CHAPTER 5

OTTER (*Lutra lutra* L.)

Introduction

A programme of regional historical studies of otter status, distribution and persecution pressures has been undertaken to provide a background to current monitoring of the otter (*Lutra lutra* L.) in river catchments, drain network systems and still waters of the Yorkshire and Humber region.

An archive of over 750 historical and current otter records up to 2000 has been collated in Appendix 5.1 and displayed in Figure 5.1 to create a general distribution map covering all Yorkshire river catchments.

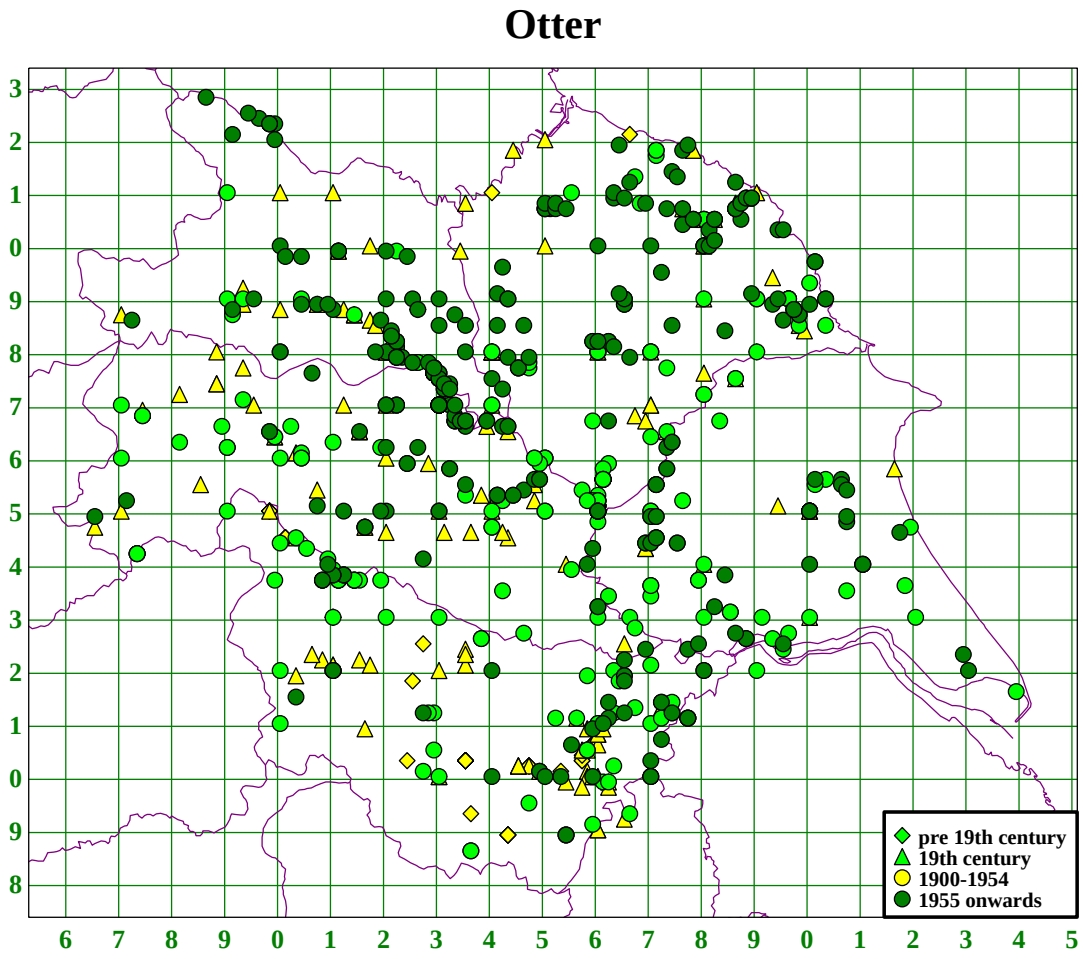


Figure 5.1. Historical distribution map of otters throughout Yorkshire.

Data collation and reviews of otter in the river catchments of South Yorkshire from are provided in Howes (1976, 1991b, 2000b), parts of industrial West Yorkshire in Howes (1976, 2003b), the East Riding of Yorkshire in Howes (2003a) and the water

courses and tidal reaches of rivers of the Humberhead Levels in the southern Vale of York in Howes (1998, 2000a, 2000b). A review of otter status and distribution in rivers of north-eastern Yorkshire, based on otter hunting records from 1910s to 1960s is in Woodroffe (1994), and studies of the potential conservation management of otters in the Swale, Ure and Ouse features in dissertations by Fuller (1999) and McAndrew (1999). The present study provides a new review of otters in the eastern- and western-flowing river catchments of the Yorkshire Dales in northwestern Yorkshire from the 17th century to 2000. This wealth of historical allusions gathered from a wide range of sources is presented here as source of background material for the range of otter habitat conservation policies expressed in a range of 'Biodiversity Action Plans' and similar wildlife conservation policy documents adopted by statutory and riparian bodies such as the Environment Agency, Local Authorities, British Waterways, Internal Drainage Boards and the water industry.

(1) Dales National Park

The Study Area

Although the study is primarily concerned with the upland region within the Yorkshire Dales National Park, it includes adjacent areas of the Forest of Bowland Natural Area on the west, and Upper Nidderdale and the Washburn Valley on the east (see Figure 5.1). On the western watershed of the Dales, the river systems include the Lune with its tributaries, the Dee and Wenning, and the Ribble with its major tributary the Hodder above their confluence near Great Mitton (SD/7138). On the eastern watershed the studyarea covers the Swale and its tributaries above Hudswell (NY/1500), the Ure and its tributaries above East Witton (SE/1487), the Wharfe with its tributaries above its confluence with the river Washburn at Leathley Bridge (SE/2246), and the Aire and its tributaries above Steeton (SE/0345). Although not included within the Yorkshire Dales National Park, the catchment of the Nidd in upland areas of Nidderdale and the Nidd Valley, and other areas included within the ‘Pennine Dales Fringe Natural Area’, sandwiched between the Dales and the lowland Vale of York, are included in this study. The catchments within the Dales National Park are largely situated above 350ft.

Data sources

Records have been sought from a wide range of archival and published sources, including natural history journals (notably the *The Naturalist*), topographical and local

historical works, press reports and interviews and correspondence with local naturalists. Use has been made of vermin bounty payment records in 17th and 18th century churchwarden's accounts from riparian parishes and townships throughout or adjacent to the study region (see Table 5.1). Additional data have been derived from hunting sources (Trappes-Lomax & Trappes-Lomax 1910, *Baily's Hunting Directory* 1973-74, Woodroffe 1994). Data in Trappes-Lomax & Trappes-Lomax (1910) are presented in Appendices 5.3 to 5.9 and Figure 5.2. Data in Woodroffe (1994) are analysed in Table 5.4. Use has also been made of the series of National Otter Surveys (Stephens 1957, Lenton *et al.* 1980, Strachan *et al*. 1990, Strachan & Jefferies 1996, Crawford 2003).

Pleistocene evidence

Otter remains were excavated from the floor deposits in the entrance chamber of Calf Hole, on Malham Moor above Skythorns (SD/96446460) (Tiddeman 1894b). The faunal context in which the otter remains were identified included sheep, horse, fox, badger hare, rabbit and various unidentified rodent, bird and amphibian bones. Although the presence of rabbit indicated a post-Conquest date, these and other burrowing animals can occur as anachronistic 'contaminants' in stratified debris. The otter remains could therefore have been from an earlier date, and indeed an axe head dated from the Mesolithic period was recovered from the site; also, from a lower sedimentary layer, the remains of bison, reindeer, horse and brown bear represented an earlier (Devensian) cold phase fauna. The specimens, identified by the celebrated 19th century palaeontologists W. Boyd Dawkins and Professor L. C. Miall, are stored in the Craven Museum, Skipton.

Place name evidence

The earliest cultural allusion to the presence of otters in the Dales region, refer to the village of Otterburn (SD/8857) on the headwaters of the Aire. The etymological elements of the name are judged to be oter = otter and burn(e) = stream (Smith 1961). The earliest documented examples of its useage date from the Domesday Book of 1086 and in charters of 1170 to 1184 (Farrer 1914).

Pre-19th century bounty payments

Bounty payments (head money) for otters relating to period from the late 16th to the early 19th centuries regularly feature in the yearly accounts of churchwardens and other

officials of riparian parishes or townships. The examination of extensive series of accounts from 19 Dales and Dales fringe parishes, located 'vermin' payments in seven (37%) parishes, but payments for otter heads were confined to 3 (15%) of these (see Table 5.1).

Table 5.1. Success rate in locating otter bounty records in churchwardens' accounts of 19 Dales parishes and townships.

PARISH	River catchment	Grid Ref.	Date range	Vermin bounties	Otter bounties
Arkengarthdale	Swale	NZ/0002	1840-1914	No	No
Bedale	**Swale**	**SE/2688**	**1668-1890**	**Yes**	**Yes**
Catterick	Swale	SE/2397	1788-1825	No	No
Hudswell	Swale	NZ/1400	1698-1703	Yes	No
Marske	Swale	NZ/0100	1812-1899	No	No
Muker	Swale	SD/9197	1821-1928	No	No
Askrigg	Ure	SD/9491	1811-1821	No	No
Bolton-cum-Redmire	Ure	SE/0391	1823-1922	No	No
Kirby Malzeard	Ure	SE/2374	1575-1895	Yes	No
Masham	Ure	SE/2280	1542-1677	Yes	No
West Witton	Ure	SE/0688	1825-1944	No	No
Bolton Abbey	Wharfe	SE/0754	1855-1902	No	No
Hubberholme	Wharfe	SD/9278	1932-1967	No	No
Kildwick	**Aire**	**SE/0145**	**1699-1849**	**Yes**	**Yes**
Skipton (Holy Trinity)	**Aire**	**SD/9951**	**1729-1831**	**Yes**	**Yes**
Kirby Malham	Aire	SD/8961	1724-1942	Yes	No
Clapham	Wenning	SD/7469	1788-1800	No	No
Giggleswick	Ribble	SD/8063	1814-1930	No	No
Horton-in-Ribblesdale	Ribble	SD/8172	1817-1921	No	No
Total and % of 19 parishes				**7 (37%)**	**3 (15%)**

As an indication of the relative abundance of otters in the waters of the Yorkshire regions and adjacent areas prior to the 19th century, Table 5.2 compares the

Table 5.2. Comparison between the numbers of parishes making bounty payments for otters in the Yorkshire Dales, with those in other parts of Yorkshire and adjacent areas (based on Howes 1976, 1998, 2000, 2003a).

Region	Parishes examined	Vermin bounties	Otter bounties	Otter bounty parishes as % of vermin paying parishes
East Yorkshire	23	12 (52%)	0 (0%)	0%
Hatfield Chase and the Isle of Axholme	32	8 (25%)	3 (9%)	37%
Don/Dearne/Rother	26	17 (65%)	7 (27%)	41%
Yorkshire Dales	**19**	**7 (37%)**	**3 (15%)**	**43%**
Nottinghamshire	31	13 (42%)	8 (26%)	61%
Total	**131**	**57 (44%)**	**20 (15%)**	**35%**

relative frequencies of parishes making otter bounty payments in the Yorkshire Dales with those in East Yorkshire, The Don, Dearne and Rother catchments in South Yorkshire, the Hatfield Chase and Isle of Axholme on the borders of South Yorkshire and North Lincolnshire and in Nottinghamshire.

Otter Hunting

Huntin' the Hodder

Old Squire Lomax's dags I'd oft heerd tell,
I bethought me one morning I'd see un mysell,
So I donn'd me and off to [1]Mytton did tridg,
And I landed me just as they lost under th' Bridg.

Cobbler wur theer, Carver wur theer,
Random and Rover, owd Pilot and aw.

We swum him to [2]Winckley, un theer he did hoyle,
But a pick un a spade soon his harbour did spoil;
Then he fought into [3]Ribble, ay, reet thro' the pack,
Though four on um once had him dean on his back.

Cobbler wur theer, Carver wur theer,
Random and Rover, owd Pilot and aw.

(Havins 1981)

[1] Great Mitton (SD/7138); [2] Winckley Park (SD/7038); [3] Confluence of the Hodder and Ribble (SD/7137).

From the mid-19th century to the cessation of otter hunting in 1976, waters in and particularly around the fringes of the Yorkshire Dale National Park have been the focus of numerous packs of otter hounds, the seasons generally lasting from May to September. Though principally falling within the hunting territories of the Kendall and District Otter Hounds and the Northern Counties Otter Hounds, press reports from the late 19th century indicate that the area was visited by many private packs; indeed particularly productive stretches such as the Ure at Masham, were claimed to be hunted by nine different packs (Carter 1894).

James Lomax (1803-1886) of Clayton Hall, Great Harwood, Lancashire ran a pack of otter hounds from 1829 to 1871. 'Squire' Lomax's pack regularly worked the rivers of the westerly watershed of the Pennines including the Calder, Darwen, Wyre and Yarrow and within Watsonian Yorkshire, the Ribble, Hodder, Lune and Wenning.

On the eastern watershed the pack visited by invitation the Aire (twice in 1840), Wharfe (on 14 occasions from 1831 to 1866), Nidd (in 1832 and 1844), Ure (on 4 occasions from 1841 to 1847), Swale (in 1835, 41 and 1843) and Tees (in 1835) (Trappes Lomax & Trappes Lomax 1910)

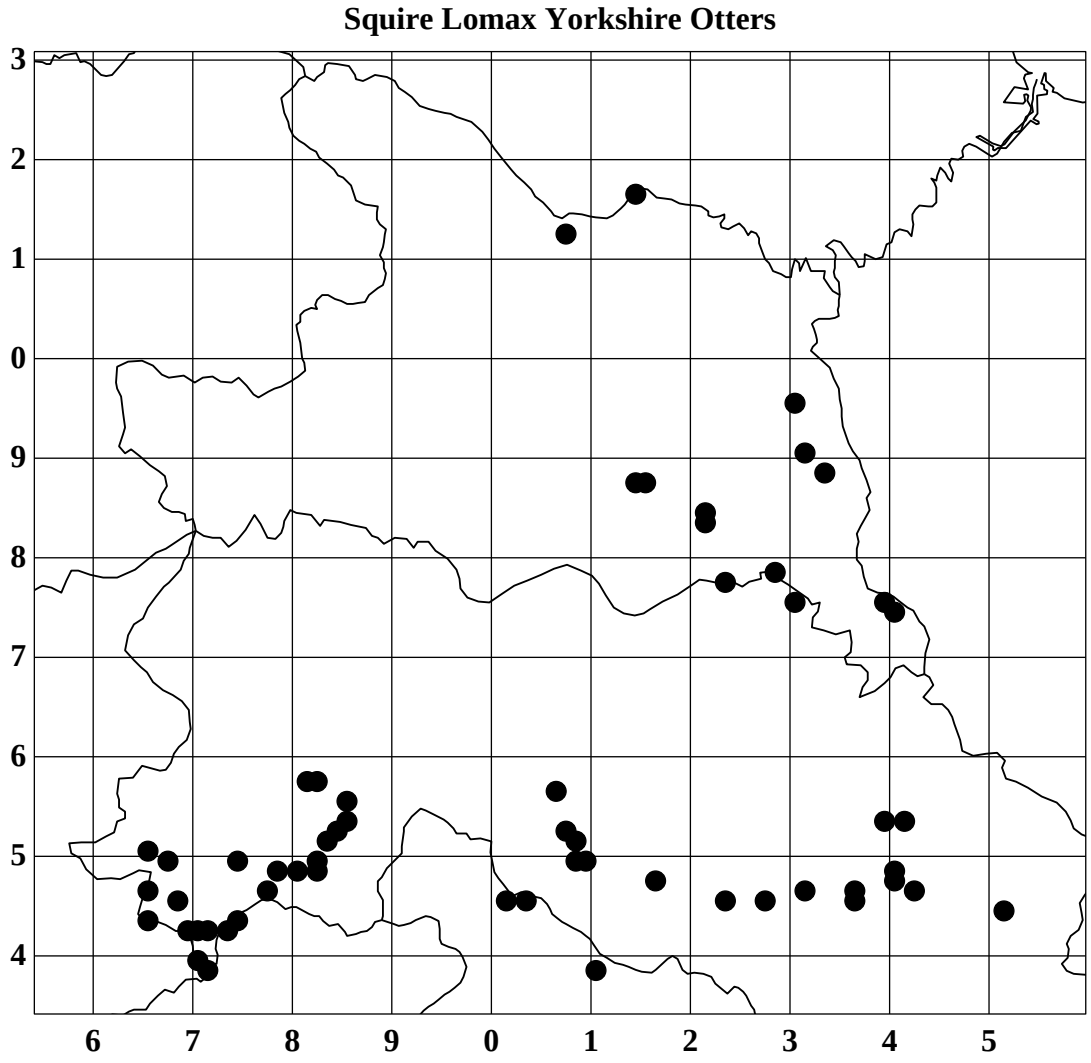


Figure 5.2. Locations of otters kills/finds on river systems within Yorkshire by Squire Lomax's Otter Hounds 1829 to 1871.

