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Fourth Otter Survey of England 2000-2002



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Summary

The fourth national otter survey of England was carried out from January 2000 to February 2002. Signs of otters were found at 34 per cent of the 3,327 sites visited. The results are expressed as the percentage of survey sites found to have signs of otters within alternate 50-km squares of the National Grid and within 12 “regions” of the country. To allow direct comparison these “regions” generally follow the boundaries used in previous surveys. They are the 10 regions of the then water authorities and National Rivers Authority, although two of the regions (Severn-Trent/Midlands and Welsh regions) have been further split into their constituent catchments (the Severn and Trent catchments and the Wye and Dee catchments) for reporting purposes.

For the baseline survey of England in 1977-79 (Lenton et al, 1980) 2,940 sites were examined, and signs of otters found at 170 (5.8 per cent) of these. For the second otter survey of 1984-86 (Strachan et al, 1990) 3,189* sites were examined, including all those in the 1977-79 survey, and 284* sites (8.9 per cent) were found to be positive. In the third survey of 1991-94 (Strachan & Jefferies, 1996), the same 3,189 sites were examined and 706 (22.2 per cent) found to be positive. A direct comparison of the 2,940 sites examined in all four surveys shows 170 (5.8 per cent), 282* (9.6 per cent), 687 (23.4 per cent) and 1,066 (36.3 per cent) respectively were positive. There was a 67 per cent increase in positive sites between 1977-79 and 1984-86, a 142 per cent increase between 1984-86 and 1991-94 and a 55 per cent increase between 1991-94 and 2000-02. This is a 527 per cent increase between 1977-79 and 2000-02, based upon the original 2,940 sites of the first survey.

The 2000-02 survey confirms that the increase in otter distribution seen since the first survey in 1977-79 is continuing. Every one of the 12 regions and catchments, into which England was divided for the survey, shows an increase in the number of positive sites.

Otters were found in 35 of the 38 50-km squares or partial squares surveyed. Only in squares SK n/w (Trent Catchment) and TR n/w (Southern Region) were otter signs found during the 1991-94 survey, but not during the 2000-02 survey. This was probably because of high water in the period just before the 2000-02 survey, and in both these squares otter signs have been found during subsequent independent surveys. Square NX s/e (North West Region) with only five sites had not been surveyed during previous surveys and no signs were found during the present survey. In all the other five partial 50-km squares added for this survey, otter signs were found. In square SX s/e (SW Region) 91 per cent of the new sites were positive.

The scale of the increase varies considerably but it is significant that the leading edge of the recovering population is continuing to expand. This appears to be creating large areas with otter populations at low density followed by consolidation which seems to occur some years after the leading edge has passed.

Otters were present in 73 per cent of the 105 LEAP areas surveyed in whole or part. An increase in otter distribution cannot be directly translated into an increase in otter numbers; nevertheless, the expansion in range must reflect a significant increase in the number of otters on Britain's rivers and wetlands.

The 2000-02 otter survey of England provides an opportunity to assess the current status of the otter in England and to recommend priorities for action to identify trends in distribution, identify possible barriers to the full recovery of otter populations and the actions needed to remove those barriers.

* Due to previous minor errors in calculation these numbers differ slightly from those given in previous reports.

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Introduction

The otter (*Lutra lutra*) is often seen as an emblem for nature conservation in the UK.

It is a top predator and important biological indicator of the health of our rivers and wetlands. Monitoring the status of the otter therefore gives us a valuable measure of the state of our water and wetland ecosystems. The otter suffered a serious decline throughout most of its European range, and by the mid 1970s the UK population had been reduced to a point where only remnant populations were found except in upland areas and the coasts and islands of Scotland. In England, as in most of its range, it is a largely nocturnal animal and rarely observed in the wild, but it is possible to detect its presence by searching for faeces (spraints) and footprints.

The first national otter survey of England was carried out during 1977-79 (Lenton et al, 1980). It provided a baseline for the distribution of otters and, together with surveys in Wales, Scotland and Ireland (Crawford et al, 1979; Green & Green, 1980; Chapman & Chapman, 1982), was undertaken in response to growing concern for the status of the otter in Britain (O'Connor et al, 1977). Of the 2,940 sites surveyed in 1977-79, only 170 (5.8 per cent) showed evidence of otters. This confirmed the results of the analysis of hunting records (Anon, 1969, 1974; Chanin & Jefferies, 1978), the impression of many naturalists (Walker, 1970; Howes, 1976; Lloyd, 1962) and the results of a volunteer survey by the Mammal Society (O'Connor et al, 1977), that there had been a major decline in otter distribution. The baseline survey showed that the only significant populations of otters remaining in England were in the south west and along the Welsh border, with small and fragmented populations in East Anglia and in northern England. Otters were absent or only sparsely distributed in much of lowland and central England. Subsequent surveys and research have demonstrated that this was probably the nadir of the decline that began in the late 1950s, and was primarily caused by the introduction of the persistent organochlorine pesticides aldrin and dieldrin (Strachan & Jefferies, 1996).

National surveys were repeated in 1984-86 (Strachan et al, 1990) and 1991-94 (Strachan & Jefferies, 1996), using the same method and visiting the same sites.

A further 249 sites were added during the 1984-86 survey to improve coverage, bringing the total to 3,189. Of these 284 (8.9 per cent) were positive in 1984-86 and 706 (22.1 per cent) were positive in 1991-94. These surveys, plus extensive monitoring by the Vincent Wildlife Trust, the Water UK and The Wildlife Trusts' Otters and Rivers Project (OARP) staff, and by other groups and individuals, showed that otter populations were gradually recovering. This recovery, however, has been markedly slower than that for many raptor species (for example the peregrine falcon) which were similarly affected by organochlorine compounds. This may reflect the slower breeding rate and recovery potential of otters, but a number of other factors may also have slowed their recovery. These include direct persecution (prior to 1978), wetland and river habitat loss and degradation, increased human disturbance, poor water quality (particularly through the impact of toxic compounds such as PCBs), a perceived decline in fish productivity and increased levels of traffic leading to more road deaths (Strachan & Jefferies, 1996; Bradshaw & Slater, 2002). Continued monitoring is therefore essential for assessing the rate of recovery, a fact recognised as far back as 1979 when it was decided to undertake regular surveys (O'Connor et al, 1979).

The present survey, the fourth in the series, added 138 more sites, bringing the total to 3,327 of which 1,137 (34.2 per cent) were positive. As with the surveys in 1984-86 and 1991-94 the sites were visited as far as possible at the same time of year to facilitate direct comparison. The survey was co-funded by the Environment Agency and English Nature and co-ordinated by Andrew Crawford of the Environment Agency. Unlike the previous surveys which were carried out by one surveyor, (or two in 1984-86), the 2000-02 survey was carried out by 25 surveyors (Appendix 2). Of the 3,327 sites, 1,110 (33 per cent) were surveyed by specialist contractors paid for by the Environment Agency or by the national co-ordinator and Agency staff. The other 2,217 (66 per cent) were surveyed by OARP staff, from The Wildlife Trusts who were supported by funding from Water UK and Biffaward, individual water companies, the Environment Agency and others.

This collaborative effort ensured that the 'health-check' of the recovering otter population was maintained. Crucially, the information from this survey builds on the foundation laid by the first national survey co-ordinated by the then Nature Conservancy Council and the two subsequent England surveys funded and carried out by the Vincent Wildlife Trust.

Since the 1991-94 otter survey of England, the UK has fulfilled a commitment to the Convention on Biological Diversity signed at the 1992 Rio Summit by producing the UK Biodiversity Action Plan (BAP).

The otter is one of over 400 priority species for which a species action plan has been produced (HMSO, 1995). The otter was considered a priority species for conservation action because of its earlier decline. It was therefore recognised that co-ordinated action and monitoring were required to ensure the restoration of fully viable populations throughout its historic range across the UK. The otter has one of the highest levels of protection for a species under European and UK law, but this alone does not guarantee its recovery.

Conservation action for the otter in Britain has a long history with many players fulfilling different roles. This effort is continuing. The Environment Agency is now the contact point for otter conservation under the UK BAP and is a lead partner with The Wildlife Trusts in implementing the Otter Species Action Plan.

The Otter BAP steering group includes representatives from the statutory nature conservation bodies and other key organisations:

English Nature (EN)

Countryside Council for Wales (CCW)

Scottish Natural Heritage (SNH)

Joint Nature Conservation Committee (JNCC)

Water UK (major sponsors of The Wildlife Trust's Otters and Rivers Projects during the period of the fourth National Otter Survey)

Scottish Environment Protection Agency (SEPA)

Environment and Heritage Service of Northern Ireland

Department of Agriculture (N.I.)

The Wildlife Trusts

The UK Otter BAP Steering Group has acted as the management group for promoting and overseeing the present survey.



Methods

Survey Method

The standard otter survey method was used, following that adopted by Lenton et al (1980).

Survey sites

These were originally selected for the 1977-79 survey at 5-8 km intervals along main rivers and coast or lake shore. Since one surveyor could cover less than half of England in two years, alternate 50-km squares - the north-western and south-eastern quarters of each 100 km square - of the National Grid, were surveyed to give geographically representative cover of all regions. A total of 28 squares and partial squares was covered, resulting in 2,940 sites. At each site a 600m survey was carried out along one bank by searching for otter signs, usually 300 m upstream and downstream of a bridge or other access point.

Due to time constraints during the first national survey, three of the alternate full 50-km squares were not surveyed. These were TQ n/w (which covers central London), because there was little chance of otter presence; TL s/e, which had been surveyed a few months before as part of a county survey; and SK n/e. Many of the partial 50-km squares next to the coast were also left out due to lack of time.

The second national otter survey in 1984-86 added four more squares or partial squares (NZ s/e, SK n/w, TL s/e and TR n/w). This brought the total of squares and partial squares surveyed to 32 and the number of sites surveyed (including assumed negative sites – see below) to 3,189*. All these sites were revisited in the 1991-94 survey.

For the 2000-02 survey it was decided that all alternate 50-km squares would be surveyed, even where they would contain very few sites. A further seven previously unsurveyed 50-km squares and partial squares were added, bringing the total of squares and partial squares surveyed to 38 and the total of sites to 3,327.

Method

For the first national survey in 1977-79 the survey effort was halted as soon as otter signs were found at

a site. The full 600m length was only surveyed at sites where no signs were found. For the second (1984-86) and third (1991-94) surveys the full 600m was usually surveyed at each site, even if otter signs were found. To reduce survey time, the 2000-02 survey used the same method as in the 1977-79 survey; the search was halted at the first otter sign.

Timing of the survey

As far as possible, the surveys were carried out within four weeks of the date of the previous survey. In a small number of cases where bad weather caused delays, surveys took place outside the four week period. However this occurred on only a very small percentage of the sites. The severe flooding in the autumn and winter of 2000 caused serious delays which were compounded by the outbreak of foot and mouth disease, in 2001. These events led to a delay of 12 months in the completion of some sites mainly in Southern and Anglian Regions. However, it is not believed that the delay altered the results in any way.

Non visited and assumed negative sites

The 1977-79 survey introduced “non-visited” sites (assumed to be negative), mainly for rivers in large conurbations such as Birmingham. It was assumed that otters would not enter urban areas, so these rivers were not surveyed because results were almost certain to be negative. If non-visited sites were excluded from the analysis, the proportion of positive sites in a mainly urban square would be highly skewed, biasing the conclusions. In some cases access to a site was refused and an alternative was not available. Survey sheets were filled in for the sites which were categorised as “assumed negative”. In 1977-79 there were 204 such sites, 136 in 1984-86, 83 in 1991-94 and 12 in 2000-02.

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Spot checks

In the 1977-79 survey, spot-checks, generally at bridges, were used as a quick way to add to the available knowledge of otter distribution. They were considered particularly useful where there were no positive sites in a catchment and bridges could be easily and quickly checked. In these cases casual records of this sort added greatly to the available knowledge. With the complete coverage of alternate 50-km squares in the 2000-02 survey and the large number of surveys carried out by wildlife trusts, volunteers and the Environment Agency, they were not considered necessary. Spot-checks were therefore not used during the present survey.

Surveyors

A single surveyor carried out both the 1977-79 and 1991-94 surveys while the 1984-86 survey was begun by one surveyor and completed by a second. The smallest possible number of surveyors was used to give greater consistency because of the technical skills required. With the availability of well-trained and experienced surveyors the 2000-02 survey was carried out by one of the following: (i) the local Otters and Rivers Project (OARP) officers of the relevant wildlife trust; (ii) one of three contractors specifically employed by the Environment Agency; (iii) the author, who also acted as national co-ordinator. In all cases the level of competence and experience was very high. All surveyors attended a two-day training course on the survey method before starting work. Appendix 2 lists the surveyors and the number of sites they surveyed.

Mink

Mink signs were also recorded while surveying for otters, but as the survey was halted when the first otter sign was discovered, the results for mink signs cannot be used as an accurate reflection of the occurrence of this species

* Due to previous minor errors of calculation these numbers differ from those given in previous reports.



Overall Results for England

The overall results for the fourth otter survey of England 2000-02 and the results for each of the “regions” are summarised in Table 1 and the results for each of the 50-km squares surveyed in Table 2.

The results for the baseline (1977-79) survey and subsequent surveys are listed in the same tables. A total of 2,940 sites was surveyed in 1977-79. This was increased to 3,189* in 1984-86 and 3,327 in 2000-02. The number was increased in order to improve national coverage but when comparing the overall success rate with that in the baseline, a comparison can only be made between those sites which were examined in every survey. Thus of the 2,940 sites surveyed in 1977-79, 170 (6 per cent) were found to be positive. The number of the same sites which were positive had increased to 282* (10 per cent) in 1984-86, to 687 (23 per cent) in 1991-94 and 1066 (36 per cent) in 2000-02. Signs of otters were found at 1137 (34 per cent) of the 3327 sites visited in 2000-02.

Otters were found in 35 of the 38 50-km squares or partial squares surveyed. Square NX s/e (NW Region) with only five sites had not been surveyed during previous surveys and no signs were found during the present survey. Only in squares SK n/w (Trent catchment) and TR n/w (Southern Region) were otter signs found during the 1991-94 survey, but not during the 2000-02 survey. This was probably because of high water in the period just before the 2000-02 survey. In all the other five partial 50-km squares added for this survey, otter signs were found. In square SX s/e (SW Region) 91 per cent of the “new” sites were positive.

* Due to previous minor errors in calculation these numbers differ slightly from those given in previous reports

Table 0.1 | Results for 2000-02 Survey and Comparison with Previous Surveys

	1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites - comparison of 77-79 sites				
- all sites	170/2940	282/2940	687/2940	1066/2940
% Positive - comparison of 77-79 sites				
- all sites	5.8%	9.6%	23.4%	36.3%
		8.9%	22.1%	34.2%

Table 1 | Results by Region 2000-02 and Comparison with Previous Surveys

REGION	1977 - 79 +ve/total	1984 - 86 +ve/total 77 - 79 +ve/total 84 - 86	1991 - 94 +ve/total 77 - 79 +ve/total 84 - 86	2000 - 02 +ve/total 77 - 79 +ve/total 84 - 86
North West	9/322 (2.8%)	31/322 (9.6%) 31/331 (9.4%)	93/322 (28.9%) 93/331 (28.1%)	110/322 (34.2%) 110/371 (29.6%)
Northumbria	14/169 (8.3%)	17/169 (10.1%) 17/174 (9.8%)	45/169 (26.6%) 46/174 (26.4%)	85/169 (50.3%) 90/174 (51.7%)
Yorkshire	4/227 (1.8%)	5/227 (2.2%) 6/270 (2.2%)	25/227 (11.0%) 28/270 (10.4%)	44/227 (19.38%) 68/284 (23.9%)
Dee	0/12 (0.0%)	1/12 (8.3%)	5/12 (41.7%)	6/12 (50.0%)
Severn	13/328 (4.0%)	22/328 (6.7%)	105/328 (32.0%)	127/328 (38.7%)
Trent	0/238 (0.0%)	0/238 (0.0%) 0/282 (0.0%)	12/238 (5.0%) 18/282 (6.4%)	58/238 (24.4%) 58/282 (20.57%)
Wye	12/70 (17.1%)	23/70 (32.9%)	49/70 (7.0%)	58/70 (82.9%)
Anglian	20/622 (3.2%)	8/622 (1.3%) 8/725 (1.1%)	52/622 (8.4%) 58/725 (8.0%)	166/622 (26.7%) 188/728 (25.82%)
Thames	0/169 (0.0%)	0/169 (0.0%) 0/179 (0.0%)	4/169 (2.4%) 4/179 (2.2%)	13/169 (7.7%) 18/225 (8.0%)
South West	91/388 (23.5%)	167/388 (43.0%)	259/388 (66.8%)	322/388 (83.0%) 332/399 (83.21%)
Wessex	2/151 (1.3%)	1/151 (0.7%)	29/151 (19.2%)	64/151 (42.4%) 69/172 (40.1%)
Southern	5/244 (2.0%)	7/244 (2.9%) 8/279 (2.9%)	9/244 (3.7%) 12/279 (4.3%)	13/244 (5.3%) 13/282 (4.6%)
Totals	170/2940 (6%)	282/2940 (10%) 284/3189 (9%)	687/2940 (23%) 706/3189 (22%)	1066/2940 (36%) 1137/3327 (34%)

Summary of Survey Results for each 50km-square

50-km Square	1977 - 1979 Survey		1984 - 1986 Survey		1991 - 1994 Survey		2000 - 2002 Survey	
	Positives/Total	% Positive	Positives/Total	% Positive	Positives/Total	% Positive	Positives/Total	% Positive
NT s/e	1/42	2.38%	1/42	2.38%	19/42	45.24%	36/42	85.71%
NX s/e	0/0	0.00%	0/0	0.00%	0/0	0.00%	0/05	0.00%
NY n/e	3/57	5.26%	7/57	12.28%	31/57	54.39%	40/57	70.18%
NY s/e	3/112§	2.68%	7/112	6.25%	19/112	16.96%	48/112	42.86%
NZ n/w	13/75§	17.33%	14/75*	18.67%	23/75*	30.67%	42/75*	56.00%
NZ s/e	0/0	0.00%	1/30	0.33%	4/30	13.33%	25/30	83.33%
SD n/w	3/108	2.78%	19/108	17.59%	36/108	33.33%	24/108	22.22%
SD s/e	0/82	0.00%	0/82	0.00%	6/82	7.32%	2/117	1.71%
SE n/w	4/129	3.10%	3/129	2.33%	13/129	10.08%	31/129	24.03%
SE s/e	0/114	0.00%	2/114	1.75%	13/114	11.40%	21/114	18.42%
SJ n/w	0/23	0.00%	1/23	4.35%	5/23	21.74%	4/23	17.39%
SJ s/e	0/148	0.00%	1/148	0.68%	44/148	29.73%	71/148	47.97%
SK n/w	0/0	0.00%	0/71§	0.00%	6/71	8.45%	0/71	0.00%
SK s/e	0/138	0.00%	0/138	0.00%	3/138	2.17%	33/138	23.91%
SO n/w	25/91	27.47%	38/91	41.76%	70/91	76.92%	80/91	87.91%
SO s/e	0/143	0.00%	6/143	4.20%	49/143	34.27%	55/143	38.46%
SP n/w	0/161§	0.00%	0/161	0.00%	4/161	2.48%	19/161	11.80%
SP s/e	0/146§	0.00%	0/146	0.00%	2/146	1.37%	4/146	2.74%
SS s/e	44/182*	24.18%	86/182*	47.25%	140/182*	76.92%	167/182*	91.76%
ST n/w	0/0	0.00%	0/0	0.00%	0/0	0.00%	5/21	23.81%
ST s/e	2/92	2.17%	1/92	1.09%	16/92	17.39%	34/92	36.96%
SU n/w	0/93*	0.00%	0/93*	0.00%	2/93*	2.15%	12/93*	12.90%
SU s/e	4/100	4.00%	5/100	5.00%	6/100	6.00%	8/100	8.00%

50-km Square	1977 - 1979 Survey		1984 - 1986 Survey		1991 - 1994 Survey		2000 - 2002 Survey	
	Positives/Total	% Positive	Positives/Total	% Positive	Positives/Total	% Positive	Positives/Total	% Positive
SW s/e	6/59	10.17%	10/59	16.95%	26/59	44.07%	48/59	81.36%
SX n/w	41/130*	31.54%	70/130	53.85%	95/130*	73.08%	101/130*	77.69%
SX s/e	0/0	0.00%	0/0	0.00%	0/0	0.00%	10/11	90.91%
SY n/w	0/46	0.00%	2/46	4.35%	8/46	17.39%	26/46	56.52%
SZ n/w	1/42	2.38%	0/42	0.00%	3/42	7.14%	11/42	26.19%
TA n/w	0/0	0.00%	0/0	0.00%	0/0	0.00%	4/14	28.57%
TF n/w	1/142	0.70%	0/142	0.00%	2/142	1.41%	43/142	30.28%
TF s/e	16/98	16.33%	1/98	1.02%	7/98	7.14%	17/98	17.35%
TG s/e	0/0	0.00%	0/0	0.00%	0/0	0.00%	1/3	33.33%
TL n/w	2/132	1.52%	4/132	3.03%	15/132	11.36%	36/132	27.27%
TL s/e	0/0	0.00%	0/113§	0.00%	6/113	5.31%	24/113	21.24%
TM n/w	0/121	0.83%	3/121	2.48%	27/121	22.31%	49/121	40.50%
TQ n/w	0/0	0.00%	0/0	0.00%	0/0	0.00%	2/49	4.08%
TQ s/e	0/134	0.00%	2/134	1.49%	3/134	2.24%	4/134	2.99%
TR n/w	0/0	0.00%	1/35§	2.86%	3/35	8.57%	0/35	0.00%

