CHAPTER 3

DISTRIBUTIONS OF SPECIES AND CANDIDATE SSSIs

3.1 Introduction

Within Great Britain, general distribution patterns of the five species of "widespread" amphibians have long been recognised (eg Arnold, 1983), and were largely reaffirmed during the "Amphibian Communities" project (Swan and Oldham, 1989). The purpose of this chapter is firstly to assess the extent of national survey coverage by 10km Ordnance Survey grid squares and identify areas of shortfall. Secondly, using only adequately surveyed 10km squares to compare the degree of ubiquity of the five species at national and county levels. Finally, as one of the project objectives was to identify sites recording high crested newt counts or supporting diverse amphibian species assemblages for potential SSSI notification, the abundance and distributions of multi-species and key crested newt sites are investigated. The conservation implications of the species and SSSI distributions are discussed.

3.2 National survey coverage

Since 1983, 1,358 10km grid squares within mainland Britain, 61% of the total, have had one or more water-bodies within them surveyed for amphibians. The areas of the country with the most complete coverage of 10km squares were:- the southeast of England, southern Devon, mid Wales and north western Gwynedd, both west and east midlands, southern north west England, central East Anglia, coastal Cumbria extending northwards into Dumfries and Galloway, Cleveland, Tyne and Wear and Weardale, the west of Borders Region, some of the far west of Strathclyde Region, the western end of Lothian Region, Fife, Tayside Region, and Highland region to the west of Inverness. This left:- north Cornwall, parts of Devon and Somerset, much of Wiltshire and Oxfordshire, Dyfed and most of South Wales, "central" North Wales (comprising eastern Gwynedd

and western Clwyd), Lincolnshire, East Anglia immediately to the south of the Wash, Lancashire, much of North Yorkshire outside the Harrogate area, the northern and central parts of Cumbria and Northumberland, eastern Borders and Lothian Regions, central areas of Dumfries and Galloway, most of Strathclyde and Central Regions, eastern Tayside Region, Grampian Region and most of the north and west of Highland Region as areas of the country with relatively incomplete coverage.

Between surveyed squares coverage varied. Figure 3.1 illustrates that in over half (58%) less than five water-bodies were recorded, the median number of sites surveyed per square being three. It is most unlikely that one pond will contain a representative sample of the square's amphibian fauna. Therefore, although every record is useful in plotting the species' distributions, very small samples cannot be used in comparing distributions between species; species "absence" may simply be attributable to low searching effort.

