and commitment with which badgers were persecuted in the rural communities of North Yorkshire and the north-east, Blakeborough and Pease (1914) reported that ‘In most localities the signs of brock’s presence are an unfailing call to the terrier ‘fancier’ and the little band, the possession of every village, who are

always game for a ‘dig’ to endeavour to capture him’. They also provide an eye witness account of a successful dig in the Pickering area. The exercise commenced by enlarging the sett entrance. A succession of terriers was placed down the burrow system to search for and put to bay the occupant or occupants, thus achieving the aim of testing the bravery and tenacity of the dogs. The direction of the sounds of conflict enabled the diggers to locate the badger and excavate down to this point. On reaching the section of tunnel, the badger would be removed to the safety of a sack, often using badger tongues. These were metal pincer-like instruments known in the vernacular as ‘clams’. Badger tongs are rare in museums. The only set traced in Yorkshire folk-life collections came from Thornton-le-Dale in the winter of 1985/86 and is now housed in the Ryedale Folk Museum, Hutton-le-Hole, North Yorkshire.

### ***Sacking the Badger***

The traditional method by which badgers were caught alive (presumably for baiting purposes) in the Doncaster area at the turn of the 18th century is outlined by Miller (1804): ‘The usual mode of taking this animal is, ... when they are abroad in the night, a sack is fastened at the mouth of their den, and one person remains near the hole to watch, while the other beats round the field with a gong, in order to drive him home; as soon as the man at the hole hears that the badger has run in for refuge he immediately seizes the mouth of the sack, ties it up and carries it off. This mode, in many parts of the county, is called ‘sacking the badger’. Variations on this theme are provided by Hamilton (1860) who mentions the use of a willow hoop to hold open the mouth of the sack, and Hatfield (1866) who describes ‘the sack is prepared with a strong cord passing round its mouth, the same as the strings of an ordinary purse’. When the returning badger enters the sack-lined sett entrance, the mouth of the purse is closed by tightening the cords and the badger is caught. He also quotes a tree as being chosen for the watcher to climb into while he awaits the return of the badger.

### ***Badger Baiting***

This is a practice where terriers are encouraged to worry and ultimately kill a captive badger. In the Doncaster area during the late-18th century, Edlington Wood appears to have been something of a Mecca for badger hunting both for sport and for the supply of animals for the popular diversion of badger baiting (Hatfield 1866, Howes 1974). Blakeborough and Pease (1914) note that Kirkby Moorside was a ‘locality in which badgers abound and in which badger baiting is popular’. Markets, fairs and public

houses were places for the exhibition of badgers as objects of curiosity and for baiting purposes. Nicholson (1890) describes how badgers obtained from the woods at Burton Constable were exhibited for baiting at the old Magdalen Fair, Hedon (abolished in 1860). This event commenced on 2nd August on Magdalen Hill, Hedon and continued for several days on Market Hill. A dozen or more badgers for baiting were present at any one time and housed in barrels on the fairground. Dog owners would pay 6d. to pit their dogs against a badger 'but the attempt to draw the badger not unfrequently ended with the death of the dog' (Nicholson 1890).

### ***Badger Hunting***

The Yorkshire hunting literature shows that during the 1860s badgers were hunted with fox hounds in wooded parts of upland North Yorkshire around Kirkbymoorside and Duncombe Park by members of the Sinnington and the York and Ainsty hunts. They were similarly hunted in the Hambleton Hills above Boltby, Bilsdale and Farndale (Pease 1887, Dixon 1898, 1899, Blakeborough 1912, 1925, Reynard 1908, 1920, Simpson 1927). Andrews (1879) indicates that badger hunting was usual within seven miles of Pickering and Battern (1923) describes a badger hunt by scent in North Yorkshire between 1912 and 1923. The sport was also pursued in South Yorkshire. In the Worsborough area near Barnsley, badger hunting was evidently a common nocturnal sport in which large numbers of people from the surrounding neighbourhood often took part (Wilkinson 1872) as indeed it was in the parishes of Wadworth and Edlington near Doncaster (Hatfield 1866). In these adjacent wooded parishes on the Magnesian limestone ridge Hatfield (1866) described that the 'The hounds were brought to the village of Wadworth in the evening and remained there till midnight and then proceeded either to Wadworth Wood or Edlington Wood. They were then thrown into the 'thick' (undergrowth) by the huntsmen; the whips and the huntsman were placed at points where ridings met ... the huntsman told by the notes (excited calls) of the hounds whether they were on the 'slots' (footprints and tracks) of the badger and followed the trail with precision ... until the badger was run into and the 'who-whoop' sounded'.

### ***Badgers caught by hunt and hunt servants***

Badgers were occasionally encountered during the course of fox hunting, particularly whilst digging out foxes gone to ground. These were sometimes killed or used for baiting. Opinions vary amongst the fox-hunting fraternity as to the merits and de-merits of badgers. Some regarded them as potentially dangerous to fox cubs and a nuisance for

opening stopped earth. In South Yorkshire, the Wentworth Hunt caught three badgers in 1884 (Brewis 1886). In East Yorkshire, Blakeborough and Pease (1914) reported that during the 1904/05 hunting season the Middleton Hunt killed 13 badgers and noted that ‘Grant [the master of hounds] was no friend of ‘brock’ when he was huntsman to Lord Middleton’s Yorkshire territory and I should imagine few huntsmen have killed more than he.’ Fortune (1916) reported an un-named Yorkshire pack killing 100 badgers in one season.

### **Mid-19th century collapse**

According to Blakeborough and Pease (1914) ‘it is not an exaggeration to say that 18 out of 20 properties [country estates] whereon the badgers have for years made their home they are systematically harassed, dug out, baited, shot and so on to the death.’ A collapse in populations reportedly took place through much of the 19th century. Referring to Yorkshire as a whole, Clarke and Roebuck (1881) noted that ‘formerly it inhabited numerous localities in which it has now been for many years unknown’. By 1881 the badger was regarded as being ‘extremely limited in numbers, its present haunts seem to be restricted to calcareous formations which afford it suitable habitat’. Clearly erroneously, though indicative of the prevailing pessimistic view as to the status of badgers generally, Marquis and Marquis (1883) claimed that the last pate [badger] in Yorkshire had been killed some 20 years ago [1863].