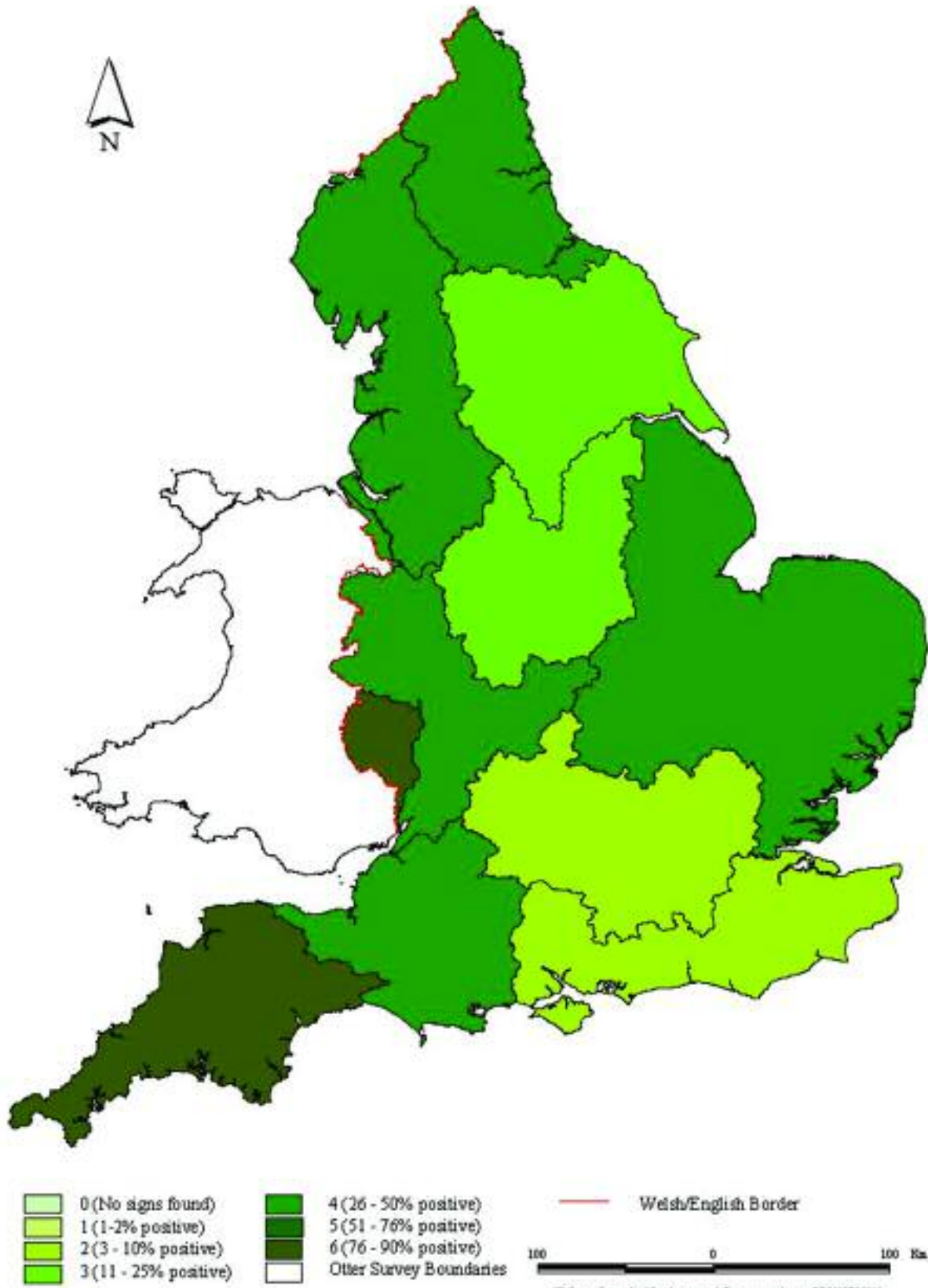
* Includes one site from just outside 50km square

§ Number differs from that given in previous reports

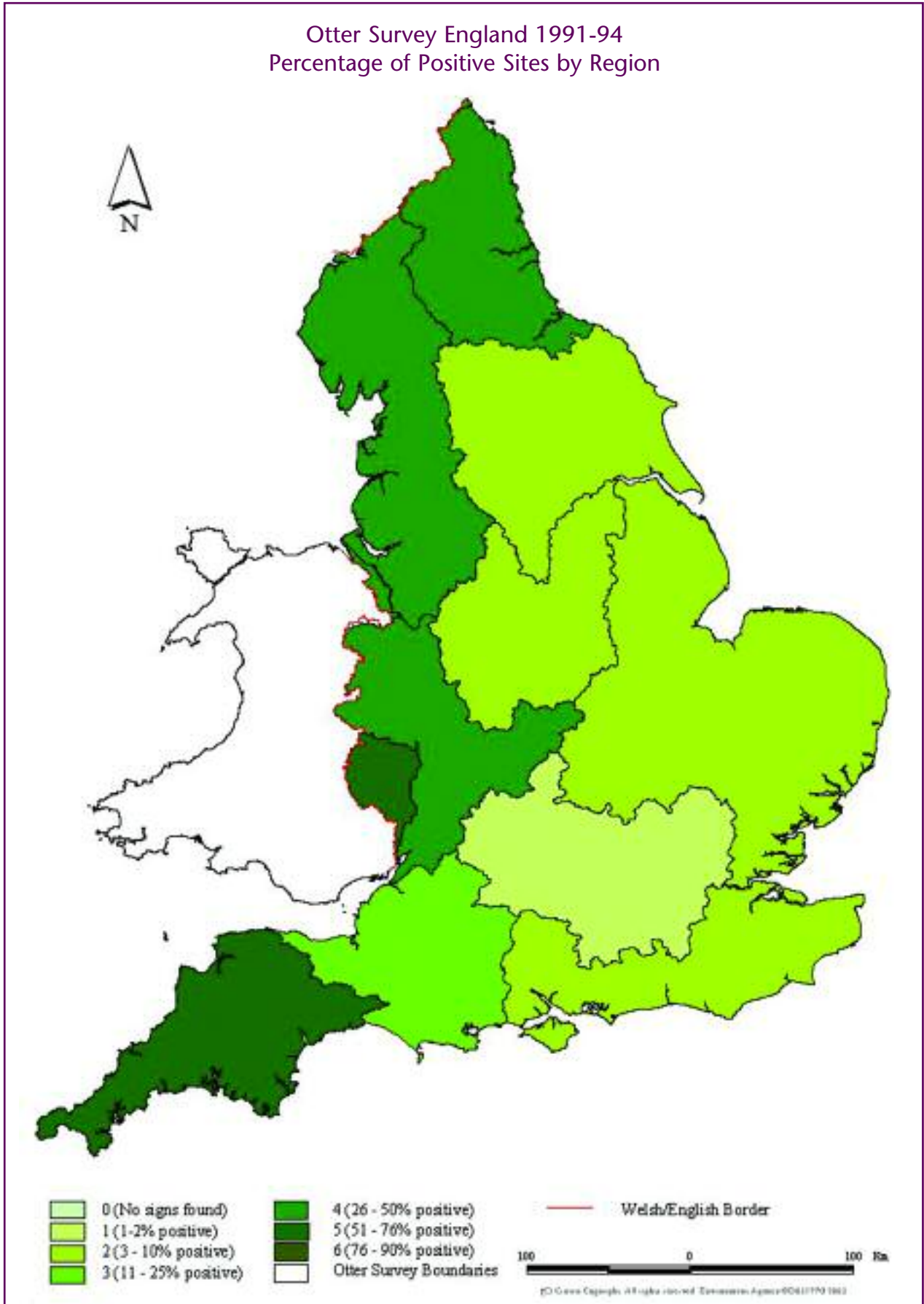
Six new 50km squares were added in the 2000-02 survey involving 103 sites

35 new sites were added to square SD s/e

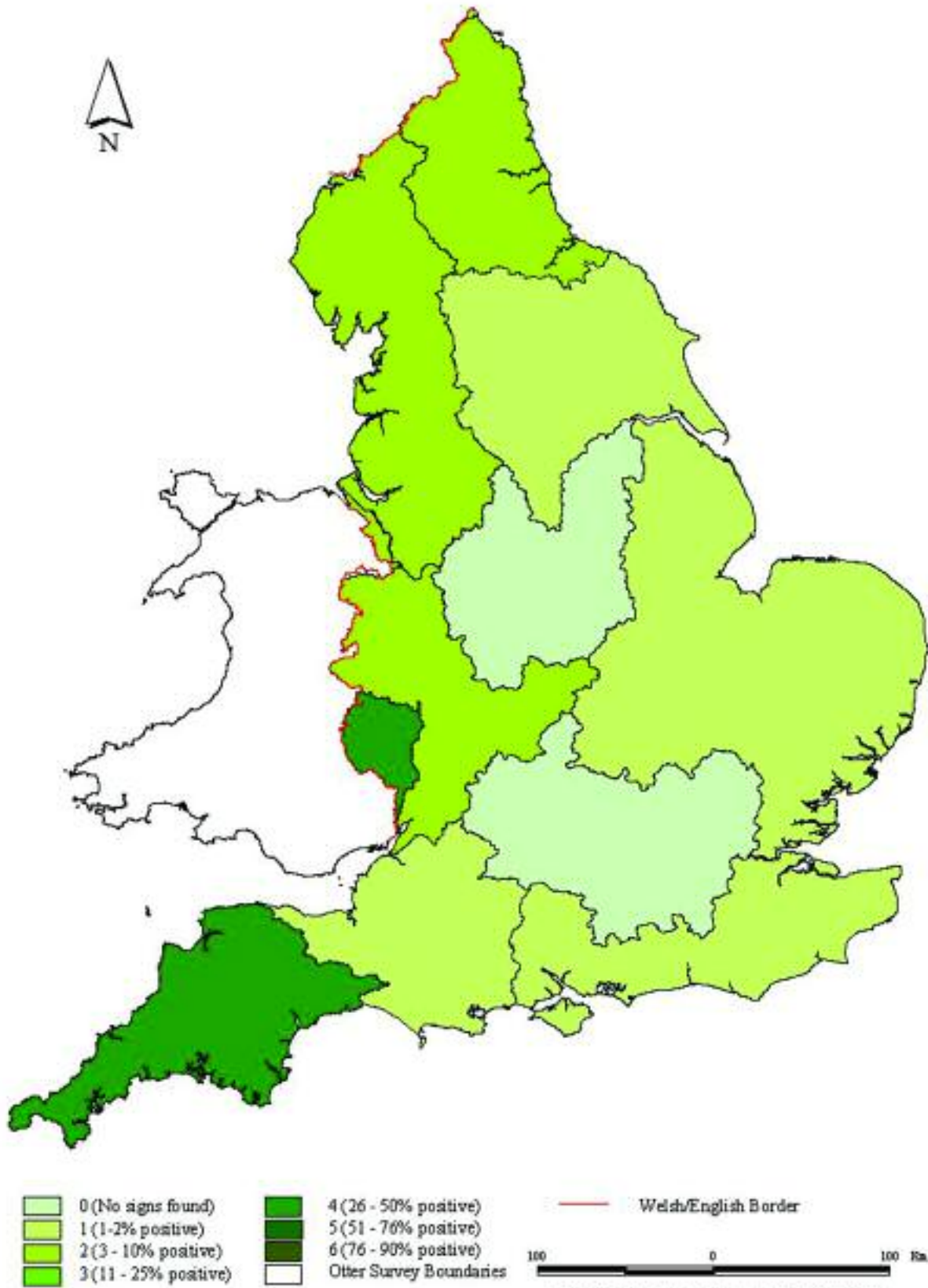
Otter Survey England 2000-02
 Percentage of Positive Sites by Region



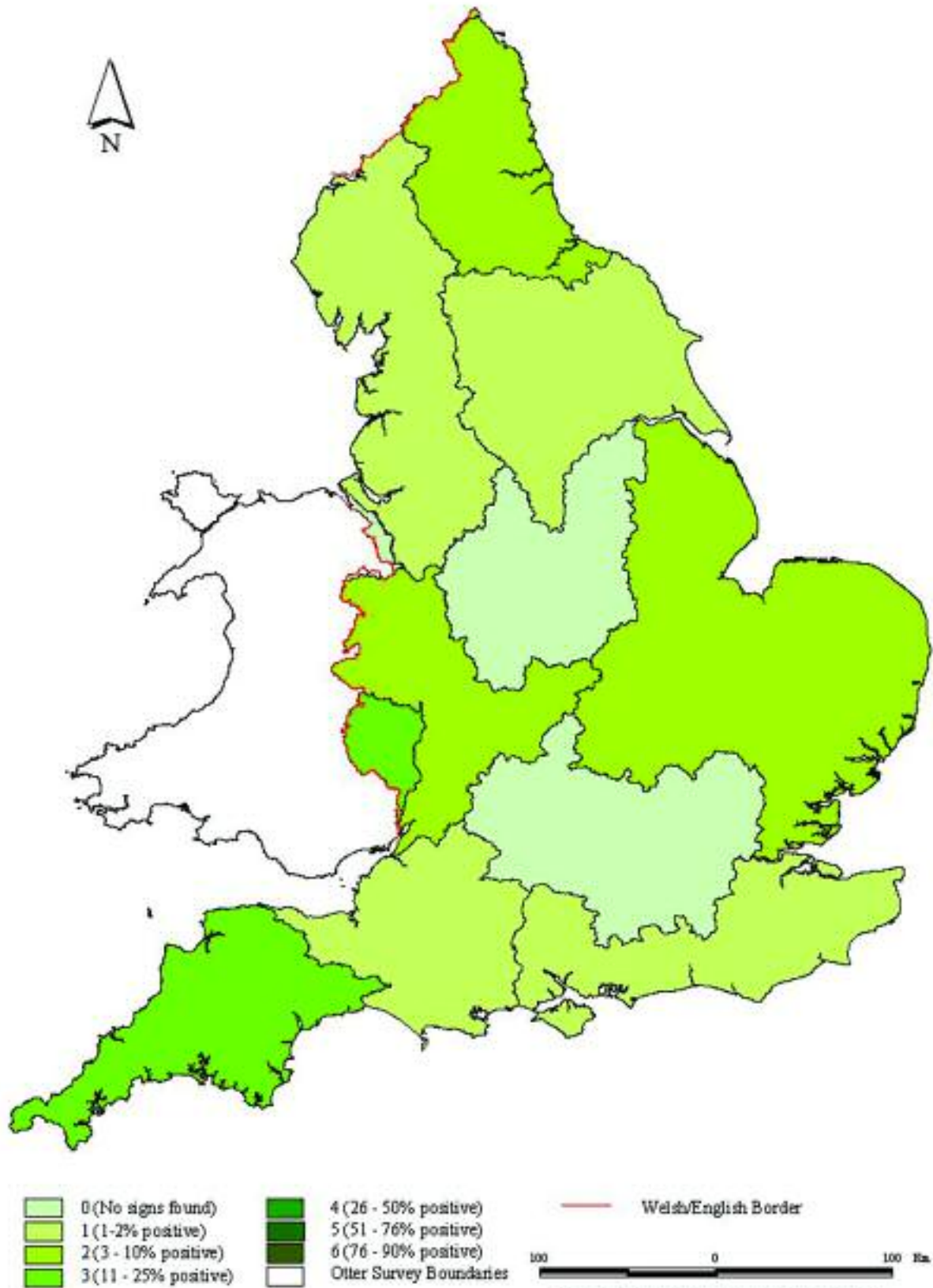
Otter Survey England 1991-94
 Percentage of Positive Sites by Region

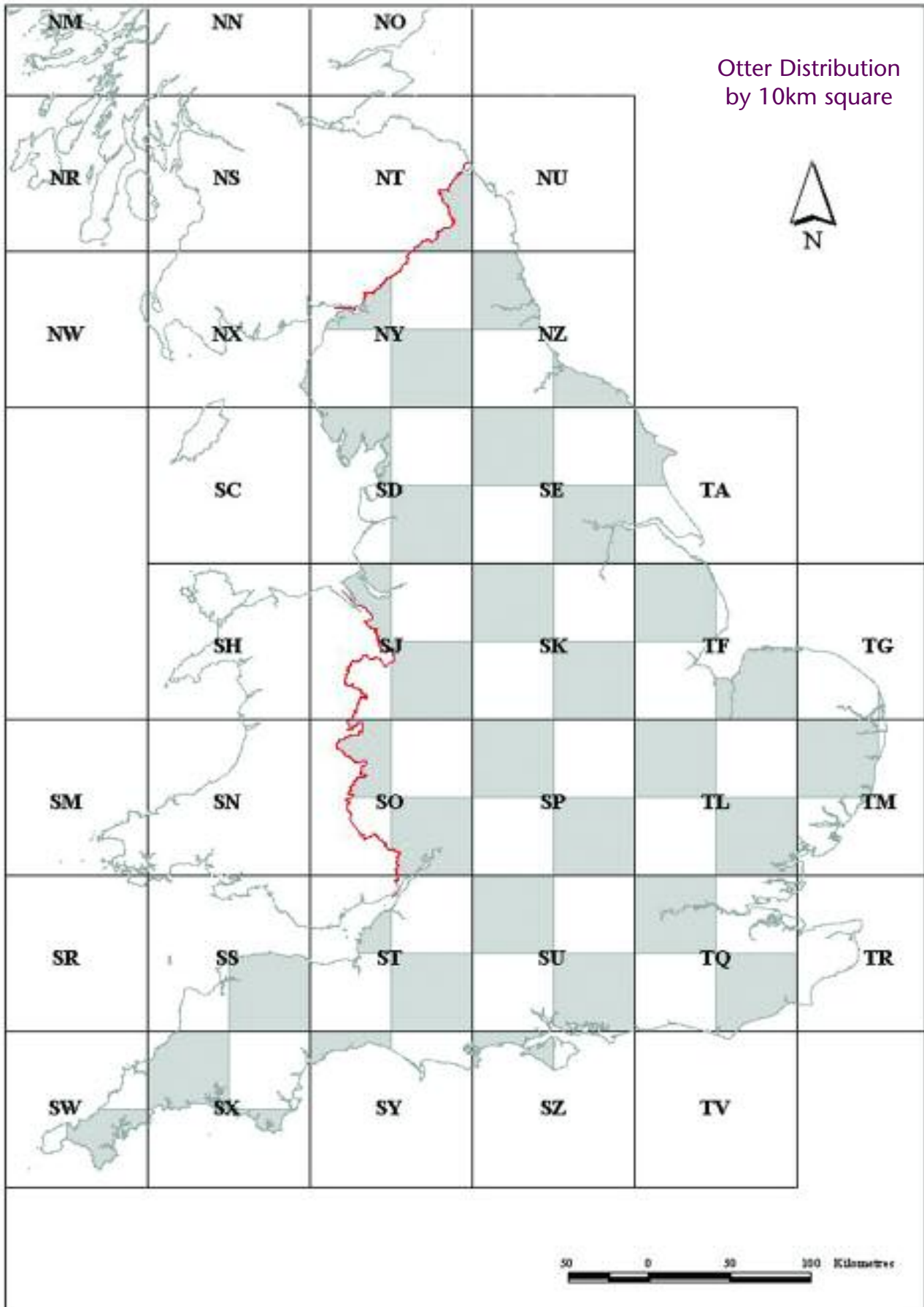


Otter Survey England 1984-86
 Percentage of Positive Sites by Region



Otter Survey England 1977-79 Percentage of Positive Sites by Region







The Regional Reports

Previous otter surveys of England (Lenton et al, 1980, Strachan et al, 1990, Strachan and Jefferies, 1996) presented their results by water authority or National Rivers Authority (NRA) region.

The Environment Agency (EA), successor body to the NRA, has changed the administrative boundaries of the regions, but in order to make the results comparable with those from previous surveys it was decided to follow the previously used, regional boundaries as far as possible. It was however, felt desirable to divide the EA Midlands Region into separate Severn and Trent catchments and those parts of the Welsh Region which fall in England into separate Wye and Dee catchments.