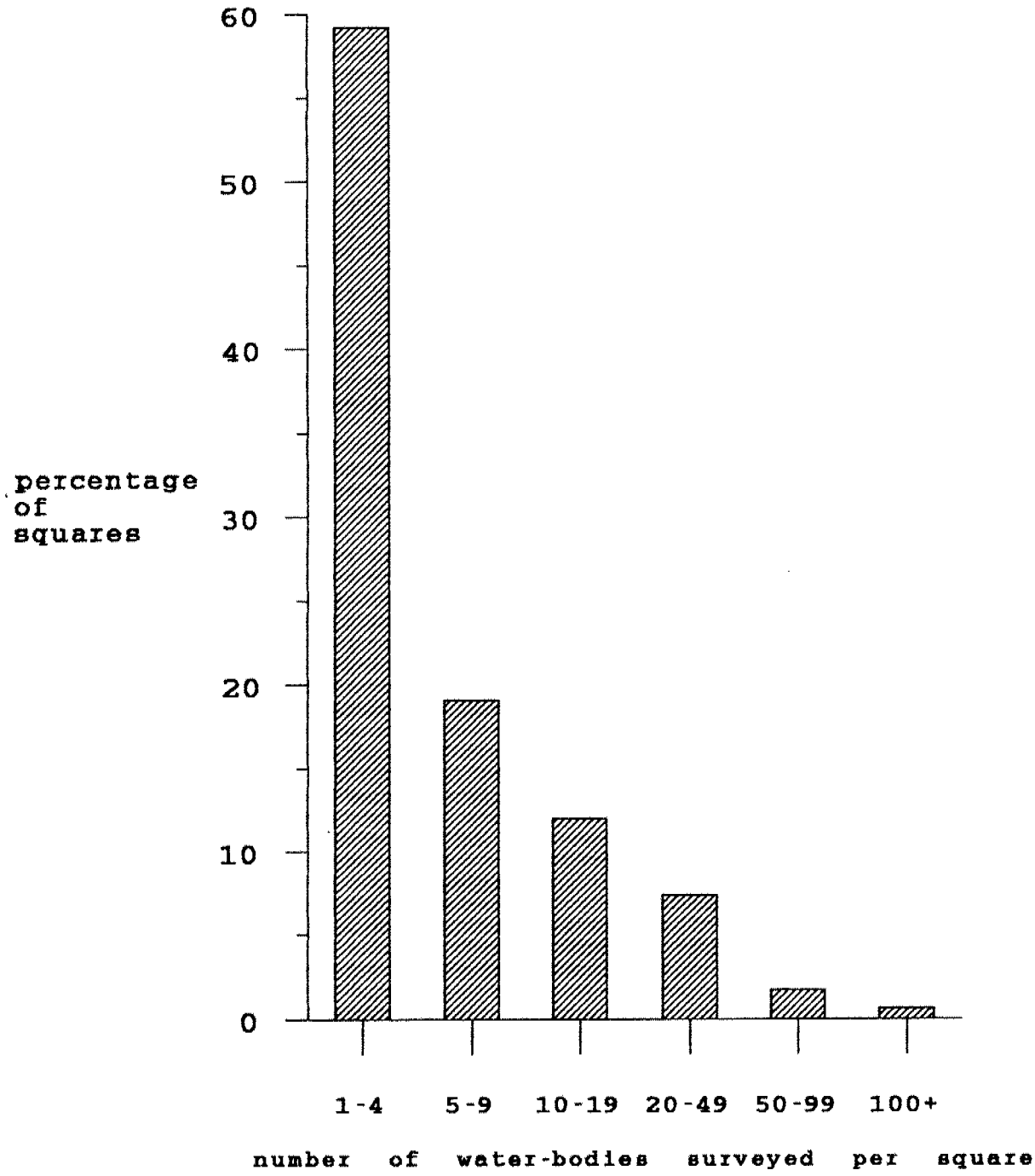
3.3 Species distributions

This section combines data from both the 1983-6 crested newt survey and the 1986-92 amphibian surveys. During the former, many surveyors sent information on the great crested newt only, 46% of the records received reporting the presence of that species alone, as opposed to just five percent of sites surveyed during the later projects. Thus, it would be inappropriate to use the entire data set comparatively and it should be borne in mind that the crested newt has been searched for somewhat more thoroughly than the other amphibians.

Almost all of the surveyed squares (98%) contained amphibians, leaving only 28 (2%) which did not. Frogs were observed in 71% of squares, everywhere in the country (Fig 3.2(a)). It is unlikely that any thorough survey of a 100km^2 area in Britain would fail to reveal them. Toads although being reported in fewer squares, (57%) were also found throughout mainland

Fig 3.1

Frequencies of numbers of water-bodies surveyed per 10km square, (1983-92).



Britain (Fig 3.2(b)). The smooth and crested newts, each found in about half of surveyed squares (51 and 53% respectively) shared a similar distribution range extending from Devon in the south west, across southern and eastern England, the Midlands, East Anglia, much of Wales, the north of England, and southern Scotland, extending on the east as far north as Fife and Tayside Regions. A small number of sites has been located in Grampian and Highland Regions where crested newts were apparently deliberately introduced, but where the validity of smooth newt records is doubtful (Fig 3.2(c) and (d). The palmate newt, although having a fragmented distribution is found throughout Great Britain (Fig 3.2(e)). There are, however, more doubts as to the validity of records of this species than of the others. A spring survey of smooth newts is more likely to produce positive identification due to the distinctiveness of the males' deep tail fins, but it is conceivable that palmate newts of either sex may be confused with female smooth newts by inexperienced recorders. It is also possible that female smooth newts may be reported as palmates, but overall, the latter are more likely to be under-recorded. The palmate may almost be regarded as Britain's "montane" newt, occurring in the upland and western areas where the smooth and crested newts are generally absent - such as Cornwall, west Wales, and most of Scotland. It is also found in pockets of upland elsewhere, such as on the Pennines or Dartmoor and can persist in relatively small areas such as Charnwood Forest in Leicestershire. It also occurs in acidic lowlands, such as heathlands in south east England where it may coexist with both the smooth and crested newts. Thirty three percent of surveyed 10km squares contained palmate newts.