Mr Buckley's pack visited the Swale in 1900 (Anon. 1900a). The Hurworth Otter Hounds were active on the Ure in 1880 and 1881 (Anon. 1880b, 1881). Captain W. C. Yates's Otter Hounds from Holmes Chapel, Cheshire worked the Wharfe at Burnsall in 1883 (Anon. 1883) and the Swale in 1887 (Anon. 1887). Col. Dawson's Weston Otter Hounds worked the Wharfe downstream at Harewood Bridge in 1890

(Anon. 1890), and in 1899 the Aire was hunted at Skipton by the Carlisle otter hounds (Anon. 1899).

The Wharfedale Otter Hounds, consisted in 1912 of 20 pairs of hounds and were kennelled at Giggleswick. Under the mastership of Mr W. Thompson of Beck House, the pack hunted the Wharfe, Aire and Nidd of the old West Riding. In the North Riding it worked the Esk at Whitby and the Derwent and its tributaries from Pickering. To the west of the Dales it worked the Lune, Wenning, Hodder, Ribble and practically all the country hunted by the 19th century Kendal Otter Hounds (Bonnett 1912). Previous to the foundation of this pack, the Wharfe had been hunted by various packs at the invitation of the Wharfedale Otter Hunt Club to which institution the Wharfedale Pack owed its origin (Bonnett 1912). Closely linked with this local interest was the Airedale Terrier, first recognized as a distinct named breed when exhibited at the Airedale Agricultural show held in Bingley in 1879. This celebrated local breed of working dog had particular capabilities as an otter hound.

The old Kendall Otter Hounds of the 19th century hunted the Hodder as early as 1890 (Anon. 1890). The re-formed Kendal and District Otter Hounds was established in 1903 and operated from kennels in Giggleswick and Milnthorpe, working the waters of Westmorland, North Lancashire and the western side of the West Riding, including the Lune, Wenning, Hodder and Ribble. In 1921 and 1922 it divided into two packs, the second, based at Malton and named the Ryedale and District Otter Hounds, to work the Esk and Derwent catchments together with the Wharfe and Nidd (*Baily's Hunting Directory* 1973-74).

The territory of the Northern Counties Otter Hounds, extending from the Tweed, down through Northumberland and Durham and including the rivers of North Yorkshire, had been worked by several small packs based at Wooler (Northumberland), Stockton (Durham) (Jack Wharton's pack of the early 19th century), Hurworth and Neasham Abbey on the lower Tees (T. L. Wilkinson's pack of the 1880s), and Thirsk (North Yorkshire). The Northern Counties pack became established under this title in 1903 but in 1953 it reduced its range and was temporarily renamed the North Yorkshire, confining its activities to the Wear, Tees, Swale and Ure and their tributaries in North Yorkshire. In 1964 till the cessation of otter hunting, the pack was reconstituted as the Northern Counties Otter Hounds (*Baily's Hunting Directory* 1973-74).

Trapping and Shooting

In support of angling interests, otters were periodically shot or trapped on waters within the study area. The *Bradford Telegraph and Argus* for 16 December 1938 reported that J. Mallinson of Kettlewell, river watcher to the Kilnsey Angling Club, had recently trapped an otter on the Upper Wharfe, which had made his "bag" up to 46 during the 40 years or so of his employment there. Even up to the 1950s otters were shot throughout the Dales region with few landowners offering sanctuaries for their protection (Stephens 1957). Woodroffe (1994) draws attention to Paisley (1964) in reporting the trapping of some thirteen otters in north west Yorkshire during a twelve week period in 1964.

Pollution

Heavy metals

Veins of lead-bearing ore (galena or lead sulphide) exist in rocks of the lower Carboniferous series over extensive areas of the Dales, mainly between 1000 to 2000 ft. Remains of ore extraction and smelting are to be found in the ruined remains of former mine shafts, smelting mills, chimneys, flues, spoil heaps, 'hushes', water courses, reservoirs and dams. The exploited orefield was principally distributed across two main areas: in the north it embraced Arkengarthdale, Swaledale and the northern side of Wensleydale, and in the south it extended in a belt of land a few miles wide from Buckden in Wharfedale to Pateley Bridge in Nidderdale (Brumhead 1979, Wright 1986).

Lead has been mined and smelted in the Dales at Hurst and Greenhow Hill since Roman times. Monasteries within and beyond the Dales held mining rights on their estates, and lead-ore was certainly mined from medieval to Tudor times. The 17th century cartographer and topographer John Speed (Speed 1676) described mineral extraction in Wenleydale as follows:

"That part again, where the river Ure cutteth thorow the Vale called Wents-dale, is very good ground, where great flocks of sheep do pasture, and which, in some places, do naturally yeald great plenty of Lead-stone: in other places, where the Hills are barren and bare of Corn and Cattle, they make a recompence of those wants by the stoe of Copper, Lead and Stone, or Pit-coal whit which they are abundantly furnished."

The main period of activity was between 1790 and 1860 and most of the existing features of industrial archaeology survive from this period (Brumhead 1979, Wright 1986).

Generally the ore veins lay approximately in an east to west orientation and are thus cut by tributary valleys, which feed into Swaledale and Wensleydale from the north. Veins were located by a particularly erosive practice known as 'hushing'. This involved scouring away vegetation, soil horizons and superficial rubble by deluges of water. On high ground above a suspected vein, dams would be constructed across moorland streams, impounding the water into a reservoir. This water would be released in controlled deluges in the hope of revealing new rock surfaces ready for examination. The rubble flushed into the valley bottoms was also examined for fragments of ore-bearing rock.

The industry reached its peak in the closing years of the 18th century and the first half of the 19th century with an estimated 4000 workers employed in 1850 (Rayner & Hemmingway 1974). The Old Gang and Surrender mines produced an annual average of some 583 tons in 1786-89 to 958 tons in 1790-93 and reached an average of over 2000 tons in the years 1800-09. In 1858, when output was at its height, the production of all Swaledale mines was estimated to be 6,576 tons (Gunn 1984). In terms of human pressure on the environment of Swaledale, the population of the dale was 5,699 in 1801, reaching 7,433 in 1821 and declining to 2,483 by 1901 (Gunn 1984).

Mason and Macdonald (1986) expressed concern over the effects on otters of mercury, cadmium and lead. Lead is known to cause damage to the nervous system, blood and kidneys. Although experimental work has been undertaken on lethal dosages of mercury in Canadian otter (*Lutra canadensis*) (O'Connor & Neilson 1981) and American mink (*Mustela vison*) (Wobeser *et al.* 1976, O'Connor & Neilson 1981), equivalent work has not been traced for the effects of lead.

Lead levels have been recorded from hair samples taken from European otter (*Lutra lutra*) in Britain by Mason and Macdonald (1986) and from Canadian otter in Wisconsin, USA (Smith & Rogstad 1981). Residues in hair samples from 24 British otters ranged from 0 to 88.5 p.p.m., with a mean of 14.1 p.p.m. (Mason & Macdonald 1986).

Although the analysis of heavy metal levels in hair is a well known practice in monitoring lead contamination in human populations (Folio *et al*. 1982), surprisingly little use has been made of hair for monitoring heavy metal pollution in wild mammals.

The benefits over the examination of other tissue samples (muscle, kidney, liver, bone brain, blood) are those of accessibility, low hazard to captured live specimens and the ability to extend the study back to the date of the earliest preserved specimens.

The analysis of heavy metal levels in otter fur is a potentially valuable technique for retrospectively assessing variations in heavy metal pollution loads in specific river catchments from the 19th century onwards. Provided preserved otter specimens can be located in museum and sporting trophy collections, it should be possible to investigate former levels of lead uptake in otters of Yorkshire river systems.

Organochlorine Pesticides

The synchronous otter population 'crashes' over England, Wales and southern Scotland of the late 1950s and 1960s commenced simultaneously within 18 months of the introduction of the highly toxic cyclodene organochlorine insecticides, aldrin, dieldrin and heptachlor, indicating a sudden country-wide introduction of a new, possibly man-made, environmental factor; Strachan and Jefferies (1996) conclude that several factors point towards the start of the use of the persistent organochlorine insecticides as the main cause of the initiation of the marked decline in the southern British otter population. One factor which stands out is that of the timing, i.e. the decline was first measurable all over the country in late 1957 and dieldrin, aldrin and heptachlor first came into use in 1955, with major usage by 1956. It is remarkable that their effect should have been so sudden and severe, with a noticeable decrease in population size within 18 months. This rapid effect occurred in other species too, e.g. the sparrow hawk (*Accipiter nisus*). Although the links between the widespread use of organochlorine insecticides with the synchronous decline of otters might be said to be circumstantial, the additional correlation of the cessation in the national otter decline with the dates at which certain organochlorine insecticides were banned, provides a firmer platform of linkage.

The primary means by which organochlorine insecticides were introduced into the Dales aquatic ecosystems and therefore into the food chain of which the otter was top predator, would have been through sheep-dip in upland sheep grazing regions and to a much lesser extent as seed dressing for cereal crops. Limited though cereal growing is within the Dales region, its occurrence is almost invariably concentrated in the alluvial soils of valley bottom and therefore riparian situations, enabling contaminated run-off to directly enter the main river systems.

Sheep dipping

In 1956 Dieldrin became the active ingredient of veterinary products used in sheep-dips to control 'fly strike' by the Calliphorid fly *Lucilia caesar* or the green-bottle. It was extensively used due to its persistence, which provided larvicidal effectiveness for 12 to 20 weeks. Dipping, required by law, was only necessary once, using Dieldrin preparations, rather than twice a year as was often the case with earlier veterinary products (Leech & Macrae 1970). It is difficult to know the extent of sheep-dip disposal within this upland region though with the implementation of the Ground Water Regulations (1998), the issuing of Environment Agency licences for the disposal of sheep-dip showed that large numbers of licences were issued for sites within both the River Swale and River Ure catchments (Fuller 1999).

A ban on the use of aldrin and dieldrin in sheep-dip was imposed at the end of 1965 and came into effect on 1 January 1966. Across English regions, Strachan and Jefferies (1996) calculated it was 2.4 years before there was a measureable response by western and upland otter populations to this ban. In 1973 a ban was imposed on the use of aldrin and dieldrin in all seed dressing. Although this was a mandatory ban, in order to give time for the using up of stocks, the withdrawal of dressings was delayed until the end of 1974. 1975 was the first year with no aldrin or dieldrin seed dressings. This ban made a considerable contribution toward the recovery of otters in river catchments in eastern England and Strachan and Jefferies (1996) calculated it was 4.7 years before there was a response by what remained of the otter populations in eastern river catchments. All agricultural use of aldrin and dieldrin was finally banned in 1981, a ban on the use of DDT followed in 1982.

Due to the relatively limited number of otter records, it is difficult to identify status changes over time and to relate these to environmental changes such as the patterns of direct persecution or the sequential presence of pollutants. Table 5.3 shows that the mean numbers of otters encountered by the Kendal and District and the Northern Counties Otter Hunts dropped from an estimated 57 per 100 days hunting in the 1950s to an estimated 19 per 10 days hunting by 1969. The rise in the success rate recorded by the Kendal and District hunt in 1971 may have been in response to the 1966 ban in the use of the aldrin and dieldrin in sheep dip. The continued decline in success rate of the Northern Counties hunt could be a response to the continued use of aldrin or dieldrin seed dressings until its withdrawal in 1974.

A separate examination of Swale and Ure, and collectively Wharfe, Nidd and Aire catchment data collated from otter hunt diaries of the Malton and District, Northern Counties and the Kendal and District Otter Hounds and from Press reports from 1910 to 1967 abstracted from Woodroffe (1994) are presented in Table 5.4. These data, which

Table 5.3. Estimated numbers of otters encountered per 100 days hunting by Otter Hunt Packs working rivers to the west (Kendal & District OH) and to the east (Northern Counties OH) of the Yorkshire Dales National Park (based on Strachan & Jefferies 1996)

Date period	Otters found per 100 days hunting		
	Kendal & District	Northern Counties.	Mean
1950-55	59	55	57.0
1966	40	65	52.5
1969	19		19.0
1971	61	12	36.5

specifically refer to the easterly flowing Dales rivers, are arranged to show the days hunted and the numbers of otters encountered in 1910 (albeit incomplete) and for the five-year periods 1935 to 1965. Calculations of the number of otters encountered per 100 days of hunting for each quinquennium is an attempt to indicate possible population trends.

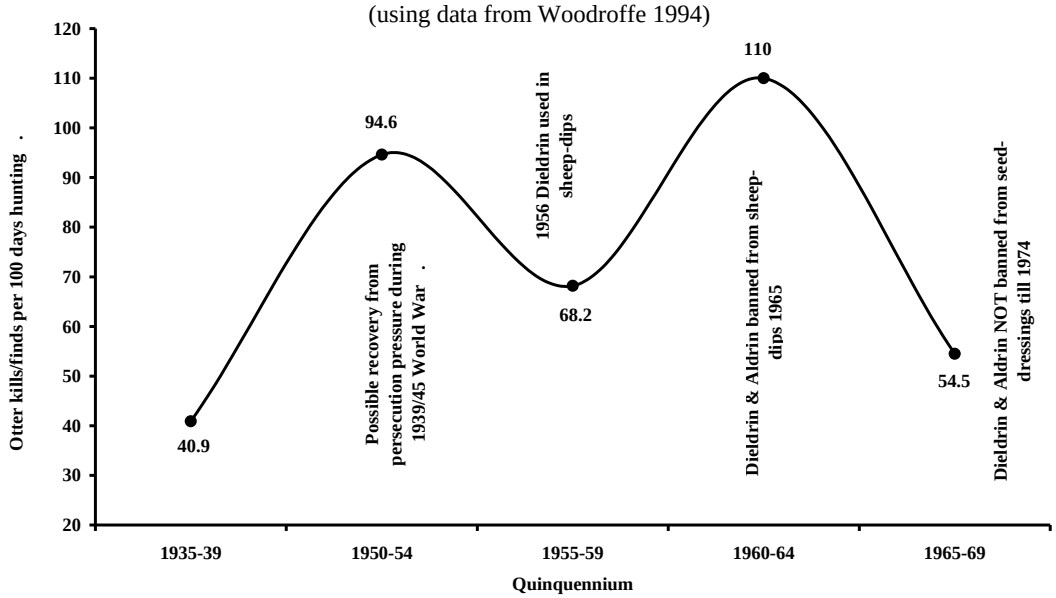
Table 5.4. Otters encountered by otter hounds 1950 to 1967 (from Woodroffe 1994)

5-year periods	Swale		Ure		Nidd/Wharfe/ Aire		Totals	
	Days hunted	Finds	Days hunted	Finds	Days hunted	Finds	Days hunted	Finds
1935-39					44	18	44	18
1950-54	13	12	7	6	17	17	37	35
1955-59	43	28	34	24	8	6	85	58
1960-64	5	5	5	6			10	11
1965-69	5	2	1	1	5	3	11	6

The calculations of otter kills/finds per 100 days hunting are shown in Figure 5.3. The results are somewhat equivocal, indicating a rise in numbers from an index of 40.9 in 1935-39 to 94.6 in 1950-54, which could reflect a cessation in persecution pressure from gamekeeping interests due to the Second World War. This was followed by a drop to 68.2 during the period 1955-59, which may have reflected the effect of

poisoning due to the use of organochlorines in sheep-dip; it may also have reflected a resumption in gamekeeping pressure, Stephens (1959) noting otters being frequently shot throughout the Dales. Curiously, for the period 1960-64 the index rose inexplicably to 110, falling to 54.5 during 1965-69, this latter figure coinciding with the continuation of aldrin and dieldrin as seed dressings until 1974.