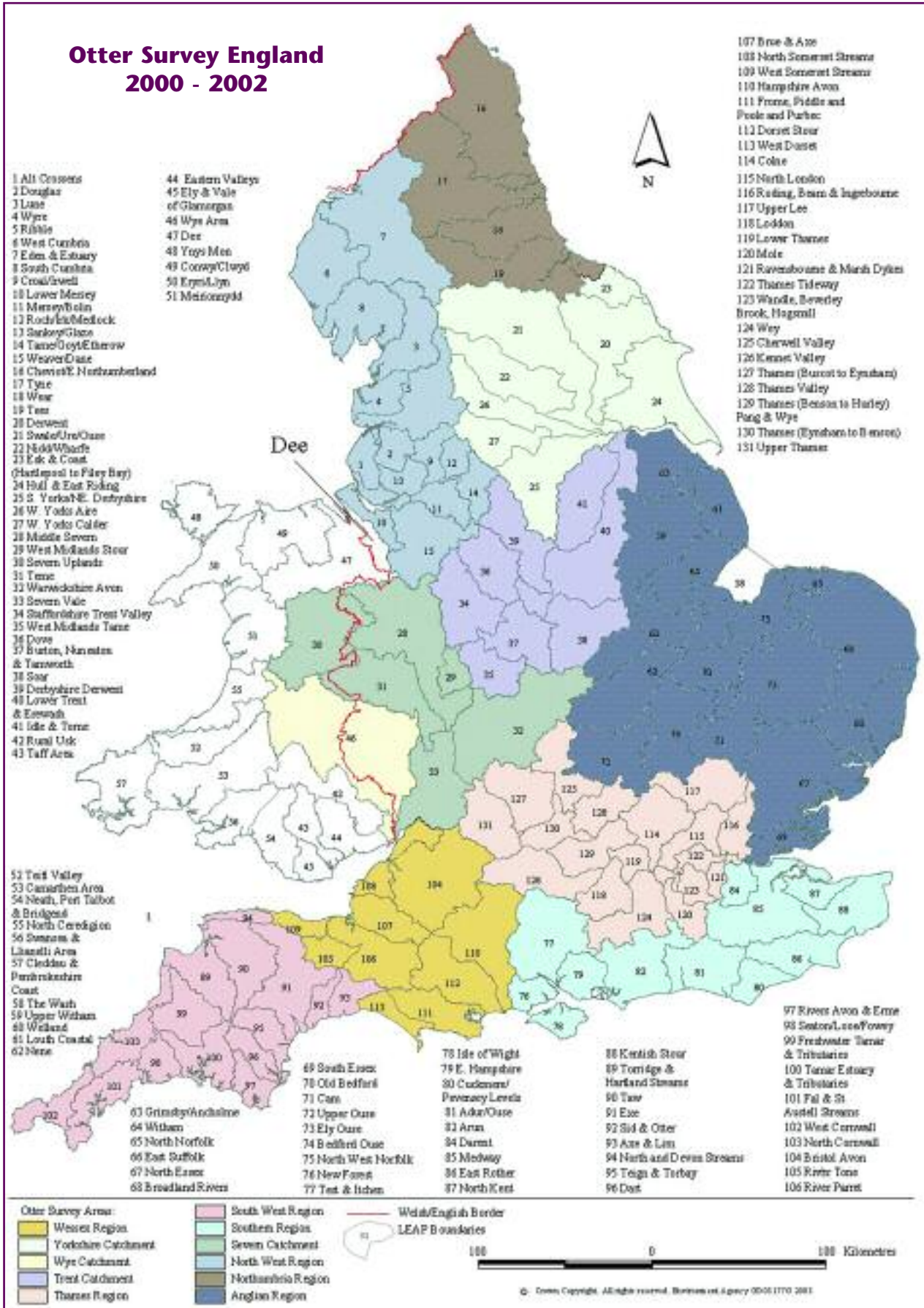
For each region the report contains:-

- a list of the 50-km squares within that region with the number of sites surveyed shown in brackets. This number refers only to sites within both that square and the region concerned;
- a brief description of the region and notes on water quality and fisheries, where these might impact on otters;
- a comparison of the results for the sites in the 1977-79 survey (which were included in all subsequent surveys) and, where sites were added during subsequent surveys, the results for the total number of sites in each survey;
- a summary of the results for each Local Environment Agency Plan (LEAP) area. The LEAP number follows the LEAP area name and refers to the key on Map 7. The individual catchment maps also show the boundaries. The results for each region were subdivided in this way both for ease of analysis and as LEAP areas are recognised EA water management boundaries. In many

cases only part of the LEAP area was surveyed if the remainder lay within an unsurveyed 50-km square. In some cases no sites were surveyed in a particular LEAP area if these lay totally outside the surveyed squares. In such cases there will have been no results for that LEAP area, and it will not be mentioned in the text;

- information from surveys carried out in adjacent, unsurveyed, 50-km squares to allow a more complete picture of otter distribution in each region. The notes are as comprehensive as possible, but inevitably other surveys will have been carried out unknown to the author.

Otter Survey England 2000 - 2002



North West Region

Surveys were carried out in the following 50-km squares – NX s/e (5), NY n/w (57), NY s/e (56), SD n/w (108), SD s/e (104), SJ n/w (14), SJ s/e (18), SK n/w (9).

Description of the Region

There is a huge range of river types in the North West. They vary from the short upland rivers of the Lake District and the large, fairly natural river systems of the Eden and Lune to the heavily modified rivers of Greater Manchester and lowland Cheshire. The River Eden and tributaries and the Derwent and Bassenthwaite are candidate Special Areas of Conservation, with otters as listed features. There is an extensive canal network particularly in Lancashire and Cheshire. Human activity is mainly centred on the large conurbations of Manchester, Liverpool, Preston and Carlisle, while tourists considerably increase the summer population of some areas such as Cumbria. Outside the industrial centres, upland sheep farming or lowland dairy farming dominate the region's landscape while coniferous plantations are found mainly in Cumbria.

Water quality

The huge variation of river types and level of human influence in the region gives rise to a wide variation in river quality, from the very clean rivers of Cumbria to the polluted rivers of the Manchester conurbation. Water quality has improved markedly in the industrial areas in recent years with fish returning to the lower Mersey and the Irwell for the first time since the early 20th century.

Fisheries

The Border Esk, Eden and Lune catchments support the principal salmon and sea trout fisheries of the region. The fisheries of the central rivers are recovering and good coarse fisheries can be found in the Weaver/Dane catchment and the Bollin.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 371 sites was surveyed including 40 sites in squares NX s/e (5) and SD s/e (35) which were added for this survey.

	1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites - comparison of 77-79 sites				
- all sites	9/322	31/322	93/322	110/322
% Positive - comparison of 77-79 sites				
- all sites	2.80%	9.63%	28.88%	34.16%
		9.36%	28.10%	29.65%

Summary of results for each LEAP area Douglas (2)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	0/15

All of these new sites proved negative. A dead otter was found on a tributary of the Douglas near Standish in 2002 but there have been no other confirmed records for this Lancashire catchment.

Lune (3)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/18	1/18	3/18	5/18

Much of this LEAP area lies in unsurveyed square SD n/e. The increase in positive survey sites on the upper reaches of the River Lune may represent part of the large extension in range on the upper Eden. The positive sites on the lower Lune suggest that otters use the river through Lancaster down to the estuary. The Lancaster Canal sites in this LEAP area were all negative.

Wyre (4)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/15	0/15	1/15	0/15

No evidence of otters was found during the survey although otter signs have been found in this LEAP area in other surveys (see below). The four sites on the Lancaster Canal within this catchment were all negative.

Ribble (5)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/55	0/55	5/55	2/56

A single site on the Ribble was positive, and a single old spraint was found near the junction of the River Hodder and a tributary, which forms a link with the Wyre catchment. All the sites previously assumed negative were surveyed, and again found to be negative. The number of positive sites was less in 2000-02 than in 1991-94 but this does not appear to be significant.

West Cumbria (6)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/13	2/13	4/13	1/18

A single new site on the lower River Derwent at Workington was negative although the upper Derwent and River Cocker are known to support very healthy otter populations. A single positive site was recorded for the lower Irt at a site that was positive in 1986. In 1993 positive sites were found on the Rivers Esk and Mite but none were found during this survey. As in the previous surveys, no positive sites were found on the River Annas. In May 1998 the Environment Agency carried out bridge checks in the area as part of the West Cumbria Survey but found no signs. However, an Agency survey in May 2002 found signs of otters.

Eden and estuary (7)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	6/105	11/105	45/105	75/105

Otter signs were found on the Eden catchment during each of the previous surveys but the results indicate considerable expansion since the 1991-94 survey, particularly in the upper reaches and eastern tributaries. The top of the catchment offers extensive links with the River Lune to the south. Of the Solway Estuary sites, only one was positive. The two positive sites on the lower reaches of the River Waver and two sites on the Wampool catchment (one on the main river and one on a lake) confirm that otters are still using this part of the area.

South Cumbria (8)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	3/82	17/82	13/82	24/82

The site on Walney Island which was positive in 1991-4 was negative in this survey, otherwise distribution remained similar but with a small decline in positive sites on the Duddon. The River Kent continues to support a good otter population with otters travelling through Kendal on a regular basis (G. Butterill, pers. comm.).

Croal and Irwell (9)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/2	0/2	0/2	0/14

No positive signs were found in this LEAP area. The upper reaches of both main rivers offer some suitable otter habitat but the lower reaches have suffered from industrialisation and severe pollution in the past.

Lower Mersey (10)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/14	0/14	1/14	0/14

No positive signs were found in this LEAP area. A single site on the Goway was positive in the previous survey and recent local surveys have found that otters use this river infrequently by otters. The water quality of the Wirral streams remains poor, as do the fish stocks.

Roch, Irk and Medlock (12)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	0/4

Four new sites on the River Roch were all negative. The upper reaches of the river are isolated from breeding otters.

Tame, Goyt and Etherow (14)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/9	0/9	0/12

All nine sites on the Rivers Goyt and Etherow remain negative as were the three new sites on the River Tame. The Tame has suffered past industrial pollution, but now offers a good habitat for otters.

Weaver and Dane (15)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/18	0/18	3/18	3/18

There were three positive sites, two on Checkley Brook and one on the River Weaver. The River Duckow offers links with the River Tern of the Severn catchment, and although no positive signs were found during the survey, otters are known to use this route (G. Butterill, pers. comm.). There was no evidence of otters using the Cheshire meres.

Information from additional surveys in adjacent 50-km squares

NY s/w

Bridge check surveys by the Environment Agency between 1998 and 2002 found otter signs throughout most of the catchments in this square. Agency surveys found evidence of a significant expansion in range and numbers during this period, with evidence of otters using the coastal streams as well as the main river catchments.

NY n/e (North West Region only)

Bridge check surveys by the Environment Agency in 2000 found evidence of good otter populations on all the catchments in this square including the Rivers Esk, Irthing, Black Lyne and White Lyne.

SD n/e

There are many historic records for the main River Lune and its tributaries indicating a strong breeding population. The River Bela and Lily Mere once supported a good population of otters and were regularly visited by the Kendal and District Otter Hounds. Recent monitoring by North West Water and The Wildlife Trusts Otters and Rivers Project (NW OARP) has recorded breeding in the catchment, but there has been a reduction in the area regularly used by otters. Agency monitoring in May 2000 found a single positive site at the top of the River Lune. There are occasional unconfirmed sightings from the upper reaches of the River Ribble but a survey of the Ribble in 1998 organised by the Agency and the NW OARP found no signs of otters on the upper reaches of the river (G. Butterill, pers. comm.).

SD s/w

The lower reaches of the River Wyre, below Garstang, have been heavily modified. Signs were found, for the first time in recent years, on the main River Wyre in 2000. Survey work in 2000 suggested transient use of the river by otters. There are no recent records for otters using the Douglas and Yarrow catchment or on the Alt catchment (G. Butterill, pers. comm.).

SJ n/e

Since 1995 local surveys by the Cheshire Wildlife Trust, and latterly through the NW OARP, have targeted this square for extensive survey work. In 1999 otter signs were found on the main River Bollin and Rostherne Mere for the first time in many years. Otters have also started to push further down the River Weaver but the population in this catchment remains small and transient with, as yet, no suggestion of breeding (G. Butterill, pers. comm.).

Discussion

North West Region, had one of the lowest increases in positive sites since the 1991-94 survey.

Even so, the slight increase masks a considerable consolidation in the core areas in the north of the region with an expansion of distribution around the fringes of these areas. The decrease in the number of positive sites is in areas known to be more sparsely occupied, mainly in the centre of the region. Of the 91 sites positive in the 1991-94 survey, 34 were negative in 2000-02 while 49 sites negative in 1991-94 were positive in 2000-02. This is unlikely to be caused by observer bias, since these results are also reflected in Agency surveys. In the core areas, mainly in the north of the region, otters are now exploiting all the available rivers and streams and expanding into adjacent areas while the small populations, mainly in the centre and south, appear barely able to remain viable. However the decrease in positive sites in these could reflect a reduction in sprainting activity which can occur at low population density (Ruiz-Olmo et al, 2001). The otter population of the northern part of the region is clearly expanding although the sparseness of signs found in south west Cumbria, suggests that there is still a need for conservation effort. There has been a considerable increase in otter range on the Eden catchment since the last survey and a link with the Lune catchment appears to have been established. It is hoped that otters will continue to re-colonise Lancashire from this source. The Ribble catchment, while showing a decrease in positive sites between the last two surveys, still has some otter presence, but to the south there is a large area in which no signs of otters have been found.

The results for the Weaver/Dane catchment in Cheshire show no increase since the last survey. However local surveys suggest that otters use the Weaver, upstream of Nantwich, fairly regularly and that there has been an increase in the use of the upper parts of the catchment (not included in this survey) probably by otters from the Severn catchment to the south.

Despite the considerable size of the canal network within the North West Region, no signs of otters were found on the canals of the region during this survey. In places the canals offer links from occupied catchments into unoccupied areas and otters are known to use canals in other areas such as Staffordshire (Hering, 1998) and Montgomeryshire (A.Crawford, pers. obs.). The otter population of the northern part of North West Region seems likely to expand to the south. However, the avenues of expansion both east and west of the Cumbrian Mountains are quite narrow, and it is likely that this will slow the recovery. The population in the south of the region can be seen as an extension of the

population using the Dee and the northern parts of the Trent and Severn catchments. It is interesting that, as such, there has not been the dramatic expansion of the population of the Weaver catchment that has been observed on the upper tributaries of the Trent in the last 10 years. The reason(s) for this difference are unknown but if the otter population of the southern part of North West Region is to expand, the area including the watersheds between the Dee, Weaver, Severn and Trent catchments is clearly a priority for otter conservation effort.

Northumbrian Region

Surveys were carried out in the following 50-km squares – NT s/e (42), NY s/e (52), NZ n/w (75), NZ s/e (5).

Description of the region

Most of the rivers in this region rise in the northern Pennines, the Cheviots or from the coastal plains. Land use is predominantly agriculture with sheep, arable and cattle in order of importance. Forestry also covers a large area, particularly around Kielder reservoir. Open cast mining and its side effects are still apparent in the central parts of the region. Gravel extraction has occurred next to a number of rivers, and the creation of post-extraction wetland habitats has increased the wildlife diversity in these areas.

Heavy industry is largely confined to the mouths of the Rivers Blyth, Tyne, Wear and Tees. However, the region's increased involvement in the service sector has resulted in large-scale redevelopment along many former industrial riverbanks. A major problem is habitat damage from overgrazing caused by very high sheep numbers and poor maintenance of riverbank fencing. This has also led to water quality problems caused by increased poaching leading to siltation.

This "region", along with the Yorkshire Region, now forms part of the Environment Agency North East Region. Different southern boundaries have been used in the reports of past surveys. In this survey Northumbrian Region is taken to include the Kilton Beck but not the Easington Beck.

Water quality

There have been major improvements in water quality in recent years but many rivers still suffer from intermittent pollution, a legacy of industry, storm-water overflows, and farm run off. The use of synthetic pyrethroid sheep dips has caused particular problems. Acidification affects large areas in the upper reaches of most rivers, a problem exacerbated by large scale conifer forests in some catchments.

Fisheries

Most of the rivers in the region are predominantly game fisheries with runs of migratory salmonids and stocks of brown trout, often supplemented by stocking. The Tyne, Wear and Tees support good populations of mixed coarse fish, mainly dace, chub and roach and the Tweed and Till in the north support smaller populations. There are numerous stillwater fisheries with both game and coarse fish. All three species of lamprey have been recorded and eels are present throughout the region, although they appear to be in decline. Many of the smaller tributary streams and coastal burns have poor water quality and consequently few fish.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 174 sites surveyed

	1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites - comparison of 77-79 sites				
- all sites	14/169	17/174	46/174	90/174
% Positive - comparison of 77-79 sites				
- all sites	8.28%	10.06%	26.62%	50.30%
		9.77%	26.44%	51.72%

Summary of results for each LEAP area

Cheviot/East Northumberland (16)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	13/86	14/86	33/86	63/86

Since the last survey, the otter population appears to have consolidated in the northern part of this LEAP area, with almost all the sites in the Tweed tributaries and the North Low being positive. The Coquet and Wansbeck systems and the Seaton Burn show similarly high levels of positive sites. The results on the Blyth were lower, but still much better than in previous surveys. All the rivers in this area now show signs of otters. The Vincent Wildlife Trust released two otters in this area in 1994 (J and R Green, pers. comm.).

Tyne (17)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/39	1/39	9/39	17/39

Much of this LEAP area is in unsurveyed square NY n/e. Two of the three sites on the North Tyne were positive reflecting the known otter presence there. The two positive sites out of nine on the South Tyne similarly reflect the known more patchy, otter distribution. Otter signs have increased on the lower Tyne and otters have expanded into the urban areas of Newcastle-upon-Tyne. Three of the eight sites assumed negative on the last survey were positive during this survey.

Wear (18)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/15	0/15	0/15	3/15

Much of this LEAP area is in unsurveyed square NZ s/w. Three of the sites on the upper Wear were positive, reflecting the recent colonisation of this part of the catchment. All five sites on the lower Wear were negative but there have been some confirmed sightings (K. O'Hara, pers. comm.).

Tees (19)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/29	2/34	4/34	7/34

The central part of the catchment is in square NZ s/w, outside the surveyed area (see below). In the Upper Tees there appears to have been no significant increase in otter numbers despite good habitat and

fish stocks. On the lower Tees only five sites were surveyed. These were all on the River Leven and all were positive. The river is believed to support breeding otters (K. O'Hara, pers. comm.)

Information from surveys in adjacent 50-km squares

Northumberland Wildlife Trust (NWT) and Durham Wildlife Trust (DWT) Otters and Rivers Projects carry out annual surveys for otter presence across the two counties. These surveys include all the areas not surveyed during the national survey.

NU s/w

Surveys by DWT have found signs of otters on all the northern coastal streams with an increasing presence in recent years. On the rivers Till (Breamish), Aln and middle Coquet, otter signs are found at almost all sites surveyed (K. O'Hara pers. comm.).

NY n/e

Surveys by the DWT have found otter signs on nearly all watercourses in this square. The Upper Coquet and the rivers Rede and North Tyne have shown particularly high levels of positive sites (K. O'Hara, pers. comm.).

NZ s/w

Most of the middle reaches of the Wear and Tees are in this square, and all now show healthy otter presence. The River Wear in particular has shown significant improvement in recent years with animals now present downstream of Durham City and a recent sighting on the outskirts of the city of Sunderland. The River Tees has shown improvement in the lower stretches with animals now present on the outskirts of Teeside (K. O'Hara, pers. comm.).

Discussion

There has been a major expansion of otters in the Northumbrian Region since the last survey. This has taken place in all parts of the region with every LEAP area showing a major increase. Three of the sites on the upper Wear were positive showing an otter presence on this catchment for the first time. The increase in positive sites in the region is reflected in the results of county surveys carried out in Northumberland and County Durham. During the winter of 1999/2000 otter signs were found at 70 per cent of sites surveyed and in 2001/02, signs were found at 86 per cent of sites surveyed. Otters are now present on every catchment in Northumberland and County Durham, some of which have very high levels of positive sites. Further expansion and consolidation would be expected in the next few years.

Yorkshire Region

Surveys were carried out in the following 50-km squares – NY s/e (4), NZ s/e (25), SD s/e (13), SE n/w (129), SE s/e (81), SK n/w (18), TA n/w (14).

Description of the region

Most of the rivers in the region arise in the Pennines, although the Derwent and Esk arise on the North Yorkshire Moors. In their headwaters these rivers have steep gradients, but soon reach more low-lying areas through which they meander to reach the Humber Estuary, with the exception of the Esk, which flows directly to the North Sea at Whitby. These floodplains often provide high quality arable farmland. Much of the upland area is moorland including the North Yorkshire Moors but there are some large conifer plantations. The River Derwent is a candidate SAC with otters as one of the species for which it is listed. The human population is concentrated mainly in the south of the region in the older industrial and mining centres of Leeds, Sheffield, Bradford, Huddersfield, Doncaster, Rotherham, Barnsley and Halifax, but there are also the urban centres of Hull, York and Harrogate.

This region now forms, with the Northumbrian Region, part of the Environment Agency North East Region. Different northern boundaries of the Yorkshire Region have been used in the reports of past surveys. In this survey Yorkshire Region is taken to include the Easington Beck but not the Kilton Beck.

Water quality

In the northern part of the region, which is mainly upland and agricultural, water quality is generally very high although acidification and agricultural runoff cause some problems. The southern part, with its long history of industry and mining, has suffered serious pollution, but major improvements in recent years mean that water quality is mainly good, although some problems from minewater runoff and industrial and sewage discharges persist.

Fisheries

Following a reduction in pollution, largely attributable to sewage works improvements, and a restocking programme by the Environment Agency, fish populations in the Rivers of South and West Yorkshire have increased. This increase has been most marked on the Don and Rother.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 284 sites was surveyed, including 14 new sites in square TA n/w added for this survey.

	1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites - comparison of 77-79 sites	4/227	5/227	25/227	44/227
- all sites		6/270	28/270	68/284
% Positive - comparison of 77-79 sites	1.76%	2.20%	11.01%	19.38%
- all sites		2.22%	10.37%	23.94%

Derwent (20)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/16	1/16	12/16	7/20

Most of this LEAP area lies in unsurveyed square SE n/e. Four new surveys were added in the upper Derwent tributaries, of which one was positive. The apparent decrease in positive sites is not thought to be significant. The Vincent Wildlife Trust introduced 25 otters between 1990 and 1993, almost all within the unsurveyed part of the catchment (J. & R. Green, pers. comm.).

Swale, Ure and Ouse (21)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	4/109	3/109	8/109	25/109

There has been a considerable increase in positive sites on the Swale downstream of Richmond but little increase in the rest of the LEAP area.

Nidd and Wharfe (22)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/45	1/45	5/45	6/45

Much of this LEAP area lies in unsurveyed square SE s/w (see below). There was no significant increase in positive sites.

Esk and Coast (23)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	1/25	3/25	20/25

The Vincent Wildlife Trust introduced four otters into the area between 1990 and 1993 (Jefferies et al, 2000). The large increase in positive sites in this area is probably due to these releases.

Hull and East Riding (24)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/14	0/14	0/14	6/24

Ten new sites in square TA n/w were added for this survey of which three were positive. Otters have clearly expanded into this area. There is evidence of breeding on the upper reaches of the River Hull system (B. Lavelle, pers. comm.).

South Yorks/N.E. Derbyshire (25)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/22	0/40	0/40	3/40

Some of this area lies within unsurveyed square SE s/w (see below). Otters are beginning to colonise the area.

West Yorks Aire (26)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/14	0/14	0/14	1/14

Most of this LEAP area lies within unsurveyed squares SE s/w and SD n/e (see below). There were no positive sites in the upstream part of the catchment and only one positive on the downstream part.

