CHAPTER 13
SUMMARY AND CONCLUSIONS

The concentrated and overwhelming turmoil of human endeavour has orchestrated the ebbings and flowings of biodiversity on the stage of the Yorkshire landscape over the past four centuries. The environments and ecologies of our ten candidate carnivores have been modified by such features as the rise of the shooting estates of the late 18th and 19th centuries, agricultural developments such as the Parliamentary enclosure movement, primarily from the 1750s to the 1850s, overlaying the formerly more rough-edged landscape with a regime of hedges and ditches, disturbing some species and encouraging others. The large scale drainage of wetlands, such as across the Humberhead Levels in the southern Vale of York, the Hull Valley in East Yorkshire and the Vale of Pickering in north-east Yorkshire, though commencing in the 1620s, were followed by a myriad of land drainage operations in the wake of the Enclosure Awards, 183 of which are catalogued in this study. The decline in rabbit warrening and the liberation of the rabbit as a ubiquitous feral species provided a universal and sometimes staple food source for carnivores. The human carnage and economic disruption of the First World War had the effect of reducing the numbers of shooting estates and their gamekeepers; it also led to the over exploitation of timber products from woodlands, removing mature and over-mature timber habitats from large areas of landscape.

The rise of intensive farming has reduced habitat opportunities for most predators, as in the case of the **otter** which has declined due to toxic agricultural chemicals contaminating fish stocks during the 1950s and 1960s; furthermore, the introduction of **American mink**, with escapees from commercial mink farms having spread since the 1950s in the absence of competition from the otter, are now to be found in all of Yorkshire's river catchments. Now that rivers are cleaner, and fish stocks restored, otters are moving back to their old haunts, and evidently causing a recent collapse in the historically short-lived rise of mink.

Although hunting chase evidence indicated the potential, though unprovable, presence of **foxes** across Yorkshire during the 13th century, 11th to 19th century place-name evidence suggests a predominantly upland Pennine distribution. Vermin bounty data provides a more authoritative distribution from the late 16th century to the early 19th century across the county, but provides confirmation of an upland preference. An examination of 50-year date groups of bounty records shows a progressive movement

from upland predominance (mean altitude of 350 ft) in the 1550s to lowland sites with a mean altitude of below 50 ft by the early 19th century. A possible explanation for this may lie in the habitat changes, notably through the creation of thousands of linear miles of hedgerow and associated field drains as brought about by the enclosure awards of the mid-18th to mid-19th centuries. Fox populations may have been increasing from the 1650s, an increase accelerating from 25% in the 1750s to 45% of Carnivora vermin bounties in the first half of the 19th century. The rise in popularity of foxhunting as a field sport and a social institution particularly in the mid-18th to the late 19th century had profound effects due to the demands on hunt masters and servants to provide good populations of healthy foxes for guaranteed sport often several days per week in over 20 hunting territories across the county. This seems to have been achieved since hunting success rates, as indicated by foxes killed per 100 days hunting, rose through the 1880s to a zenith in the early 1890s (Figure 3.18). Part of this success was attributable to the planting of numerous fox coverts across the new enclosure landscapes of Georgian Yorkshire (Figure 3.6). The concentrations of largely late 19th century fox kill records from these lowland (mainly central and eastern) areas (Figure 3.7) contrasts with earlier centuries. Declining kill rates and extended search distances reveals a major simultaneous collapse in hunt success rates during the period coinciding with what appears to have been and major mange epizootic, largely from 1893 to 1904. Vermin bounty evidence suggest intra-guild pressures on pine marten (Figures 6.8 and 6.9) and polecat (Figure 9.11), with both species declining as foxes increase as a % of bounty records; indeed there is evidence that all members of the genus mustela declined in response to the rise in fox populations (Figure 9.11).

Place-name evidence for **badgers**, particularly relating to the term ‘broc’ is surprisingly numerous, their distribution being similar to the fox in indicating a Pennine upland distribution (Figure 4.1) from the 12th century onwards. Vermin bounty payment data indicates a more widespread and less focused distribution (Figure 4.2), though the % frequency data identifies the elevated landscapes of the Yorkshire Dales, Pennines and the Magnesian limestone ridge as their strongholds and their predisposition for modestly upland areas (200 to 299 ft) (Figure 4.3). As with the fox, there would seem to have been a movement with time to landscapes with a lower elevation. In the 1550s the mean altitude for badger sites was 350 ft, dropping to a mean of 120 ft by the 1750s (Figure 4.4).

The changing status of badgers in Yorkshire, as depicted by anecdotal evidence, indicates its rising fortunes from c. 1900 to the 1950s, followed by a sharp decline and

local eradication through persecution during the 1960s and 1970s. The implementation and strengthening of badger protection legislation, assisted by vigorous conservation action by a range of legal and conservation agencies through the 1980s and 1990s undoubtedly reversed this decline of active setts.