Figure 5.3. Otter kill/find rates per 100 days hunting on eastern flowing Dales rivers 1935 to 1969
(using data from Woodroffe 1994)



Diet and food availability

Otters opportunistically feed on a wide range of prey which varies according to habitat and season. A review of evidence from Yorkshire sites showed that from all anecdotal sources, fish formed 65% of prey items, others being 22% waterside birds and 13% amphibians and crayfish (Howes 1985d). Of fish prey noted along the Ouse during the 1950s, eels formed 25%, Cyprinidae (carp family) 22%, Salmonidae 22%, Sticklebacks 22% and Perch 7% (Stephens 1957). From 60 spraints collected from rivers in the northern Vale of York (Simms 1971b), evidence of eels was found in 58%, Cyprinidae 48% and Salmonidae (probably brown trout) 17% (Howes 1985d).

Elsewhere in Britain, the diets of riverine otters are dominated by slower moving coarse fish with eels being particularly favoured. This would seem to disadvantage otters in the Yorkshire Dales National Park region where the fish fauna and biomass is dominated by swiftly swimming salmonids. These consist of brown trout, grayling and to a small extent re-establishing salmon populations in the eastern flowing rivers, and

salmon, sea trout and brown trout in the wester-flowing catchments. Where salmonids are taken, they tend to be small; for instance, 74% of salmonids taken in the River Webburn, Devon were less than 12 cm long (Wise *et al*. 1981). Similarly 69% of roach and 74% of perch taken in the still-water shoreline lake Slapton Lea, South Devon were also below the12 cm size class (Wise *et al*. 1981).

A review, based largely on Environment Agency data, of the fish fauna and fish biodiversity zones present in the river catchments within the Dales study area is provided as Appendix 5.2.

Chronological records of otters by river catchment

Western Watershed

River Lune catchment

Squire Lomax's pack regularly visited the Lune from 1829 to 1869, but his diaries do not obviously refer to activity in Yorkshire stretches (Trappes-Lomax & Trappes Lomax 1910). Otters were recorded as common in the Sedbergh area (SD/69) in 1887 (Watson 1887) and 1902 (Morris 1902). They were present in the Dent area (SD/78) in 1899 (Prior 1899) and were described as being plentiful in the Tebay area (NY/60) in 1912 (Fortune 1912). Although providing no details, Crawford (2003) confirmed that there had been many historic records from the Lune and its tributaries, indicating a previously strong breeding population. Footprints were identified in Dentdale upstream of Dent (SD/78) in 1972 (G. R. Dee, *pers. comm.*).

The 1978 National Otter Survey of the upper reaches of the Lune within the 50 x 50 km square NY s/e was undertaken in August when the river had been in spate so only recent evidence could be searched for. Although none of the six sampling sites was positive, otters were reputedly present in one area (Lenton *et al.* 1980). The 1985 Survey was undertaken in July under conditions of heavy rain and spate and again proved negative (Strachan *et al*. 1990). The 1991-94 Survey, however, found positive signs at one site (NY/6100) (Strachan & Jefferies 1996). This site was again positive in the 2000-02 survey together with three additional sites, one on Birk Beck (NY/5909) and two at adjacent sites further up the Lune (c. NY/6205 and NY/6705) (Crawford 2003). This increase was regarded as being part of the large extension in range on the upper Eden. Since the 50 x 50 km square SD n/e falls outside the remit of the national survey, the Environment Agency independently undertook a survey in May 2000 which located a single positive site at the top of the River Lune.

River Wenning catchment

Squire Lomax's pack regularly visited the Wenning from 1831 to 1870, but his diaries do not obviously refer to activity in Yorkshire stretches (Trappes-Lomax & Trappes Lomax 1910). Otters were recorded around Clapham (SD/7469) in 1898 (Anon. 1898). A female otter weighing 10lb was shot on Simon's Fell, Ingleborough at an altitude of c. 2000 ft. (Handby 1900). In 1902 otters were reported as being 'fairly numerous' along secluded reaches of the river Wenning and its tributary streams and in May of that year a young male otter was trapped near Crina Bottom Farm, Clapam (SD/7468) (Handby 1903). Otters were known to pass along the Wenning and onto the 'mosses' in the Austwick area (SD/76) (Anon. 1940), and between 1952 and 1954 they were often seen in the river near Bentham (Stephens 1957). Since the Wenning falls outside the 50km survey plots of the national otter survey, no recent records have been forthcoming from this area.

River Hodder catchment

Squire Lomax's pack visited the Yorkshire stretches of the Hodder, encountering or killing otters on 30 occasions from 1829 to 1866; these are listed in Appendix 5.3. Kills included 9 males, 4 females and a further 4 where the sex is not recorded. On 17 November 1880 otter cubs were observed on the banks of the Dunsop (SD/65), a tributary of the Hodder (Anon. 1880a, Southwell 1888). In September 1890, a 15lb otter was killed at Whitwell (SD/6547) by the Kendal Otter Hounds (Anon. 1890). In the 1890s, otters were known to breed on the Hodder (Anon. 1898) and were occasionally seen (Pickard 1896). In 1909 they were occasionally seen on the Hodder system in the Bowland region (SD/64) (Wilson 1909), and in 1961 one was recorded at the confluence of the Hodder and the Crossdale Beck at Slaidburn (SD/7152) (Fenton 1961).

Only the southern sections of the Hodder, which flow through the 50 x 50 km square SD s/e, fall within sampling area of the National Otter Survey. Lenton *et al*. (1980) described the river as unpolluted and appearing to be ideal for otters, having wooded banks for much of its length and apparently little disturbance. It was surveyed in June and July 1979 during and after heavy rain which might have affected results but there were many bank cavities where spraints would have been unaffected. None the less no signs were encountered. It was again surveyed in July 1986 under good conditions and although none of the sample sites proved positive, anecdotal reports of

otters were received (Strachan *et al*. 1990). The 1991-94 Survey, however, found positive signs at one of nine sample sites (c. SD/6942) (Strachan & Jefferies 1996). The 2000-02 survey also confirmed the presence of an old spraint at Langden Bridge (SD/6649) at its confluence of the Langden Brook (Crawford 2003).

River Ribble catchment

Squire Lomax's pack visited the Yorkshire stretches of the Ribble, encountering or killing otters on 44 occasions from 1830 to 1887; these are listed in Appendix 5.4. Kills included 7 males, 5 females and a further 3 where the sex is not recorded; also one was caught alive to be hunted on another occasion. In the late 19th century, otters were common on the upper reaches around Horton-in Ribblesdale (SD/8172) (Foster 1892). In 1928 they were 'evidently on the increase' in the Ribble Valley (Ribble Head to Settle) area (Bramley 1929). In 1947 tracks were seen in the Clitheroe area (SD/74) and below the mill at Waddington (SD/7342), and a holt with a female and cubs was located in a reed-covered drain near Brungerley Bridge (SD/7342) (Hazelwood 1948). From 1952-54, otters were again regarded as numerous around Settle (SD/8163) and along the Ribble and its numerous tributaries, notably near Clitheroe (Stephens 1957). From the upper reaches of the Ribble which flow through the 50 x 50 km square SD n/e, the Environment Agency independently undertook a survey in 1998 which failed to reveal any positive sites (G. Botterill, in Crawford 2003).

Only the middle reaches of the Ribble, which flow through the 50 x 50 km square SD s/e, fall within sampling area of the National Otter Surveys and only sites down to the confluence with the Hodder are considered here. Lenton *et al*. (1980) described the river as unpolluted down to its confluence with the Calder. It was surveyed in June and July 1979 during variable weather conditions and none of the seven sample sites contained positive signs. It was again surveyed in July 1986 under good conditions and although none of the sample sites proved positive, anecdotal reports of otters were received (Strachan *et al.* 1990). The 1991-94 Survey found positive signs at three sites, two on the main river (c. SD/7138 and SD/8249) and one on Swansyke Beck (c. SD/7845) (Strachan & Jefferies 1996). Although the 2000-02 survey confirmed the presence of otters at one site on the Ribble, the location was outside the remit of this study, indeed none of the three sites found positive in the previous survey were confirmed (Crawford 2003).

Eastern Watershed

River Swale catchment

Of the six Swale riparian parishes examined for otter bounty data, only the parish of Bedale (SE/2688), situated outside the Dales National Park on the fringes of the Vale of York, produced any evidence. During 1671 and 1692, the churchwardens' accounts give evidence of bounty payments for four otters heads:

1685 It. to John Ward for an Otter's head 1s.

1692 It. To Geo. Birkenshaw and Steven Forwith for an Otter 1s.

1692 It. Allowed to Bryan …. For 2 Otter heads 2s.

Bedale is not on the main river, but on a Swale tributary (variously known as the Bellerby, Burton, Bedale and Leeming Beck) flowing from Bellerby (SE/1192) and entering the Swale to the east of Leeming (SE/3190).

Squire Lomax's pack visited the Swale on four occasions from 1835 to 1843 killing four otters, 2 males, 1 female and one of unspecified sex. All were encountered at sites within the central Vale of York rather than on Dales stretches; records are shown in Appendix 5.5. The Bedale Beck area was visited by otter hounds in 1889 and an otter was killed in its upper (Burton Beck SE/1691) reaches (Anon. 1889). The last of the 19th records was of reported presence in the Richmond area (NZ/10) in 1895 (Anon. 1895) and a 15lb specimen killed in 1897 at Downholme Bridge (SE/1199) (Anon. 1897a).

20th century evidence of a resident population in upper Swaledale only came 1975 when D. Laws (*pers. comm*.) report that otters might have bred in the Marske Bridge area (NZ/1000) and Thompson (1977) reported receiving 'regular reports' of otters between Reeth (SE/0499) and Richmond. Otter signs were also located on the Arkle Beck (NZ/00) in 1981 (M. Thompson, *pers. comm*.).

The Swale was surveyed in August and September 1978 during good weather conditions, but all of the four monitoring sites on the upper Swale within the 50 x 50 km square NY s/e and all the 43 sample sites in the adjacent square SE n/w, covering the mid- and lower stretches were negative. In 1985 the sample sites were surveyed in August during a period of unseasonable spate and again no evidence was encountered despite some good available habitat on its upper to middle reaches. Other contemporary reports were confined to a single record of a probably transient animal (Strachan *et al*.

1990). In 1994 positive signs were encountered at only three sites on the entire Swale system two of which, Healaugh (SE/0198) and the old Downholme Park (SE/1199) site, were from the Dales area (Strachan & Jefferies 1996). The 2000-02 survey of stretches within SE n/w noted a considerable increase in positive sites on the Swale below Richmond, but in the Dales area only one site near Grinton (SE/0498) proved positive (Crawford 2003). S. Jay (in Crawford 2003) reported that investigations of small upland tributaries of the Swale within NZ s/w in parallel with the 2000-02 National Survey proved negative, and streams within SD n/e showed only sporadic use of these waters by otters.

Records from the Dales section of the Swale are curiously few. This could possibly be a reflection of a low productivity in terms of fish biomass in the relatively unproductive upper reaches of a spate river, though because of the temporal pattern of records, it could also be a legacy of heavy metal pollution of water courses from the numerous lead mines and other mineral workings scattered across the upper Swale catchment. Waste tips and flushes from these workings became notable for their specialist toxic heavy metal tolerant flora.

River Ure catchment

Squire Lomax's pack visited the Ure on four occasions between 1841 and 1847, killing five otters, 3 males, 1 female and one of unspecified sex; records are shown in Appendix 5.6. As with the Swale, otter records in the upper (Dales) reaches of the Ure catchment above 400ft are relatively few. Since the topography and mining history of upper Wensleydale is similar to that of upper Swaledale, the reasons for this apparent scarcity may also be linked. On the Bain, a tributary of the Ure, otters were present at Semer Water (SD/9187) in 1934 (Booth 1934) and in 1975 a pair was regularly seen by D. Metcalf (McAndrew 1999). At Bain Gill (SD/9389) and Whity Gill (SD/9392), otters were present in 1884 (Lees 1884). Downstream at Bainbridge (SD/9390), otters were reportedly 'not uncommon in streams' in 1914 (Anon. 1914). In the streams around Askrigg (SD/9590), otters were regarded as 'not uncommon' in 1905 (Anon. 1905), and in 1970 a recently and locally taken otter 'mask' was shown to a local resident (Simms 1970). Further downstream at Aysgarth (SE/0088), an otter was recorded in 1893 (Percival 1893), and in 1983 an adult with an unidentified number of young were observed there (M. J. A. Thompson *pers. comm.*). At Redmire (SE/0490) one was hunted in 1900 (Anon. 1900a). On 24 April 1980, two otters were watched playing in

pool at West Witton (SE/0789) (Yorkshire Mammal Group *pers. comm*.). In June 1881, otter hounds hunted the Ure near Bolton Hall (SE/0490) (Anon. 1881). At Wensley (SE/0989) spraints were found in 1977 by C. Simms (Thompson 1977) and on 6 November 1990 an old spraint was found by Environment Agency Staff (McAndrew 1999). On the tributary river Cover, two were encountered by the Hurworth Otter Hounds at Cover Bridge (SE/1487) in May 1882 (Anon. 1882), one was killed here by otter hounds in May 1889 (Anon. 1889) and in 1900 one was again hunted by Mr Buckley's Otter Hounds (Anon. 1900a). In 1987 and in December 1992 signs were encountered along the Cover by the Environment Agency staff (McAndrew 1999).

The Ure was surveyed in August and September 1978 during good weather conditions. Evidence was only encountered in the middle reached outside the Dales study area (Lenton *et al.* 1980). In 1985 the Ure was again surveyed during August and September and although the river and its tributaries offered many stretches of good riparian habitat, again the upper reaches proved negative (Strachan *et al.* 1990). The 1994 survey again proved negative but provided further evidence of a small isolated population present outside the Dales between Leyburn and Ripon (Strachan & Jefferies 1996). This population has been monitored closely through the 1970s to 1997 by McAndrew (1999), resulting in the artificially high incidence of records (130 out of 150) for waters between 100 and 200ft outside the Dales area (see Figure 5.1). The 2000-02 survey provided evidence of continued presence at three sites together with one new site in the river's middle reaches. However, a positive site at Redmire Force (SE/0490) provided the first recent evidence on the Ure from within the Dales National Park (Crawford 2003). S. Jay (in Crawford 2003) surveying the small unproductive headwater streams within SD n/e showed only sporadic use of these waters by otters.

River Nidd catchment

As with other Dales rivers, the majority of reported occurrences on the Nidd catchment are from the middle and lower reaches below 200ft AOD and within the Vale of York. Of those reported from the Dales Fringe Natural Area, the earliest was from Patley Bridge (SE/1565) and an adult and cub seen lower downstream at Ribston in February 1880 (YNU archive records).