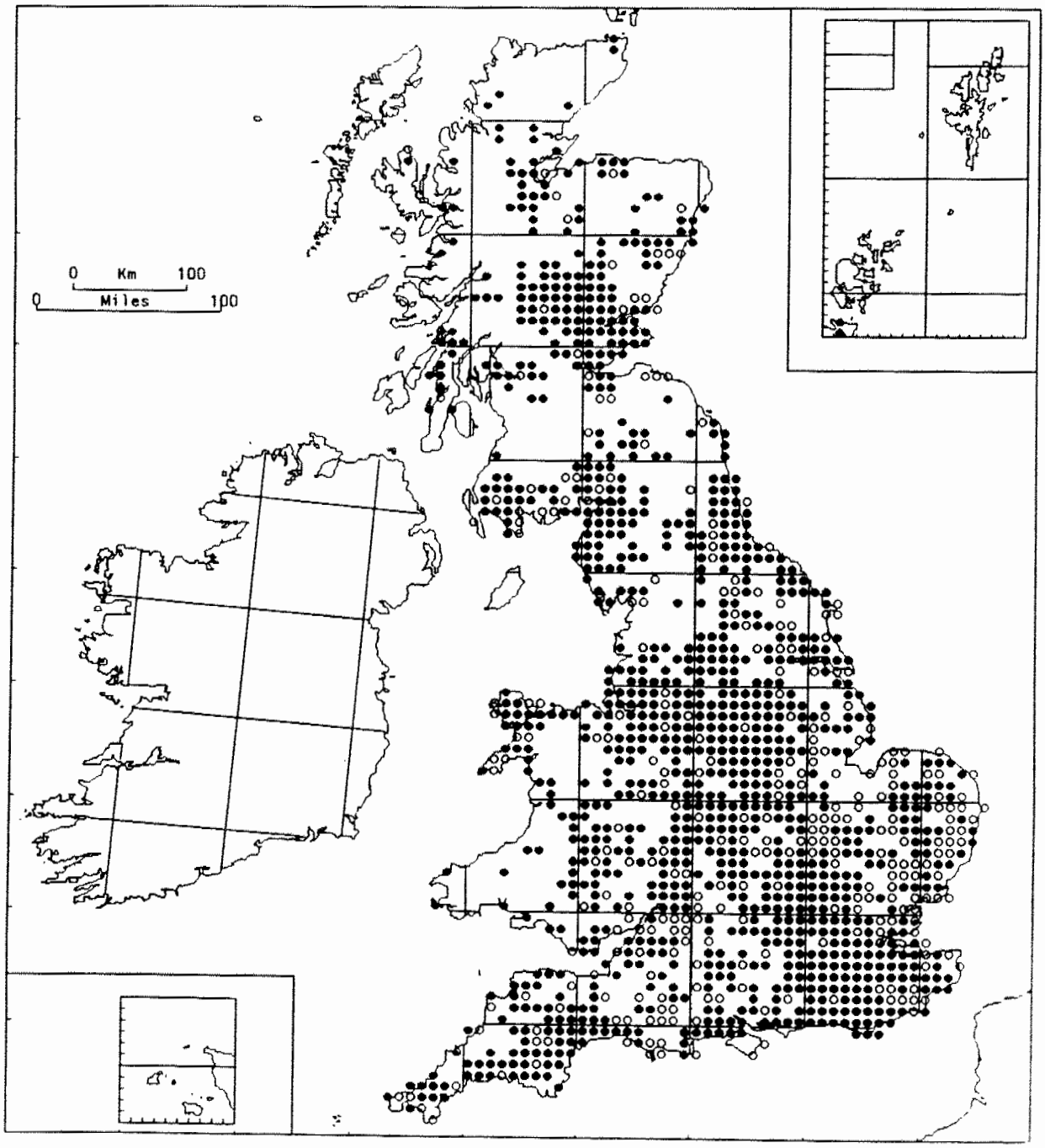
3.4 Comparative species ubiquity

In order to compare the relative ubiquity of the five species, the numbers of 10km squares in which each of the species occurred were again investigated. However, to extract valid comparative data, all the 1983-6 crested newt survey records were excluded, as were any 10km squares in which less than