The following review presents negative records of the late-19th and early 20th centuries in a regional context. In 1892 on the northern boundary at Rokeby (NZ/01) it was regarded as ‘now extinct’ (Anon. 1892). In the north-eastern uplands around Whitby (NZ/80) (Anon. 1885) and Sandsend (NZ/8512) (Anon. 1900) it was ‘once common’ but now ‘very rare’. In the Dales it was ‘rare’ around Askrigg (SD/99) in 1905 (Anon.1905), ‘scarce’ in Burnsall (SE/0361) in 1913 (Anon.1913) and ‘rare’ in Bainbridge (SD99) in 1914 (Anon.1914). In 1886 in Upper Nidderdale there was ‘only few in number’ (Clarke *et al.* 1886). In 1889 it was believed to be ‘extinct’ at Rudding and Plumpton Parks (SE/35) (Anon. 1889), and lower down the Nidd valley at Cawthorpe (SE/4352), they were thought to have been ‘absent for many years’ (Anon.1903). In 1881 on the chalk Wolds, badgers appear ‘only to occur at Sledmere (SE/9465) and Hunmanby (TA/1178) (Clarke & Roebuck 1881) and in 1893 at Cottam (SE/9764) they were thought to have been extinct for years (Marshall 1893). Along the southern Magnesian limestone ridge, Clarke and Roebuck (1881) regarded badgers as having become extinct at Brockdale (SE/4917), Conisbrough (SK/59), Marr (SE/5105)

and Watchley Craggs (SE/4706), and in 1880, 61 years after evidence of abundance at Bramham (Simpson 1927), badgers were reported as being rare in the neighbourhood of Bramham Park (SE/4242) (Raine 1880a).

### **Reintroduction and possible management for hunting purposes.**

The influential writing of John Fairfax Blakeborough and Sir Alfred Pease (1914) persuaded numbers of Yorkshire landowners and estate managers to recognise the potential value of badgers in benefiting fox hunting by creating new fox earths and in cleaning out old fox earths and cleansing them from the vectors of mange. Although they were sympathetically disposed towards badgers which they felt were being unnecessarily persecuted, they were aware that badger populations had been wiped out on many estates. Under the prevailing sporting culture, as a matter of pragmatism, it was advocated by them that, badger hunting could be developed into a ‘legitimate’ and controlled sport which ‘might even make for his [the badger’s] preservation’ if populations were conserved for the sport they afforded.

Clarke and Roebuck (1881) reported that habitats had been restocked by specimens being turned down in Brockadale (SE/4917), Conisbrough (SK/59), Marr (SE/5105), Watchley Craggs (SE/4706) and ‘stragglers’ found in various localities throughout the county were probably escaped or introduced specimens. A male badger weighing 35 lb caught in Wortley (SK39) was released on Lord Wharnccliffe’s estate in Wharfedale on 22 April 1884 (Bradley 1884) and in 1885 two badgers from this source were observed in Clough Wood, Fossdale (Lees 1885). A badger observed in Burley-in-Wharfedale was thought to have escaped from captivity (*Yorkshire Weekly Post* 26 October 1895). By 1920 all the known badger colonies in Upper Wharfedale were said to be ‘in a thriving condition ... due mainly to the kindly preservation by friendly landowners’ (Smith 1921).

Several badgers of unknown provenance were ‘turned out’ in the woodland around Hutton Hall, Ingleby Greenhow (NZ/4500), the seat of Sir J. W. Pease (Nelson 1886). Badgers were also protected and not uncommon on the Osmotherly estate (SE/4595) of J. S. Barwick (Sheppard 1908). Thanks to the preservation of badgers by Sir I. J. Bell and his son, signs were not infrequently seen around Arncliffe (SE/4599) (Blakeborough 1912). In coastal north-east Yorkshire in the Robin Hood’s Bay area (NZ/9304) badgers were reportedly ‘much increased in numbers and range of late years ... doubtless from the protection it has received in this [Flying Hall] estate (Barry

1907), and in 1920, on the Kirkham Abbey (SE/7366) estate of Sir A. E. Brotherton, two colonies were carefully preserved by the keeper Mr Brigham (Brotherton 1920).

### **Late-19th century and early 20th century population recovery**

By the late-1890s and particularly during the first two decades of the 20th century reports indicate that populations began to recover and traditional sites allegedly abandoned decades earlier were claimed to have become recolonised. The following review examines evidence of this resurgence on a regional basis.

#### *North-east Yorkshire*

In the Scarborough district (SE/98) badgers 'are not so uncommon in the district ... as is generally supposed and they may be found in almost all of the larger woods but are rarely seen' (Clarke 1898). In 1923 in the same district (TA/07) W.J. Clarke noted that badgers were maintaining their numbers in spite of persecution (Smith 1924) and in 1931, 1936 and 1940 they were still 'maintaining their numbers' (Smith 1932, Clarke 1937, Hazelwood 1941). In Harwood Dale (SE/99) in 1904 badgers were 'still sufficiently plentiful to allow local rustics to bait them with dogs' (Anon. 1904). At Ramsdale (NZ/9203) badgers were 'once abundant, nearly exterminated, now re-establishing with prints seen on 18-21 May' (Anon. 1907). At Fyling Hall (NZ/9304) by 1907 'the badger was much increased in numbers and also in range of late years. This is doubtless from the protection it has received on this estate'. They had become 'so numerous and in one part had so mined the side of the ravine with their burrows that I feared landslips. At the same time they had spread widely in the neighbourhood and began to annoy the farmers' (Barry 1907). At Hayburn Wyke (TA/09), 'badgers were fairly plentiful, judging from numbers of footprints and earths' (Anon. 1927). In the Egton Bridge area (NZ/80) they were reportedly 'fairly plentiful' (Anon. 1930).

#### *Southern escarpment of the Jurassic limestone from Pickering to Helmsley*

In the Pickering area (SE/88) in 1898 badgers 'are not so uncommon in the district surrounding Pickering as is generally supposed and they may be found in almost all of the larger woods but are rarely seen' (Clarke 1898). In the Sinnington area (SE/78) Mr 'Nimrod' Pearson, Hon. Sec. of the Sinnington Hunt, noted that badgers were much on the increase in his part of Yorkshire and they have had to reduce the numbers in the Sinnington territory (Blakeborough & Pease 1914). 'Badgers are reported as very plentiful in the Dales north of Helmsley' (Hazelwood 1942). Badgers continue to be

plentiful in all our wooded valleys of the tributaries of the Rye (SE/68) (Hazelwood 1943, Taylor 1944).