Squire Lomax's pack made visits in May 1834 and May 1844 during which four otters were encountered, two of which were killed, the details are given in Appendix 5.7. Again, the find sites were situated in the central Vale of York area. On 26 January

1884 a 2ft 6in. female was killed at Killinghall (SE/2859) (Storey 1884). Otters were again noted at Pateley Bridge (Anon. 1886). In 1886 it was claimed that most of the Nidderdale records were from the Pateley Bridge area, though Ramsgill (SE/1270) was also listed as a site (Clarke *et al*. 1886). Fortune (1894) noted otter at Knaresborough in 1894, and otters were known from the Summer Bridge area in 1902 (Anon. 1902). On 11 December 1909 two adults and two cubs were at Birstwith (SE/2459), a site where a partly devoured chub and the remains of other coarse fish had often been seen (Fortune 1914). In 1938 a litter was reared on the Nidd at Scotton Banks and considerable damage to local fish stocks was alleged (Gallwey 1939). Sightings of single animals were reported from the Nidd Gorge in the Summer Bridge area (SE/2062) in the 1950s, the last up to 1978 (Lenton *et al*. 1980) and near Bilton (SE/3357) in 1952, the last seen up to 2002 (Bilton Historical Society Website 2003). From the 1950s to the 1990s records were few. Lenton's (1980) Summer Bridge informant commented that there were 'never many otters' in the area. In 1961 tracks were noted downstream in the Knaresborough area (W. Beck *pers. comm*.), where in 1963, Govett (1964) reported seeing the fresh pelt of a locally taken otter. In 1965 one was seen in a tributary stream at Shaw Mills (SE/2662) (*Harrogate & District Naturalists' Society Annual Report* 1965).

The Nidd within 50 x 50 km square SE n/w was surveyed in August and September 1978 during good weather conditions. Although the middle reaches appeared to offer suitable habitat, having wooded banks and a natural course, no signs were located. Part of the lower reaches were impossible to survey adequately because of steep banks and very dense herbaceous growth (Lenton *et. al*. 1980). The 1985 Survey also provided no evidence despite the availability of some suitable habitat. A report of a road casualty near Harrogate during the 1980s suggested that otters enter the Nidd catchment (Strachan *et al*. 1990). In 1994, five of 27 main survey sites showed the presence of otter. Three consecutive sites along the lower Nidd showed presence as tracks only and could easily have been overlooked if the water level had been high at the time of survey. Further upstream, spraints were found along the well-wooded riverbank of the Nidd Gorge at Birstwith (SE/2459) and Scotton Banks (SE/3258) (Strachan & Jefferies 1996). Subsequently, during 1995 an otter was seen at Bewerley (SE/1565), and a pair was present at Scar House Reservoir (SE/0676) (Harrogate & District Naturalists' Society *in litt*.). The 2000-02 Survey confirmed the presence at only three sites, all downstream of the study area. Two were at previously positive sites near the confluence

with the Ouse and and one was just downstream of Knaresborough at SE/3756 (Crawford 2003).

River Wharfe catchment

Squire Lomax's pack visited on 18 occasions from 1831 to 1866, the results of which are shown in Appendix 5.8. Kills included 4 males, a further 5 where the sex was not recorded. On 16 May 1832 one was caught alive at Harewod Bridge (SE/3146) and was released for later hunting at Cock Bridge (SD/7434) on the Lancashire Calder. Another was caught alive in Harewood Park Lake (SE/5144) on 31 July 1832 and released into the Wharfe at Harewood Bridge (SE/3146) to be hunted the following day. The diaries also report that a 9lb cub was killed by a gamekeeper on 29 May 1840 and that 11 had been killed by keepers in 1860-1861.

Of subsequent records, commencing in the headwaters of Langstrothdale, Woodd (1891) referred to otters being hunted up the dale to Beckermonds (SD/8780). The preserved specimen of an otter taken at Buckden (SD/9377) on the upper Wharfe in 1886 was exhibited at the Racehorse Inn, Kettlewell (YNU Archives box 139). An otter was trapped at Kettlewell (SD/9672) in 1938 (Anon.1938, Hazelwood 1940). On the River Skirfare at Halton Gill (SD/8876) an otter, regarded as a 'rare visitor', was seen in 1897, and in August 1898 one was seen in the nearby Hesledene Beck (Shuffrey 1898). A preserved specimen exhibited in a glass case in the Falcon Inn, Arncliffe had been taken at Hawkswick (SD/9570) during the 1890s (Shuffrey 1898). In 1907 Rev. Shuffrey again referred to the otter occurring in Littondale on rare occasions (Booth 1907). In the Grassington area (SD/9964) an otter was recorded on 7 August 1882 (Clarke 1882). In 1891 and 1900 otters were regarded as 'not uncommon in the Wharfe' (Anon. 1896, 1900b). Local inhabitants reported the presence of otters in the area in May 1945 (Chislett 1945). At Netherside Wood, Grassington (SD/9865) an otter was seen by a local angler during April and July 1963 (Govett 1964). During the first decade of the 1900s otters bred annually among the old lead mine workings at Hebden Gill (SE/0266) and one summer there was a family of otter 'kits' in the river Dibb (SE/0461) (Batten 1952). At Burnsall (SE/0361) in August 1883, Captain W. C. Yates caught a male otter weighing 20lb (Anon. 1883). At Appletreewick (SE/0460) otters were reported in 1949 (Hazelwood 1950), and in 1952, Stephens (1957) reported otters to be 'plentiful in the Wharfe', tracks generally being numerous at Appletreewick. By contrast, Batten (1952) noted that in his boyhood [early 1900s] 'eels were plentiful in

the River Wharfe and so were otters. Industrious trapping has since reduced them to a negligible few and accordingly the otters are practically gone.'

On the Washburn, sightings were noted on several occasions on Lindley Reservoir (SE/2248) (Clarke & Roebuck 1883). Otters were known to occur in the Blubberhouses area (SE/1755) (Clarke 1885). At Farnley Lake (SE/2247), near the Washburn's confluence with the Wharfe, an otter was killed in 1915 (Fortune 1916, 1927), fresh footprints were noted on 17 July 1926 (Booth 1926) and signs were noted during January and February 1973 (Bradford Naturalists' Soc. *in litt*.).

The upper Wharfe within the 50 x 50 km square SE n/w was surveyed in August and September 1978 during good weather conditions though none of the 15 main sample sites provided evidence (Lenton *et al*. 1980). In 1985 the Wharfe was again surveyed during August and September and although no signs were encountered within the Dales area, positive signs were located at one site on the Washburn (Strachan *et al.* 1990). The 1994 survey again proved negative within the Dales area and although some 19 sample sites were examined, no evidence was located anywhere within the catcment (Strachan & Jefferies 1996). L. Collins (in Strachan & Jefferies 1996) separately investigated the Wharfe, particularly the middle and lower reaches within SE s/w and although otters had been reported irregularly in recent years, these were indicative of transient animals rather than a resident population. Subsequent casual records are of a spraint found above Lindley Bridge (SE/2248) on the Washburn on 2 November 2000 (*Wharfedale Naturalists' Society Annual Report* 2000), and in 2002 an otter allegedly devoured a trout at Kilnsey Park Trout Farm (SD/9767) (Kilnsey Park Web Site 2003). The 2000-02 survey confirmed presence at three sites. These were on the main river at Beamsley (SE/0752), at March Ghyll Reservoir on Bow Beck (SE/1251) and on the Washburn (SE/2050) (Crawford 2003). S. Jay (in Crawford 2003) reported that surveys on the middle reaches of the Wharfe within SE s/w showed an increase in occurrence since 1997. The small unproductive headwater streams within SD n/e showed only sporadic use (Crawford 2003).

River Aire catchment

In the riparian parish of Kildwick (SE/04) during the 127 years between 1671 to 1798 the churchwardens' accounts give evidence of bounty payments for five otters heads (NYCRO PR/KID Mic. 1704, Booth undated):

1671 Hustler for one otter head 2d. [the low tariff suggests this may have been an otter cub].

1677 Jo. Parkinson for an otter head 1s.

1680 For an otter head 1s.

1798 Wm. Cryer of Cononley for an otters head 1s.

1798 Paid for an otters head 1s.

In the neighbouring parish of Skipton (SD/95) the churchwardens' accounts give evidence of bounty payments for five otters heads during 1736 to 1752 (NYCRO PR/SKP Mic. 1487-88; 1507, Birtwhistle 1896):

1736 June 23. For an otter head.

1750 May 27. Henry Atkinson esq. two otters 2s.

1751 February 2. An otter head 1s.

1752 An otter head to John Bell 1s.

Squire Lomax's pack only visited the Aire on two occasions in April and July 1840, the results of which are shown in Appendix 5.9. During the 19th and up to the middle of the 20th century the following records have been documented in the press and natural history sources. In 1897 a 21.5lb specimen was shot by a gamekeeper at Steeton (SE/0345) (Anon.1897b). In 1899 two otters were hunted at Skipton (SD/95) by the Carlisle otter hounds (Anon. 1899). In 1927, otters were reportedly 'becoming numerous' in the upper Aire valley (Bramley 1928). In 1945 one was seen in the Holme Beck near Sutton-in-Craven (SE/0044), swimming upstream towards Cowling (Hazelwood 1946). Otters were seen on the Aire and its tributaries in the Skipton area (SD/95) between 1952 and 1954 (Stephens 1957). At Malham Tarn, otters were present in 1947 and 1949 (Hazelwood 1948, 1950). It was regarded as being one of their few 'sanctuaries' in the region, otters being frequently shot throughout the Dales (Stephens 1957).

Of the six survey sites in the headwaters of the Aire within SD s/e, none have been positive in any of the National Otter Surveys (Crawford 2003). L. Collins (in Strachan & Jefferies 1996) investigated the middle and lower reaches within SE s/w for the 1971-74 Survey, but found no signs of occurrence. S. Jay (in Crawford 2003) reported that inspections of sites along the headwaters of the Aire within SD n/e

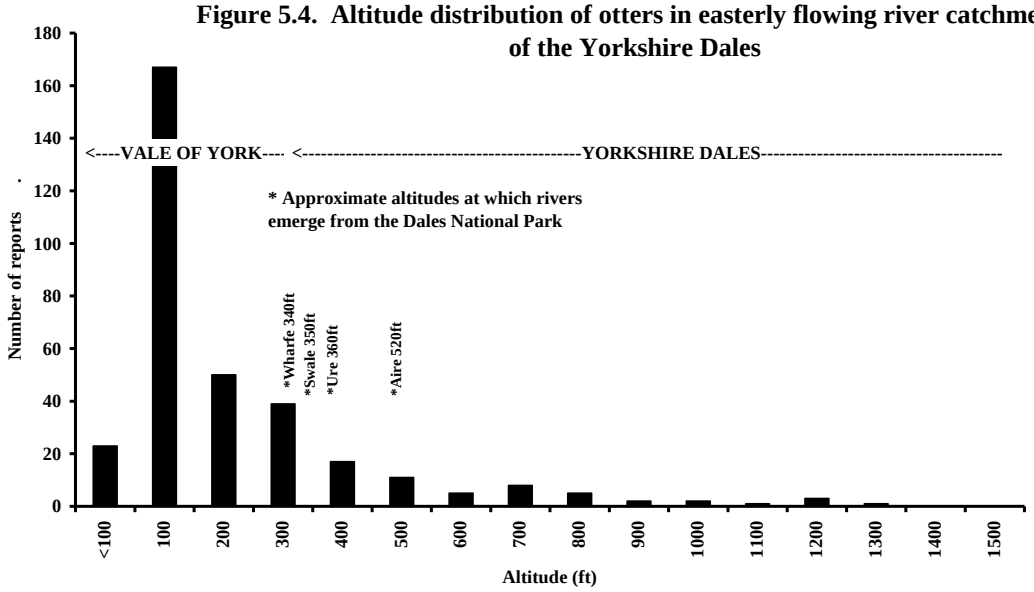
provided evidence of sporadic use of these streams and in the middle reaches within SE s/w, signs were located upstream of Leeds in 2002.

Discussion

An examination of the frequency of recorded occurrences of otters along the courses of river systems originating within the Dales study area suggests that otter prefer the more productive middle and lower reaches below 350ft (Fig. 5.4) where a generally greater fish biomass and slower moving cyprinid dominated fish fauna is likely to occur. Furthermore there are differences in the relative frequencies of recorded otter occurrence per km of river in three Dales river catchments (Table 5.5). This is not the case with the westerly-flowing rivers where seasonal influxes of migratory salmon and sea trout make excursions to upper reaches more productive for the otter.

Monitoring occurrences of otters during the period of lead mining, i.e. prior to the general availability of published records, presented a major difficulty. However,

Figure 5.4. Altitude distribution of otters in easterly flowing river catchments of the Yorkshire Dales



examination of vermin bounty payments recorded in churchwardens' accounts from riparian parishes and townships adjacent to the main Dales rivers provide some comparative evidence. For the Aire catchment, the townships of Skipton and Kildwick (outside the Dales orefield) bounties were paid for ten otter heads between 1671 and 1798; also on the Bedale Beck system, a Dales fringe tributary of the Swale, the township of Bedale (SE/2688) (again, outside the Dales orefield) bounties were paid for

four otter heads between 1671 to 1709. Whereas for the Swale itself, the parish records from Hudswell (NZ/1402) covering the period 1698 to 1703 and for the Ure catchment, the churchwardens accounts for Masham (SE/2280), covering the period 1542 to 1677, though rich in payments for terrestrial carnivores, failed to provide any evidence of otter.

Table 5.5
Relative frequencies of recorded otter occurrence per km of river in three Dales river catchments

Catchment	Length of river and main tributaries (km) within the National Park	No. of otter records	Otters per km
Swale	78	6	0.08
Ure	77	19	0.25
Wharfe	85	20	0.24

Reported occurrences of otters in the Dales sections of the Swale catchment prior to the 20th century are curiously few and substantially fewer than for other river catchments emanating from the Yorkshire Pennines. This could possibly be a reflection of low fish biomass in the relatively unproductive upper reaches of spate rivers. It could be a scarcity of preferred and easily catchable fish prey species. It could be indicative of the lack of suitable riparian tree cover and holt sites. It could, however, be a legacy of toxic heavy metal pollution of water courses from the numerous lead mines and other mineral workings scattered notably across the upper Swale, but also the upper Ure, Wharfe and Nidd catchments.

(2) East Riding of Yorkshire

Data sources

Records have been sought from a wide range of archival, published and verbal sources. These include natural history journals (notably *The Naturalist*), topographical and local historical works, press reports and interviews and correspondence with local naturalists, anglers, farmers and other residents. Additional data have been derived from hunting sources via Woodroffe (1994) and UFAW (1969) and reports of the National Otter surveys (Stephens 1957, Lenton *et al*. 1980, Strachan *et al*. 1990, Strachan & Jefferies 1996).

The study area

The study is based on the historic East Riding of Yorkshire which equates largely with the Watsonian vice-county 61 and the current administrative area of East Yorkshire. Its northern boundary is delineated in the Vale of Pickering by the Rivers Hertford and Derwe and its western boundary is formed by the Derwent from Malton to Stamford Bridge; the boundary then cuts southwest to York and continues down the tidal Ouse to its confluence with the Derwent; its southern boundary extends from the Derwent/Ouse confluence to the Ouse/Humber confluence and thence along the north shore of the Humber estuary to Spurn Peninsula; its eastern boundary is formed by the North Sea coast from Filey Brigg to Spurn Peninsula.

With regard to English Nature's 'natural areas', the study area comprises Holderness and the Yorkshire Wolds in entirety and also includes sections of the Vale of Pickering south of the Derwent, the Vale of York east of the Ouse; the Humberhead Levels north of the estuarine Ouse and east of the Derwent; and the northern section of the Humber Estuary from Faxfleet to Easington.