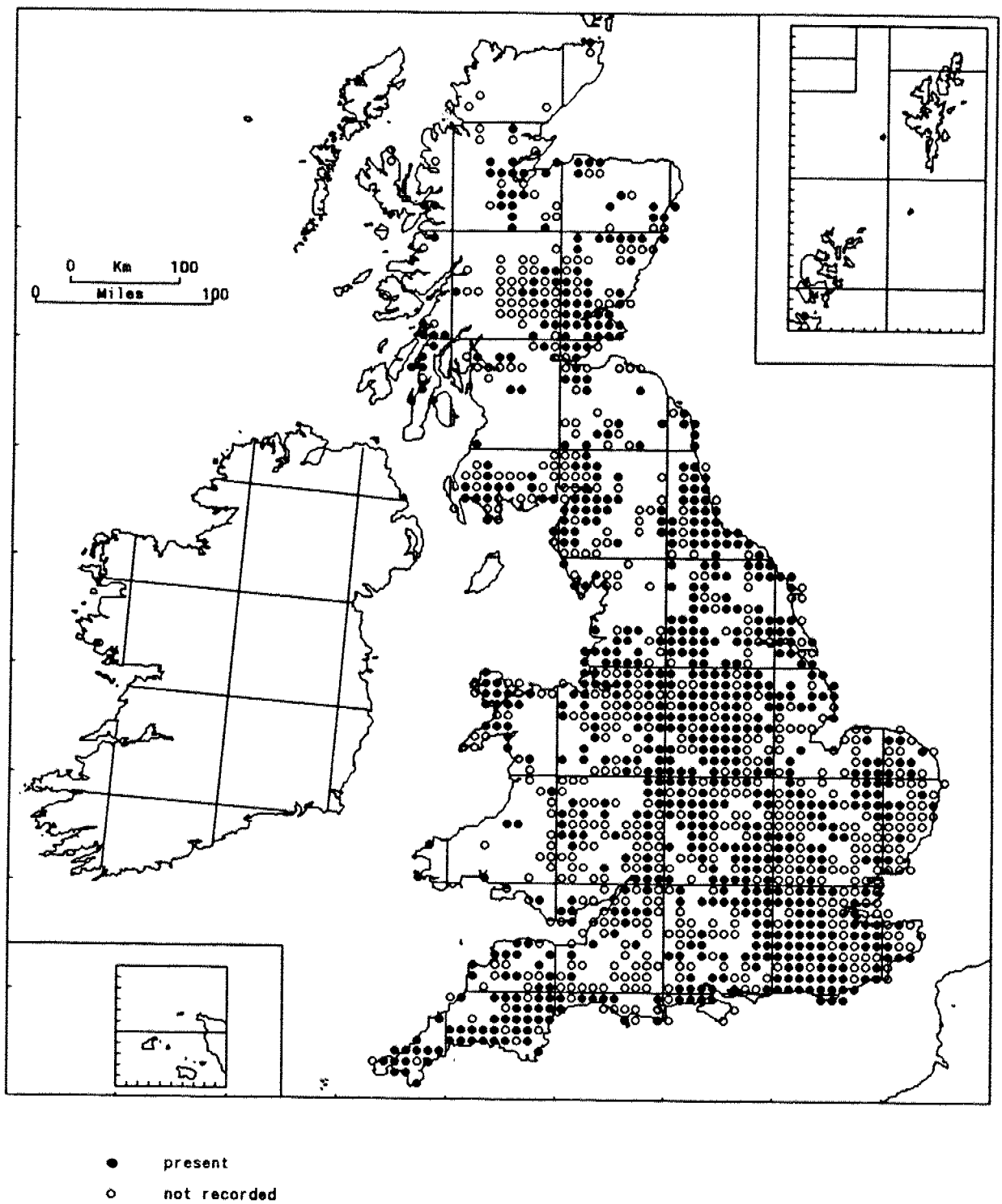
Fig 3.2

Distributions of the five widespread species, by 10km square.