#### *Yorkshire Dales and the Dales fringes*

In Bedale (SE/28) by 1904 badgers 'seem to have increased in numbers in recent years' (Anon. 1904). At Rigston (SE/2756) some years ago 'earths' in the neighbourhood were re-occupied after been unattended for many years (Fortune 1909). In 1918 it was claimed that badgers were 'still on the increase in our dales in spite of much efforts of keepers to reduce their numbers' (Musham 1919). Around Skipton (SD/95), according to local residents and gamekeepers, badgers had greatly increased in the last ten years (Anon. 1920). In Upper Wharfedale (SE/05) all the known badger colonies appear to be in a thriving condition due mainly to the kindly preservation by friendly landowners (Smith 1921) and by 1945 'more badgers than ever before have been recorded in the Linton area, (SE/34) (Hazelwood 1945).

#### *Yorkshire Wolds*

Badgers had been established at Brantingham Dale (SE/9430) for the last four years (Whittaker 1914). Driffield (TA/05) appearance rare, but they are secretive and more numerous than generally thought (Anon. 1939).

#### *Vale of York*

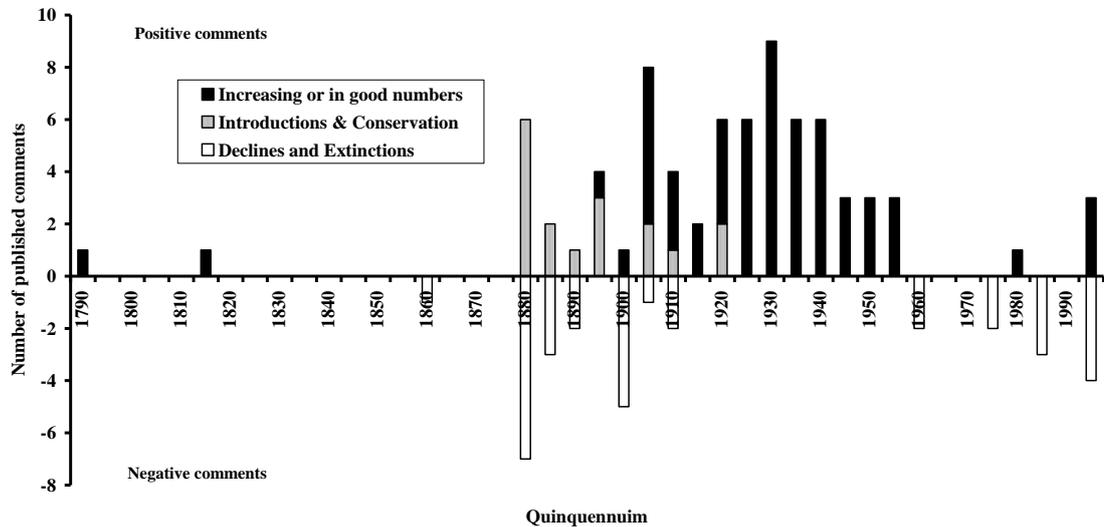
At Cawthorpe (SE/4352) in 1903, badgers 'suddenly appeared after absence for many years' (Anon. 1903). At Allerton Park (SE/4158) in 1909 badgers 'suddenly appeared ... occupying old 'earths' where they had been unknown for a great number of years' (Fortune 1909) and in the York area (SE/55) in 1911 'the badger appears to be extending its sphere of occupation, odd ones having been noted in new localities' (York Naturalists' Society Record Book),

#### *Yorkshire generally*

With regard to Yorkshire as a whole, successive YNU mammal recorders reported in 1901 that it was 'very pleasing to note the gradual increase of the badger in the county' (Anon. 1902), and in 1906 'we may report the gratifying increase in badgers' (Anon. 1908a). The badger entry in the VCH for Yorkshire reported that it was still common in many parts of the county (Grabham 1907). In 1908 the YNU reported 'there is no doubt

that badgers are increasing in numbers' (Anon. 1908b) and in 1916 the badger is 'gradually gaining ground and extending its range' (Fortune 1916).

**Figure 4.5. Perceptions of status changes in badger populations in Yorkshire 1790-1999**

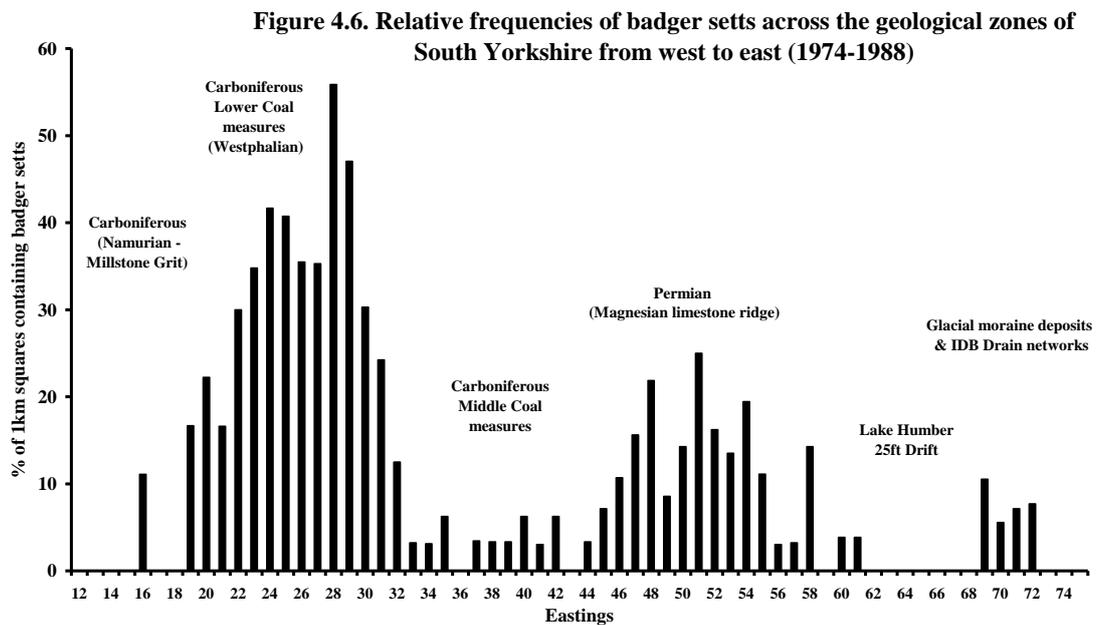


### Geological influence in sett densities

Badgers generally prefer to excavate their setts into a steep or even vertical surface (Paget & Middleton 1969, 1974a) it is understandable that their distribution should reflect the prevailing topography and geology. An examination of the distribution of 208 badger setts known to be active from 1974 to 1988 across the post 1974 Metropolitan county of South Yorkshire, revealed an association with the exposed geology, the history of human exploitation of mineral resources and human management to the agricultural landscape.