In addition to the main rivers already mentioned, the study area includes the Wolds tributaries of the Derwent including the Scampston and Settrington Becks; the Blackfoss Beck and the Foulness catchment; the tributaries of the tidal Ouse including the Skipwith and Stillingfleet Becks; the series of flooded clay pits adjacent to the Market Weighton Canal and along the north shore of the Humber to North Ferriby; the Pocklington, Market Weighton, Driffield and Leven Canals; the river Hull catchment including the Driffield, Frodingham and Watton Becks; the still waters of Holderness including Hornsea Mere and Burton Canstable Park Lake the Holderness drains including the west-flowing Barmston Drain which enters Bridlington Bay, and the south-flowing Winestead and Ottringham drains which pass into the lower Humber Estuary.

Place name evidence

Place name evidence in the form of Ottringham (TA/2624), does not refer to otter but to a personal name, eg. the Scandinavian 'Oder' (Smith 1937). There are no documentary sources to suggest the presence of otters prior to early wetland drainage schemes.

Pre-19th century bounty payments

Bounty payments (head money) for otters relating to period from the late 16th to the early 19th centuries regularly feature in the yearly accounts of churchwardens and other officials of riparian parishes or townships. Examination of an extensive series of accounts from 23 East Riding parishes, located 'vermin' payments in 12 (52%) parishes. Curiously, considering the presence of major river catchments and wetlands within the region, the exercise failed to locate evidence of otter bounties being paid in potentially suitable riparian parishes (see Table 5.6).

TABLE 5.6. Success rates (*) in locating otter bounty records in churchwardens' accounts of 23 East Riding parishes.

Parish	Appropriate date range	Vermin bounties	Otter bounties
Aldbrough	*	-	-
Beverley (St Mary's)	*	*	-
Catwick	*	-	-
Cottingham	*	*	-
Eastrington	*	-	-
Elloughton & Brough	*	*	-
Garton in Holderness	*	-	-
Hilston	*	-	-
Hollyn cum Withernsea	*	-	-
Holmpton	*	-	-
Hotham	*	-	-
Howden	*	-	-
Langtoft with Cottam	*	*	-
North Ferriby	*	*	-
Patrington	*	*	-
Roos	*	-	-
Routh	*	*	-
Sigglesthorne	*	*	-
Skirlaugh	*	*	-
South Cave	*	*	-
Wawne	*	-	-
Wold Newton	*	*	-
Wressle	*	*	-
Total	**23 (100%)**	**12 (50%)**	**0 (0%)**

Otter hunting

From the mid-19th century to the 1960s, the middle and lower reaches of the River Derwent, which forms respectively the northern and western boundaries of the old East Riding, was celebrated for otter hunting. The Durham City and Stockton Otter Hounds worked the Derwent in the Vale of Pickering in 1863 (Hatfield 1866) and Sir Charles Legard's hounds hunted at Thicket Priory and on the Pocklington Canal in 1890 (Tyke 1890). During 1921 and 1922, the Kendal and District Otter Hounds temporarily split to form an eastern pack named the Rydale and District Otter Hounds. These were based at Malton to work the Derwent and its tributaries (*Baily's Hunting Directory* 1973-74).

The Malton and District Otter Hounds, which was established with ten pairs of hounds, appear to have succeeded the Rydale pack on at the disbandment of the Staffordshire and Yorkshire Otter Hounds. Their hunting territory included the Rivers Derwent and Hull of the East Riding together with their tributaries and associated carrs (*Baily's Hunting Directory* 1973-74). Woodroffe (1994) was privileged to be able to examine the hunting diaries of the Malton Otter Hounds which showed that during the 1950s and 1960s 11 different hunting venues were visited on the Derwent, with 28 km of river being worked. The diaries, covering the period 1933 to 1968 (excluding the years of the Second World War and immediately after), showed that in 26 outings, 24 otters had been encountered.

Using data from Woodroffe (1994) to calculate the success rates for the three decades (represented in terms of the numbers of otters encountered per 100 days of hunting), a substantial decline is indicated from an index of 106.6 for the 1930s to 50.0 for late 1960s (see Table 5.7).

TABLE 5.7. Annual numbers of outings and finds recorded by Malton Otter Hounds on the Yorkshire Derwent (abstracted from Woodroffe 1994)

Year	Outings	Finds	Equivalent to per 100 days hunting
1933	4	6	
1934	7	7	
1939	4	3	106.6
1950	3	4	
1952	2	0	
1954	1	1	83.3
1959	1	0	
1960	2	2	66.6
1967	1	0	
1968	1	1	50.0

General status reviews

In the late 19th century, Clarke and Roebuck (1881), reviewing the data available to them, regarded the otter as occurring 'in limited numbers in all the rivers', although it was 'apparently absent from Holderness'. Procter (1922) regarded the otter as still 'very rare in Holderness', but 'fairly common on the upper reaches of the river Hull and the chalk streams of the Wolds, where ... it is again increasing'. Sheppard (1927) knew of them occurring only 'occasionally in trout streams and more inaccessible parts'. In her questionnaire survey of national River Boards, Stephens (1957) received no response from the Hull and East Yorkshire River Board so she assumed otter status was as high as in the non industrial catchments of the Yorkshire Ouse River Board (Pennine and Vale of York) region, though she had evidence that they were 'scarce around Hull'.

Sites monitored by the National Otter Surveys

A small number of sites in the East Riding were included in four published National Otter Surveys, the first (Stephens 1957) undertaken from 1952 to 1954, largely through correspondence with River Board managers and Otter Hunt masters, the second from 1977 to 1979 (Lenton *et al*. 1980), the third from 1984 to 1986 (Strachan *et al*. 1990), and the fourth from 1991 to 1994 (Strachan & Jefferies 1969). Sadly most of the East Riding was missed by this system; only that area which falls within the 50 x 50 km square SE s/e (east from the Derwent and north of the Ouse and Humber to northing SE/50) was included. However, the Survey did include 16 highly significant sampling sites on the lower Derwent and Pocklington Canal catchment, a further ten on the Foulness and Market Weighton canal catchment, three on the lower Ouse banks, and four on the north Humber bank. In the September and October 1978 Survey all sites were negative (Lenton *et al*. 1980), yet during October 1985 one site on the Pocklington Canal was positive (Strachan *et al*. 1990) and during the 1991 to 1994 survey 12 major sample sites, plus two spot check sites proved positive (Strachan & Jefferies 1996).

Release programmes

Following a detailed survey of the North York Moors National Park rivers, a number of sites were selected to receive otters for release. From 1991 to 1993 the restocking programme, undertaken in co-operation with the Environment Agency and English

Nature and co-ordinated by the Vincent Wildlife Trust, introduced 21 rehabilitated wild orphaned and injured or captive bred otters, largely from Scottish sources, into the River Derwent system. Table 5.8, based on Strachan and Jefferies (1996), indicates releases onto the Derwent on the East Riding boundary. Collectively, the surviving release animals have successfully established themselves as a breeding population and now occupy the majority of the Derwent catchment; indeed, it was judged likely that all the positive 1991 to 1994 national survey evidence in the lower Derwent resulted from the re-establishment programme (Strachan & Jefferies 1996). This population may also be the origin of animals now being monitored on the Foulness catchment. Up to 1996 there were four known losses from this programme. In 1992 two released males were drowned in a single illegally set eel fyke net, a female was killed on the road 18 months after release (Woodroffe 1993), and a specimen was found dead near pheasant rearing pens (Strachan & Jefferies 1996).

TABLE 5.8. Numbers, sexes, release sites and dates of release of captive-bred and rehabilitated otters on the Derwent system adjacent to the East Riding.

Date	Locality	Numbers & Sexes	
		Males	**Females**
April 1992	Thornton Ings	2	1
May 1992	Buttercrambe	3	0
July 1992	Thornton Ings	0	1
September 1992	Thornton Ings	1	1
July 1993	Buttercrambe	1	1
Total		**7**	**4 (11 Otters)**

Review of records by river catchment, drain networks and still water bodies

The approximate locations of records for which specific sites have been traced are indicated as solid dots on Figure 5.1. No attempt has been made to differentiate records from different date periods.

Yorkshire Derwent - Ayton downstream to Malton

On Whit Monday 1863 the Ayton to Ganton stretch (SE/97) was successfully worked by the Durham City and Stockton Otter Hounds (Hatfield 1866). In March 1895, many fresh footprints and a freshly killed pike were found on the river bank downstream of Ayton (SE/97) (Hay 1895). Although the Vale of Pickering reaches of the Derwent were regularly hunted, notably by the Malton Otter Hounds, in 1889 the proprietor of the Scampston estate declared that otters were to be 'preserved' in Scampston Park (SE/8675) (St Quintin 1889). In the autumn of 1919 otters entered the Park on two occasions, killing captive examples of Ross's Snow and Brent geese, Curlew and 9 ducks from the waterfowl collection. A female otter weighting 14 lbs visited on 15 May 1922 and was trapped after killing a captive Lesser White-fronted goose and a Japanese teal, and destroying several clutches of eggs (St Quintin 1923). In 1976 otters were reported at Yedingham (SE/8979) (Thompson 1977).

Yorkshire Derwent - Malton to Stamford Bridge

On the Settrington Beck, a Wolds tributary of the Derwent, an otter was recorded at North Grimston (SE/8367) in 1902 (Fraser 1902). On 14 January 1931 the remains of a brown trout allegedly killed by an otter were reported at Malton (SE/8072) (Smith 1932). Otters were reported repeatedly in 1931 and were regarded as being 'comparatively plentiful' and that 'a number of cubs had been killed' (Smith 1932). Otters were present on the river in 1933 as indicated by spraints (York Naturalists' Society Report Book).

Otters were recorded on the stretch at Kirkham (SE/7365) in 1889 (Walker & Longster 1889) and according to fish remains left on river banks they still frequented the area in 1920 (Smith 1920). At nearby Howsham Bridge (SE/7362) one was seen in 1977, (Yorkshire Mammal Group) and on 7 May 1978 spraints and prints were found at three points along the river (SE/7463) (Yorkshire Mammal Group) and on 25th January 1981 footprints were again located along the river bank at Howsham Wood (SE/7463) (Yorkshire Mammal Group). In the winter of 1910 a pair of otters occupied a holt in the roots of a pollarded willow in a beck between Buttercrambe and Stamford (SE/7256) (York Naturalists' Society Report Book). Two otters were reportedly seen at Buttercrambe in 1981 and spraints were located on the weir there (SE/7358) on 22nd February 1981 (Yorkshire Mammal Group). In spite of further reported sightings in

1984 and 1986, regular surveying by Laura Winter (unpublished) from 1987-1989 at eight sites between Malton (SE/7871) and Scrayingham (SE/7360) found only a single spraint (Woodroffe 1994).

Yorkshire Derwent - Stamford Bridge to the Ouse confluence

This ryver at great raynes ragith and overflowith much of the ground there aboute beyng low meadowes (Leland 1520s).

John Leland's 1520s allusion to the lower reaches of the Derwent and its surrounding landscape describes the river's natural propensity to create substantial wetland regions, as at Wheldrake Ings, particularly in times of high rainfall. Today, the tidal barrage at the Derwent's confluence with the estuarine Ouse (constructed in the 1980s), has effectively removed the tidal element from the lower river and holds the riparian habitats under inundation for much longer periods than was formerly the case.

At Stamford Bridge (SE/7155) on 18 July 1909 the remains of a brown trout allegedly killed by an otter were reported (Roebuck 1910). An otter was reported in the Stamford Bridge area in 1913 (Smith 1913) and one was again seen in the area in 1977 (YNU unpublished records).

A note in the *Field* for 1890 reported that Sir Charles Legard's otter hounds working the Derwent at Thicket Priory (SE/6943) had killed a female otter (Tyke 1890). In 1912 one was seen at Menthorpe Ferry (SE/7034) (*YNU Annual Report* for 1912), in January 1920 a 19lb male otter was killed on the Derwent bank at Bubwith (SE/7036) (York Naturalists' Society Report Book) and in 1933 otters were regarded as 'frequent' in the Derwent near Skipwith (SE/63) (Smith 1933). In 1976 one was seen at Wheldrake Ings (SE/7043) (Thompson 1977).

During surveillance for the National Otter Surveys of 1978 and October 1985 the five sampling sites on the lower Derwent main river (within 50 x 50 km square SE s/e) proved negative (Strachan *et al*. 1990). However, the survey of 1994 located signs at all five sites together with an additional spot check site. Only two sample sites on tributaries remained negative (Strachan & Jefferies 1996). Collectively, the 16 full sites and two spot check sites on the lower Derwent , Pocklington Canal and Blackfoss Beck complex provided 14 positive records for this system which provides some excellent habitat (Strachan & Jefferies 1996). Strachan and Jefferies (1996) were of the opinion

that all the evidence encountered was from otters released into the Derwent system from 1990 to 1994.

Pocklington Canal catchment

In 1890 Sir Charles Legard's otter hounds had worked the Pocklington Canal (SE/74) (Tyke 1890). In about 1974 an otter was shot at East Cottingwith (SE/7042) (Thompson 1977) and on 16 October 1985 otter signs were located at Hagg Bridge on the Blackfoss Beck/Pocklington Canal confluence (SE/7145). During the 1994 National Otter Survey seven of the ten sample sites together with an additional spot check site provided positive signs; these included continued presence at the Hagg Bridge site (Strachan & Jefferies 1996).

Foulness catchment

On 29 December 1915 and on 1 January 1916 single female otters were killed at Spaldington (SE/7934) (Booth 1917). During surveillance for the National Otter Surveys of 1978 and October 1985 and 1994 the ten sampling sites on Foulness catchment (SE/73; 83) remained negative (Strachan and Jefferies 1996). However, sight inspections undertaken from winter 1999 to summer 2000 confirmed presence on the Foulness catchment (SE/73, SE/83) (Lavelle 2001).

Lower Ouse and adjacent wetlands

In January 1903 a 24lb otter was killed at Cliffe (SE/6630) (*Goole Times and Weekly Herald* 1903). In 1912 sightings were reported from the Ouse near Drax (SE/6728) and the Turnhead reach, Barlby (SE/6728) (Fortune 1913) and in 1931 otters were repeatedly reported from the Ouse and were regarded as ‘comparatively plentiful’ (Smith 1932).

Curiously there are no specific lower Ouse records from naturalists’ sources for four decades until signs were reported at Saltmarshe Delph (SE/7724) on 22 June 1974 and an otter was seen at Laxton (SE/7925) early in 1980 (S. Holliday *pers. comm.*). Surveillance at 17 sampling sites on the lower Ouse (including the Skipwith and Stillingfleet Becks) for the national otter surveys of 1978 and 1994 failed to reveal signs of otters, though on 10 October 1985 a single site was positive by Stillingfleet Beck (SE/5840). This was probably from a transient animal and since that time there

have been occasional unconfirmed sightings of single otters from this stretch (Strachan & Jefferies 1996, J. Birks & R. Strachan *pers. comm.*).

South Wolds streams and Market Weighton Canal

In the streams of the Market Weighton region (SE/84) otters were present in 1897 (Boyes 1897) and were 'seen occasionally' in 1909 (Marshall 1909). On 23 February 1902 an otter was shot near South Cave (SE/9130) and on 31 April 1903 one was shot as it emerged from a drain at Welton (SE/9627) (Hill 1907). In December 1911 an adult and a cub were shot in the flooded disused clay pits by the Market Weighton canal at Sandholme Landing (SE/8531) (*Goole Times & Weekley Herald* 1911). At Gilberdyke (SE/8328) a female was shot and a cub captured in January 1916 (*Goole Times & Weekly Herald* 1916). Prior to 1970 otters were seen by a farmer on several occasions on a Humber tributary (SE/82), probably the Market Weighton canal (Lenton *et al*. 1980).