The post-Second World War rise in car ownership has led to huge increases in mean traffic flows and the building of more high speed highways. Badger road deaths have been monitored in Yorkshire since 1939 with a progressive increase in mortality, peaking at 199 reported cases per annum in 1997 and with 1,350 being recorded in all up to 2000.

Up to and including the 19th century, **polecats** were apparently widely distributed throughout Yorkshire, but records show they underwent a complex pattern of decline. A review of the factors associated with their persecution, land-use changes and possible predation/competition pressure from the fox has revealed possible causes which may prove useful in its conservation in areas of Britain where it still survives and within areas where it has recently been expanding its range. An effect of the 18th and 19th century enclosure of common land seems to have rendered polecats vulnerable to unsustainable culling, possibly being replaced by foxes as the new agricultural habitats matured. It would seem that increases in fox populations as revealed by bounty statistics led to a concomitant decline in polecats within the same parishes.

By 1880, the Yorkshire population was noticeably in decline, and by 1915, apart from ambiguous records from the Pennine uplands and Holderness, it had evidently vanished. Langley and Yalden (1977) correlated the decline of the polecat throughout Britain with the rise in game-keeping pressure brought about by the development of shooting estates during the 19th century. Although it is highly probable that final extinctions were brought about by the intensity of 19th century gamekeeping, vermin bounty data has indicated that the polecat declined at least half a century prior to this and that enclosure award developments suspiciously coincide with this status change.

The establishment of a captive-bred release population in Cumbria in 1978 has led to the beginnings of its recolonisation on the western extremities of Yorkshire; furthermore, the spread of Welsh polecats into neighbouring areas of Derbyshire suggests further recolonisation is imminent.

Evidence of **pine marten** in Yorkshire is very sparse, but tantalizingly persistent. Vermin bounty payments, always problematical to identify, have only been traced in four parishes. A possible cause of the early decline and continued scarcity of

pine martens may be a combination of competition with foxes and the loss of venerable and over-mature trees as denning sites.

With pine martens having an energetically inefficient elongated body shape with limited insulatory qualities, arboreal dwelling potentially places them at a severe disadvantage in terms of heat conservation. Therefore, if martens are to create dens, particularly natal dens in wind-swept arboreal situations, then large rot holes and substantial timber thickness are required. The scarcity or fragmented nature of such habitats may account for the persistent scarcity of pine martens, particularly where they live in competition with foxes. It may also provide a reason for former occurrences being in areas with survivals of venerable parkland timber, as well as the current use of roof voids of domestic dwellings.

Early records of **stoat** are perplexingly scarce, the earliest Yorkshire example being as recently as 1749. This raises the proposition that its populations may have been suppressed by intra-guild pressure from other carnivores, possibly polecat and/or fox.

With myxomatosis decimating feral rabbit populations across Yorkshire in 1954, the stoat was revealed to be particularly vulnerable to competition by the smaller weasel for small rodent prey. The feral rabbit has probably only been part of our fauna since the decline of commercial rabbit warrening (from the time of the Parliamentary enclosures onward), and particularly from the time of the Ground Game Laws which designated the rabbit as ‘game’, thus preventing its control as an agricultural pest. It is therefore possible that the stoat has only existed as a common species since the 19th century. Ironically, although it was one of the main vermin species controlled on game shoots, its population way well have been inadvertently protected by keepers’ vigilance against competitive predators such as polecats, foxes and birds of prey. Although stoats rallied as rabbits recovered post-myxomatosis, reaching a peak in the mid-1970s, both stoat and weasel have been declining since.

The absence of conclusive evidence of **weasel** in the post-glacial sub-fossil record for the Yorkshire region and its absence from elsewhere in Britain prior to the submergence of the land-bridge with Europe some 9,500 years b.p. suggests it may have been accidentally introduced into the British fauna. It would appear that although a nomenclature and knowledge of the weasel was imported with Germanic languages during the period of Saxon colonisation but actual evidence of its presence and its status as a pest species does not appear until the 1566 Act of Parliament which enabled parish officials to pay head money for their destruction, the earliest Yorkshire example being traced to 1619.

In examining the persecution pressures specifically within the weasel bounty parishes its highest populations coincide with lower polecat and fox populations. This suggests that the status of the weasel as England's most abundant native carnivore (apart from the feral cat) may be a recent phenomenon, post-dating the 18th and 19th century decline and demise of our larger carnivores. With fox populations rising to record levels during the early 1890s, foxes would at this time have competed heavily with stoats for rabbit prey. This may be an explanation as to why stoats were outnumbered by weasels at this time. At the close of the 19th century, due to the severe but brief mange-related collapse in fox numbers, the rabbit population became available for exploitation by other predators. This phenomenon may be the trigger for the population swing in favour of stoats at the turn of the 20th century. Stoats were evidently outnumbering weasels in the late-1940s prior to myxomatosis, but following the temporary eradication of rabbits in 1954 the weasel, better able to exploit small rodents, again predominated.

Our carnivores have clearly lived, and continue to live, in difficult times: within relatively few decades we have seen rarities become perceived problem species, aliens claimed to be running rampant and long-term rarities making a come-back.