By counting the numbers of 1 km squares of the Ordnance Survey National Grid north and south along a line of 64 1 km squares from west to east of the Metropolitan County, those squares known to contain setts were expressed as a % of the total at each easting. By plotting the % scores along a line of the 64 eastings, a pattern of sett preference was revealed in Figure 4.6. By examining solid and drift geological maps of the British Geological Survey for Sheffield, Barnsley, Doncaster and Goole, it was possible to detect a reason for the uneven distribution: the geological divisions run conveniently in four belts from west to east, commencing with the coarse Carboniferous Namurian Millstone grit, the Westphalian Lower coal measures, the Middle coal measures, often overlain by alluvium of the Don and Dearne valleys, the Permian Magnesian limestone and marl ridge, the Sherwood sandstones overlain by the 25 ft

drift of the bed of the post-glacial Lake Humber and by deposits of morainic and glacio-fluvial debris.



The tough Millstone grits of the Pennine Peak District (within easting 12 and 18) are occupied, but relatively sparsely compared with the Westphalian Lower coal measures (within easting 19 to 32) which provide more friable strata including sandstones, coal, shale and clay. These form the ‘exposed’ coalfield, strata being worked at surface. Over the centuries, the landscape has been pitted by hundreds of disused shallow mine workings (including large numbers of now wooded ‘bell pits’), quarries and clay pits. This industrial heritage has provided numerous structures which badgers have taken over and developed as sett systems. These occupied sites are particularly resistant to illegal badger digging and are therefore disproportionately represented (Mike Dyson *pers. comm.*). The alluvial river washland landscapes of the Don and Dearne valleys overlay parts of the Westphalian Middle Coal measures to the west of the Permian Magnesian Limestone ridge. This is commercially exploited by deep mine technology offering fewer opportunities for sett excavation and those that are present are subject to high levels of illegal badger digging. A second increase in sett creation, from easting 45 to easting 58, is provided by the Permian limestone and marl ridge. The underlying basal Permian sand, revealed largely along the western escarpment of the ridge, is particularly favoured by badgers for the excavation of setts, as are the numerous fissures and crevices exposed by quarries and disused railway cuttings. Across the low lying bed of the former lake Humber, from easting 59 to 75, setts are largely absent. This is probably due to a high water table and a notably flat landscape. Islands of occurrence do occur in a series of slightly elevated areas of

morainic and glacio-fluvial erratic debris, between eastings 69 and 72 as at Lindholme Island on the Hatfield Chase. Human constructions in the form of flood embankments and the faces of networks of Internal Drainage Board ditches and drains are increasingly being utilised. Exploitation of these sites appears to be a post 1970s phenomenon, coinciding with the lowering water table, through agricultural irrigation and over exploitation of the underlying Sherwood sandstone aquifer (Mike Dyson *pers. comm.*).

## **Road and Rail Casualties**

### ***Railways***

Fatal encounters between badgers and various road vehicles extend back at least to the first decade of the 20th century; however, despite an extensive network of railway tracks with their cuttings and embankments established throughout the rural landscape over the last two centuries, recorded badger fatalities due to trains in Yorkshire have been few. Although it is likely that badger setts and communities may have been destroyed or isolated by road and rail engineering works, the provision of a range of new escarpments and fissured rock exposures and other earthworks into which badgers could establish new sett systems could in the long-term have proved to be a nett benefit. Fatalities brought about by night travelling locomotives and rolling stock undoubtedly took place, the earliest recorded example being a 32 lb male badger killed by the night mail between Pickering and Whitby some years before 1907 (Grabham 1907). Subsequent examples have been very few, with only seven examples from the Yorkshire region (Appendix 4.5). With railway tracks generally being prohibited to public access, badger fatalities are relatively unlikely to come to public notice and are therefore likely to be under represented in natural history society and biological records centre records. The three fatalities reported in 1967 at Burton Salmon suggest that casualties are possibly more frequent than available records indicate. Interviews with track maintenance staff (I. McDonald *pers. comm.*) also suggest that fatalities are not as uncommon as records suggest. Of the dated fatalities, all relate to August and September, a period when young, inexperienced badgers are likely to be foraging away from the natal sett (Figure 4.10), indeed the Wath-on-Deerne railway marshalling yard fatality (22.9.1964) was reportedly a cub. However, rail fatalities are unlikely to be as frequent as those on roads since unlike the intermittent nature of private transport on public highways, railways generally run to a prescribed timetable, potentially enabling badgers to become accustomed to the periodicity of passing trains and therefore avoid crossing tracks at vulnerable times.

## Roads

Records of badgers being killed on roads in Yorkshire date from 13.2.1939 in Sheffield (Hazelwood 1942). By 1945 naturalists were reporting multiples of casualties in certain areas as at Helmsley (Hazelwood 1946) and Clegg (1963) reviewing the mammals of the Sheffield area commented that ‘often the first indication of the presence of this species comes when one is the victim of a road accident’.

Up to the year 2000, over 1,350 have been gathered from personal fieldwork, local natural history societies affiliated to the Yorkshire Naturalists’ Union, some of the local Yorkshire Badger Groups affiliated to the National Federation of Badger Groups, animal welfare organizations and a smaller number from local museums, and DEFRA (Appendix 4.5). Figure 4.7 simply shows the annual numbers of records received of road casualty badgers from 1939 to 2000. Although this no doubt reflects the increase in vehicle ownership and usage over this period, a substantial increase from 1987 Badger Groups and particularly from 1996 due to very high levels of recording activity by the Ryedale Badger group in association with the RSPCA, police and the Ryedale Animal Sanctuary.