Humber shore clay pits

In August 1925, up to four otters were reported frequenting a 'reservoir' [clay pit] and an outfall stream to the Humber near Brough (SE/9326) (Smith 1926). Otters were known to 'occasionally visit' the Humber bank at North Ferriby (SE/9624) in 1944 (Procter 1944), and in 1947 otters were seen at the Melton clay pits (SE/9524) (Hazelwood 1948). On 28 June 1962 tracks were followed through the Phragmites reed beds on the Humber bank near Broomfleet (SE/8826) and two otters were seen by anglers on a nearby pond (Govett 1963). In 1967 otters were reported to the west of Hull (Clegg 1968) and in December 1979 fresh spraints were seen in the flooded disused clay pits by the Humber at Welton Ponds (SE/9525) (Hull Naturalists' Society *pers. comm.*). During surveillance for the National Otter Surveys of 1978 and October 1985 and 1994 the four sampling sites on the Humber all remained negative (Strachan & Jefferies 1996).

River Hull catchment

From the late 19th century there is a reasonably continuous record of occurrence. Otter were known, but regarded as 'rare', in the Driffield Beck in the Driffield area (TA/0256) in 1890 (Boyes 1890) and again in 1899 (Boyes 1899). On 29 May 1902 one was killed in the 'trout stream' at Driffield (TA/0356) (Hill 1907), and a male otter was

captured near Driffield (TA/05) in 1902 (*Eastern Morning News* 1902; Anon 1903). A 12lb female was captured near Driffield (TA/05) in February 1903 (Anon 1903), two were killed in the Driffield Beck at Sunderlandwick (TA/0155) on 4 March 1903 (Hill 1907) and on 28 April 1903 a 25 lb male and a 15 lb female were shot on the Kelk Beck at Lowthorpe (TA/0860) (Hill 1907). In referring to status in the Driffield area (TA/05), Procter (1922) noted that otters were 'fairly common on the upper reaches of the River Hull and the chalk streams of the Wolds', and in 1933 (Procter 1933) suggested that 'though the appearance of otters is rare, they are secretive and more numerous than is generally thought'. They were regarded as occasional visitors to the area in 1950 (Saith 1950) and were still present in 1962 (Govett 1963). An otter pelt in the possession of Mr C. Grantham of Driffield was from an animal killed locally in the early 1960s (T.G. Manby *pers. comm*.).

In the summer of 1964 otter tracks were found in several places along a two mile stretch of the exposed mud banks of the tidal river Hull up stream of Hull Bridge, Beverley (TA/04). Spraints and the chewed remains of an eel were also found (Govett, 1965). In 1971 otters were reported on Watton Beck (TA/0647) and at Toplock Low (TA/0748) (Hull Natural History Society *pers. comm*.) and on 6 May 1979 signs in the form of a characteristically chewed grayling was found on the bank of the Driffield Beck at Wansford (TA/0656) (Howes 1980).

In 1991 and 1992 Edwin Pretty (*pers. comm*.) regularly obtained good sightings of otters entering and leaving a holt site amongst willows and Phragmites reeds in the Hempholme Lock area (TA/04). Following this report, in January and February 1995 a detailed survey involving the examination of almost 100 sites along the river Hull located positive signs (4 spraints and 1 footprint) at five sites all upstream of the confluence of the Hull and the Frodingham Beck (TA/0752) (Jay 1995 & *in litt*.). Several unconfirmed sightings were also reported by ornithologists at Tophill Low Reservoir Nature Reserve (TA/0749) (Crowther 1995), and detailed surveys in the headwaters of the river Hull from winter 1999 to summer 2000 confirmed regular otter activity with additional sites being added on the Frodingham Beck (TA/0852) and the Leven Canal (TA/0745) (Lavelle 2001).

Otters utilised the catchment further downstream, though records are less common. At Hull Bank Hall (TA/03) in the 1850s footprints were identified in the mud by a pond (Harworth-Booth 1900) and an otter was seen here in June 1901 (Shepperd 1902). Breeding was proved in the lower Hull valley in 1928 when on 9th February two

young otters were dug out of a section of Sutton Drain near Wawne (TA/1037). Otters were present in the Dunswell area (TA/0735) between 1945 and 1950 (Rider 1969).

Holderness

Lordinges, ther is in Yorkshire, as I guesse,
A mersshy contree called Holderness.
The Sumnours Tale, Geoffrey Chaucer Late 14th century

An examination of the surface drift deposits of this region (Arnett 1990) shows considerable areas of Holocene fen peat and alluvium in the central Hull valley, indicating equivalent areas of former wetland. In addition were the series of post-glacial meres and networks of meandering drainage runnels generally running west off the underlying compacted Skipsea Till boulder clay into the Hull catchment, or south into the Humber marshes. Pollen analysis of peat deposits (Beckett 1981) shows abundant evidence of the wetland and riparian indicator tree, *Alnus glutinosa*, suggesting that conditions would have been suitable for otters. The progressive and hugely influential drainage schemes, commencing largely in the 1760s (Sheppard 1958) massively reduced the gross areas of permanent and seasonal wetlands, and Hornsea Mere, although the largest natural lake in Yorkshire, is now the only surviving example of the Holderness meres. The alder pollen record which declined markedly in more recent superficial deposits appears to reflect the post-drainage replacement of wetland with arable agriculture. The current landscape, characterised by geometrical networks of clinically maintained drainage systems, provides relatively limited habitat opportunities for otters. However, a residual population still occupies these waters and with sympathetic management of riparian habitats and fish stocks and a control of pesticidal loadings reaching the water courses, a sustainable future may be possible.

Although Clarke and Roebuck (1881) regarded otters as being 'apparently absent' in Holderness, and up to the 1920s they were regarded by Procter (1922) as 'very rare in Holderness', a significant series of scattered records have come to light. At Hornsea Mere (TA/14), George Bolam found no evidence of otters and John Taylor, game keeper on the Wassand estate on which the Hornsea Mere is situated, claimed not to recall otters in the area during his many years service around the turn of the 19th century (Bolam 1913). However, after the First World War, records began to come to light. On 22 May 1926, a pike was found with characteristic wounds in its shoulder proving the first, if circumstantial, evidence of otter on the mere (Badland 1926, Procter

1935). In 1947 breeding was confirmed (Hazelwood 1948) and otters were again noted in 1950 (Hazelwood 1951). Single otters were sighted on 26 November 1970 (W. Curtis *pers. comm.*), 19 May 1971 at Swan Island (TA/1746) (J. Hawley *pers. comm.*), at the western end of the Mere (TA/1646) also in 1971 (Hull Naturalists' Society *pers. comm.*), and again at the western end on 20 November 2000 (W. Curtis *pers. comm.*).

To the north of the Holderness area, one was killed at Barmston Drain (TA/1658) in about 1890 (Harworth-Booth 1900). Further south, shortly before 5 December 1928, a specimen weighing 8.5 lb and measuring 28 inches in length was trapped at Aldbrough (TA/2438) (*Hull Daily Mail* 5.12.1928, Anon. 1929), and a pair was present on Burton Constable Park lake (TA/1835) in 1947 (Hazelwood 1950).

On the southern fringes of Holderness on 9 December 1892, a 21 lb male otter was shot on the Humber bank near Kilnsea (TA/41) (Cordeaux 1893). Chislett (1946) also reported footprints in the tidal dykes near Kilnsea. In April 1961 an otter was seen in Winestead Drain (TA/3020) (B. Pashby *pers. comm.*) and on 17 and 18 February 1962 two were seen near the railway track at Winestead (TA/2923) (Govett 1963). The most recent sighting in this area was at Ottringham (TA/2724) in 1976 (Howes 1980).

Contrasting with the pre-Second World War allusions to absence or scarcity in Holderness (Clarke & Roebuck 1881, Bolam 1913, Procter 1922), by the late 1940s the region was regarded as something of a stronghold for otters, with Hazelwood (1950) noting them as being 'numerous in the Holderness area'.

Discussion

Bounty payments

The apparent absence of otter bounty payments being made in riparian parishes during the 16th to early 19th centuries, contrasts with equivalent studies in the Humberhead Levels (9% of parishes) (Howes 2000) and Nottinghamshire (26% of parishes) (Howes 1998a). This could either indicate that otters were not perceived as a competitive threat to local fisheries, that other mechanisms (as yet unknown) were in place to control otters, or that otters were absent or genuinely scarce in east Yorkshire and only colonised the region during the 19th century. This would seem highly unlikely since this period coincides with the height of shooting estates and the efficiency of the gamekeeping profession when culling pressure would have been intense, certain species of larger British carnivores were driven to the brink of extinction (Langley & Yalden 1977) and otters met with local extinctions (Howes 1976).

Status changes in Holderness

Although status reviews relating to Holderness from the late 19th century to the first quarter of the 20th century (Clarke & Roebuck 1888, Bolam 1913, Procter 1922) suggest that otters were absent or very scarce across in this region, this may have been an artificial situation created by unpublicised culling on numerous game estates. With estate staffs leaving for, or losing their lives during, the First and Second World Wars, or because of the financial collapse of some of the landed estates at this time, the wartime and post-war culling pressure was likely to have been significantly relaxed, thus allowing a monitorable population increase. This would help explain the sightings and breeding records during the 1940s and justify the claim by Hazelwood (1950) that Holderness was now (immediately prior to the widespread use of organochlorine pesticides) a stronghold for otters.

Population monitoring

By using otter hunting data from the Malton and District Otter Hunt via Woordoffe (1994) and the Universities Federation for Animal Welfare (UFAW 1969) it has been possible to infer population changes in the Derwent system by expressing statistics in terms of the numbers of otters encountered per 100 days of hunting. In the 1930s the numbers of otters encountered per 100 days of hunting provided an index of 106.6. With the cessation of otter hunting and game keeping during the Second World War, the otter population could be expected to have rallied, as was evidently the case across Holderness. However, the seasons of 1950 to 1954 produced an index of only 83.3 finds per 100 days of hunting. This is a significant post-war baseline figure, Table 5.7 showing a progressive decline, with the index of finds for the seasons of 1959 and 1960 dropping to 66.6, for a 3-year period in the late-1960s to 53.3, and for the seasons of 1967 and 1968 dropping to 50.0. If the 1930s figure is ignored, the timing of this decline coincides generally with the major ‘crash’ in otter populations in the eastern counties identified by Chanin and Jefferies (1978) and ascribed to the rapid and lethal effects of the introduction in 1956 of aldrin, dieldrin and heptachlor organochlorine seed dressings and sheep-dips (Strachan & Jefferies 1996). The unpredicted drop from five occupied waters in the under-recorded 1940s to just two occupied waters in the 1950s

(see Table 4) when hunting re-commenced, may also be attributable to otter mortality, through the biocidal effects of organochlorine residues reaching the water courses from this intensively arablised region.

Distribution monitoring

Table 5.9 summarises the 21 waters from which otter evidence has been collated and categorises the periods during which otters are known to have been present. These in turn have been grouped into seven discrete catchments. Records from hunting,

TABLE 5.9. Chronological review of otters on East Riding rivers and wetland sites

River catchment and water body	1850s - 1890s	1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	Totals
Derwent (Ayton - Malton)			*	*					*			*	4
Derwent (Malton - Stamford Br.)	*		*	*	*		*		*	*			6
Derwent (Stamford Br. - Ouse)	*	*	*		*				*	*	*	*	7
Settrington Beck		*											1
Pocklington Canal	*								*	*	*	*	4
Foulness catchment			*									*	2
Lower Ouse		*	*		*				*	*			5
South Wolds streams & Mkt. Weighton Canal	*	*	*					*					3
Humber shore & clay pits (above Hull)			*	*		*		*	*				5
Driffield Beck & chalk streams	*	*		*	*		*	*	*		*	*	8
River Hull (above Beverley)								*	*		*	*	4
River Hull (below Beverley)	*	*		*		*							3
Frodingham Beck												*	1
Watton Beck									*				1
Leven Canal												*	1
Barmston Drain	*												0
Hornsea Mere				*		*			*			*	4
Burton Constable Lake						*							1
Winestead Drain								*					1
Ottringham Drain									*				1
Humber shore (below Hull)	*					*							1
Total river systems / waters	8	6	7	6	4	5	2	5	11	4	4	9	

topographical and naturalists' sources show that during the latter half of the 19th century, otters occurred on the Derwent from Ayton to its confluence with the Ouse, on the newly constructed Pocklington Canal, the south flowing Wolds streams, the Driffield Beck and River Hull, the Barmston Drain and the brackish dykes leading to the Humber shore at Kilnsea.

For each decade from the 1900s, Table 5.9 lists and totals the waters for which otters have been recorded within the study area. Numbers of occupied waters oscillated from four to seven between the 1900s and 1940. The cessation of otter hunting during the 1940s due to the Second World War resulted in the decade being under-recorded, with records coming from only five waters. Usual hunting activity on the Derwent could have added between two and three additional water sections. In the 1950s, even with the resumption of otter hunting on the Derwent, the number of positive waters suspiciously dropped to just two (the Driffield Beck and the Derwent between Malton and Stamford Bridge). In the 1960s the figure returns to five, but in the 1970s increased to an unprecedented eleven. This is likely to be a reflection of high levels of recorder effort by members of the Yorkshire Naturalists Union and the newly formed Yorkshire Mammal Group in recording sites for the national mammal atlas scheme promoted by the Mammal Society and the Biological Records Centre, and for the Yorkshire mammal atlas (Howes 1983). During the 1980s and 1990s, despite sample work within the region for the National Otter Surveys of 1984-86 and 1991-94, the number of occupied waters remained at four. In 2000, however, the positive results of the otter releases on the Derwent system are being confirmed on additional stretches and adjacent waters and the population confirmed on the Hull catchment is similarly expanding, giving a total of nine waters from which positive signs have been confirmed.

Of the 21 waters listed in Table 5.9, Barmston Drain has received no positive sightings since the 19th century and a further eight waters have only produced records in one decade since the 19th century. Optimistically, two of these (Frodingham Beck and the Leven Canal) are new additions from the year 2000. The Foulness catchment also proved positive in 2000 for the first time in eight decades. The most consistently occupied waters are the Derwent from Ayton to Malton, the Pocklington Canal, the River Hull above Beverley and Hornsea Mere with records from four decades. The lower Ouse and the Humber shore and flooded clay pits up-stream of Hull both had records for five decades, though with no positive sightings at the clay pits since the 1970s it is possible that increased disturbance by recreational interests may prove a

deterrent for animals which may potentially establish in future. The Derwent from Malton to Stamford Bridge has records for six decades, the Derwent from Stamford Bridge to the Ouse confluence has records for seven decades but the most consistently recorded water in East Yorkshire is the Driffield Beck and associated chalk streams with records for eight decades. All these waters and catchments should form a focus for conservation management in appropriate regional and local Biodiversity Action Plans.

(3) Hatfield Chase, Isle of Axholme and catchments of the Torne, Tidal Don and Went

Data sources

This area contains the river catchments, drain network systems and still water bodies associated with the 'Humberhead Levels Natural Area'. The histories and development of these waters are reviewed with respect to their suitability as otter habitats. Records have been derived from a wide range of archival, published, verbal and material sources. These include parish records, hunt trophies, museum specimens, press reports of the Doncaster, Goole and Lincoln regions, natural history journals, notably *The Naturalist*, topographical and local historical works and interviews and correspondence with local naturalists, anglers, farmers, gamekeepers and other residents. The relative productivity of these sources is shown in Howes (2000a, fig.1). This wealth of historical data has been important in order to support otter habitat conservation policies in a range of Environment Agency 'River Catchment Management Plans', 'Water Level Management Plans', 'Flood Defence Maintenance Programmes' and local 'Biodiversity Action Plans'. Such data will also assist statutory bodies and riparian land owners (Internal Drainage Boards, British Waterways, Local Authorities, Environment Agency etc.) in the re-establishment of viable otter populations within resuscitated river catchments in the lower Trent/Don regions.