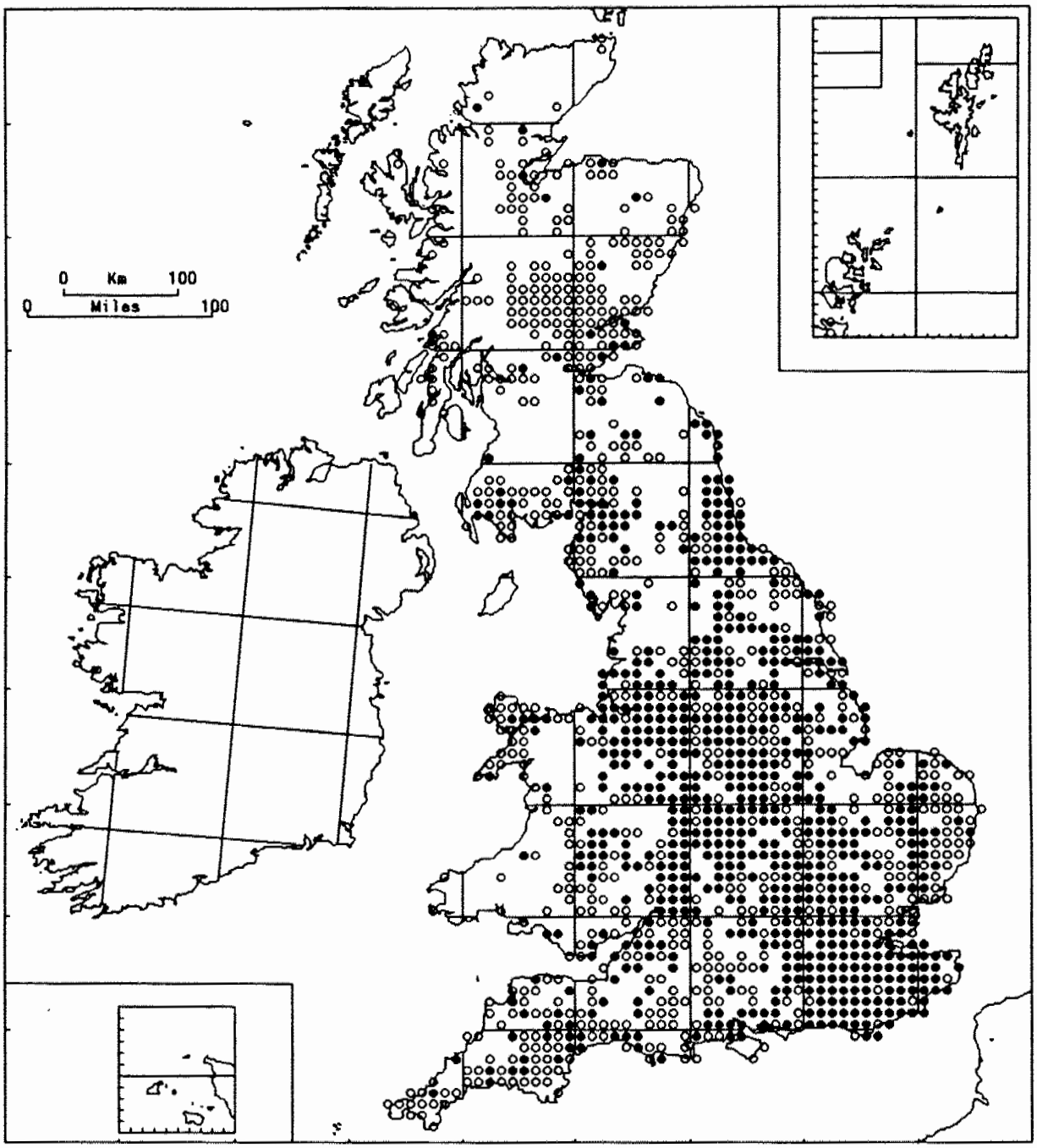
(a) Frog



(b) Toad



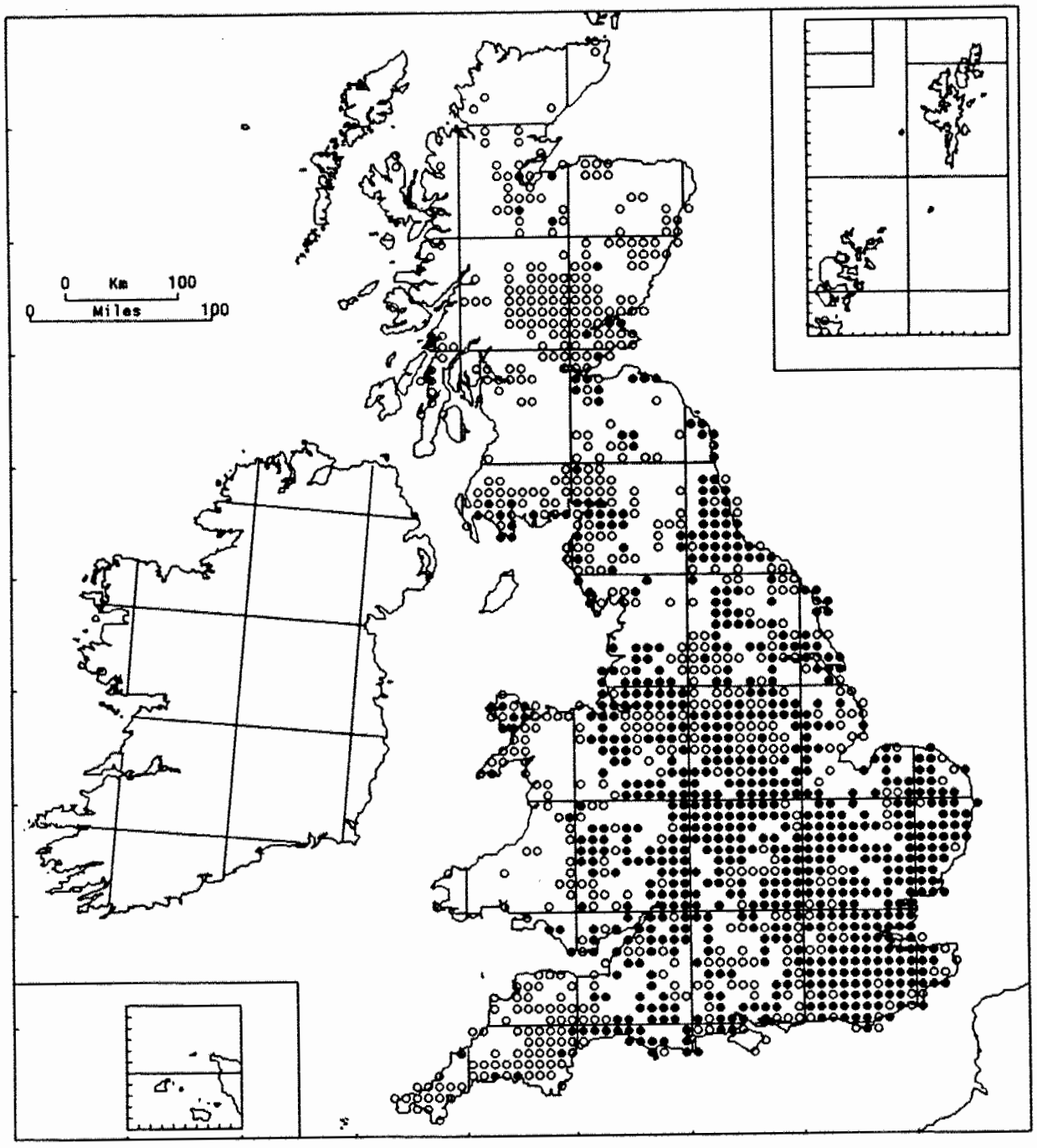
(c) Smooth newt



● present

○ not recorded

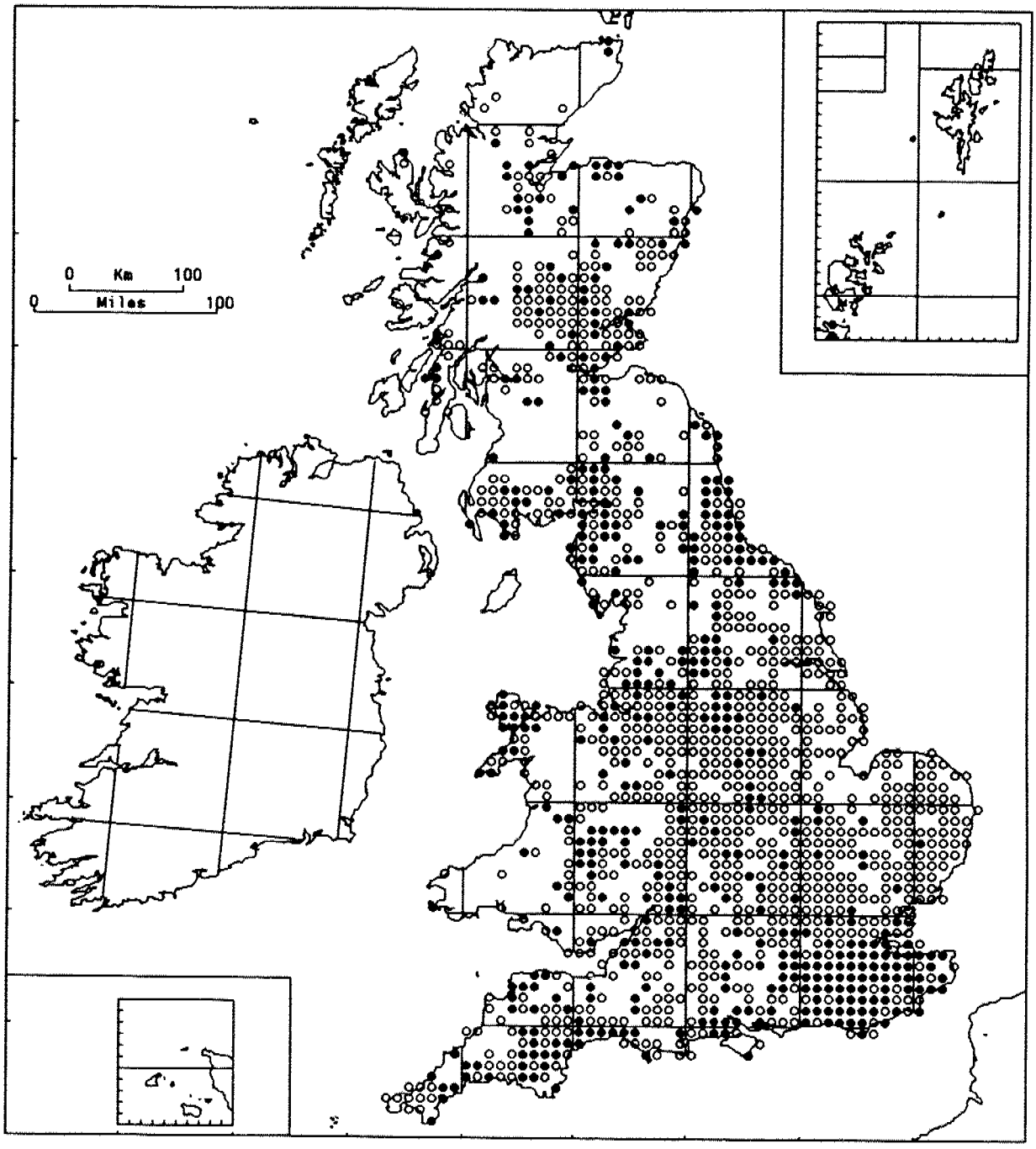
(d) Crested newt



● present

○ not recorded

(e) Palmate newt



● present

○ not recorded

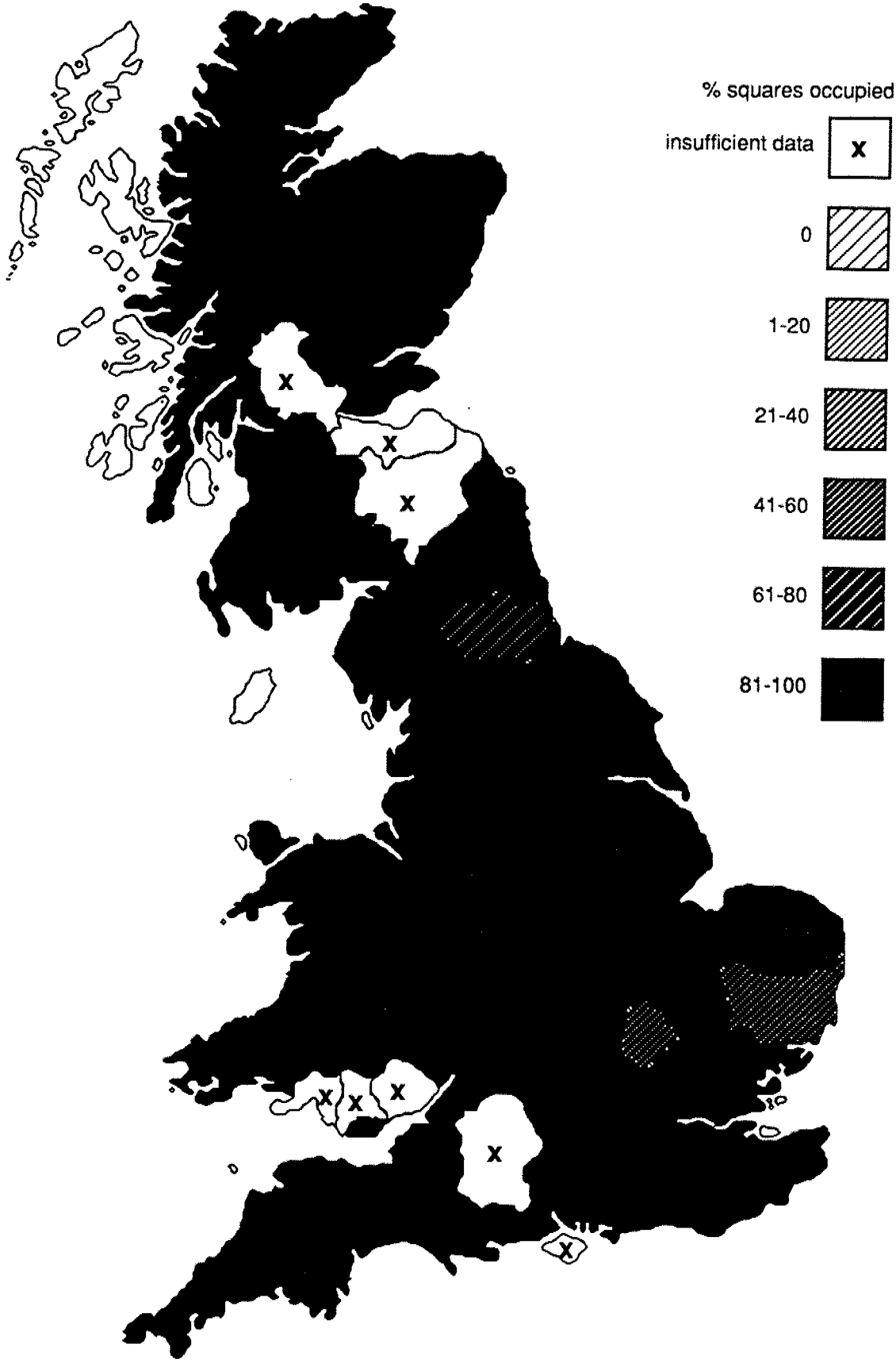
five water-bodies had been surveyed. Although a survey of five ponds within a 100km^2 area cannot be regarded as an exhaustive search, to have eliminated all squares in which less than 10 sites, for example, had been surveyed would have reduced the sample size to 79. Arbitrarily selecting a five site per 10km square minimum resulted in a sample size of 448 10km squares nationally and provided information on at least two squares in each of 56 counties. The sample analyzed below therefore comprises data from the 448 10km squares known to have been surveyed for all five species and within which at least five water-bodies have been investigated.