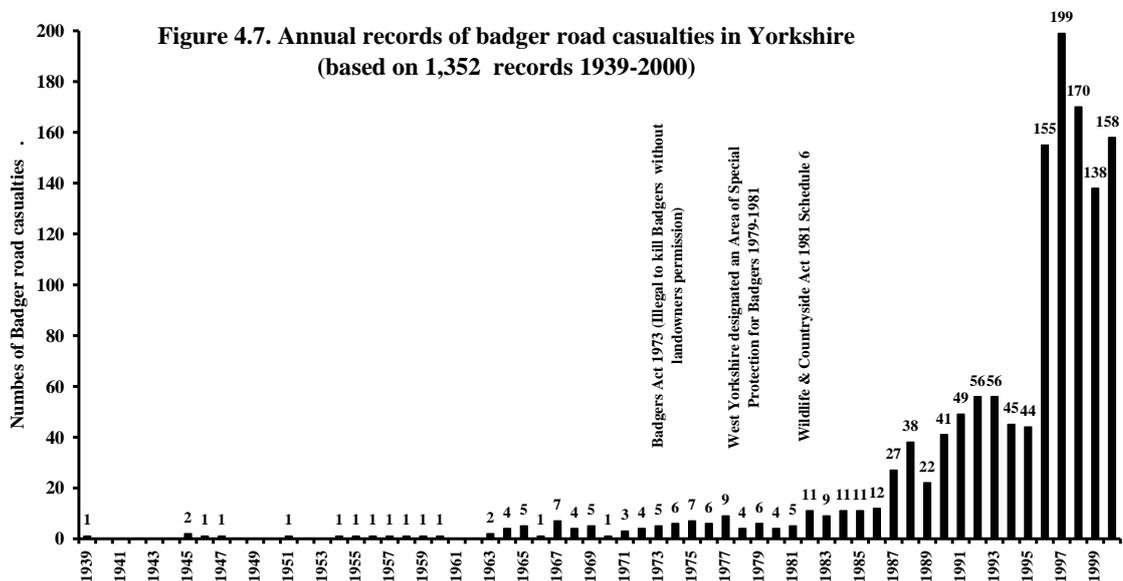
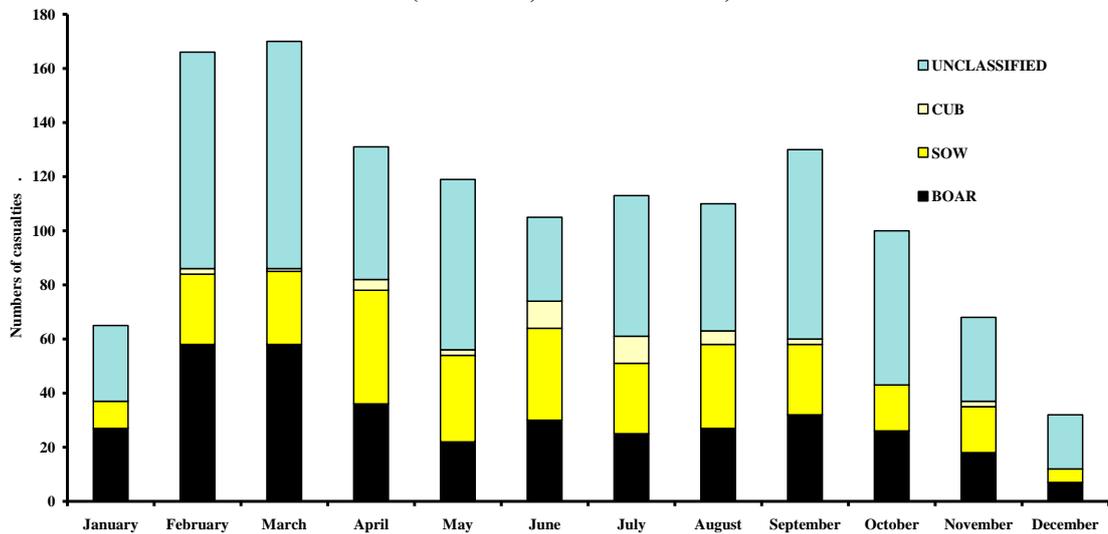


Figure 4.8 shows the monthly pattern of reported occurrences for the 1,309 cases for which the month of casualty has been recorded. This preliminary analysis indicates a bimodal seasonality with a spring peak in February and March and a late summer peak in September. The pattern of seasonality could be due to activity patterns of the badgers,

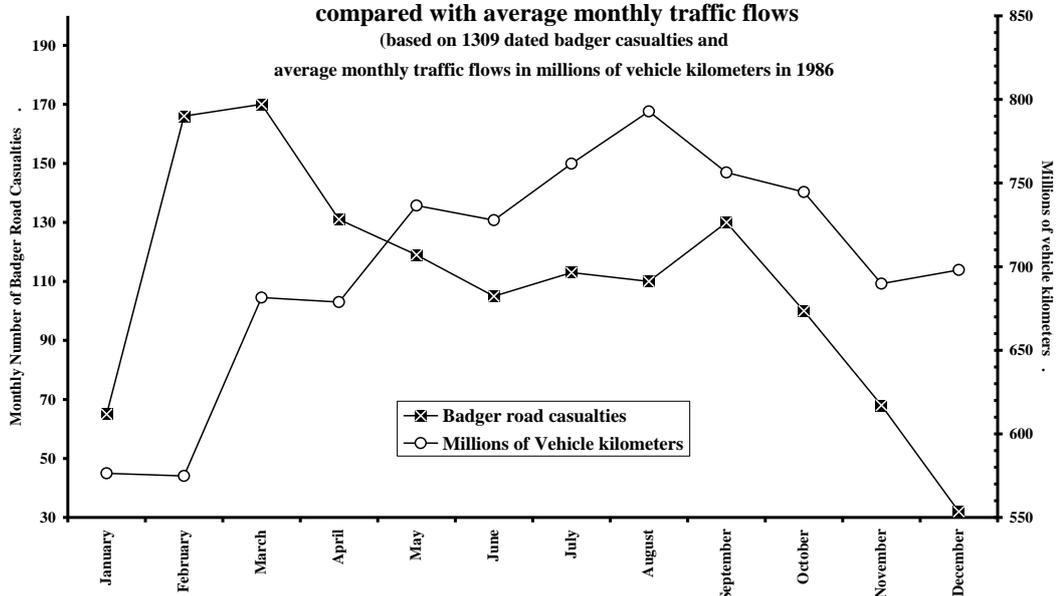
seasonal variations in the volumes of traffic movements or a combination of the two.