West Yorks Calder (27)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/7	0/7	0/7	0/7

Most of this LEAP area lies within unsurveyed square SE s/w (see below). Only the headwaters were surveyed and no positive sites were found.

Information from surveys in adjacent 50-km squares

SD n/e (in Yorkshire Region)

This includes the small unproductive headwater streams of the Swale and Ure, the Wharfe and the Aire. Yorkshire Wildlife Trust surveys show sporadic use of these streams by otters (S. Jay pers. comm.).

SE n/e

Surveys up to 1998 in this square showed that otters are present across most of the Derwent catchment, but few signs have been found on the Ouse tributaries the Kyle and Fosse (G. Woodroffe, pers. comm.). The south-eastern corner of the square lies within the Yorkshire Wolds and has few streams.

SE s/w

Surveys by Yorkshire Wildlife Trust show some increase in otters on the Wharfe, some activity on the Aire downstream of Leeds and on the Calder from Wakefield to the Aire confluence. In 2002 some signs were found on the Aire upstream of Leeds. No signs have been found on the Dearne system. (S. Jay, pers. comm.; B. Lavelle, pers. comm.).

Discussion

There has been a significant increase in positive sites in the Yorkshire Region since the 1991-94 survey. Otters are now widely, though generally sparsely, distributed throughout the Yorkshire Region. There has been both consolidation in those areas which previously had a sparse population of otters and expansion into areas which did not previously have otters.

The Vincent Wildlife Trust released 25 otters into the Derwent LEAP area of Yorkshire region between 1990 and 1993 (see above). These appear to have made little change to the results of this survey, as the introductions were into the unsurveyed parts of the upper catchment and the Vale of Pickering. The Derwent remains a stronghold for otters in the Yorkshire Region with regular sightings and field signs and several road casualties.

The main increases in positive sites have been in four areas. There have been marked increases on the Swale and the Esk. An extension of the previously known distribution on the lower reaches of the Don and on the Market Weighton Canal included a single new positive site near the mouth of the Aire. The Nidd and Wharfe LEAP area showed an expansion of range. The sites in TA n/w added during this survey have for the first time revealed the presence of otters on the Derwent near Scarborough and on the Hull catchment near Driffield. In the Esk and coastal LEAP area there has been a considerable increase in the use of coastal streams. This appears to be due to the movement of otters from the Esk and Derwent systems. Otters have been seen swimming out of the Esk at Whitby harbour and the Derwent is also connected to the coast near Scarborough via an artificial channel, the Sea Cut, which otters are known to frequent and from which there have been reliable records of breeding (R. Martin, pers. comm.). Further consolidation and expansion would be expected in this region.

Dee Catchment

Surveys were carried out in the following 50-km squares – SJ n/w (9), SJ s/e (3).

Description of the catchment

Rising in the Welsh hills around Bala Lake, the River Dee flows through a varied landscape, including steep wooded valleys, before it meanders down onto the Cheshire Plain. The river has recently been designated a Site of Special Scientific Interest (SSSI) by English Nature and put forward as a proposed Special Area of Conservation (pSAC) with otters one of the 'designated features'.

About 425,000 people live within the catchment, where commercial and industrial activity centres on Wrexham, Ruabon and Chester. Much of the lower end of the catchment is dominated by intensive dairy farming. Many of the rivers have little cover, but there is some very good localised habitat.

Water quality

Throughout the catchment water quality is generally very good, and over 70 per cent of the classified rivers are of Class 1.

Fisheries

The fisheries of the Dee are of national importance. The estuary supports salmon netting and economically important sea fisheries and the river supports a rod salmon fishery. The lower Dee suffered severe pollution in late summer 2000 but fish stocks are recovering assisted by extensive re-stocking of chub, dace and barbel by the Environment Agency. Most of the tributaries hold good stocks of small coarse fish (R. Peirce, pers. comm.).

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 12 sites was surveyed.

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/12	1/12	5/12	6/12
% positive	0.00%	8.33%	41.66%	50.00%

All sites are within the Dee LEAP area (47) most of which lies in Wales and was not covered by this survey.

Information from surveys in adjacent 50-km squares

SJ s/e

Since 1995, Cheshire Wildlife Trust has regularly surveyed the Cheshire part of this square and some of the lower Welsh tributaries, in order to monitor this vital route for otters re-colonising Cheshire. The frequency of signs on the lower reaches of the main River Dee downstream of Bangor on Dee have increased in recent years, with otters also utilising the Rivers Clwedog and Alyn (lower Welsh tributaries) on a regular basis (G. Butterill, pers. comm.).

Discussion

The survey shows almost no changes in otter distribution since the 1991-94 survey. The exception is the Wych Brook, which forms the border between Cheshire and Wales, where the tracks of an adult and cub were recorded and a female and cub were seen by the surveyor later the same day thus confirming that breeding is taking place in the catchment. The single site on the Shropshire Union Canal within the Dee catchment proved negative, although a site on the canal just over the border in the Severn catchment was positive. The canal offers a potential link from the Severn catchments into the Dee catchment and the rest of Cheshire. The single site on the Shotwick Brook was negative but a dead male otter was recovered from this estuary tributary only a short time before the survey was carried out. Prior to this there had been no records of otters in this area (G. Butterill, pers. comm.).

Severn Catchment

Surveys were carried out in the following 50-km squares – SJ s/e (70 sites), SO n/w (60 sites), SO s/e (101 sites) and SP n/w (97 sites).

Description of the Catchment

The Severn and its tributaries rise in the Welsh hills and flow in a generally westerly direction to the Welsh border then generally south to the estuary. Only those parts of the catchment lying within England were surveyed. The principal tributaries are the Vyrnwy and Teme (both of which lie partly in Wales), the Tern, Stour and Warwickshire Avon. The larger towns include Shrewsbury, Worcester Gloucester, Tewkesbury and Bromsgrove. Dudley and Wolverhampton lie on the headwaters of the Stour system and Coventry lies within the Avon catchment.).

Water quality

Water quality is generally very good. There is still pollution in some of the lower tributaries, but there have been significant improvements in recent years. Acidification, a serious problem in the headwater streams in Wales, may be affecting salmon spawning but is not known to affect the English part of the catchment.

Fisheries

A wide variety of fish are present in the catchment, both coarse fish such as roach, chub and barbel and game fish such as brown trout and salmon. There are commercial fisheries for salmon as well as eels and elvers in the estuary. The elver fishery has, however declined markedly in recent years leading to concerns about future eel stocks. Native crayfish are present in many rivers and populations of non-native crayfish are present in some parts of the catchment.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 328 sites surveyed

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	13/328	22/328	105/328	127/328
% positive	3.96%	6.71%	32.01%	38.71%

Summary of results for each LEAP area

Middle Severn – including Tern, Roden and Worfe (28)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/73	1/73	33/73	45/73

The Severn and the Tern and Roden system all show high levels of otter activity but the upper Worfe seems to be used only periodically.

Severn Uplands (30)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	1/5	3/5	5/5	5/5

Almost all this LEAP area lies in Wales and was not therefore surveyed. The results reflect the known widespread distribution of otters, which are known to breed in this area.

Teme – including Clun, Onny and Corve (31)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	12/55	18/55	40/55	44/55

The results of the 2000-02 survey reflect the results from other surveys in the area, showing that otters use the whole catchment. The Teme is an SSSI and the lower part of the Clun is an SSSI and cSAC.

Warwickshire Avon (32)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/113	0/113	10/113	12/113

These results are consistent with the results of surveys carried out by the Worcestershire and Warwickshire Wildlife Trusts in the same area. Otters apparently colonised the Avon in the early 1990s but there seems to have been little consolidation since, despite improvements in water quality and fish stocks (A. Graham pers. comm.).

Severn Vale (33)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/82	0/82	17/82	21/82

This area includes the River Severn downstream of Tewkesbury and its tributaries other than the Avon. The lower level of positive sites reflects the results of other surveys (A. Graham pers comm.).

Information from additional surveys in adjacent 50-km squares

SO n/e

A survey of square SO n/e was carried out in 1991 for the Worcestershire Wildlife Trust (Howell, 1991) covering 77 sites of which 25 (33 per cent) were positive. A repeat of the same survey sites between October 1996 and February 1997 (Graham, 1997) showed that 56 (73 per cent) were positive. This is a similar level of positive sites to those parts of the upper Severn catchment covered during the present survey. It shows that otters have consolidated their position on the upper Severn as far downstream as Worcester (A. Graham, pers. comm.).

SP s/w (Severn catchment only)

Surveys by the Worcestershire and Warwickshire Wildlife Trusts in 2000-01 found otter signs on the Avon and Isbourne and a more recent survey in 2002 found signs on the River Stour near its confluence with the Avon and on the headwaters of the Stour. It is possible that the signs found on the upper Stour were from an otter that crossed from the Thames catchment (A. Graham, pers. comm.).

SP n/e (Severn catchment only)

A Warwickshire Wildlife Trust survey in 2000 found no signs of otters in this area but a survey in 2002 found two positive sites, one at Stanford Reservoir on the Avon east of Rugby (M. Jones, pers. comm.). These results indicate a steady low level of otter activity in the Avon catchment.

Discussion

The small increase in positive sites on the Severn catchment is both surprising and disappointing. The results of this survey show a consolidation of the otter population in the upper and middle part of the catchment but little increase on the Severn below Worcester or on the Avon. Surveys by the Worcestershire and Warwickshire Wildlife Trusts, both in the squares not covered by this survey (see above) and covering the same areas, give similar results and show that the consolidation extends down to Worcester. The increase in range of otters on the Middle Severn (including the Tern and Roden system) indicates a population increase which also appears to have “spilled over” into the Sow and Penk catchments of the Trent system, probably via the Tern and its tributaries but also possibly via the Worfe. This has led to a major colonisation of the Trent catchment (see below). It is therefore hard to understand why there has been so little expansion down the Severn and on the Avon in the period since otter signs were first found near Bewdley in 1985 (A. Crawford, pers. obs.).

There is a marked difference between the upper Severn (including the River Teme and the Severn catchment down to the Teme confluence) and the lower Severn, both in the level of positive sites and the increase in positive sites since the 1991-94 survey.

Upper Severn	1977-79	1984-86	1991-94	2000-02
Positive sites/total	13/133	22/133	78/133	94/133
Percentage positive	9.8%	15.5%	58.6%	70.7%
Lower Severn				
Positive sites/total	0/195	0/195	27/195	33/195
Percentage positive	0%	0%	13.8%	16.9%

The most obvious difference between the two parts of the catchment is in in-stream habitat, with the Severn below Stourport being heavily modified for recreational boat traffic. While the whole of the English part of the Severn is legally navigable, there is little or no boat traffic between Ironbridge and Shrewsbury, while many boats use the river below Stourport. While the lower Severn is the only heavily navigated river within the current range of otters in Britain, it is very unlikely that the failure of otters to colonise it is the result of direct disturbance by boats as otters are known to use canals (Hering, 1998). However the impoundment and river management needed for navigation have resulted in the almost complete absence of in-stream habitat features such as riffles, bars and backwaters and a severe reduction in emergent vegetation. This lack of cover could be affecting otters directly, but the effect is more likely to be indirect via the effect on fish stocks. Fisheries catch data (A. Taylor, pers comm.) show that weights of fish caught per hour fished during fishing matches drops by 63 per cent between upstream and downstream of Worcester. However, fish biomass in the lower reaches of the Severn should still be above that on rivers in Scotland which have good otter populations (Kruuk 1995). Further research is needed to determine all the factors involved and their relative importance.

Trent Catchment

Surveys were carried out in the following 50-km squares – SE s/e (24 sites), SJ s/e (57 sites), SK n/w (44 sites), SK s/e (96 sites), SP n/w (61 sites).

Description of the catchment

The River Trent and its major tributaries rise in the Peak District and flow generally south and then north east to the Humber estuary. Land use is diverse and includes moorland, mixed farming and intensive arable and industrial areas. There is a large population with many big urban and industrial centres including the West Midlands conurbation, Stoke on Trent, Derby, Leicester, Loughborough, Nottingham, Newark and Gainsborough. The majority of rivers have been re-sectioned or dredged leaving a very impoverished in-stream habitat which has reduced the holding capacity for fish, a factor that has become more apparent as water quality has improved.

Gravel works on the floodplains of the Trent, Tame, Soar and Idle have left large areas of wetland and open water, often stocked for fishing. Flooded gravel pits and fishing lakes are a major feature of the Trent catchment and provide an important resource for otters. There is a large number of canals in the catchment, often with good habitat quality and fish stocks.

Water quality

A unique feature of the catchment is that many of the urban areas are concentrated around the headwaters of rivers resulting in severe urban runoff problems not moderated by dilution of pollutants. The Tame (draining Birmingham and the Black Country) has been particularly badly affected but the headwaters of the Trent (draining Stoke-on-Trent) and the Soar (draining Leicester) have also suffered as, to a lesser extent, have the Maun, Erewash and Ryton.

Water quality improved very markedly during the 1980s and 1990s and some of the more urbanised rivers now support fish for the first time in many decades. However, pollution still affects a number of watercourses. The catchment includes the Staffordshire and Nottinghamshire coal-fields and several rivers suffer from the effects of minewater

discharge, a factor likely to become more of a problem as pumping of abandoned coal mines ceases.

Fisheries

The rivers in the catchment contain a wide variety of coarse fish such as roach, chub and barbel, with brown trout in the more upland rivers. There are commercial eel fisheries in the lower part of the catchment but eels are rare above Nottingham. Salmon have been reintroduced to the River Dove and returning fish have been observed at several weirs on the Trent and Dove. White clawed (native) crayfish are present in many parts of the catchment, and introduced signal crayfish are common in many rivers and pools. Fish stocks are sparse in the urban River Tame and in the Trent above Stone, as a result of urban runoff and pollution reducing fish stocks in some other rivers.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 282 sites were surveyed

	1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites - comparison of 77-79 sites				
- all sites	0/238	0/238	12/238	58/238
% Positive - comparison of 77-79 sites				
- all sites	5.8%	0%	5.04%	24.37%
		0%	6.38%	20.57%

Summary of results for each LEAP area

Staffordshire Trent Valley (34)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/55	0/55	9/55	24/56

The Sow and Penk catchment has shown a major improvement with most sites now positive. Surveys by Staffordshire Wildlife Trust indicate that transient animals use the river Trent through Stoke on Trent despite the low fish stocks and the high level of human disturbance in this reach (N. Mott, pers. comm.).

West Midlands Tame (35)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/42	0/42	0/42	24/55

All the positive sites found during the survey were on the River Blythe SSSI. Most of the area lies within the West Midlands conurbation with rivers that historically were some of the most polluted in England. These rivers still suffer from periodic water quality problems and heavily engineered banks.

Dove (36)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/1	0/14	1/14	0/14

Otters are known to use the lower Dove catchment outside the surveyed square. Staffordshire Wildlife Trust volunteer surveys have found signs within the surveyed area in 1999 and 2000. High water preceding the survey may have affected the results.

Burton, Nuneaton and Tamworth (incl. R. Anker & parts of the Tame & Trent) (37)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/16	0/16	0/16	4/16

The four positive sites were on the Tame and its tributaries in the vicinity of flooded gravel pits that provide ideal habitat for otters. Signs of breeding were found in 1999 (N. Mott, pers. comm.).

Soar (38)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/55	0/55	2/55	13/55

There has been a major expansion of range here since the last survey. The positive sites on the Soar showed only single old spraints possibly indicating a transient animal while the positive sites on the Wreake had numerous spraints, probably indicating resident otter(s).

Derbyshire Derwent (39)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/31	5/31	0/31

There has been an apparent loss of otters from this area, but the area was surveyed following high water conditions. Otter signs were found on the Rivers Wye and Derwent during the water vole survey of Britain in 1996-98 (R. & C. Strachan, pers. comm.), and also on the Derwent in unsurveyed square SK s/w during Derbyshire Wildlife Trust surveys (G. Smart, pers. comm.).

Lower Trent & Erewash (40)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/57	0/57	0/57	9/57

Most of this LEAP area lies in unsurveyed square SK s/e (see below). In 1996 the Vincent Wildlife Trust introduced two otters into the area (J. & R. Green, pers. comm.). Probably as a result of these introductions, the northern part of the area shows a significant increase in otter range. The southern part of the LEAP area shows only a small increase in otter signs. Surveys by the Nottinghamshire Wildlife Trust reflect this (E. Palmer, pers. comm.).

Idle & Torne (41)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/12	0/12	1/12	3/12

The watercourses of this area are largely deep drained rivers and artificial drainage dykes but fish stocks are good. There has been a small increase in positive sites since the 1991-94 survey. Surveys of the area by Nottinghamshire Wildlife Trust found similar results (E. Palmer, pers. comm.).

Information from additional surveys in adjacent 50-km squares

SK s/w

Repeated surveys by Staffordshire and Derbyshire Wildlife Trusts indicate the presence of otters on the rivers Sow, Trent, Dove, Churnet and Tame as well as many smaller watercourses within the square. Surveys by Nottinghamshire Wildlife Trust in 1999 found signs on the lower reaches of the Erewash close to Attenborough Gravel Pits but no signs were found on a subsequent survey in 2001 (N. Mott and E. Palmer, pers. comm.).

SK n/e

Between 1998 and 2001 Nottinghamshire Wildlife Trust carried out surveys in this square. No signs were found on the Rivers Idle and Ryton or on the Rivers Maun, Meden and Poulter. Signs were found on the Smite Devon and Fleet in 1999 but not on subsequent surveys. Otter signs have been found near the confluence of the Trent, Soar and Derwent during casual surveys (E. Palmer, pers. comm.).

SJ n/e

Signs have been found at Tittesworth Reservoir on the Churnet. It is believed that otters are crossing

from the Churnet to the headwaters of the Trent via the canal network and over the watershed to the Weaver catchment of NW region (G. Butterill, pers. comm.).

SP n/e (Trent catchment only)

Volunteer surveys by the Leicester and Rutland Wildlife Trust during 2001 and 2002 found otter signs on the River Sence and the Grand Union Canal in the South Wigston and Newton Harcourt area, and on the lower Soar near Enderby (M. Bainbridge, pers. comm.).

Discussion

The Trent catchment showed one of the largest increases in positive sites of any of the catchments and regions into which England was divided for this survey. Only in Anglian and Thames Regions has the percentage increase been larger. In Thames Region the increase was from a very low base and was probably largely from introduced animals and in Anglian Region most of the increase is believed to have come from introductions. On the Trent only two otters were introduced - into the lower Trent in 1996 (see above). Because of the isolated nature of the introduction site it is likely that these animals, or their progeny, are responsible for a maximum of 9 positive sites in the present survey. Without these there would still have been a 308 per cent increase from 5.0 to 20.6 per cent. The Trent catchment shows that where conditions are favourable and where a source of breeding otters is nearby, in this case the Severn catchment, otters can recolonise large areas very rapidly.

No signs were found anywhere in the Trent catchment during the 1977-79 and 1984-86 surveys. However, otters were almost certainly present in the unsurveyed part of the catchment during this period as an otter was found dead in Leicestershire in 1979 (Jefferies, 1990) and signs were found continuously on the Churnet and part of the Dove between 1989 and 1991 (in unsurveyed square SK s/w) until an otter was found dead at Oakamoor in 1991 (A Crawford, pers. obs.). Re-colonisation appears to have come from the Tern system of the Severn catchment into the Sow and Penk catchment, beginning in the early 1990s. No signs were found on the Sow and Penk during the surveys in 1977-79 and 1984-86 and only a single spraint was found during a systematic survey of the Sow and Penk system in 1990 (Howell, 1990, unpublished report for NRA). Only seven positive sites were found during the 1991-94 survey compared with 20 during the present survey.

Otters now use the whole of the Trent and its tributaries down to, and including, the River Soar, as well as some of the tributaries of the lower tidal Trent. The speed of re-colonisation, particularly of the Upper Trent catchment and the increase in positive sites on the catchment as a whole have been spectacular and probably the greatest success story for otters in Britain in the last 10 years. Much of the expansion has unfortunately been within square SK s/w which was not included in this survey. The expansion on the Trent catchment is expected to continue, although otters have now reached the upstream limit of the heavily navigated part of the Trent. It will be interesting to see if there is a pause in expansion at this point as appears to have happened on the Severn.

During this survey no otter signs were found on the upper Dove and upper Derwent catchments despite signs being found during the 1991-94 survey.

This is one of only two instances of a 50-km square changing from positive to negative between the two surveys (the other is square TR n/w in Southern Region). Both these catchments were surveyed during higher than normal water conditions, which could have influenced the results. However only the upstream parts of these catchments were covered in this survey. Detailed surveys of the Dove catchment by the Staffordshire Wildlife Trust in 1997, 1999 and 2000 found evidence of otters to just upstream of Ashbourne, but few signs in the square covered in this survey (Mott 1997 and pers. comm.). A similar survey of the Derwent catchment by Derbyshire Wildlife Trust in 2000 (Smart 2000) found signs downstream of Ambergate but no signs in the square covered in this survey. The main centres of otter activity are clearly in the lower parts of these catchments and otter use of the upper parts of these catchments is still likely to be spasmodic.

Improving water quality throughout the region combined with the provision of coarse fish passes and a re-stocking programme has allowed fish stocks to recover on many rivers. An example of this is the River Tame, which drains the West Midlands conurbation. During the 1977-79 survey this river was so polluted that not only was it totally without fish but the level of pollution was sufficient to kill fish down the Trent to Nottingham. It remained almost without fish during the 1984-86 survey, but large investment in sewage treatment by Severn Trent Water, along with pollution prevention work by the Environment Agency and its predecessor bodies, have allowed fish to return to all but the upstream parts of the river. Otter signs were found on the Tame for the first time during this survey, and after the survey was completed signs were found at Castle Bromwich, just within the Birmingham City boundary (A. Crawford, pers. obs.).

Wye Catchment

Surveys were carried out in the following 50-km squares – SO n/w (31), SO s/e (39).