Increasing the "thoroughness" of the survey in each square and excluding records for which only one species was searched, produces a more credible comparison of the degree to which each of the species is widespread at a within-county scale. In this sample, which included data from 56 counties, 447 (99.8%) of the 10km squares contained amphibians; one square only, contained none - all five sites recorded in square SH27 (Gwynedd) were "empty".

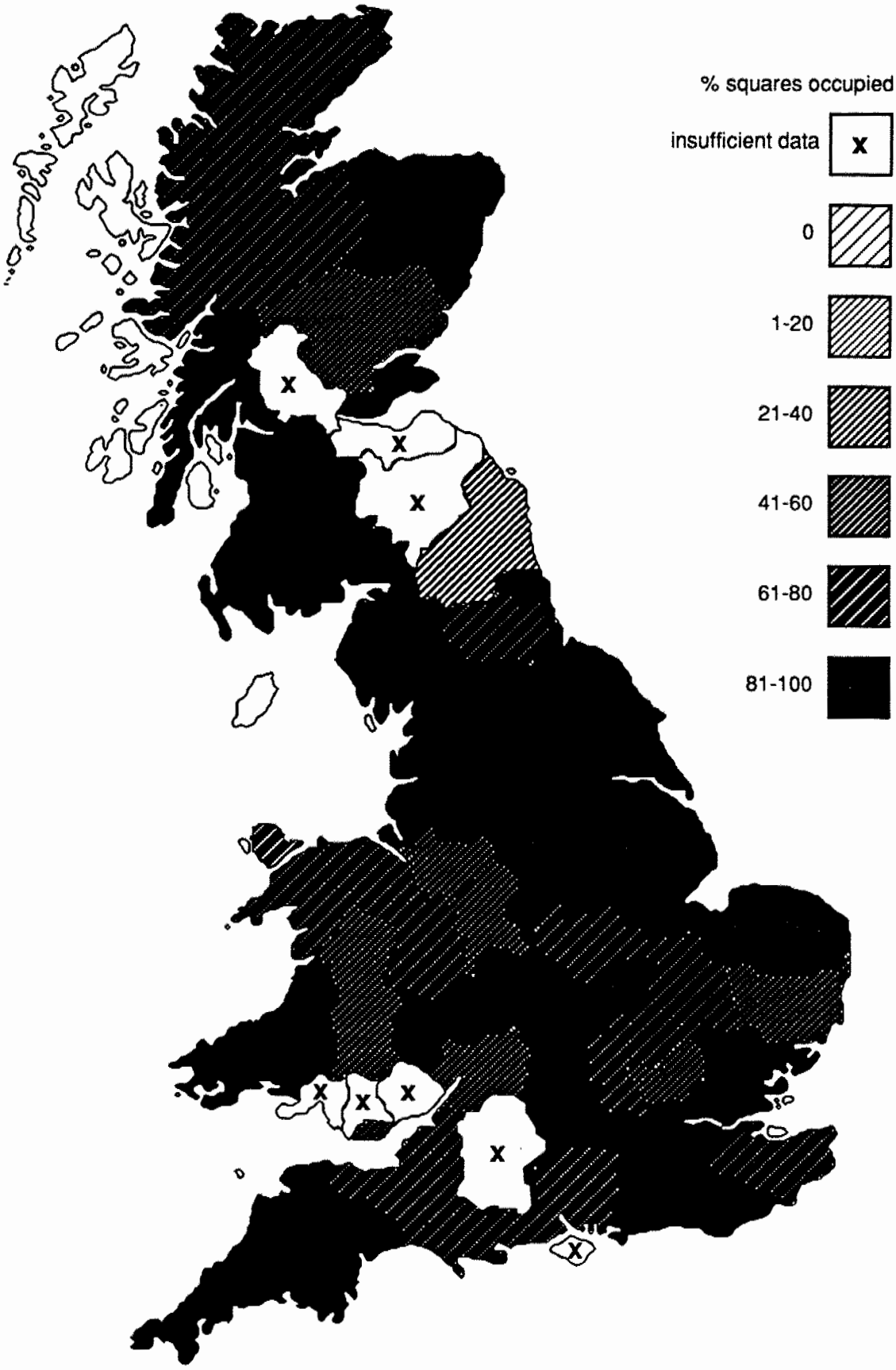
Most of the squares (97%) contained frogs, 79% toads, 72% smooth newts, 57% crested newts and 50% palmate newts. Thus, the data resulting from the adoption of these more stringent sample selection criteria suggested that each of the species apart from the crested newt was relatively more widespread than was apparent from the all-inclusive data. Frogs were absent from none of the counties, and present in over 80% of surveyed squares in 53 (95%) of them. The species was therefore confirmed as widespread nationally and ubiquitous within counties, (Fig 3.3(a)). Toads were recorded in over 80% of squares in 33 (59%) of counties, between 41 and 80% in 22 (39%) and in 40% or less in only 1 (2%). Thus this species was also ubiquitous nationally but found in fewer localities within counties, (Fig 3.3(b)).