The study area

The study area forms the central portion of the geographically distinctive flat lowland wetland region of the 'Humberhead Levels Natural Area' (Hirst 1997). It extends broadly from the Southern Magnesian Limestone ridge of South Yorkshire in the west to the tidal lower Trent in the east, and includes the catchments of the rivers Torne in the south (SK/5790 to SE/8311), the tidal reaches of the Don from Doncaster to Goole

(SE/5704 to SE/7422), the River Went to its confluence with the Don (SE/5216 to SE/6618), and the networks of drains and canalised water courses of the Hatfield Chase and Isle of Axholme. Although situated largely in South Yorkshire, the more easterly and northerly elements of the region fall within the new counties of North Lincolnshire and East Yorkshire respectively and part of the Went catchment borders or lies within North Yorkshire. Historical reviews of otters in the lower Trent and the catchment of the River Idle in Nottinghamshire are dealt with in Howes (1998) and the Don upstream of Doncaster in Howes (1976).

The historic landscape

Prior to the 1620s, the lowland and tidal reaches of the untamed rivers Went, Don, Torne and Idle meandered amongst meres, marshes and peat moors before exchanging waters with the brackish, estuarine Ouse and Trent. This 'northern everglades' formed the basis of a rural economy, which included fish trapping, wildfowling, egg collecting and reed-cutting. The Trent, Ouse and Don supported lucrative salmon fisheries and the twenty or so fisheries in the vicinity of the Tudworth and Thorne Meres yielded an estimated 20,000 eels annually (Tomlinson 1882). During the 15th century, swaneries and fisheries at Crowle supplied cygnets, waterfowl, eels, pike, roach, perch and tench to the kitchens of Selby Abbey (Haslop 1986). Otters could undoubtedly have thrived in this landscape, their perceived predation of commercial fish stocks giving rise to the attitudes expressed in the historical novel *The Manuscript in a Red Box* (Hamilton 1903), with bounty money paid for otter heads up to the late 18th century.

In the 1620s and 1630s, the extensive river and tidally fed meres and wetlands of the Hatfield Chase were largely marginalised or removed by the drainage schemes of Cornelius Vermuyden. These diverted the Idle into a new easterly flowing channel at Idle Stop (SK/7296). The once meandering Torne, which joined the Idle near Tunnel Pits, (SE/7304) and ultimately the old Don at Sandtoft (SE/7308), is now much diverted, straightened, considerably embanked and directed through a V-shaped water course. Now technically regarded as a 'highland drainer', the Torne is frequently above the level of the surrounding mechanically drained arable landscape, waters from which are lifted into it via a series of pumping stations.

The entire flow of the Don north from Stainforth (SE/6421) was diverted north through an artificial channel to join the Ouse at Turnbrigg (SE/6621) and later via the 'Dutch River' at Goole (SE/7422). The region of the Hatfield Chase between Thorne

Moors and Hatfield Moors, forming the old (pre-1620s) eastern course of the Don is now drained by a number of water courses including the Hatfield Waste Drain and the Boating Dyke. From the south, taking waters from the old course of the Idle in the Bull Hassocks area are the South Engine Drain and the Folly Drain. All these waters, including the Torne are placed into parallel channels known as the 'Three rivers' and finally pumped into the estuarine section of the lower Trent at Keadby (SE/8311).

Other major easterly-flowing drains entering the Trent are the Warping Drain from the Park Drain Hotel (SK/7298) and Owston Ferry (SK/8199), the Paupers Drain (SE/7814 to SE/8515) and the Adlingfleet Drain (SE/8018) to SE/8521). A detailed history of the courses of the Old river Don, its 'meres' and its associated Hatfield Chase waters is given in Taylor (1987).

Allusions to the natural rivers

Went

An entry in the diary of Rev. Abraham De la Pryme for 1697, described the water course as a 'narrow river not six yards over, but the crookedest and deepest that I ever saw in my life .... Every turn of the river makes a great bogg on the other side, on which the water is thrown by the current and there is delicate fish therein...'. Of the abundance of eels, the otter's preferred prey, he noted '.... such quantities of eels that the like was never seen. Sometimes there will break out, or fall out of the hollow bank sides, when people are a fishing, such vast knots of eels, almost as bigg as a horse, that they break all their nets in pieces' Jackson (1870). Clearly a river of this configuration and with such an abundance of eels, made the Went an ideal habitat for otters. Though currently relatively heavily engineered, the Went supports a good coarse fish stock, and is adjacent to a landscape of thickly hedged pastures and meadows, marshes, networks of drains, willow groves, and the washlands of the Went Ings. It therefore has a good potential for otter recolonisation.

Don

Adjacent to the tidal Don at Trumfleet water mills (SE/6011), De la Pryme recorded in 1697 that 'there are commonly, every May, such vast numbers of young eels comes over the wheels with the water and runs into the mill, that they are forced to give over-working, and to send into town for the swine to devour them, for they are innumerable as the sand on the sea shore' (Jackson 1870).

Torne

19th century and earlier maps show the Torne to have been a river meandering between reed beds and marshes. Descriptions by the 18th century otter hunters, refer to 'sluggish and moderately deep' sections being the otters strongholds, indeed 'John Brooke of Awkley ... could point out various places among the flags [*Iris pseudacorus*] of the old serpentine Torne where the otter had been killed'. The holts were known to be in hollows in the 'overhanging banks' and 'the deep recesses formed by the tortuous roots of the alder [*Alnus glutinosa*], and sometimes within a hollow in the body of the tree'. 'The elevated dry patches which divide the currents are spots upon which he deposits his spraints and here he breakes up his prey and leaves the refuse' (Hatfield 1866).

Habitat modifications

Navigation

The tightly meandering nature of the lower Don between Doncaster and the port of Thorne was clearly attractive to otters judging from the abundance of their records. The history of re-routing, and straightening the river and adding sections of canal for navigation purposes cut off a series of meanders and ox-bow lakes, creating at least six significant isolated still waters which served to increase the habitat diversity of the catchment. The first section of the Dun Navigation between Holmstile (SE/5703) and Barnby Dun (SE/6010) opened in 1733 and was extended downstream to Fishlake Ferry (SE/6513) soon after 1740 (Firth 1998). The resultant series of isolated meanders and ox-bow lakes, particularly at Wheatley Park, Kirk Sandall and Barnby Dun were evidently attractive to otters, giving rise to a number of breeding and hunting records. Since the 1940s several sections of old river meanders have been land-filled and the pressure to continue this process still exists. Currently all but two, which survive are now managed for angling.

The Stainforth and Keadby Canal (SE/6512 to SE/8311) with its associated soak drains which linked the Dun navigation with the Trent in 1802, in a sense recreated the pre 1620s eastern arm of the lower Don. The New Junction Canal (SE/6110 to SE/6518) which linked the Dun Navigation to the Air Calder Navigation in 1905, potentially made a new passage for otters between the Don, Went and lower Aire

catchments and provided a new series of aquatic habitats in the form of soak drains and 'borrow pits'. The Southfield Reservoir (SE/6518; 6519), a compensation lake for the Aire Calder Navigation was constructed in two sections in 1890 and 1910 respectively. Covering some 47ha it is the largest still water body in the study area and is well stocked with coarse fish. It was regularly frequented by otters in the 1930s and 1940s, but in 1958 became a busy sailing and now wind surfing venue.

Railways

The 'delves' and soak drains adjacent to the embanked railway networks created largely during the late 19th and early 20th centuries formed linking corridors between river catchments and wetland regions and gave rise to extensive linear runs of sallow carrs, reed beds and open waters often holding fish stocks. Radiating out from Doncaster across the flood plains of the Humberhead levels are the major rail routes to Selby, Goole, Scunthorpe and Gainsborough. Railway casualties have been a negative effect of this development and more recently the larger still waters created by the railways, such as Arksey Pond (SE/5706), Cementation Pond (SE/5606), Inkle Moor Pond (SE/6916), Thorne Delves (SE/6713; 6813) and Willow Garth Pond (SE/5707) are all managed for angling.

Mineral extraction

Sixteen permanent still water sites have resulted from mineral excavation for sand, gravel, clay, gypsum and warp (Armthorpe (SE/6504), Bank End (SE/9969), Belton (SE/7805), Birds Wood (SE/7300; 7301), Blaxton Common (SE/6810) Carr Side (SE/6902), Crowle (SE/7711), Ellerholme (SE/6903), Hatfield Fishing Ponds (SE/6711), Hatfield Moors (SE/6906; 6907), Hatfield Marina (SE/6610), Hayfield (SK/6399), Lindholme Lake (SE/7306), Moss (SE/5814), Tire'em Hall (SE/6805) and Tudworth (SE/6810). Although these are potential otter sites, seven are managed for angling, three for boating and three have ‘terrestrialised’ through a drop in the water-table. Only those at Armthorpe, Birds Wood and Hatfield Moors are currently undisturbed. Although more quarries have been and are being excavated, a generally falling ground water table renders their water holding capacity problematical with landfill and low grade agriculture regarded as a more lucrative end-use.

Pre-19th century bounty payments

Evidence of bounty payments made for otters can occasionally be located in the accounts of churchwardens and other parish officials in riparian parishes from the late 16th century to the first quarter of the 19th century (Howes 1978, 1984, 1998). Attempts were made at the Doncaster Metropolitan Borough Archives Department, the Borthwick Institute for Historical Studies, and the County Records Offices at Nottingham and Lincoln to trace appropriate documents relating to riparian parishes situated within the following river catchment areas:

River Don - Arksey with Bentley; Barnby Dun; Doncaster; Fishlake; Stainforth.
River Trent (left bank) - Althorpe; East Lound; Owston Ferry; West Butterwick.
River Torne - Cantley; Loversall; Rossington; Tickhill; Wadworth; Wroot.
Pre-1620s course of river Don and Hatfield Levels drains - Adlingfleet; Crowle; Eastoft; Hatfield; Thorne;
Isle of Axholme - Belton; Epworth; Graizelound; Haxey.
River Ouse - Goole; Hook; Swinefleet; Whitgift.
River Went - Cowick; Moss; Sykehouse.

Of these 32 targeted parishes, relevant archives from the appropriate date period were only traceable for 11 them (see Appendix 5.1); of these, only eight parishes contained records of 'vermin' bounty payments, and of these only three, Arksey with Bentley (34 records), Doncaster (2 records) and Owston Ferry (4 records) (9% of those investigated) produced records of otters. The resultant 40 otter records, ranging in date from 1619 to 1762, are itemised in Appendices 5.10, 5.11 and 5.12.

Otter hunting

On 15 August 1862, the Doncaster journalist C. W. Hatfield interviewed Mr Hill Lee, schoolmaster and local historian of Auckley on the subject of his own forebear Robert Lee (1745 to 1814) and Mr Whitaker (1710 to 1794) of Auckley, two of the most celebrated otter hunters in the Doncaster region. Whittaker was described as being a remarkable character who wore immense waterproof boots and was armed with a spear and often with a long pole 'shod with an iron pike' with which he could 'vault with ease over rivers and drains after the manner of the Dutch'. He was a solitary hunter and his otter killing services were in demand on all the local landed estates 'the more he protected the stew ponds, the more cordial were his receptions' and he regularly

patrolled the banks of the Torne, Trent and Don in pursuit of the otter. Other followers of otter hunting on the Torne during the late 18th and early 19th centuries were John Bradbury, John Brooke, William Elvidge, Edward Law, Thomas Milner, George Mowbray and John Watson. They generally kept an otter hound and had their fixed days for 'hunting' (Hatfield 1866).

Private packs of otter hounds, such as those managed by Sir Charles Legard and by Colonel Dawson, visited the Don in the 1890s, notably at the invitation of Sir William Cooke of Wheatley Park, Doncaster. Whilst based at Bawtry for their annual week's sport, the Buckinghamshire Otter Hounds, formed in 1890, visited and made kills at Lindholme Lake up to the 1950s.

Review of records by river catchments, drain networks and still water bodies

Records from all sources are presented in chronological order per water body, drain or river system commencing in the south of the study area.

River Torne and the Doncaster Carrs above Rossington Bridge

During the 18th century otters regularly visited the fish ponds of the estates at Loversall (SK/5798) and Alverley (SK/5499) situated on the fringes of the fens and marshes of the Doncaster, Balby and Rossington Carr complex (Hatfield 1866). In 1812, in snowy conditions, John Wright tracked an otter across the Doncaster Carrs (SE/5801) where it had killed a pike, and on to the lake known locally as the Old Eaa (SE/5900) where it had killed a second fish (Hatfield 1866). In January 1907, a 3 ft .5 in., 14 lb female was shot by Arthur Shirtcliffe at Styrrup Haugh, Tickhill (SK/5991); the specimen was preserved by the local taxidermist James Watson (*Doncaster Gazette* 4.1.1907). During the prolonged winter of 1946-7, tracks and the remains of fish kills, which included roach and gudgeon, were seen on the Torne bank from Park Wood (SK/6199) and Rossington Bridge (SK/6299) (R. Rhodes, *pers. comm*. 1987). The last otter seen in this part of the catchment was an adult on the newly subsided and inundated carrland at Low Ellers (SE/5900) in 1963 (B. Baxter, *pers. comm*. 1969).

River Torne downstream of Rossington Bridge

In the early winter of 1810, John Wright, a Doncaster Corporation gamekeeper shot an otter at Rossington Bridge, its body was later found down stream at Tunnel Pits (Hatfield 1866). Mr William Brook of Bawtry noted in 1863 that 'the river Torne, from

Acomb Bridge (SE/6410) to Rossington Bridge (SK/6299), afforded much sport in the otter hunt' Hatfield 1866). In 1976 anglers again reported seeing otters in the Wroot area (SE/7003) and the section known as the Three Rivers (SK/8110) (D. Mahoney, *pers. comm.* 1976). Single spraints were located by the bridge at Hirst Wood (SE/7809) during the 1994 national otter survey (Strachan and Jefferies 1996), and in November 1994 by the author.

Drains associated with the Hatfield Levels and Keadby Canal

On 13 May 1906 an otter weighing 21lb and measuring 4' 6" was trapped and killed on the southern edge of Thorne Moors at Medge Hall Farm (SE/7412) and other otters had been seen in the area (*Doncaster Gazette* 18.5.1906). In early January 1921 an adult female was shot near Hatfield (SE/61) and a week later an otter cub was found asleep in farm stackyard about one or two miles distant and also dispatched (*Doncaster Chronicle* 7.1.1921). In about 1923 an adult otter was shot by Joseph Richardson in the Boating Dyke on the Hatfield Levels, the mounted specimen is in Doncaster Museum (Howes 1987). In the 1930s, otters were known to occur in the Crowle Brick Ponds (SE/7711) and in 1963 there were sightings and fish kill remains (W. Bunting, *pers. comm.* 1976). On 5 June 1971, signs in the form of a slide through bank-side vegetation and the remains of characteristically chewed roach and bream were seen in the North Engine Drain, downstream of Dirtness Pumping Station (SE/7710) (Howes, 1987). In September 1982, otters, including young were seen in the North Soak Drain of the Stainforth and Keadby Canal between Medge Hall (SE/7412) and Keadby Power Station (SE/8311), and on 2 September an otter was sighted in an angling pond near the power station (A. Frankish, *pers. comm.* 1987). In October 1997 an otter was killed on the A18 west of the Crowle/Hirst Priory Junction (SE/7810) (A. Dickson, *pers. comm.* 1998) and on 12 March 1998 one was seen crossing the A18 near the same point (C. Taylor, *pers. comm.* 1989).

Drains of the Isle of Axholme

Between 1730 and 1748 the churchwardens of Owston Ferry paid 1 s. per head for four otters (see Howes 2000a, Appendix 4). In 1939, a 4 ft 11 in. specimen was shot in Temple Drain at Belwood (SE/7908) and preserved by a local taxidermist (M. Jackson, *pers. comm.* 1986, F. Robinson, *pers. comm.* 1986). In November 1972 one was seen in the Warping Drain at Owston Ferry (SK/7998) (B. Fetherstone, *pers. comm.* 1972).