Description of the catchment

The Wye catchment includes some of the finest rural scenery in England. It covers the river catchment areas of the Wye and its tributaries including the Monnow and Lugg. The River Wye and several of its tributaries including the Lugg are an SSSI and cSAC and among the most important rivers in Britain for nature conservation. Much of the lower Wye valley is an Area of Outstanding Natural Beauty emphasising its importance in terms of landscape and amenity. The city of Hereford and the main towns of Ross-on-Wye, Monmouth and Chepstow are all on the banks of the River Wye, while the town of Leominster lies on the River Lugg.

Water quality

Water quality is generally very good in the catchment, which supports a salmon and trout fishery.

Fisheries

The Wye is best known for its annual salmon run although numbers have decreased substantially in recent years. Trout are present in most parts of the catchment. There are many species of coarse fish chub, dace, pike and roach being the dominant species, present in all but the smallest streams. Native crayfish occur in parts of the catchment.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 70 sites was surveyed

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	12/70	23/70	49/70	58/70
% positive	17.14%	32.86%	70.00%	82.86%

All sites are within the Wye LEAP area (46).

Information from additional surveys in adjacent 50-km squares

SO s/w and SO n/e

There have been no recent surveys in either of these squares but it is believed that otters are widely distributed (S. Ayling, pers. comm.).

Discussion

Since the 1991-94 survey, the increase in positive sites in the Wye catchment at 18 per cent (from 70.0 to 82.9 per cent) is, - with North West Region - the lowest of any of the regions and catchments. In contrast to North West Region this reflects the fact that the Wye had the highest level of positive sites in the 1991-94 survey and so there was less room for expansion.

The otter population in the Wye catchment appears to have consolidated and 'filled the gaps' following an expansion in its range between the 1977-79 and 1991-94 surveys. Otters now exploit nearly all the watercourses in the Wye catchment. The few sites which were negative were all on very small watercourses unlikely to be used by otters or, in two cases, on the main River Wye in sites that were very difficult to survey adequately. Fish stocks and cover are generally very good, and further consolidation would be expected.

Anglian Region

Surveys were carried out in the following 50-km squares – SE s/e (9), SK s/e (42), SP s/e (78), TF n/w (142), TF s/e (98), TG s/e (3), TL n/w (132), TL s/e (103), TM n/w (121).

Description of the region

Anglian Region is by far the largest of the regions used for this survey. The land is mainly low lying, with only the Chiltern Hills exceeding 200 m above sea level. Much of the land is made up of river floodplains that have been drained for agricultural use and now provide fertile arable land.

There are no very large urban centres but there are a number of cities and large market towns including Northampton, Peterborough, Milton Keynes, Chelmsford, Colchester, Bedford, Kings Lynn, Norwich, Ipswich, Cambridge, Lincoln and Corby.

Water quality

Major expenditure on sewage works and sewerage infrastructure has led to considerable improvements in river water quality. Over 90 per cent of the rivers of the region are of fair to good quality.

Fisheries

All of the region's flowing waters, covering some 4800 miles of rivers and drains, are classified as lowland fisheries but with a range of riverine types. Roach, bream and pike are the dominant species while dace, chub and barbel become important in the upper reaches of major rivers such as the Ouse and Nene. Many of the chalk rivers feeding into Breckland, the River Great Ouse and some Lincolnshire and Norfolk rivers, support natural brown trout populations.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 728 sites was surveyed including three new sites in partial square TG s/e which were added for this survey.

	1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites - comparison of 77-79 sites	20/622	8/622	687/2940	166/622
- all sites		8/725	58/725	188/728
% Positive - comparison of 77-79 sites	3.22%	1.29%	8.36%	26.69%
- all sites		1.10%	8.00%	25.82%

Summary of results for each LEAP area

Upper Witham (59)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/73	0/73	2/73	16/73

Some of this LEAP area lies within unsurveyed square SK n/e. There has been a significant increase in positive sites since the last survey, mainly on the River Bain.

Welland (60)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/26	0/26	1/26	16/26

Much of this LEAP area lies within unsurveyed squares SP n/e and TF s/w. In 1994 the Otter Trust released seven otters into this LEAP area (Jefferies et al, 2000). There has been a significant increase in positive sites since the last survey mainly on the Rivers Gwash and Chater.

Louth Coastal (61)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	1/50	0/50	0/50	24/50

No otter signs were found in this LEAP area during previous surveys. In 1994 the Otter Trust introduced seven otters in 1994 and the Vincent Wildlife Trust 10 otters into the area in the same year (Jefferies et al, 2000). Otters are now widespread.

Nene (62)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	1/24	2/24	5/24	14/24

Much of this LEAP area lies within unsurveyed square SP n/e. Between 1994 and 1995 the Otter Trust introduced eight otters into this area (Jefferies et al, 2000). Otter signs have been found here in every national survey, but the number of positive sites has increased significantly since the last survey.

Grimsby/Ancholme (63)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/24	0/24	0/24	0/24

Much of this LEAP area lies within unsurveyed square

TA s/w. Although the Vincent Wildlife Trust introduced six otters into the area in 1995 (J. & R. Green, pers. comm.), no signs were found during this survey.

Witham (64)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/20	0/20	0/20	4/20

No positive sites were found in this LEAP area in previous surveys. Any otters in this area are likely to be the result of the introductions into the adjacent Louth Coastal LEAP area (see above).

North Norfolk (65)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	6/17	0/17	1/17	1/17

Although the Otter Trust introduced six otters into this area between 1987 and 1992 (Jefferies et al, 2000), there was only one positive site in both 1991-4 and the present survey.

East Suffolk (66)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	1/60	2/60	10/60	24/60

Although the Otter Trust introduced seven otters into this area between 1985 and 1993 (Jefferies et al, 2000), a remnant of the original population probably also survived since signs were found in every national survey. There has been a significant increase in positive sites since the last survey with otters well distributed throughout the surveyed part of the LEAP area.

North Essex (67)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/95	3/95	20/95

The Otter Trust introduced 17 otters into this LEAP area between 1983 and 1998 (Jefferies et al, 2000) and the RSPCA introduced two otters in 2000 (S. Bullion, pers. comm.). The otter population appears now to be sparsely but widely distributed.

Broadland Rivers (68)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	3/68	0/68	13/68	26/71

Most of this LEAP area lies within unsurveyed square TG s/w. The Otter Trust introduced 19 otters into this area between 1984 and 1996 (Jefferies et al, 2000). Otters are now widely distributed within the surveyed part of the LEAP area.

South Essex (69)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/3	0/3	0/3

Most of this LEAP area lies within unsurveyed square TQ n/e. No signs of otters were found on the three sites surveyed.

Old Bedford (70)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/49	0/49	0/49	3/49

Much of this LEAP area lies within unsurveyed square TL s/w. No otters were found here in any of the previous surveys. The Otter Trust introduced four otters into this area in 1995 (Jefferies et al, 2000).

Cam (71)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/10	0/15	10/15	8/15

Much of this LEAP area lies within unsurveyed squares TL n/e and TL s/w. The distribution of otters appears not to have changed since the last survey.

Upper Ouse (72)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/81	0/81	2/81	4/81

The two positive sites in the last survey were both at the downstream end of this LEAP area but both were negative in this survey; signs were only found further upstream.

Ely Ouse (73)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	2/30	2/30	10/30	14/30

Most of this LEAP area lies within unsurveyed square TL n/e. Otter signs were found in the headwaters of the catchment in all four surveys. The Otter Trust introduced nine otters into this area between 1984 and 1995 (Jefferies et al, 2000).

Bedford Ouse (74)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	1/45	2/45	1/45	11/45

Otter signs were found in this LEAP area in very low numbers in each of the previous national surveys but the number of positive sites has increased significantly since the last survey. The Otter Trust introduced four otters into this area in 1995 (Jefferies et al, 2000).

North West Norfolk (75)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	5/45	0/45	0/45	3/45

Although signs were found in this area in the first national otter survey, no signs were found during the last two surveys. During this survey signs were found on the River Nar and on a tributary of the Great Ouse near King's Lynn.

Information from surveys in adjacent 50-km squares

SK n/e

A systematic survey for the Environment Agency in 1999 found no signs of otters in this square. Incidental records and occasional sightings since then show that otters are present (P. Smith (EA), pers. comm.).

SP n/e

Surveys in 1998 found signs of otters on the River Nene downstream of Northampton and surveys by EA staff between 2000 and 2002 found numerous otter signs on the Rivers Welland and Glen (C. Addy, pers. comm.). Casual surveys by volunteers from the Leicestershire and Rutland Wildlife Trust found signs on the River Welland in the Welham and Medbourne area (M. Bainbridge, pers. comm.).

TA s/w

Systematic surveys for the Environment Agency in 1994 and 1999 found no signs of otters in this square. There are however continuing reports of otter sightings particularly in the coastal strip (P. Smith (EA), pers. comm.).

TF n/e

Incidental records and occasional sightings show that otters are present but no systematic surveys have been carried out (P. Smith (EA) pers. comm.).

TF s/w

A systematic survey for the Environment Agency in 1999 found signs of otters on the Welland down to Spalding but no signs on the Witham system (P. Smith -EA- pers. comm.). Systematic bridge checks in the Cambridgeshire part of the square by the Beds., Cambs., Northants., and Peterborough Wildlife Trust and the Cambs. Badger and Otter Group in 2002 found a small number of otter signs on the Welland system but only one positive site on the Nene system (M. Baker, pers. comm.).

TG s/w

This square was surveyed as part of the 1997 county survey undertaken by Norfolk Wildlife Trust (Yaxley 1997a). This, together with other small scale surveys and incidental records, has shown that otters use all the main rivers in the square, and sporadic signs have been found along the north Norfolk coast although not east of Salthouse (S. Henson, pers. comm.).

TL n/e

Surveys by the Anglian Otters and Rivers Project 1999-2002 (S. Norman, unpublished report) show otters to be widespread on the larger rivers in the Ely Ouse catchment within this square, but with fewer signs on the headwaters. Some otter signs were also found on the headwaters of the North Essex rivers.

Systematic bridge checks by the Beds., Cambs., Northants., and Peterborough Wildlife Trust and the Cambridgeshire Badger and Otter group found otter signs on the Ouse and lower Cam systems. Otter signs are now widespread but localised (M. Baker, pers. comm.).

The Norfolk part of the square was surveyed during the 1997 county survey by the Norfolk Wildlife Trust (Yaxley 1997b). Otter signs were found on the Little Ouse, the River Wissey, the River Thet and the Cut-off Channel. Sporadic signs have been found on the River Great Ouse southwest of Downham Market, but few on the Fens drains system (S. Henson, pers. comm.).

TL s/w

Surveys by the Ivel Otters and Rivers Project between April 2001 and July 2002 found signs of otters on the River Ivel and the Ivel Navigation but few signs on the River Hiz (A. Proud, pers. comm.). Systematic bridge checks by the Beds., Cambs., Northants., and Peterborough Wildlife Trust found signs of otters on the upper reaches of the Cam in this square (M. Baker, pers. comm.).

TM s/w

Surveys by the Anglian Otters and Rivers Project (S. Norman, unpublished report) found widespread otter signs within the northern part of this square. These results are confirmed by the systematic yearly surveys of Essex for WWF UK between 1996 and 2002 (Macdonald, S.M. & Mason, C.F. 2002).

TQ n/e

No signs of otters were found in the South Essex LEAP area during the systematic yearly surveys of Essex for WWF UK between 1996 and 2002. However signs were found in the North Essex LEAP area of this square during each survey (Macdonald, S.M. & Mason, C.F. 2002).

Discussion

The increase in positive sites in Anglian Region since the 1991-94 survey has been one of the highest of any of the regions with a 222 percentage increase. Only Thames Region and the Trent catchment had greater increases. Between 1983 and 1998 the Otter Trust introduced 81 otters, between 1994 and 1995 the Vincent Wildlife Trust introduced 16 otters, and in 2000 the RSPCA introduced 2 otters. Of these, 60 were released since the 1991-94 National Otter Survey. Undoubtedly some otters remained in the region prior to, and during, the introduction programmes (Spalton & Cripps 1989 and results above from the Nene, East Suffolk, Ely Ouse and Bedford Ouse LEAP areas), but the introductions have been responsible for most of the otters present during this survey. The majority of the increase in positive sites between the 1991-94 and 2000-02 surveys has taken place in those LEAP areas into which otters were introduced since the 1994-96 survey. No attempt has been made (or would be possible without DNA techniques) to distinguish between spraints from 'original' and 'introduced' populations. Only two of the introductions took place after June 1996, so few if any of the introduced animals would still be alive in 2001. The otter signs found must therefore be from their progeny or subsequent generations, which would be expected to have bred with the surviving remnants of the original population.

Otters are now present in the overwhelming majority of the LEAP areas within Anglian Region. It would appear that it is simply a matter of time before the population spreads to the remaining unoccupied areas. However Macdonald & Mason (2002) who carried out yearly surveys of Essex between 1996 and 2002 expressed concern about the otter population of the county. Further monitoring work is essential to see if the Anglian population, essentially derived from introductions, can continue to spread.

Thames Region

Surveys were carried out in the following 50-km squares – SO s/e (3), SP n/w (3), SP s/e (68), SU n/w (77), SU s/e (18), TL s/e (10), TQ n/w (46).

Description of the region

Thames Region consists of the River Thames and its tributaries including the Kennet, Lee, Colne, Wey, Cherwell, Mole, Windrush and Thame. The Thames rises to the west as springs issuing from the limestone of the Cotswolds and flows eastwards to the sea downstream of London.

The region is one of the driest in the UK but major aquifers provide a base flow for many rivers. The region has 12 million inhabitants, 20 per cent of the total UK population in 5 per cent of the land area, putting a high demand on resources and the environment. A fifth of the land is urban, with the massive conurbation of London dominating the lower Thames. Other large urban areas include Swindon, Oxford and Reading, but over a quarter of the land is within designated Areas of Outstanding Natural Beauty and a third of the region is used for arable farming.

Water quality

With the very high level of urbanisation, many rivers are strongly affected by flows from sewage treatment works. As a result water quality in the region has, in the last 10 years, varied with river flows. During drought periods (for example 1995-7) water quality declined but improved again as more normal rainfall returned.

Large-scale investment in the sewerage system and in sewage works, has led to improved water quality, with over 85 per cent of rivers classed as “very good” or “good” and poorer water quality mainly confined to urban areas and below significant discharges.

Fisheries

There is a diversity of fish fauna, and 119 species have been recorded in the lower Thames Basin including the estuary. Coarse fish predominate but there are many reaches with mixed coarse and salmonid fisheries. Trout predominate on the headwaters of tributaries on the chalk and limestone. However, lack of habitat affects natural recruitment on many reaches, and most watercourses have suffered some form of modification in the past. Water quality does not appear generally to be limiting fish stocks, and the Thames itself has a diverse fish fauna with a good range of age-classes. Eel fisheries are important in the lower catchment, and elvers released into the Upper Thames, Wey and Lee in 1993-4 may be responsible for the older eels now being found in these parts of the catchment. There are many artificially stocked fisheries, and a large number of water-filled gravel pits, which add significantly to the fishery resource.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 225 sites was surveyed, including 46 new sites in square TQ n/w added for this survey.

	1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites - comparison of 77-79 sites				
- all sites	0/169	0/179	4/179	18/225
% Positive - comparison of 77-79 sites				
- all sites	0%	0%	2.23%	7.69%
			2.23%	8.00%

Summary of results for each LEAP area

Colne (114)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/1	0/1	0/1	0/13

Most of this LEAP area lies within unsurveyed squares TL s/w and SU n/e. All of the 13 sites were negative.

North London (115)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	1/7

One site on the Lee near the M25 was positive in this previously unsurveyed area. It is believed that the population derived from introductions in the Upper Lee LEAP area has spread downstream.

Roding, Beam and Ingrebourne (116)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/6	0/6	4/11

Four sites were positive in this area. The otter, or otters, present are believed to be derived either from those introduced by the Otter Trust into the neighbouring Upper Lee LEAP area, or the 17 otters (10 females and 7 males) introduced into the North Essex LEAP area of Anglian Region between 1983 and 1998 (Jefferies et al, 2000). The positive sites were all on the upper Roding, which flows through a predominantly agricultural landscape. The lower Roding, and the Beam, are dominated by the urban landscape of Greater London.

Upper Lee (117)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/4	0/4	0/4

Most of this LEAP area lies within unsurveyed square TL s/w. No signs were found within the small part of the LEAP area surveyed. The Otter Trust introduced 6 otters into this area in 1991 (Jefferies et al, 2000).

Lower Thames (119)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	0/4

Most of this area lies within unsurveyed square SU n/e. No signs were found on the four sites surveyed.

Mole (120)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	0/5

The headwaters of this catchment lie within unsurveyed square TQ s/w. There were no positive sites in this previously unsurveyed area. Recent improvements in water quality in the area have led to increased fish stocks (G. Scholey, pers. comm.).

Thames Tideway (122)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	0/6

There were no positive sites in this previously unsurveyed area. The banks are heavily revetted and industrialised and water control structures could prevent otter access to the smaller tributaries that offer the greatest potential. Fish stocks are good, however, and it should be possible for otters to utilise this area.

Wandle, Beverley Brook, Hogsmill (123)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	0/2

No otter signs were found on these small, previously unsurveyed Thames tributaries. The three watercourses are dominated by the urban landscape of Greater London.

Wey (124)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/18	0/18	0/18	0/23

No otter signs were found in this area. Fish stocks are good and have been increased by stocking. Otter signs were recorded in 1994, possibly from a transient animal.

Cherwell Valley (125)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/30	0/30	1/30	1/30

Only one site out of the 30 surveyed was positive. There have been sporadic signs of otters on the Cherwell catchment since the last national survey (G. Scholey, pers. comm.).

Kennet Valley (126)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/28	0/28	0/28	0/28

No sites in this LEAP area were positive but there have been sporadic, but unconfirmed, reports of otters on the catchment since 1994. The Kennet valley contains the River Lambourne, which is a cSAC and SSSI, and part of the River Kennet is also an SSSI.

Thames (Buscot to Eynsham) & Windrush (127)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/3	0/3	1/3	2/3

Almost the whole of this area lies within unsurveyed square SP s/w. There were two positive sites and the otter or otters are believed to come from those released in the Upper Thames area (see below). The Thames and Windrush have a good fishery resource and there have been periodic signs of otters in the catchment, particularly on the Windrush, since 1989. This was the main part of the upper Thames to show evidence of otters prior to releases by the Otter Trust in 1999.

Thames Valley (128)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/37	0/37	0/37	0/37

None of the sites in this LEAP area were positive. The lower Thame in particular has an abundance of coarse fish.

Thames & Ock (130)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/20	0/20	2/20	0/20

None of the sites in this LEAP area were positive but fish stocks are good and it is anticipated that otters will spread from the upper Thames to this LEAP area in time.

Upper Thames (131)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/32	0/32	0/32	10/32

This is the first national survey to find signs of otters in this LEAP area with ten of the 32 sites being

positive. In 1999 the Otter Trust introduced 17 otters into this area (Jefferies et al, 2000) before which there had only been sporadic records mainly on the River Coln. Otter activity is now widespread, particularly within the Cotswold Water Park and on the River Coln and tributaries of the Rivers Rea and Cole (G. Scholey, pers. comm.).

Information from surveys in adjacent 50-km squares SP s/w

Between February 1992 and November 1993, 83 sites in SP s/w were surveyed of which two were positive. These sites were re-surveyed by a team of 7 surveyors in March 2002 and 36 per cent of the 30 sites found to be positive (G. Scholey, pers. comm.). This significant increase complements that in square SU n/w to the south.

SU n/e

In surveys carried out on the Kennet catchment no otter signs have been found. No strategic surveys have been carried out in the remainder of this square but casual surveys have found occasional signs at a number of sites including the Thames and associated gravel pits near Abingdon and on the lower Lodden (G. Scholey, pers. comm.).

TL s/w

Systematic surveys by the Hertfordshire Wildlife Trust in 2000 found evidence of otters along the whole of the River Stort and confirmed breeding on the Lee south of Hertford. Similar surveys on the Colne catchment failed to find any signs of otters (G. White, pers. comm.).

TQ s/w (Thames Region only)

Bridge checks by Surrey Wildlife Trust on the Wey system every 3 months since 1999 have found no signs of otters and a survey in August 2002 on the Mole system was also negative (C. Matcham, pers. comm.).

Discussion

The increase in positive sites in the Thames Region has been the highest of any of the regions. While a small part of the increase in positive sites may have been as a result of natural re-colonisation much of the expansion is likely to have been due to the introduction of 23 otters by the Otter Trust. During the 2000-02 survey otter signs were found in five LEAP areas in three groupings within Thames Region, in the Upper Thames and Windrush, in the Upper Lee and Roding and a single positive site at the northern edge of the Cherwell catchment.

In the Upper Thames and Windrush LEAP area only one site out of 35 was positive in the 1991-94 survey compared with 12 out of 35 in the present survey. However, two sites a little further down the Thames that were positive during the 1991-94 survey were negative in this survey. If the three LEAP areas of Upper Thames, Thames & Windrush and Thames & Ock are taken together then the figures are three positive sites out of 55 in the 1991-94 survey and 12 positives out of 55 during the 2000-02 survey. In 1999 the Otter Trust released 17 otters (6 males and 11 females) at 3 sites in the upper Thames (Jefferies et al, 2000). The introductions greatly augmented the low numbers present and were followed by a marked increase in otter activity. There are three known cases of successful breeding even though at least seven of the released animals were found dead on roads (G. Scholey, pers. comm). It is anticipated that otters will continue to spread from the Upper Thames through Oxford to colonise the middle and lower parts of the catchment. The otter signs found in SP s/w (above) probably indicate an extension of range by the introduced Upper Thames population.

In the Roding and Lee LEAP areas, there were no positives in previous surveys, and the otter activity found in this area during the 2000-02 survey is almost certainly the result of the six otters introduced by the Otter Trust to the Lee and the Stort in Hertfordshire in 1991. It is believed that these otters have bred and the resulting population has spread to the North London LEAP area and possibly the Roding LEAP area.