Figure 4.9 compares monthly badger casualty numbers based on 1309 dated records

**Figure 4.8. Seasonality of badger road casualties in Yorkshire (based on 1,309 dated records)**

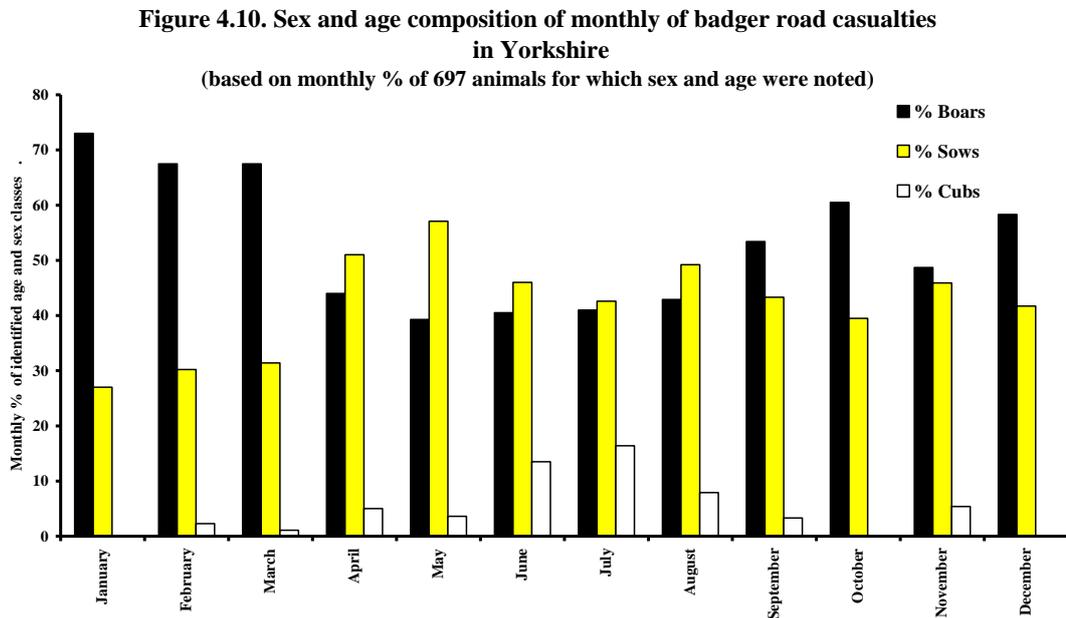


**Figure 4.9. Monthly distribution of badger road casualties in Yorkshire, compared with average monthly traffic flows (based on 1309 dated badger casualties and average monthly traffic flows in millions of vehicle kilometers in 1986)**



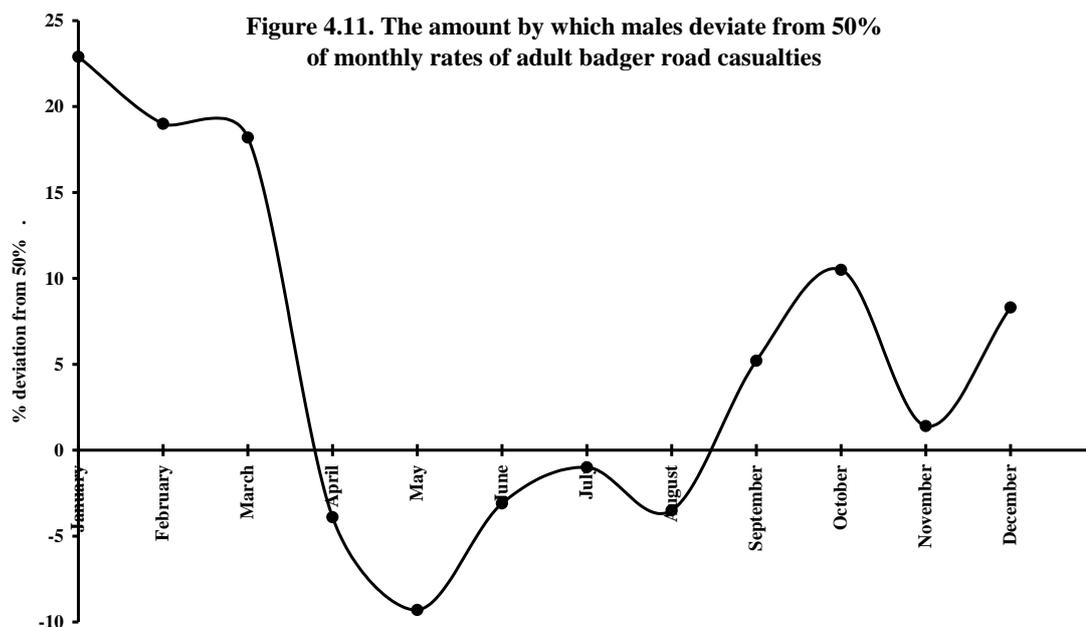
From Figure 4.8, with average monthly flows in millions of vehicle kilometers in 1986 (Department of Transport 1987). The two graphs appear to have little in common, this was confirmed by plotting the coincidence of the two data sets the resultant  $R^2$  correlation of 0.002 indicating that badger casualties were not the result of fluctuating traffic levels. Since seasonal patterns of casualties are likely therefore to relate to patterns of social and

foraging behaviour in the badgers, Figure 4.10 was assembled to reveal any patterns of seasonality in the gender and age categories. It was constructed from the 697 casualties for which the date, sex and age status were available.