Hatfield Moors and Lindholme Lake

Otters frequented Lindholme Lake and the drain on the east side of the moor during the 1930s (Marshall *et al.* 1989). Up to the 1950s, Lindholme Lake (SE/7306) was seasonally visited by the Buckinghamshire otter hounds. A visit in 1950 'caused local excitement', although no kill was made (Hyde 1952); however, a mounted specimen and a mounted head, both dating from the 1950s in the collection of Jack Lyon at Lindholme Hall, were obtained at the lake (Hyde 1952, D. Mahoney, *pers. comm.* 1976, Marshall *et al*. 1989). In 1976 otters were still being observed here by local anglers (D. Mahoney, *pers. comm*. 1976). From the 1970s to the 1990s, otters were present in the Hatfield Waste Drain (SE/7207) on the northern boundary of Hatfield Moors, indeed a holt was still in use during the late 1990s (B. Craggs, *pers. comm.* 1998).

Thorne Moors

Although Thomas Bunker (1898) knew of no otters on the moors, one was shot in the Thorne Waste Drain (SE/7213) in the 1890s (M. Snow, *pers. comm.* 1989). Contrasting with Bunker's (1898) comment, Corbett (1907) claimed that the otter still abounded in the neighbourhood of Thorne Moors (SE/71). The only records actually referring to the peat moor involve otters in the peat canals area (SE/7215) in the late 1930s, along Swinfleet Warping Drain (SE/7415) in 1947 and along Thorne Waste Drain in 1963 (Bunting 1976). Significantly, during the winter of 1972-3 following the peat industry's excavation of major drainage ditches through the peat and into the underlying clays along the southern edge of the 'canals area' (now Thorne Moors National Nature Reserve), the footprints of many species, including otter, could be seen in the fresh clay (Limbert 1979).

***River Don* (*Doncaster to Goole*)**

The churchwardens' accounts for the township of Doncaster show that in 1619 1 s. was paid for two otter heads (see Appendix 5.11). In the 1700s, otters were known to frequent the River Cheswold (SE/5703) near St George's Vicarage and in periods of flooding, otters enter the open sewers connected with the Don at Doncaster (SE/50)

(Hatfield 1866). The churchwardens' accounts for the parish of Arksey with Bentley (SE/50) reveal that between 1720 and 1762 bounties of 1 s. each were paid for some 34 otters with a maximum of five being declared in 1762, giving an average cull of 1.2 per year (see Appendix 5.12). Nonetheless, during the 1790s William Guest reported that he still 'frequently met with the otter in the River Don at Bentley' (Hatfield 1866).

In 1794 two were killed with one shot at their holt in the bank of a Don oxbow at Wheatley Park (SE/5805), and in the early 19th century, Richard Guest and John Tomlinson caught one in Cobshire [Cockshaw] dyke end in the catchment of the Eaubeck, near Reedholme House (SE/5810) (Hatfield 1866). In 1833 otters were present in Wheatley Ponds at Wheatley Park (SE/5805) (Hatfield 1866) and in December 1844, several otters were present in the old river Don at Kirk Sandall (SE/6008), their many footprints being distinctly visible in the sandy bank (*Doncaster Gazette* 20.12.1844). One caught a nesting duck at Sandall Grange (SE/6006) in 1850 (Hatfield 1866), and in September 1890 Sir Charles Legard's Otter Hounds found but did not kill an otter in the old course of the Don about a mile above Kirk Sandall Lock (SE/5906) (*Goole Weekly Times* 26.9.1890). In early February 1891 a 3ft 7inch 18lb otter was shot by James Piper in one of the Dun Drainage drains at Kirk Sandall (SE/6007) (*Doncaster Gazette* 6.2.1891), and in late September 1892 Col. Dawson's otter hounds encountered an otter at Barnby Dun (SE/6109) (*Doncaster Gazette* 23.9.1892).

In June 1911 an otter was at Sandall Lock (*Doncaster Chronicle* 9.6.1911) and in 1921 one was killed on the railway lines in Wheatley Park (SE/5804) (Howes 1976). The *Doncaster Chronicle* reported that 'Two cases of very fine otters captured at Wheatley Ponds (SE/5805) may be seen at the museum' (Senior 1926); these were likely to be the specimens mentioned above, placed in the collection of Sir William Cooke of Wheatley Hall and loaned and later donated to Doncaster Museum.

During the third week of October 1933 two young were caught at Rawcliffe Bridge (SE/7021) (Bramley 1933, YNU Circular 385) and on 13 June 1938 a 'family party' of five were reported in the adjacent river Aire at Rawcliffe (SE/6823) (Gallwey 1939). By the 1950s otters were reportedly rare around Doncaster though they evidently still visited the ponds (river Don oxbows) at Wheatley Park until the 1940s, George E. Hyde (1952) recalling a pair that lived behind the old hall provided interest and entertainment to the quiet observer on numerous occasions.

In 1959, on the warpings by the Rawcliffe Road, Thorne Waterside (SE/6714), on opening a 'potato pie' a large male otter, using this structure as a refuge, was disturbed and killed. Its pelt, preserved by a local butcher, survived until recently (D. F. Finch, *pers. comm*. 1989). In 1966 an adult was seen in the Stainforth-Keadby canal at Bramwith lock (SE/6111). During this period breeding had taken place as from time to time cubs were killed by local youths with air guns (J. McGarry, *pers. comm.* 1971). In April 1971 many footprints were present in the tidal mud and around the washland ponds between the Don and its flood banks at Stainforth East Ings (SE/6613 and 6713) and on 6 April two adults and up to three cubs were observed (J. McGarry, *pers. comm.* 1971, Lenton *et al*. 1980). Footprints were also identified around the 'dugout' lake at Thorpe Marsh (SE/5909) on 14 April (R. Rhodes, *pers. comm.* 1971).

River Went

An otter was present on the fenland lake of Shirley Pool (SE/5611) in 1847 (Hatfield 1866). On 15 December 1872 a cub was found dead on the banks of the Went (Land and Water 1873, Southwell 1877). An adult otter was unsuccessfully pursued by the hunt in the Carr Drain at Cowick Park (SE/6302) in June 1909 (*Goole Times & Weekly Herald* 18.6.1909) and on 9 December 1919, a 28lb female otter was killed on the Hull Barnsley Railway line near a fishing pond at Balne Moor (SE/5819) (*Goole Times* 12.12.1919). Otters were again reported from Shirley Pool in 1938 (Yate-Allen 1938) and during the 1930s and 1940s otters occurred fairly commonly on Southfield Reservoir (SE/6519). Jim Hall, water bailiff for the Castleford Angling Association, noted that 'Otters were fairly common, sometimes three or four could be seen in a morning. The best time to see them was at first light, their favourite haunt being the grassy triangle at the southern end of the reservoirs serpentine bank. When disturbed they would swim across the canal and soak drain and run across the Went water meadows towards the aqueduct' (Wall 1986). One was found dead by Reg. Rhodes on the eastern bank of the reservoir in January 1960 (Hazelwood 1961), in the autumn of 1972 one was encountered on the Went near its confluence with the Don (Wall 1986) and on 14 September 1981 one was seen at Southfield Reservoir (Burden 1981).

National Surveys

Water courses in the study area have been included in four National Otter Surveys. Stevens (1957) report that within the lower Trent region they were 'numerous' and in the

Yorkshire Ouse region, they were *'very numerous'*. The 1977-79 survey visited 24 sample sites on the canalised and heavily maintained water courses of the river Torne and the associated drains up to the Ouse within the lower Trent region and 16 sites in the lower Don/Went area in October 1978, and all proved negative (Lenton *et al*. 1980). For the 1984-86 survey, the combined 40 sites were examined in October 1985, and again all proved negative (Strachan *et al.* 1990). The 1991-94 survey revealed a single spraint on the Torne and this, together with a probable otter sighting on the lower part of the Trent suggested that transient animals were using this system (Strachan & Jefferies 1996).

Discussion

This study has accumulated 123 records or allusions to otters from the study area with dates ranging from 1619 to 1998. The number of records gathered for the 18th and 19th centuries and each decade through the 20th century for each of the target catchments of the Torne, tidal Don, Went, and the drain networks of the Hatfield Levels, Isle of Axholme, Thorne Moors and Hatfield Moors is provided in Table 5.9.

Table 5.9. Records and allusions of otters per drain and river catchment

	pre. 18th century	18th century	19th Century	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	TOTALS
Torne catchment		2	3	1				1		1	2		2	**12**
Hatfield Levels & Keadby Canal				2		3	1			1	1	3	2	**13**
Isle of Axholme		4					1				1			**6**
Hatfield Moors							1	1	3		2	1	1	**9**
Thorne Moors			1	1			1	1		1	1			**6**
Don catchment	2	38	8		1	1	2	2	1	3	6			**64**
Went catchment			2	1	1		2	4		1	1	1		**13**
TOTALS	**2**	**44**	**14**	**5**	**2**	**4**	**8**	**9**	**4**	**7**	**14**	**5**	**5**	**123**

Indications of the suitability of river courses for otter habitats deduced from early cartographic sources and allusions to the abundance of otter prey species in the natural river catchments prior to the river diversion and drainage schemes of the 1620s

and 1630s suggest that otters would have been numerous and widespread throught the Humberhead Levels prior to the early 17th century.

Upstream of the Hatfield Chase the riverine habitats of the Torne, Don and Went, and superabundance of eels, the otters preferred lowland prey species, indicated a continuation of otter abundance up to the late 18th century and allusions to the popular though solitary pastime of otter hunting indicate the Torne to have been a prime otter river up to the 19th century. By isolating a number of substantial meanders of the lower Don, the development of the Dun navigation seems to have actually created a number of otter habitats. A considerable number of other aquatic habitats have also been created incidentally to the development of linear canal and railway systems and also by the mineral extraction industry.

Figure 5.5 compares the number of records gathered for the 18th and 19th centuries and each decade through the 20th century. This indicates the very high rate of persecution during the 18th century through specialist otter control on private estates and a bounty payment system operated through township or parish authorities. The churchwardens' accounts from the parish of Arksey with Bentley revealed bounty payments for some 34 otters with a maximum of five in one year, between 1720 and 1762 represented an average cull of 1.2 per year (see Appendix 5.12). If this was typical, an average annual culling pressure of some 12 per year may have been exerted

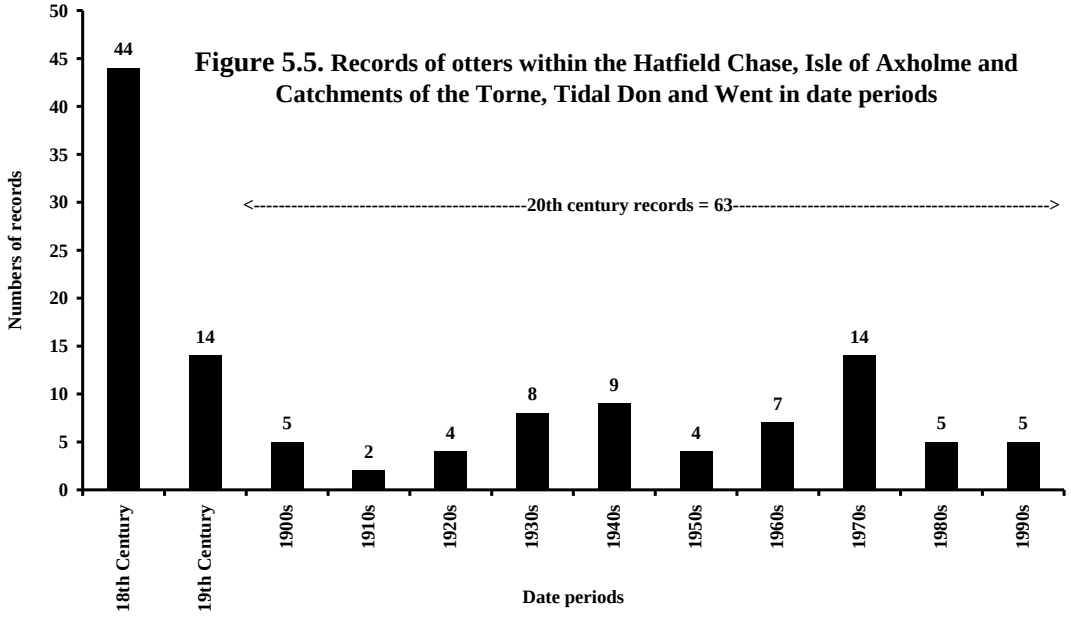


Figure 5.5. Records of otters within the Hatfield Chase, Isle of Axholme and Catchments of the Torne, Tidal Don and Went in date periods

within riverside parishes from Doncaster to Goole. Interestingly, through the 19th century, when one would have expected a rise in documentary evidence of otters via the

increased availability of local newspapers, scientific journals and topographical histories, in fact otter records decline. This is probably related to the 19th century 'crash' in otter populations in South Yorkshire rivers due to persecution pressure (Howes 1976). Hugh Reid, the Doncaster taxidermist, remarked that 'every hand was uplifted against the otter, its desertion of its old haunts is entirely attributed to the … intense hatred of its habits of destruction of fish'. Referring to the Don at Doncaster around 1800, William Guest claimed that 'the otter has deserted its former haunts … becoming extinct by the vigilance of the expert gunner' and Hatfield (1866) noted that the otters 'extermination on the banks of preserved ponds and pools has been nearly if not wholly accomplished'.

Figure 5.5 indicates that the decline continues through the early decades of the 20th century. Possibly due to a decline in game keeping and 'vermin' control during and after The First World War, numbers appear to increase to the 1940s. However, a decline during the 1950s and 1960s could reflect the population crash in lowland eastern England at this time, caused by the introduction of the cyclodiene organochlorine insecticides, aldrin, dieldrin and heptachlor (Strachan & Jefferies 1996). Since these pesticides, which became widely available by 1955, were used on cereal, brassica and root crops, the study area, which is largely managed for the benefit of the arable industry, would have been particularly heavily contaminated up to the period of their voluntary ban in 1962 and total ban in 1975 (Strachan & Jefferies 1996).

The peak of records during the 1970s can be accounted for by an increase in recorder effort in the form of an interview survey of anglers across the Hatfield Chase (D. Mahoney, *pers. comm.*) and the author canvassing for data for the Mammal Society otter survey at this time. Subsequent low numbers of records through the 1980s and 90s is probably a reflection of a lower canvassing effort and therefore represents an under-estimation of occurrence. It does however confirm that some otters survived the organochlorine-poisoning ‘crash’ and the species still maintains a presence within the study area.

From Table 5.9 (see also Howes 2000a, Figure 3) the percentage frequencies of the 123 records can be determined; this highlights the tidal lower Don catchment as being easily the most significant otter river, providing 52% of the records. Even excluding the 17th and 18th century bounty payments, the tidal Don accounts for 27% of the records, representing approximately twice the productivity of the Went catchment (13%), Hatfield Chase drain networks (13%) and Torne catchment (12%).

This study has identified 26 still waters, which have been created by river straightening, canal and railway construction and the mineral extraction industry over the past two and a half centuries. Although some of these have a history of otter usage, only five are currently free from the disturbance of water sports and angling interests. Since human disturbance is generally inimical to otter activity, this current level of recreational use of still water sites may be a significant impediment to successful re-colonisation. Further, since there is currently active lobbying by angling and fishery interests against the protected status of piscivorous birds within the study area, the almost universal utilisation of still waters, canals and the recently much improved rivers by angling interests, may raise objections should otter populations become established and increase. Meanwhile, in accordance with 'Local Biodiversity Action Plans', work proceed to install artificial otter holts at strategic sites on the Torne and lower Don catchments to enable vagrant animals which periodically pass through the region to form the basis of sustainable resident populations.