The single positive site in the Cherwell may represent a small population in the upper end of this catchment, as a single site less than 10 km away was positive in the 1991-94 survey. It could, however, be an outlier from the Evenlode catchment to the west or from the otter population in the Upper Ouse catchment of Anglian Region.

Thames Region, with 8 per cent of sites positive (7.7 per cent of sites surveyed in all four surveys) has one of the lowest levels of positive sites of any of the English regions. Only Southern Region has a lower level of positive sites. However, because the sites are in three widely separated areas and otters are present in many catchments contiguous with the region, it is likely that there will be a considerable expansion in the area occupied by otters in Thames Region during the next few years. Consolidation seems to be taking place on the Thames catchment upstream of Oxford but it remains to be seen if the London conurbation and associated high traffic density will be a barrier to the establishment of a viable population throughout the region.

South West Region

Surveys were carried out on the following 50-km squares – SS s/e (167*), SW s/e (59), SX n/w (130*), SX s/e (11), SY n/w (32).

* includes one site just outside the square.

Description of the region

This is one of the most rural of the English regions. The population is moderately low and concentrated mainly along the coast, with Plymouth, Torbay, Exeter, Newquay, Falmouth and Penzance the principal towns. Despite the popularity of the region with holidaymakers the level of disturbance on most rivers remains low. Riparian habitat is generally very good and extensive semi-natural habitat provides cover along river banks. There are numerous wetlands in the headwaters of many of the streams.

The land is mainly used for mixed sheep, beef and dairy farming, but arable production has increased in recent years. There are some large areas of horticulture particularly in west Cornwall.

Water quality

Water quality throughout the region is generally very high but there are localised problems from mine water seepage and from the historic use of organochlorine pesticides in the bulb growing areas of West Cornwall. There are occasional farm pollution incidents. The increasing silt load in many rivers as a result of more intensive farming methods is also a cause for concern.

Fisheries

The rivers of the region are classified as game fisheries, supporting resident and migratory salmonids and, locally, good populations of coarse fish and eels. There is, however, concern over declining salmon stocks in both Devon and Cornwall, reflecting the wider decline across the North Atlantic. There are numerous stillwater fisheries in the region including several well-stocked reservoirs.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 399 sites was surveyed including 11 new sites in square SX s/e added for this survey.

		1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites	- comparison of 77-79 sites	91/388	167/388	259/388	322/388
	- all sites				332/399
% Positive	- comparison of 77-79 sites	23.45%	9.6%	23.4%	82.99%
	- all sites				83.21%

Summary of results for each LEAP are

Torrige and Hartland (89)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	16/23	17/23	21/23	22/23

The results reflect the very high otter use of this LEAP area which has good habitat and fish stocks. Only the eastern part of this area, in the lower reaches of the Torrige, was surveyed.

Taw (90)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	23/73	43/73	60/73	65/73

The results reflect the established very high level of otter use of this LEAP area.

Exe (91)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	5/60	25/60	42/60	54/60

Some of this LEAP area lies within unsurveyed squares ST s/w and SX n/e. There has been an increase in positive sites since the last survey with some infilling of territories in the Exmoor headwaters. Otters are known to breed throughout the catchment even within the city boundaries of Exeter (M-R. Lane, pers. comm.). The high level of positive sites found during this survey reflects this.

Sid and Otter (92)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/14	1/14	4/14	11/14

The upper parts of this LEAP area lie in unsurveyed square ST s/w. The results are now very good and otters are known to breed in the area following a slow re-colonisation. Deaths on roads are a cause for concern, but do indicate that otters are now more numerous (M-R. Lane, pers. comm.).

Axe and Lim (93)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/15	1/15	3/15	7/15

The upper parts of this LEAP area lie in unsurveyed square ST s/w. Otter re-colonisation has been slow

but the results are now quite good although lower than for other areas in the region.

North Devon Streams (94)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	1/15	2/15	9/15	15/15

Otters utilise all streams in the area, even those running through coastal towns much visited by tourists. These are small and have correspondingly small fish populations, but otters are believed to be crossing from the Taw and Exe catchments to utilise them and the coast (M-R. Lane, pers. comm.).

River Avon and Erme (97)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	10/10

This area was not surveyed in previous surveys but otters are using all the available watercourses.

Seaton/Looe/Fowey (98)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/31	9/31	21/31	17/31

There has been a small decrease in positive sites, since the 1991-94 survey but as many of the surveys were carried out after heavy rain this is probably not significant.

Freshwater Tamar and Tributaries (99)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	28/45	40/45	41/45	42/45

The continuing high level of positive sites reflects an area that is now believed to have a high otter population (M-R. Lane, pers. comm.).

Tamar Estuary and Tributaries (100)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/28	8/28	15/28	20/29

There was an increase in positive sites in this area. The negative sites were almost all coastal and estuarine.

Fal and St. Austell (101)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	6/46	10/46	19/46	37/46

Part of this area is within unsurveyed square SW n/e. There was a significant increase in positive sites in this LEAP area, largely on the Fal catchment and on the Lizard, where otters are now found on very small coastal streams, the coast itself and in areas of heathland.

West Cornwall (102)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/15	1/15	8/15	13/15

Parts of this area are within unsurveyed squares SW n/e and SW s/w. There has been a significant expansion of otter activity in this LEAP area with otters now using the smaller streams. For the first time otter signs were found on the Red River, which historically suffered from severe tin mining pollution.

North Cornwall (103)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	12/23	11/23	16/23	19/23

Part of this area is within unsurveyed square SW n/e. The LEAP area includes the River Camel, which is an SAC for otters. There was an increase in positive sites particularly along the coast.

Information from additional surveys in adjacent 50-km squares

SS s/w

Since 1996 Devon Wildlife Trust volunteers have surveyed this square four times a year. The level of otter presence is very high and even the small coastal streams are used (M-R. Lane, pers. comm.).

ST s/w (South West Region only)

Surveys in this square show widespread otter signs with evidence of breeding on the Culm (Exe tributary), regular use on the upper Axe and intermittent use of the upper River Otter. (J. Williams, pers. comm.).

SX n/e

Surveys by Devon Wildlife Trust volunteers show a high level of otter use throughout the square even on watercourses through urban areas on the coast

such as Torbay, Teignmouth, Exeter and Dartmouth. Otter signs are found in the watershed linking the streams that radiate out from the centre of Dartmoor. This crossover makes the area of considerable importance for otter populations in the region (M-R. Lane, pers. comm.).

SW n/e

No systematic surveys have been carried out in this square but casual surveys indicate that otters are widespread (K. Stokes, pers. comm.)

SW s/w

No systematic surveys have been carried out in this square but casual surveys indicate that otters are present (K. Stokes pers. comm.)

Discussion

The 24 per cent increase in positive sites (67 to 83 per cent of sites surveyed in all four surveys) is, like the similar low increase in the Wye catchment, a reflection of the fact that there was limited room for expansion in the region. The very high level of positive sites, the highest for any region, is close to that found during the Otter Survey of Ireland 1980-81 (Chapman & Chapman, 1982) and confirms the region as the stronghold of otters in England. Otters are now using most of the rivers, small watercourses and the coast within the region. The number of otter sightings is increasing, including sightings during the day, along the coast and of cubs.

Two areas in West Cornwall show a marked increase, with otter records for the first time on the Lizard, where all sites were positive, and an increase in records on the small west-coast streams. There has also been an expansion at the eastern end of the region with increases in the Sid and Otter and Axe and Lim LEAP areas. The increase in these areas emphasises the fact that few areas were found to be unoccupied during the 1991-94 survey. Otters are now known to cross between the rivers of the north coast and the headwaters of the Taw and Exe thus consolidating their use of these areas. The numerous amphibians found in the extensive wetlands and areas of wet grassland in the headwaters of many of the region's rivers provide an additional food resource, with frog bones commonly being found in spraint in these areas in the spring (M-R. Lane, pers. comm.). There are increasing records of otters in urban areas and even using garden ponds (K. Stokes and M-R. Lane, pers. comm.). Elsewhere the otter population continues the consolidation and expansion observed in previous surveys.

Wessex Region

Surveys were carried out in the following 50-km squares – SS s/e (15), ST n/w (21), ST s/e (92), SU n/w (16), SY n/w (14), SZ n/w (14).

Description of the region

The region is predominantly rural in character, with an emphasis on livestock rearing in the west and arable production in the east. There are major urban centres around Bristol and Bath and along the south coast including Bournemouth and Poole. Large-scale industry is largely confined to the Avonmouth area. The region has a very large number of designated sites, including extensive wetlands on the Somerset Levels and Moors and in the Hampshire Avon Valley.

Water quality

Most of the rivers in the region have high water quality but there is some pollution around Bristol and Avonmouth and some rivers in Dorset and Wiltshire suffer from low flows with consequent dilution problems. Concern has been expressed over a decline in the water quality of the classic chalk rivers in the east caused by run off of silt and nutrients from farmland.

Fisheries

Dorset, Hampshire and Wiltshire are renowned for their game fisheries while coarse fisheries predominate in Somerset and the north of the region. The Region supports a diverse range of fisheries including numerous well-stocked stillwaters. There are a large number of reservoirs, particularly in Somerset, most of which are stocked with trout.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 172 sites was surveyed including 21 new sites in ST n/w added for this survey.

	1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites - comparison of 77-79 sites	2/151	1/151	29/151	64/151
- all sites				69/172
% Positive - comparison of 77-79 sites	1.32%	0.66%	19.21%	40.38%
- all sites				40.12%

Summary of results for each LEAP area

Bristol Avon (104)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/15	0/15	0/15	1/15

Most of this LEAP area is in unsurveyed square ST n/e (see below). This is the first national survey in which otter signs have been found in this area. The Otter Trust introduced two otters into this area in 1990 (Jefferies et al 2000).

River Parrett (106)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/22	0/22	3/22	12/22

Much of this area is in unsurveyed square ST s/w. The negative results for surveys in the headwater streams in Dorset may have been caused by high water at the time of survey. There is clearly a strong otter population in this area.

Brue and Axe (107)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	2/15	1/15	4/15	7/24

Part of the LEAP area is within unsurveyed square ST s/w. Nine sites in the previously unsurveyed square ST n/w were added for this survey. Despite the proximity to areas with strong otter populations, there has been only a small increase in positive sites and volunteer surveys over 20 years confirm this (J. Williams, pers. comm.). The reasons are not clear.

North Somerset Rivers (108)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	4/12

Otter signs were found across the area despite the discovery of a dead otter just before the start of the survey. This area was not surveyed previously but the re-colonisation is believed to be recent (J. Williams, pers. comm.).

West Somerset Rivers (109)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/15	0/15	9/15	13/15

Otters are widely distributed in this area, despite the deaths of several otters on the roads in recent years.

Hampshire Avon (110)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/22	0/22	0/22	4/22

Most of the LEAP area is in unsurveyed square SU s/w (see below) and the results probably do not reflect the situation in the catchment as a whole. The Otter Trust introduced two otters into this area in 1989. In 2001 three otters were found dead on the roads (G. Roberts, pers. comm.) and in May 2002 one was found dead near the watershed between the Avon and Stour (M. Satinet, pers. comm.).

Frome Piddle, Pole and Purbeck (111)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/9	0/9	1/9	1/9

Most of the LEAP area is in unsurveyed square SY n/w (see below). The survey sites were all on headwaters and on the streams entering Poole Harbour, which appear subjectively to be the least suitable parts of the LEAP area for otters.

Dorset Stour (112)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/39	0/39	11/39	19/39

Otter signs were found throughout the area apart from the smaller headwater streams and the Stour has become the stronghold for otters in Dorset. The Otter Trust introduced five otters into this area between 1989 and 1991 (Jefferies et al, 2000).

West Dorset (113)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/14	0/14	1/14	7/14

Most of the LEAP area is in unsurveyed square SY n/w (see below). The results for the surveyed area show a good level of otter signs confirmed by Dorset Otter Group surveys (B. Bruce, pers. comm.).

Information from additional surveys in adjacent 50-km squares

ST s/w (Wessex Region only)

Regular surveys by Somerset Otter Group show that otter populations are strong. Numerous otters have been killed on the roads in this square (J. Williams, pers. comm.).

ST n/e

Systematic monthly surveys of the Bristol Avon catchment show that otters use the whole of the Avon and its tributaries downstream of the confluence with the Somerset Frome but there is only limited evidence upstream of the confluence. Breeding in the Avon catchment was confirmed in both 2001 and 2002 but five otters are known to have been killed on roads here during 2002 (S. Reece, pers. comm.). Surveys by Wiltshire Wildlife Trust have found regular signs on the By Brook near Bradford-on-Avon and some signs on the Avon near Malmesbury (M. Satinet, pers. comm.).

SU s/w (Wessex Region only)

Surveys by Dorset Otter Group in this square have found otter signs to be widespread but not common (B. Bruce, pers. comm.). Surveys by Wiltshire Wildlife Trust have found widespread signs on the middle and lower Hampshire Avon from 1997-2002, with signs increasing over this period. Signs have also been found in this square on the Dorset Stour (M. Satinet, pers. comm.).

SY n/w

Surveys by Dorset Otter Group show widespread otter signs on the Frome and the lower Piddle catchments but limited signs on the streams in the West Dorset LEAP area (B. Bruce, pers. comm.).

Discussion

There has been a 121 per cent increase in positive sites in Wessex Region since the 1991-94 survey (19 to 42 percent of sites surveyed during all four surveys). With 69 positive sites out of 172 there has been a substantial increase in signs since the 1977-79 and 1984-86 surveys which found two and one positive sites respectively, and an encouraging increase since 1991-94 when only 29 sites were positive. The eastward expansion of otters from South West Region appears to be continuing, and otters are now widely but sparsely distributed across Wessex Region, with breeding taking place on several catchments. There are, however, many watercourses where otters are still rare or absent, despite apparently suitable habitat and good fish stocks.

Wessex is probably one of the most important areas for otter conservation in England. It links the good otter populations of the South West with the much sparser populations of Southern and Thames Regions, the lower Severn valley and the expanding populations on the rivers of South Wales (T. Jones pers. comm.). It is essential that the otter population in Wessex Region is assisted, both as a way of colonising the key areas to the north and east and also ensuring the genetic viability of the combined metapopulation. In this context it is disturbing that the re-colonisation of the Brue and Axe catchments has been so slow despite their proximity to rivers with strong otter populations and the fact that the surrounding area contains a large number of nature reserves and protected sites. The reasons for this are not clear, but extensive volunteer surveys over 20 years confirm the continuing low otter population within these two catchments (J. Williams, pers. comm.). Similarly there appears to be a gap in otter distribution between east Devon and West Dorset, although there are some signs that otters may now be colonising this area via the River Stour.

It is hoped that the otter population in Wessex Region will expand and allow the natural re-colonisation of both Thames and Southern Regions.

Southern Region

Surveys were carried out in the following 50-km squares – SU s/e (82), SZ n/w (28), TQ n/w (3), TQ s/e (134), TR n/w (35).

Description of the region

The region comprises the south-eastern corner of England where gently rolling downlands run east to west through of Sussex and Kent to form the higher ground, but only reaching a maximum of 250 m. The rivers of the region tend to drain north or south from the downs with the area between, the Weald of Kent, giving rise to the Medway, Stour and Rother. To the western end lies the New Forest. There is good riparian habitat for otters on many of the rivers of the region.

There is significant pressure from the increasing human population. The largest towns are mainly coastal and include Southampton, Portsmouth, Brighton, Margate, Dover, Folkestone, Hastings and Eastbourne with somewhat smaller inland towns such as Winchester, Rochester, Maidstone, Canterbury, Sittingbourne, Tonbridge and Tunbridge Wells. Despite the high population, a large part of the region lies within Areas of Outstanding Natural Beauty and there are a large number of SSSIs, Special Areas of Conservation (SAC) and Special Protection Areas (SPA), especially around the coasts.

Results for 2000-02 Survey and Comparison with Previous Surveys

A total of 282 sites was surveyed including three new sites in square TQ n/w added for this survey.

		1977 - 79	1984 - 86	1991 - 94	2000 - 02
Positive sites	- comparison of 77-79 sites	5/244	7/244	9/244	13/244
	- all sites		8/3279	12/279	13/282
% Positive	- comparison of 77-79 sites	2.05%	2.87%	3.69%	5.33%
	- all sites		2.87%	4.30%	4.61%

Water quality

Over 90 per cent of the rivers in the region are of fair to good water quality with few watercourses in need of improvement.

Fisheries

The chalk streams support good salmonid fisheries. Other rivers support good diverse coarse fisheries, and healthy populations of eels occur throughout the region. There are a large number of well-stocked enclosed stillwaters.

Summary of results for each LEAP area

New Forest (76)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	1/15	0/15	0/15	1/15

Much of this LEAP area lies in unsurveyed square SU s/w. The one positive site recorded is likely to be an "outlier" from the otter population on the Dorset Stour/Hampshire Avon less than 10 km to the west.

Test and Itchen (77)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	4/10	5/10	6/10	8/10

Most of this LEAP area lies in unsurveyed square SU s/w. All the sites that were positive in the 1991-94 survey were positive during this survey and two additional sites were also positive. The Otter Trust introduced four otters into this area between 1993 and 1994 (Jefferies et al, 2000).

Isle of Wight (78)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/13	0/13	0/13	0/13

Half of this LEAP area lies in unsurveyed square SZ n/e. No positive signs were found in the area surveyed.

East Hampshire (79)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/25	0/25	0/25	0/25

No otter signs were found at any of the 25 sites surveyed but three road deaths were recorded during 2000-01 (G. Roberts, pers. comm).

Cuckmere/Pevensy Levels (80)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/32	0/32	0/32	1/32

One positive site was found on Waller's Haven but this is remote from any other known otter populations and may indicate a transient animal.

Adur and Ouse (81)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/5	0/5	0/5	0/5

Nearly all this LEAP area lies in unsurveyed square TQ s/w. No otter signs were found at any of the five sites surveyed.

Arun (82)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/47	0/47	0/47	0/47

Nearly half this LEAP area lies in unsurveyed square TQ s/w. No positive sites were found during the survey but there have been several sightings of otters (G. Roberts, pers. comm.).

Darent (84)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/0	0/0	0/0	0/2

Most of this LEAP area lies in unsurveyed square TQ n/e. Two new sites were added during this survey but both were negative.

Medway (85)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/38	2/38	3/38	1/39

Much of this LEAP area lies in unsurveyed squares TQ s/w and TQ n/e. A small number of sites have been positive at each survey since 1984-86 and one site was positive during this survey. It is likely that the otter population is very small, and could consist of only one transient animal.

East Rother (86)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/56	0/56	0/56	2/56

The eastern part of this LEAP area including Romney Marsh lies in unsurveyed square TR s/w. No otter signs were found during this survey but some signs have been found in this part of the LEAP area during recent casual surveys (G. Roberts, pers. comm.).

North Kent (87)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/6	0/6	0/6	0/6

Most of this LEAP area lies in unsurveyed square TQ n/e. Only six sites were surveyed and none was positive.

Kentish Stour (88)

	1977-79	1984-86	1991-94	2000-02
Positive sites/total	0/3	1/32	3/32	0/32

No otter signs were found within this LEAP area although a small number of sites were positive during the previous survey and there are large areas of wetland habitat. An otter was found dead on a railway line near Reculver in January 2002.

Information from surveys in adjacent 50-km squares SU s/w

This square includes most of the River Test and the headwater streams from the New Forest. In June 2002 Hampshire Wildlife Trust surveyors found otter signs in both LEAP areas in this square during water vole surveys. In March 2002 a bitch otter with cubs was seen on the Avon Water, part of the New Forest Streams LEAP area, at Keyhaven Marshes. There were two road deaths in 2001 and one in April 2002 (G. Roberts, pers. comm.).

SZ n/e

One positive site for otters was found at Newtown Marshes on the Isle of Wight during the 2000 Hampshire Wildlife Trust mink survey, but no signs have been found in subsequent surveys (G. Roberts, pers. comm.).

TQ s/w

Otter signs were found on the Arun catchment in 2001 and a dead otter was found on the Arun estuary in March 2001. There have been no recent records of otters on the Adur or Ouse catchments (G. Roberts, pers. comm.).

TQ n/e

There have been two road deaths and one rail death during 2000-01, as well as several reliable sightings. It is possible that these animals crossed from south Essex (G. Roberts, pers. comm.).

TR s/w

There have been some reports of otters in this square

but none have been confirmed. Water vole surveys for the Romney Marsh Countryside Project have found no signs of otters (G. Roberts, pers. comm.).

Discussion

There has been a small percentage increase in positive sites in Southern Region since the 1991-94 survey but, as in the three previous national surveys, the results remain very low. The River Itchen, almost at the western edge of the region, retains the largest nucleus of otters but with little expansion of the known range since the 1977-79 survey. Otter signs have also been found on the upper reaches of the Medway catchment in each national survey since 1984-86, indicating the continued presence of otters. The single positive site on this catchment during this survey confirmed the continued survival of at least a small population. Only scattered signs were found in other parts of the region. The single positive site on the New Forest streams can be seen as an "outlier" of the stronger population in Wessex Region. The two positive sites in the Rother catchment and the single positive site near Pevensey indicate the presence of at least transient individuals in the south-eastern part of the region.

No otter signs were found in square TR n/w where 3 sites were positive in the 1991-94 survey. This is one of only two instances of a 50-km square changing from positive to negative between the two surveys (the other is square SK n/w in the Trent catchment). The absence of otter signs in north Kent indicates that the population must be very small, but an otter found dead near Reculver in January 2002 indicates that this population still existed at that time.

The small number of scattered positive sites in each national survey over a period of 25 years, and the considerable number of reported road deaths, may indicate a widely distributed but very small otter population. Under such circumstances it may become more difficult to detect otter signs (Ruiz-Olmo et al, 2001). The small population of otters within the region is unlikely to be capable of generating sufficient surplus individuals to allow more than very slow colonisation of other rivers. In this context road and rail deaths are an additional concern. Fifteen such deaths occurred between May 2001 and July 2002 and the population appears to be far too small to sustain such losses.