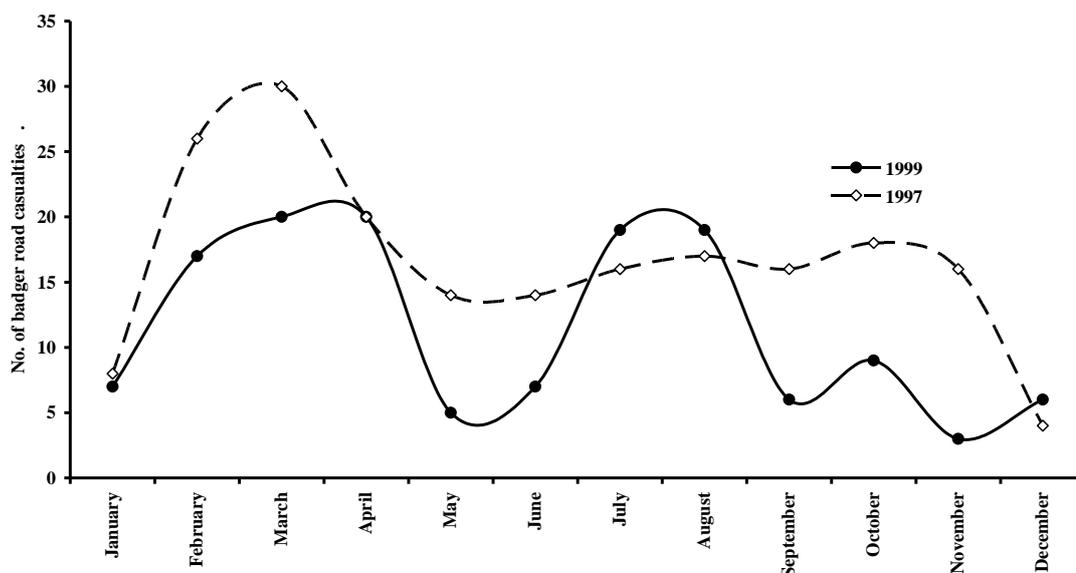


This indicates that the three component groups, males, females and sub-adults (cubs) produce different seasonal patterns. Males (boars) predominate as casualties in early spring (January to March) and marginally in Autumn (September to December), females (sows) become marginally more frequent from late spring and through the summer (April to August) and sub-adults (cubs) occur from February to November, rising to a slight peak in July. Although the data set for adult badgers shows that both sexes occur as casualties in almost equal numbers (366 (55.5%) adult males and 293 (44.5%) adult females), the patterns of seasonality appear to be differ markedly. To further investigate the bi-modality of the adult male seasonality, Figure 4.11. expresses male occurrence proportionally above or below 50% of monthly rates.

The precise amplitude and timing of the bimodal pattern varies annually as demonstrated by Figure 4.12 which shows that in 1997 the slight autumn peak appeared in October and November whereas that of 1999 occurred in July and August. Fluctuations in invertebrate food availability would seem to affect the precise timing of the second peak in mortality, badgers having to forage further and cross more roads in search of food, both Neal (1977) and Davies *et al.* (1987) noting an early autumn mortality peak in July due to drought conditions.



**Figure 4.12. Annual differences in seasonality of badger road casualties (based on 199 casualties in 1997 and 138 casualties in 1999)**



With respect to conservation and animal welfare, individual or multiple casualty records for single 1 x 1 km squares could potentially help to identify specific ‘accident black-spots’ where highway mitigation features such as fencing, reflectors and even underpasses could be installed. Also, for road safety purposes, the sites of recurring badger road traffic accidents need to be drawn to the attention of the police and highway engineers. Figure 4.13, based on data in Appendix 4.5, shows the variation in numbers of road casualties per 10 x 10 km square. The mean figure according to currently collated data is 12.8 per 10 x 10 km square, but this analysis shows that in SE/87 on the A64 at Old Malton and in SK/39 on the A616 Stocksbridge by-pass and its feeder roads north of Sheffield, each have 54 casualties reported. In SK/29, further north on the

A616 Stocksbridge by-pass there have been 70 casualties, in SE/20 which includes the northern part of the Stocksbridge by-pass and the A628 Silkstone by-pass there have been 106 casualties, and in SE/76 where the A64, south of Malton, passes by the Jurassic limestone gorge of the River Derwent near Kirkham, there have been 142 recorded casualties.

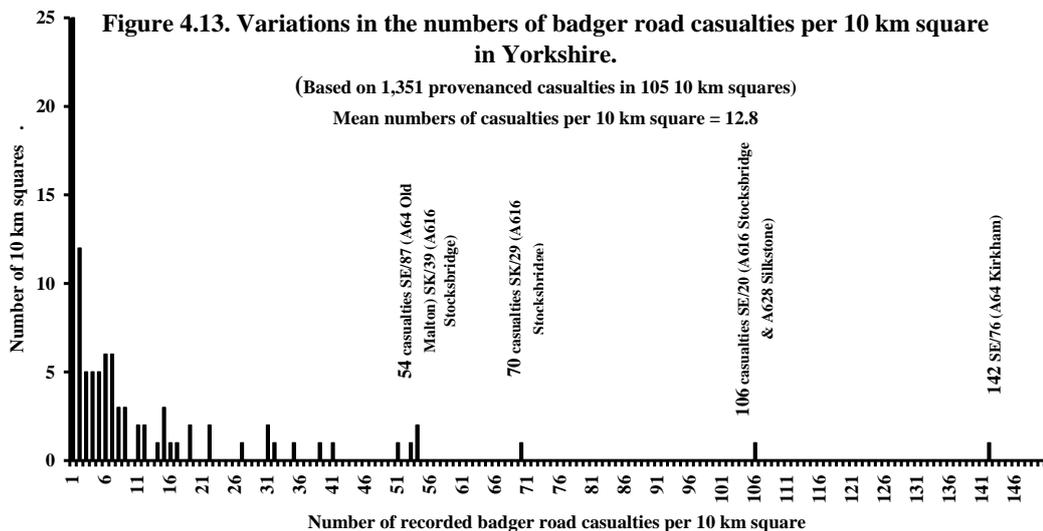
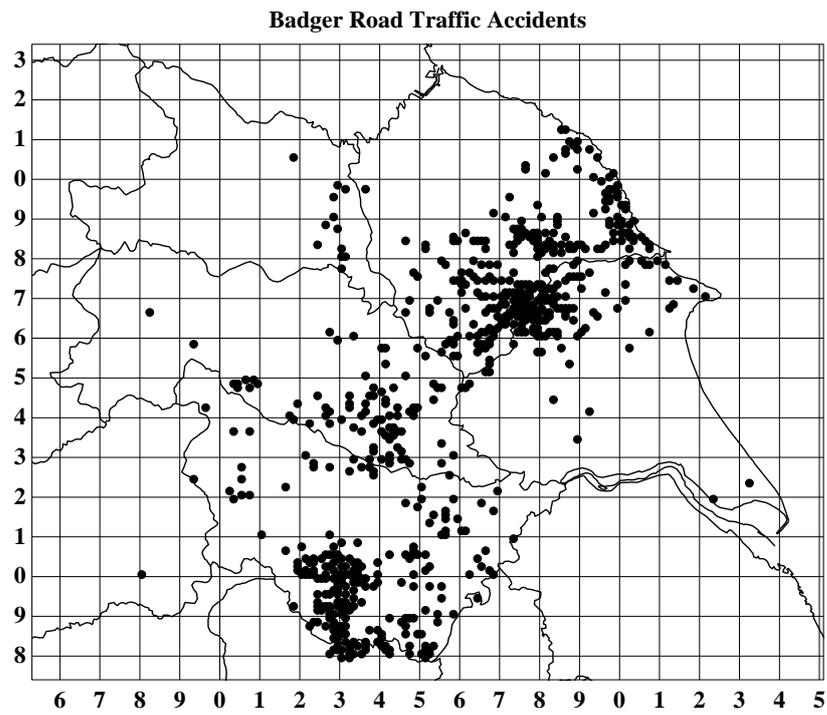
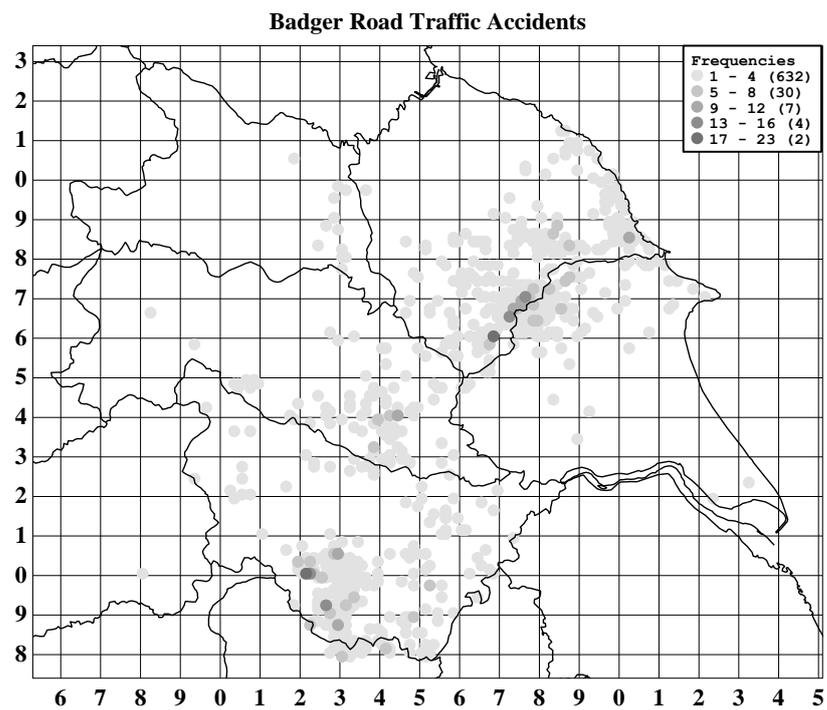