Further colonisation is likely to come from the Dorset Stour and Hampshire Avon catchments, in Wessex Region, via the New Forest streams or the Rivers Test and Itchen. The extremely high profile of both sport fishing and fish farms in the valleys of these rivers means that unfortunately there is potential for serious conflict with an expanding otter population.

While there is no evidence from this survey of otter expansion into the East Hampshire rivers, independent evidence including road deaths (see above) indicates that this is taking place. The population of southern Region may well follow the pattern of many other areas in Britain with a very slow increase to a level where more rapid expansion becomes possible, but this is unlikely to be in the near future.



Mink

During the 2000-02 survey, searching stopped at each site as soon as otter signs were found and although mink signs were looked for, and noted whenever they were found, the data for mink is incomplete.

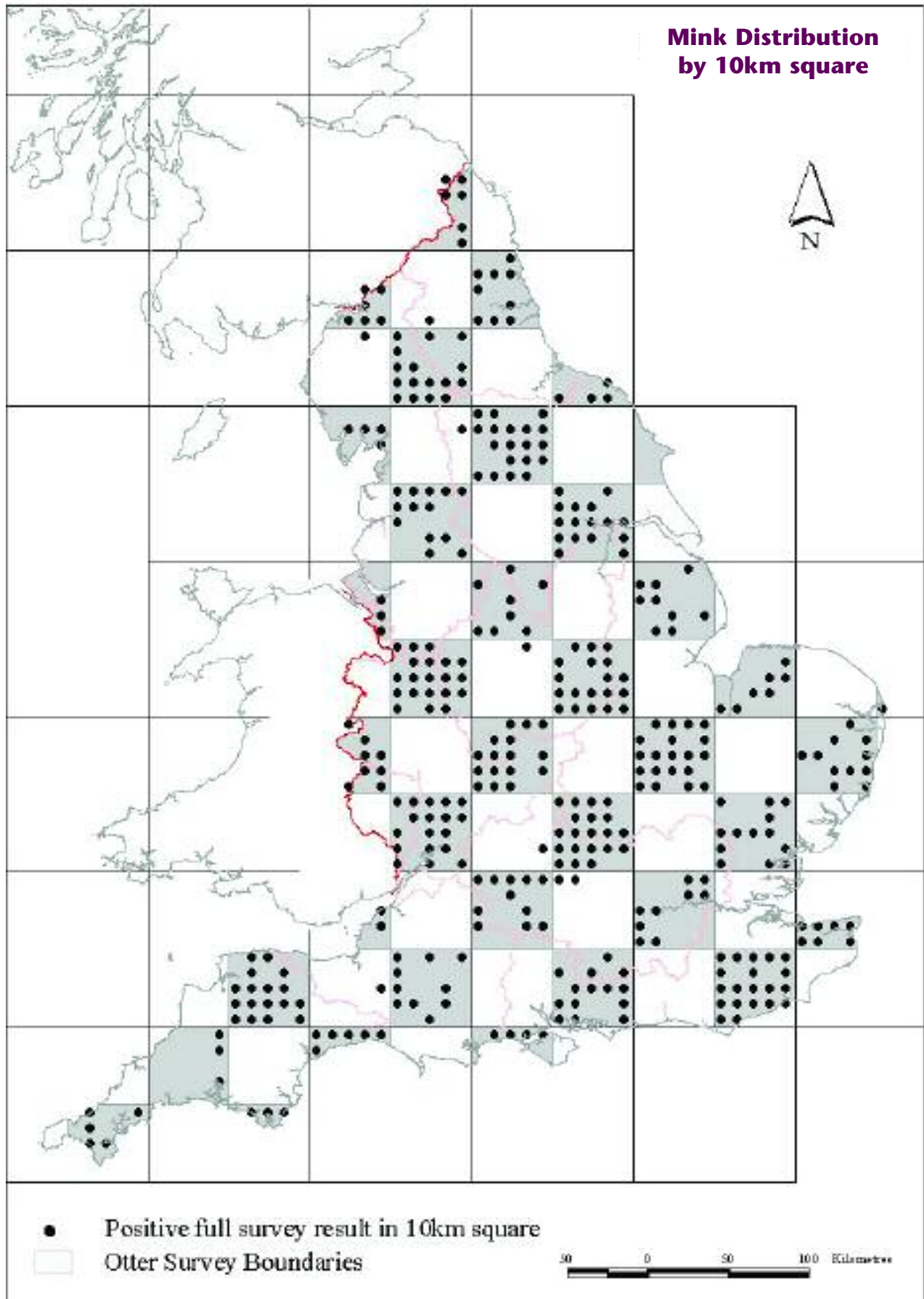
In the case of otters, where no signs were found over a considerable area it is possible to conclude that the species is absent or at least at very low density (Ruiz-Olmo et al, 2001). Strachan & Jefferies (1996) in the report for the 1991-94 survey discussed the relative distribution of otters and mink based on the survey results. This was not possible for the 2000-02 survey results as a full 600 m survey for mink was not carried out at each site. Mink signs were found to be widely distributed in every region but at low levels (See below and Map 20).

Because of the way in which the data was collected it is not possible to draw the conclusion that mink are absent from an area. As with otters, it is not possible to determine their population density.

There is anecdotal evidence of otters excluding mink. The data from the 2000-02 survey is consistent with this view but it is not possible to use the data to prove or disprove it. Even if otters were severely restricting the ability of mink to survive they would be expected to remain widely distributed.

Results for 2000-02 survey for mink by region

REGION	Total sites	Positive sites (mink)	% Positive (mink)
North West	371		18.5
Northumbria	174	34	19.5
Yorkshire	284	74	26.0
Dee	12	4	33.3
Severn	328	64	19.5
Trent	238	64	26.8
Wye	70	13	18.8
Anglian	728	144	19.8
Thames	225	71	31.5
South West	399	50	12.5
Wessex	127	27	15.7
Southern	282	114	40.4
Totals	3327	728	21.9





Discussion

Of the 3,327 sites surveyed during 2000-02, 1,137 (34 per cent) were found to be positive (i.e. to have signs of otters present). Of the 2,940 sites examined in all four surveys, 1,066 (36 per cent) were positive.

This represents an increase of 55 per cent since the previous otter survey (1991-94) and a 527 per cent increase since the first survey in 1977-79. The percentage of positive sites has increased in every one of the regions and catchments into which England has been divided for this survey but the increase varies considerably between individual regions/catchments (Table 1). In some of the regions and catchments, such as the Trent catchment and Anglian and Thames Regions, there have been major increases while in North West Region and Wye catchment more modest increases have occurred.

The 2000-02 survey shows that the overall rate of increase since the 1991-94 survey has not been as great as that predicted by Strachan and Jefferies (1996), who calculated a recovery curve for the otter based on eight "snapshots" of status in the form of the three surveys of England, two of Scotland and three of Wales which had been completed when the report was written. The prediction was for 43 per cent of all sites to be positive by 1999, increasing to 56 per cent by 2006. These are of course only approximations but the 2000-02 survey results fall below the lower of the two estimates. The England survey differs from the other UK national surveys in that it only covers alternate 50-km squares. In several regions (for example the Severn and Trent catchments and Thames Region) there have been major expansions of the otter population in areas outside the survey squares. This needs to be borne in mind when interpreting the results.

The increase to 34 per cent of sites positive in 2000-02 demonstrates a real and continuing recovery of the otter population in England. The trend is still upwards, and otters now occur almost everywhere in the country.

Nevertheless there are significant gaps in distribution, and on many river catchments otter populations are clearly at lower numbers than the potential carrying capacity of these areas. Overall the widespread distribution provides a good platform for full recovery of the population over time. It should be noted that the relationship between the percentage of positive sites, the density of otter populations and the number of otters are not linear and are not fully understood.

Based largely on the predictions of Strachan and Jefferies, the UK BAP steering group for the otter established a target of 50 per cent positive sites for England by 2002. The steering group also generated targets for percentage catchment occupancy for England, Wales, Scotland and Ireland for interim periods up to 2010. By this date the BAP objective is to have breeding otters present on all catchments in their historic range. The target for England for 2002 was for 60 per cent of catchments to have breeding otters. It should be understood that 100 per cent occupancy of catchments does not equate to 100 per cent of sites positive in sample surveys. In the 2000-02 survey 73 per cent (77 out of 105) LEAP areas surveyed contained at least one positive site. Therefore although the 2000-02 results fall short of the BAP target for positive sites, the BAP interim target for the percentage of catchments occupied by otters has been exceeded.

The most important message from the recovery curve predicted by Strachan & Jefferies (1996) was that full recovery was still "several decades away". Similarly, the BAP steering group interim targets for the percentage of catchments occupied and supporting breeding otters were pragmatic milestones on the way to meeting the 2010 target.

Habitat quality

There has been major degradation of river and riparian habitats in England, mostly as a result of agricultural intensification and the associated drainage of wetlands and river engineering for land drainage. There has also been urban encroachment along river corridors and over floodplains. The resulting impact on biodiversity has been significant, and in some cases locally devastating. A much more enlightened approach to river management (Lewis & Williams, 1984; Ward, Holmes & Jose, 1994) since the 1980s, and a move towards the adoption of more environmentally-friendly farming practices, supported in many cases by agri-environment incentive scheme payments, has slowed the rate of damage considerably. More recently, a large number of small-scale and a few large-scale riparian enhancement and wetland creation schemes have restored or recreated some of the lost habitats. The greater recognition of the ecosystem function of wetlands in reducing flood risk and improving water quality also seems likely to assist the move towards a more holistic approach to river catchment management.

The main factor in the decline of the otter population in England is believed to have been the impact of organochlorine pesticides (Chanin & Jefferies, 1978). In addition, Strachan & Jefferies (1996) showed that persecution was also a factor in both the severity of the decline and the slow start of the recovery. However, it was assumed (O'Connor et al, 1977) that loss of river and wetland habitats must also have contributed to the decline, and that habitat quality would be a major factor in delaying the recovery of the otter in England. Conservation work for otters has generally emphasised the provision of refuge sites, in the form of underground or log-pile holts, the provision of riparian woody cover and the creation of wetlands (Anon, 1993, Anon 1999). These provide safe havens for otters, particularly in catchments with potentially high levels of disturbance and few potential natural holt and refuge sites. The provision of refuge sites has been part of the holistic approach by all those concerned, including the Water UK and Wildlife Trusts' Otters and Rivers Projects and their recent successor the Water for Wildlife Projects, as well as the Environment Agency. The focus of the work has not simply been on otters but on the wider aquatic environment and on using enhancement work for otters as an educational tool to advance the cause of the aquatic environment as a whole.

The results of the 2000-02 survey seem to indicate that lack of good habitat does not prevent otter use of rivers. Otters are now using many areas

previously thought sub-optimal, and it seems that even in catchments with highly fragmented riparian habitat, they can still find sufficient refuge sites to prevent their exclusion. Otters are also using rivers in urban areas in many parts of England, a trend noted in the 1991-94 survey report. Otter signs in large conurbations such as Newcastle, Leeds, Norwich and Bristol suggest that the otter's return primarily reflects the improvement in water quality and the consequent increase in fish stocks in urban rivers. Otters in urban fringe habitats have been observed with young cubs (Hamilton-James, 2002), so they can and do breed successfully in seemingly hostile environments. However, this does not mean that habitat in which otters can survive, can also support a viable breeding population. Breeding female otters may be strongly dependent on safe refuge sites free from deliberate or accidental disturbance and with a readily available food supply. We do not know whether breeding success in urban areas is at the same levels as that in more rural environments or if there is a greater risk of mortality on busier urban roads. Sympathetic design of water-front development and re-development is needed to ensure that otters are taken into account particularly where previously undisturbed habitat is developed. It would be unwise to be complacent about the return of otters to sub optimal urban or rural habitat or the viability of "urban otters". The quality of river and riparian habitat is still considered vital to the full restoration of otter populations.

Habitat in its broadest sense, including in-channel structure, has a considerable impact on aquatic productivity in general and on fish populations in particular. Fish species depend on a variety of river habitats for different life-stages such as spawning, fry survival and juvenile and adult habitat. Some species such as eel and salmon must also be able to migrate. Many rivers now have limited habitat for certain key life-stages for some of the range of species they support. The data from the lower Severn catchment seem to indicate that removing virtually all habitat features - even on a major river - may limit the spread of otters by severely reducing the availability of prey, but more investigation will be needed to confirm this. Similar in-stream habitat impoverishment has taken place on the River Trent where the leading edge of otter re-colonisation has now reached the upstream limit of major navigation, as occurred on the Severn in about 1985. This loss of riverine and riparian habitat on the River Trent has been offset by the large number of flooded gravel-pits along the Trent Valley, but it will be instructive to see if the spread of otters on the lower reaches of the Trent slows down in future years.

Disturbance

Disturbance has always been considered one of the problems faced by otters (O'Connor et al, 1977). However, Chanin and Jefferies (1978) showed that increased disturbance was not implicated in the decline of the otter in Britain while Jefferies (1996) concluded that otters select low disturbance situations wherever possible, but are willing to tolerate higher levels of disturbance when they are forced to by increased population density. Jefferies (1987) concluded that otters were able to by-pass sources of disturbance by swimming underwater or travelling through cover and that increased availability of cover would allow the effects of disturbance to be reduced or eliminated. If this is so then the availability of cover and safe refuge and breeding sites would be crucial to allow them to use urban areas. Much effort has been made by the Environment Agency and others to enhance urban river environments and to provide cover for many species (Environment Agency, 2002). While otters have rarely been the focus of such work it may have an influence on otter utilisation of urban rivers and careful consideration may need to be given to the specific needs of otters in designing future schemes.

There have always been occasional sightings of otters in daylight even in urban areas (Forrest, 1945; Stephens, 1957; Walker, 1970) and there have been a large number of sightings of otters in daylight since the 1991-94 survey (Hamilton-James, 2002; G. Butterill, pers. comm.; M-R. Lane, pers. comm.; M. Boot, pers. comm.; K. Webb, pers. comm.). Many observers believe that they are now more commonly seen in daylight (M-R. Lane, pers. comm.; N. Mott, pers. comm.) but it is impossible to know if this is due to changes in observer effort or whether otters are really becoming more tolerant of disturbance or, because of higher otter population densities, they are being forced to become more tolerant. The results of the 2000-02 survey show that otters pass through many large towns and cities even where cover is scarce. This does not in itself prove that they tolerate disturbance as they could simply be passing through during the night at times when very few people are about. However other observers have found otters using urban sites for lying up (Williams 2000).

Prey biomass

The carrying capacity of an environment for otters is largely a function of the availability of food and lying up and/or breeding sites. However, human persecution can be a major limiting factor and other anthropogenic factors such as road deaths and disturbance may be important. It is difficult to

separate these impacts but where refuge sites are plentiful then food supply is likely to be the controlling factor. As otters take a wide variety of prey, but are very much fish specialists, the biomass and availability of fish species might be expected to be a key issue.

The main factors limiting some fish populations are the physical degradation of river habitat through past river engineering works and, in a few cases, poor water quality. Only six per cent of rivers were of poor or bad quality in 2000 compared to 16 per cent in 1990 and water quality in English rivers, particularly in urban areas, is generally improving. Pollution is no longer generally believed to be limiting fish populations sufficiently to constitute a barrier to the spread of otters in England.

The prey requirement and food needs of otters, recently reviewed in Chanin (2002) are not precisely known. Our lack of knowledge, combined with the very large and variable home range of otters, makes it difficult to determine the lowest level of fish biomass below which it ceases to be possible for an otter to exploit a river system. Brazier and Mathias (2001) attempted to estimate the productivity requirements of otters and to assess whether any rivers in the Environment Agency's Midlands, Thames and Southern Regions were likely to be unable to support otters. Difficulties with the variations in fisheries data made analysis and estimates of biomass problematic. Nevertheless, they concluded that fish biomass and productivity in the rivers of the Midlands and south of England were very unlikely to be limiting for otters to the point of exclusion. The fact that otters will also exploit non-riverine habitats such as lakes and ponds, and to a lesser extent terrestrial habitats, reinforces this conclusion. Biomass figures produced by Agency electrofishing surveys usually exceed those for Scottish rivers known to support thriving otter populations (Environment Agency unpublished reports; Kruuk 1995). However, Kruuk, (1995) found that otters spend much more time foraging in smaller rivers and may find it harder to exploit the prey resource on larger rivers, especially those with few habitat features. This might explain the poor results from the lower Severn catchment.

Many of England's rivers are artificially stocked with fish, which may compensate for lowered productivity to some extent. There is also a large number of stocked stillwaters, many of which did not exist before the decline of otters in the late 1950s. Some highly stocked fisheries can be a focus for otter predation and the recovery of the otter has occasionally led to conflict with fishery owners and managers.

Stillwater fisheries

One of the issues which has grown in prominence since the 1991-94 survey is the impact of otters on fisheries interests. Fish farms and specialist carp fisheries have both reported levels of otter predation which are of concern, and in a small number of cases losses have been significant. Staff from The Wildlife Trusts and the Environment Agency have, for some years, been providing advice to stillwater fishery managers on measures to reduce or mitigate the impact of otter predation. These measures include fencing (both permanent and temporary electric fencing) and decoy/sacrificial ponds. There is no universal solution, and the appropriate management measures need to be considered on a site-by-site basis. It is however, important to keep this issue in perspective. Otter predation should not be considered a major problem on rivers or on most stillwaters where otters are returning as top predators. Conflict occurs only in circumstances where the monetary value of individual fish is very high (for example carp ponds with specimen carp worth several thousand pounds), or at intensive fish rearing units (where the loss of an individual fish causes a direct monetary loss). In these circumstances protective measures may be worth the expense. There is a view that the costs of fencing or other works should lie with the fisheries involved. However, it is now accepted by the UK otter BAP steering group that specimen carp fisheries may be a special case. Discussions have been held involving the Specialist Anglers' Alliance representing fisheries interests, the EA, The Wildlife Trusts, EN, Defra and Sport England, to identify a funding route by which support can be given for fencing these specialist fisheries, so far without success (G. Scholey, pers. comm.). Otter predation on fish is a natural occurrence, and it is the uniquely artificial nature of some fisheries that makes them particularly vulnerable to otters. The UK otter BAP steering group believes that any funding should not therefore be from a conservation source, but from one relating to the objective of promoting recreational fisheries for socio-economic reasons.

This issue will probably gain greater prominence as otter populations continue to recover, and it is important that it is handled openly and with understanding on both sides. Despite some unfortunate articles in the angling press this has largely been the case to date. There have been isolated reports of individuals taking the law into their own hands but a considerable proportion of fishery managers and most fishermen are only too pleased to see otters on their waters again.

Direct and indirect persecution

Direct and indirect persecution including hunting and trapping were responsible for a large number of otter deaths in the past. In 1978 the otter was given full legal protection in England under the Conservation of Wild Creatures and Wild Plants Act 1975 and direct persecution largely ceased. In 1982 this protection was extended to otter holts under the Wildlife and Countryside Act 1981. However in the 1980s, serious concerns were raised over the level of accidental deaths in fyke nets set for eels (Jefferies et al, 1984). In response to this, between 1989 and 1997 four of the Environment Agency regions instituted bylaws prohibiting the use of a fyke net without an otter guard being fitted and in May 2001 a national Environment Agency bylaw to this effect came into force. This threat to otters has thus largely been eliminated although enforcement action by EA fisheries staff needs to be maintained as fyke nets are occasionally found set without otter guards. Illegal killing of otters undoubtedly still occurs (Bradshaw & Slater, 2002) and there are serious concerns in a limited number of areas, but persecution is no longer considered a general threat for otter populations.

Road casualties

Road casualties have been recognised for many years as a potential threat to otters, Green (1991) considered that road traffic was the largest and most rapidly expanding cause of otter mortality but the effect of road casualties on the population dynamics of a recovering otter population are largely unknown. In some regions with very few otters (e.g. Thames and Southern) there were significant numbers of road casualties during the extensive flooding in autumn and winter 2000-01 and this could represent a serious threat to the populations in these regions. It is becoming clear that otter road deaths peak at times when high flows force them out of rivers at culverts and bridges. The numbers of otters killed in this way on the leading edge of their range fuels concern that road casualties could significantly delay the recovery of the species or even prevent the full recovery of the otter population to its historic range. Williams (2000) calculated that the level of road casualties in parts of Somerset (Wessex Region) were sufficient to wipe out the whole of the potential yearly recruitment of otters in the vicinity. Southern Region has seen a very small increase in positive sites between the 1991-94 and 2000-02 surveys and still remains largely devoid of otters, despite their being present in all four national surveys.

Anthropogenic mortality has been a feature of this small population throughout the monitoring period. In Thames region, it is known that at least seven of the seventeen otters released by the Otter Trust in the upper Thames in 1999 have been killed on the roads. It remains to be seen whether the density of traffic, the extent of the road network, and the number of bridges and culverts which are difficult to negotiate in the south-east of England, becomes a real stumbling block to re-colonisation.

In contrast to areas with low otter populations, South West region has seen both the greatest number of otter road deaths and a further consolidation and expansion. There is an apparent relationship between the consolidation of the otter population in south-west England and in Wales and the number of reported otter road deaths (Simpson 1998; Bradshaw & Slater, 2002). The ability of otters to consolidate and expand onto most small streams within South West Region does not appear to have been prevented and nor has the spread of otters from South West into Wessex Region. However these may have been slowed or constrained by the level of road deaths.

The Highways Agency has funded investigations into the extent of otter road deaths and developed detailed advice on techniques to reduce otter mortality (Grogan, Philcox and Macdonald, 1999). It is following this up with an England-wide assessment of the mitigation works required for otters on the trunk road network. Greater effort is now being put into the provision of otter road-kill mitigation techniques for new road schemes, bridge replacements and road widening schemes. A significant but unquantified resource has been put into constructing underpasses, ledges and otter-proof fencing, often negotiated by Environment Agency staff through its land drainage consenting process and through Agency and Wildlife Trust staff advice to the planning process. Mitigation should clearly be provided at road crossings at every opportunity. It is now generally accepted that otter underpasses and other mitigation should be provided on all new roads, even in catchments which otters have not yet re-colonised. The current initiative by the Highways Agency covers trunk roads, which constitute only 5 per cent of the road network in England, and large resources will be needed to ensure that the requirements of otters are addressed at all other relevant bridges and culverts.

It has long been recognised that dead otters provide an important potential source of material for study. During the 1980s the Vincent Wildlife Trust funded the collection and post-mortem analysis of otter carcasses; from 1992 this has been funded by the

Environment Agency and supported by the network of EA and Wildlife Trust staff. Between 1992 and 2000 over 190 dead otters were collected in England (210 in Wales). The vast majority of these were road casualties and since many carcasses are not collected, this represents a significant level of mortality. The livers from these otters have been passed to the Environment Agency's laboratories in Exeter for ecotoxicological analysis for organochlorines, polychlorinated biphenyls (PCBs) and heavy metals. This post-mortem work has led to invaluable information on the general condition of the otter population, as well as providing a database of spatial and temporal trends in otter mortality. Simpson (1998) and Bradshaw & Slater (2002) published results from this work which is still continuing.

Pollution

Water quality in English rivers, particularly in urban areas has improved massively in the period since the decline of otters in the 1950s and is still improving. This is mainly due to massive investment by water companies in sewerage infrastructure, to reduce the impact of episodic pollution from storm-water runoff, and in sewage works to improve the quality of the final effluent (Environment Agency, 2001). Some of our previously most polluted rivers have seen a significant recovery, and river managers from around the world visit the UK to see how metropolitan rivers like the lower Thames and its estuary have been transformed in the space of a few decades. There is however still room for improvement on many rivers. In addition, the impact of agricultural pollution from farm wastes, artificial fertilisers and other agri-chemicals is now a growing focus of concern for both the statutory agencies and the agricultural sector. The insidious impact of chronic diffuse pollution and of increased siltation due to intensive farming on the quality of our river environments are very difficult problems to solve.

General water quality, even acting through a reduction in prey biomass, is unlikely in itself to be a significant obstacle to the continuing recovery of the otter but there is a need to continue surveillance of toxic environmental contaminants in the aquatic food chain. The introduction of organochlorine pesticides into widespread agricultural use in the late 1950s was probably the major factor in the initial decline of the otter in the UK. Although Strachan & Jefferies (1996) suggested a more significant impact from persecution than had hitherto been generally assumed, it was a secondary factor in the decline; indeed, the statutory protection given to the otter in England in 1978 reduced the impact of persecution to insignificant levels.

The Environment Agency's otter post-mortem analysis work since 1992 has provided a data set of toxicological analyses of otter tissue taken from the livers of corpses. The interim results of this work reveal that low levels of dieldrin and other pesticides can still be detected in otters (Simpson, 1998; Bradshaw & Slater, 2002). There is variation around the country, with the highest mean levels of these pesticides found in otters from the Midlands region. The bias in the sample resulting from road deaths means that it is difficult to use the results to show a continuing decline in environmental contamination from organochlorines and PCBs, but the results show that there is a largely healthy otter population with a range of, generally low, pesticide burdens.

It is essential that levels of toxic pollutants in the aquatic environment continue to be monitored if we are to maintain a picture of the state of the water environment. It may also be important to sample for other compounds that may bioaccumulate in otters with as-yet unforeseen effects. These compounds include synthetic pyrethroids, flame retardant bromides and a range of hormone mimicking substances. Active monitoring is required to ensure that new compounds do not cause the same impact as dieldrin when it was first introduced. The levels of these pollutants in water are often below the limits of detection, so it is essential to continue with the analysis of otter tissue to detect bioaccumulating compounds at an early stage.

Natural re-colonisation

The overwhelming majority of the expansion in the range of the otter demonstrated by the 2000-02 survey, and by implication the majority of the increase in otter numbers, has occurred by natural re-colonisation. The consolidation in South West Region, the expansion in North West Region (including particularly areas of west Cumbria not covered directly by this survey) and the vast majority of the expansion in the Trent catchment, are all the result of this natural population expansion. Most of the increase in otter activity in Wessex and Northumbrian Regions is also probably the result of this natural colonisation.

The results of the survey are consistent with a "leading edge" expanding to create areas with low otter populations followed by consolidation of areas behind the "leading edge" continuing for many years. On the Wye catchment the 1977-79 survey found otter signs at only 12 out of 70 sites (17 per cent), confined to the upper River Lugg and its tributary the Arrow. The 1984-86 survey found otter signs well distributed on the Wye catchment at 23 out of 70 sites (33 per cent) but with many gaps

between the occupied areas. By the 1991-94 survey consolidation had occurred with few rivers unoccupied and 49 out of 70 sites (70 per cent) positive. The results of the 2000-02 survey show further consolidation, with 58 out of 70 sites (83 per cent) positive with most of the increase in positive sites taking place on smaller tributaries of rivers with known otter populations. This would mean that the consolidation phase has taken over 14 years between 1984-86 and 2000-02 and may still be continuing. The results for South West Region and the upper Severn catchment show a similar pattern as does the northern part of NW region, and parts of Northumbrian Region. The results for the Trent catchment appear to show the start of the process with extensive re-colonisation having occurred between the 1991-94 and 2000-02 surveys. In this case we would expect a further spread down the Trent with consolidation starting in the areas first colonised. Results for many of the other regions are less easy to interpret.

Otter releases

The value and role of otter releases has been extensively debated by those involved in otter conservation (Mason 1992; Jefferies, Wayre & Shuter, 2000), and were analysed in the report for the third otter survey of England (Strachan and Jefferies, 1996). Both sides in the debate - those supporting releases and those opposing them - have felt they had the otter's best interests at heart.

The majority of otter releases in England were undertaken by the Otter Trust, starting in 1983 and concluding with the release of 17 otters at three different locations on the upper Thames catchment in 1999. The Vincent Wildlife Trust released at least 49 rehabilitated otters between 1990 and 1996 and the RSPCA also released a small number of rehabilitated otters.

Most releases were into Anglian Region (at least 99 between 1983 and 1998, 50 of these since the 1991-94 survey) with 29 in Yorkshire Region, 23 in Thames and smaller numbers in South West, Wessex, Southern and Northumbrian Regions and the Trent catchment. The current status of the otter in Anglian Region is largely a result of these release programmes, although some animals from the original remnant population were undoubtedly present throughout the period of the releases. The pattern of increase of positive sites within Anglian Region since 1994 is clearly different from that in regions with natural re-colonisation.

In Anglian Region numerous discrete populations have been established by introductions, whereas natural re-colonisation usually takes the form of a "leading edge" advancing from an adjacent otter population. Most of the increase in positive sites in the region between the 1991-94 and 2000-02 surveys took place in those areas into which otters were introduced after the 1991-94 survey. Kruuk (1995) in a study on Shetland found that only 12 per cent of otters lived to be 6 years old or more. Since the otters were normally about 18 months old when released and few releases took place after 1996, the vast majority of these individuals must have died before the 2000-02 survey commenced. The otter signs found are therefore presumed to be from their progeny or subsequent generations. How, and even if, the introduced populations will spread is unknown but if the pattern apparently shown by naturally re-colonising populations is followed, then each of the, largely discrete, introduced populations is likely to go through a period of expansion followed by consolidation.

The releases in the upper Thames must have been responsible for the upsurge in otter activity detected by the present survey although, once again, there has been sporadic evidence of otters on the upper Thames since 1989. The releases on the lower part of the Trent catchment have resulted in what appears to be a discrete population on one sub-catchment. Releases may also have augmented the small population on the Itchen catchment in Southern Region, but the contribution of releases to the current state of the populations in Yorkshire, Northumbrian and Wessex Regions is more difficult to assess. In Yorkshire Region most otter introductions took place in the Derwent catchment which is largely outside the surveyed squares.

In 1999 the release by the Otter Trust of a number of otters in the upper Thames near a fish farm and carp fishery brought to national prominence the occasional conflict between otter predation and certain sensitive fisheries (such as specialist carp fisheries and trout farms). The Otter Trust has decided, in agreement with the UK Otter BAP steering group, to phase out its release programme and the only releases which are now considered acceptable are those of rehabilitated injured and orphaned otters, at the locations at which they were originally found.

Otters, mink and water voles

American mink were first imported into England for fur farming in 1929 (Dunstone, 1993). Escaped mink were recorded in the wild from the 1930s, but the first record of breeding in the wild was in 1956 on the River Teign in Devon (Linn and Stevenson, 1980). By the early 1960s mink were well established in many parts of

England. The spread of mink co-incided with the decline of the otter leading some observers to blame mink for the otter's decline. Chanin & Jefferies (1978) showed that the spread of mink followed the decline of the otter and thus could not be its cause and they suggested that the absence of otters facilitated the spread of mink. They also expressed concern that well established mink populations might delay or even prevent the re-establishment of otters. However the spread of otters in the South West Region between the 1977-79 and 1984-86 surveys into areas with established mink populations showed that this was not the case (Strachan et al, 1990) and subsequent national surveys have confirmed this. The results for the 2000-02 survey show that otters have clearly spread into many areas such as the upper Trent catchment that were known to have strong mink populations.

In Sweden, Erlinge (1972) suggested that the presence of otters led to a decrease in mink and in Britain some observers noted that expanding otter populations led to a decrease in mink signs (A. Crawford, pers. obs.; N. Mott, pers. comm.). Birks (1990) collected all the circumstantial evidence together and concluded that otters were acting to exclude mink. As mink are known to be a serious threat to the survival of the water vole (Strachan & Jefferies, 1993) it was expected that the expansion of range of otters would lead to a reduction in mink numbers and a consequent easing of the predation pressure on water voles. Although this may occur in the long term the apparent impact in some areas has been unexpected. Water voles in many parts of Staffordshire and the West Midlands have disappeared from most main rivers apparently following the arrival of mink and have survived only in peripheral and urban areas (Mott 1997; Richmond, 1997). Following the colonisation of main rivers in the upper Trent catchment by otters, mink in turn appear to have moved to the peripheral areas (N. Mott, pers. comm.). The short-term result may therefore be to eliminate water voles from some refuge areas. These observations need to be treated with caution however as they are based on few data and the presence of otters may be leading only to a reduction in the amount of territorial marking by mink and not in an actual decrease in numbers. This is however unlikely as the amount of padding also drops (N. Mott, pers. comm.; A. Crawford, pers. obs.; P. Preston, pers. comm.). Otters and mink appear to have co-existed on some rivers for many years but the population levels and dynamics are unknown and it may be that this situation is not stable in the long term. In Devon and Cornwall the fact that otter signs are now to be found on virtually all watercourses in the region has not stopped the believed extinction of the water vole. However it should be noted that mink were found to be very widely distributed in both counties in both the 1984-86 and 1991-94 surveys.



Conclusion

The 2000-02 survey confirms that the increase in otter distribution observed since the first survey in 1977-79 is continuing. Every one of the 12 regions and catchments, into which England was divided for the survey, shows an increase in the number of positive sites.

- The 2000-02 survey confirms that the increase in otter distribution observed since the first survey in 1977-79 is continuing. Every one of the 12 regions and catchments, into which England was divided for the survey, shows an increase in the number of positive sites.
- The scale of the increase varies considerably but it is significant that the leading edge of the recovering population is continuing to expand. This appears to be creating large areas with otter populations at low density, followed by consolidation which seems to occur some years after the leading edge has passed.
- Otters were present on 73 per cent (77 out of the 105) LEAP areas surveyed in whole or part (and if unsurveyed LEAP areas which are known to have otters are added this percentage increases still further). An increase in otter distribution cannot be directly translated into an increase in otter numbers but such a significant increase in distribution represents a significant increase in the number of otters on England's rivers and wetlands.
- Otters were found in 35 of the 38 50-km squares or partial squares surveyed. Only squares SK n/w (Trent catchment) and TR n/w (Southern Region) showed small numbers of otter signs during the 1991-94 survey, but none during the 2000-02 survey. This was probably caused by high water in the period immediately before the survey and in both these squares otter signs have been found during subsequent independent surveys.
- The table below shows the percentage increase in the number of positive sites between the 1991-94 and 2000-02 surveys for each of the regions and catchments into which England was divided for the survey. [They are calculated using only those sites surveyed in both the surveys. It includes those sites added in the 1984-86 and 1991-94 surveys but does not include sites added for the 2000-02 survey. The figure therefore differs from that calculated on the basis of sites surveyed in all four surveys].

Percentage increase in positive sites (sites surveyed in both 1991-94 and 2000-02 only)

Region		
	Total number of survey sites	Percentage increase 1991-94 to 2000-02
Thames	179	300
Anglian	725	222
Trent	282	222
Yorkshire	270	129
Wessex	151	121
Severn	328	105
Northumbrian	174	96
South West	388	24
Dee	12	20
Wye	70	18
North West	331	18
Southern	279	8

- There were high percentage increases in Thames and Anglian regions where the populations are largely (but not wholly) derived from introduced animals. The large increase in Thames Region should be seen in the context of a very low starting point in 1991-94 and the majority of the increase is probably due to the release of otters in the upper Thames in 1999. In Anglian Region a total of 99 otters were released since 1993, 48 of them since the 1991-94 survey. The distribution in 1991-94 largely reflected the areas into which otters had previously been introduced and the increase since the last survey has mainly occurred in those areas where otters were released since 1994. The consolidation which was expected does not, as yet, appear to have taken place.
- The high percentage increase in the Trent catchment is believed to be almost entirely due to natural recolonisation. Two otters were introduced by the Vincent Wildlife Trust in 1996, but because of the isolated nature of the catchment into which they were introduced, these animals, or their progeny, are probably responsible for at most nine positive sites in the 2000-02 survey. Without these there would still have been an increase in positive sites from 5.0 to 20.6 per cent.
- The Trent catchment shows that where conditions are favourable and with a source of breeding otters nearby (in this case the Severn catchment), otters can re-colonise large areas very rapidly.
- The increases in Wessex, Northumbrian and Yorkshire regions appear to be almost entirely the result of natural re-colonisation although a small number of otters were released into all three regions.
- The small number of sites surveyed in the Dee catchment mean that the low percentage increase is not significant.
- The Severn presents a special case where there has been significant consolidation on the upper part of the catchment but on the lower Severn the recovery falls far short of what would be expected given the presence of an apparently healthy population nearby. The reasons for this are not clear.
- The low percentage increases in the South West Region and the Wye catchment are an indication that otter populations have now almost fully recovered in some areas. Significant consolidation and a small amount of expansion took place in these regions but there was no room for a significant increase with the high level of positive sites in the 1991-94 survey.

- The low percentage increases in North West and Southern Regions were more disappointing. In North West Region there was a significant increase in the north which has extended into unsurveyed square NY s/w while in contrast the central and southern parts of the region showed a fall in the percentage of positive sites. The low increase in Southern Region suggests that the viability of this population may remain low until it connects with the expanding populations to the west.
- The increases in otter range have taken place without wholesale improvements in habitat. There is still a considerable level of "attrition" of habitat from intensive farming, grazing and development but large-scale degradation resulting from land drainage schemes is almost entirely a thing of the past. Poor in-stream habitat is undoubtedly limiting fish stocks and otter populations would probably have benefited from improved in-stream and riparian habitat but it is not possible to prove this. Equally, it is clear that the rivers with the most diverse habitats are more likely to support viable otter populations.
- The tolerance of otters to apparently high disturbance situations such as city centres appears to be far higher than was previously thought. They appear to select low disturbance situations wherever possible, but are willing to tolerate higher levels of disturbance, possibly when they are forced to by increased population density. There is likely to be a balance between the level of cover and the level of disturbance.
- Deaths from road kills remain a serious problem for otters in England and it may be having an effect at the population level in some areas. Deaths from direct and indirect persecution no longer seem to be a general problem but concerns continue in some areas.
- There have been major improvements in general water quality but the role, if any, of these in the recovery of the otter is not clear. Organic pollution, even acting through its effect on fish prey, now appears to be less of a problem for otters following massive investment in sewerage systems and sewage works. However there are continued concerns about the potential role of bio-accumulating toxins and a high level of environmental surveillance needs to be maintained.



Priorities for Future Action

The 2000-02 Otter Survey of England provides an opportunity to assess the current status of the otter against the predicted recovery trend and specific BAP targets for the species.

Although otter populations in England have continued an upward trend it is by no means certain that the UK BAP target of all catchments having breeding otters by 2010 will be achieved.

Analysis of the results reveal that our knowledge of the factors limiting the spread of otter populations is limited. Survey and monitoring, research and enhancement work as well as routine work by public bodies and others will be required if otters are to return to all rivers. There are several priority areas for action to enable the full recovery of otter populations in England. The otter BAP steering group should consider all the activities within these areas and recommend a programme of actions identifying priorities, responsibilities and a timetable.

Survey & monitoring – The present level of monitoring is insufficient to give the frequency and extent of coverage required to determine whether or not the UK otter BAP target or milestones are being attained. Repeat surveys and monitoring effort will be required in areas where recovery has not happened as expected such as Wessex and the lower Severn. Co-ordination with other research is also required to determine the extent of limiting factors.

- Develop a more effective monitoring programme. This could be either through the national mammal monitoring programme or as a separate programme through the wildlife trusts or others.
- Establish a system to collate, and if possible co-ordinate, local surveys to ensure consistency and maximise the benefits of data sharing and analysis.
- Planning for the seven-year survey, to be repeated in 2010, should be undertaken by 2009. This survey will be essential to see whether the BAP target has been attained. Full coverage rather than alternate 50-km squares should be surveyed and the survey should be carried out by a small number of surveyors to avoid the problems of co-ordination which occurred during the 2000-02 survey.
- Carry out detailed otter use surveys on the heavily navigated parts of the Severn, Trent and Thames both to provide a baseline of present distribution and to identify the speed of recovery in those rivers. Co-ordinate these surveys with River Habitat Survey (RHS), and surveys of fish stocks and disturbance to determine the importance of habitat quality, food availability and disturbance.
- Carry out targeted surveys at the “leading edges” of re-colonisation to assess the extent of recovery.– There are clearly gaps in the understanding of the barriers to full recovery of the otter population and the conservation actions needed to assist this recovery. Understanding of otter/prey relationships in lowland English rivers clearly needs to be improved if we are to understand the full importance of prey biomass as a potential limiting factor. Research and development into the best ways to protect otters from motor vehicles, and vulnerable fisheries from otters, is also clearly needed.

- Continue with fisheries monitoring and carry out more detailed surveys on selected rivers in all regions of England to determine fish biomass including minor species to assess full prey availability.
- Carry out analysis of spraints from lowland English rivers and collate this with fish species and biomass data.
- Carry out fish species analysis of all or a sample of the spraints collected during the 2000-02 survey.
- Continue to support the development of otter spraint DNA fingerprinting to enhance our understanding of otter numbers, movements and social structure.
- Continue with the programme of collection of otter carcasses to identify road death black spots.
- Continue with the EA-financed programme of otter post mortems and expand the scope of the analysis to include other chemicals of possible concern. Use this research as a "long-stop" for pollution monitoring particularly of bioaccumulating toxins to ensure that this factor is not, and does not become, a problem for otters.
- Monitor existing underpasses and fencing installed to reduce otter road deaths to ensure that the most cost-effective designs are identified and promoted.
- Continue research and development of electric, and other, fencing systems for protecting vulnerable fisheries.

Enhancement – In those areas where the spread of otter populations is unexpectedly slow, habitat enhancement, both in-stream to enhance fish stocks, and in the riparian zone to provide cover for otters, should be undertaken. Where impediments to the recovery of the otter population have been identified it is essential that work is undertaken to rectify the causes. Specific recommendations include the following.

- Carry out habitat enhancement in Wessex Region, an area vital for the spread of otters into other regions and to the establishment of metapopulations.
- Carry out habitat enhancement in the Cheshire/Shropshire/Wales border area (the watershed of the Weaver, Tern and Dee catchments - including the Shropshire Union and Llangollen Canals).

The slow spread into Dee and Weaver catchments from Severn catchment is a cause for concern.

- Carry out work on the lower Severn to reverse habitat losses to benefit fish, otters and other species.
 - Implement a programme of fitting bridge ledges and fencing at identified blackspots to reduce otter roadkills.
 - Develop catchment based river and wetland restoration strategies to restore diverse river catchments which will support long term viable populations of otters and other wetland dependant wildlife.
- Routine work by public bodies, local authorities, wildlife trusts and other voluntary bodies
- Continue with provision of advice for vulnerable stillwater fisheries.
 - Continue to take account of the needs of otters when deciding on priorities for water company investment.
 - Continue to ensure that needs of otters are considered in riverside development and flood defence schemes including in urban areas.
 - Ensure that the local planning system ensures appropriate protection from possible otter predation is included in permission for new fisheries.
 - Continue support from EA and others of the Water for Wildlife projects to maintain a body of technically competent staff to carry out otter surveys and to provide development and management advice.



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Appendix 2:

Standard Survey Form

List of Surveyors	<i>Number of sites surveyed</i>
Libby Andrews	242
Ash Bennett	117
Bronwen Bruce	63
Gail Butterill	166
Andrew Crawford	92
Alice Fox	26
Andy Graham	211
Julia Gallagher	111
Steve Henson	154
Sylvia Jay	243
Matt Jones	96
Mary-Rose Lane	98
Chris Matcham	71
Nick Mott	149
Sarah Norman	147
Kevin O'Hara	81
Eric Palmer	81
Graham Roberts	147
Graeme Smart	84
Kate Stokes	158
Mark Satinet	84
Phil Smith	595
Alison Washbrook	21
James Williams	78
Mike Williams	12
<hr/> TOTAL <hr/>	<hr/> 3327 <hr/>

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