Figure 4.14 shows the county-wide distribution of collated casualty records. Not only does this illustrate a radically more extensive distribution of badger records than do Figures 4.1 and 4.2, indicating a more widespread distribution in the late 20th century, it identifies focuses of badger recording activity, notably in Pennine South Yorkshire by the South Yorkshire Badger Group, the Leeds region by the Leeds Badger Monitor, Ryedale by the Ryedale badger Group and Scarborough and adjacent coastal areas by the Scarborough Field Naturalists' Society (Massey & Howes 2005). Absences from substantial blank areas such as the Cleveland and northern North York Moors region, the north-western Yorkshire Dales and much of the Wolds and Holderness are largely associated with a lack of recorders or recorders keeping records confidential. Figure 4.15 again illustrates distribution at a 1 km square resolution but modifies the symbols to reveal frequencies of records per square, thus enabling a more refined identification of accident 'black-spots'. Here again the symbols highlight the route of the A616 Stocksbridge by-pass to the northwest of Sheffield, the A628 Silkstone by-pass to the west of Barnsley, the A1 and A64 junction on the Magnesian limestone ridge at Hazelwood. A series of symbols signifying from 9 to 23 casualties per square, feature



**Figure 4.14. 1 x 1 km distribution of badger road casualties.**



**Figure 4.15. Showing multiples of road casualties per 1 x 1 km square.**

along the A64 from Sand Hutton to Malton and another high scoring square is at Musham Bank on the outskirts of Scarborough, effectively at the junction of incoming tourist routes from the A64 from Leeds/York and the A170 from Pickering/Thirsk.

## Discussion of road casualty records

Although this would appear to be the largest sample of badger road casualties examined in the literature, these records have been amassed over a period of 61 years and many records lack age, gender, date and road number information. Although other badger road casualty studies in Britain have examined lower total numbers, they have generally been collected during a single or very few years and the associated data have been more complete. Notable comparative studies are Jefferies (1975) who examined 41 corpses mainly from counties south of the Wash, Killingley (1973) and Neal (1977) who analysed 71 and 442 casualties respectively from the south-western counties, Davies *et al.* (1987) who analysed 185 casualties from south-eastern counties and 799 from south-western counties, all gathered in 1984, Clarke *et al.* (1998) who analysed 584 from the south-western England in 1984, and Skinner *et al.* (1991b) who analysed 275 from Essex.

Skinner *et al.* (1991a) found a relationship between the category of road nearest to a sett and the number of setts associated with that type of road. They found significantly fewer setts near trunk roads, A-class and B-class roads, and significantly more setts near unclassified roads. They also found a significant relationship between badger sett numbers and distance from the nearest road. However, it was not possible to determine whether badgers avoided close proximity to busy roads to reduce disturbance or that occupants of nearer setts did not survive due to high levels of road mortality. There is some evidence to support the latter, since Harris *et al.* (1995) calculated that in Britain road traffic was responsible for the equivalent 48.8% of all adult and post-emergence cub fatalities and Clarke *et al.* (1998) quote higher estimations of 58.5% and 66% for Surrey and Gloucestershire respectively, concluding that that roads clearly limit badger dispersal and increase mortality by road traffic.

The Yorkshire data show that the bimodal peaks vary considerably from year to year. Seasonal peaks in road deaths presumably reflect seasonal increases in mobility within the badger population. This has been explained in terms of mating, dispersal and foraging. The February to April peak coincides with the main mating season in badgers (Neal 1977). Furthermore, territorial behaviour (fighting and scent marking at latrines) within this period is at a maximum (Davies *et al.* 1987). Bait-marking studies conducted at this time of year suggest unusual levels of mobility among badgers with individuals visiting surrounding territories in search of potential mates and are at the same time vigorously defending their own territories. With regard to the definite but smaller peak of female mortality at this time (Figure 4.10), Neal (1977) suggests that females have to

forage further afield to find enough food to satisfy increased energy demands of lactation. Davies *et al.* (1987), however, suggest that females may also be wandering in search of potential matings. Much the same explanation can be applied to the second peak in male and female mortality (July to September), indeed both mating and territorial behaviour also shows a second peak at this time of year (Neal 1977).