In 55% of the 51 counties in which it occurred the smooth newt was ubiquitous, found in over 80% of squares, (Fig 3.3(c)). The palmate newt however, occurred in only 47 counties, and

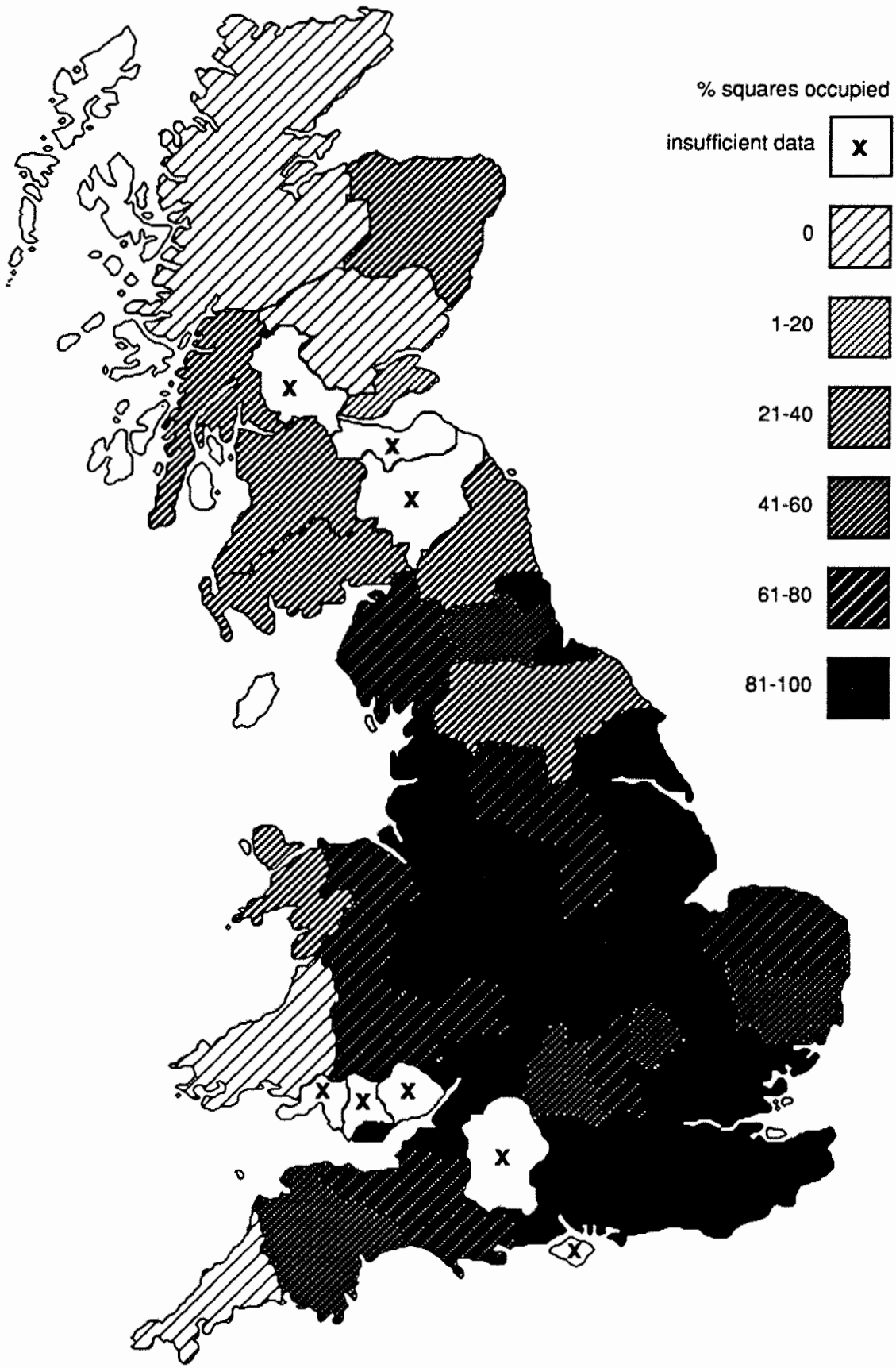
Fig 3.3
Percentage of 10 x 10km squares in each county in which each species occurs. Data from the 1987-92 survey only were used in the analysis; only 10 x 10km grid squares in which at least five sites have been surveyed were included.
(a) Frog- found in 431 adequately surveyed squares



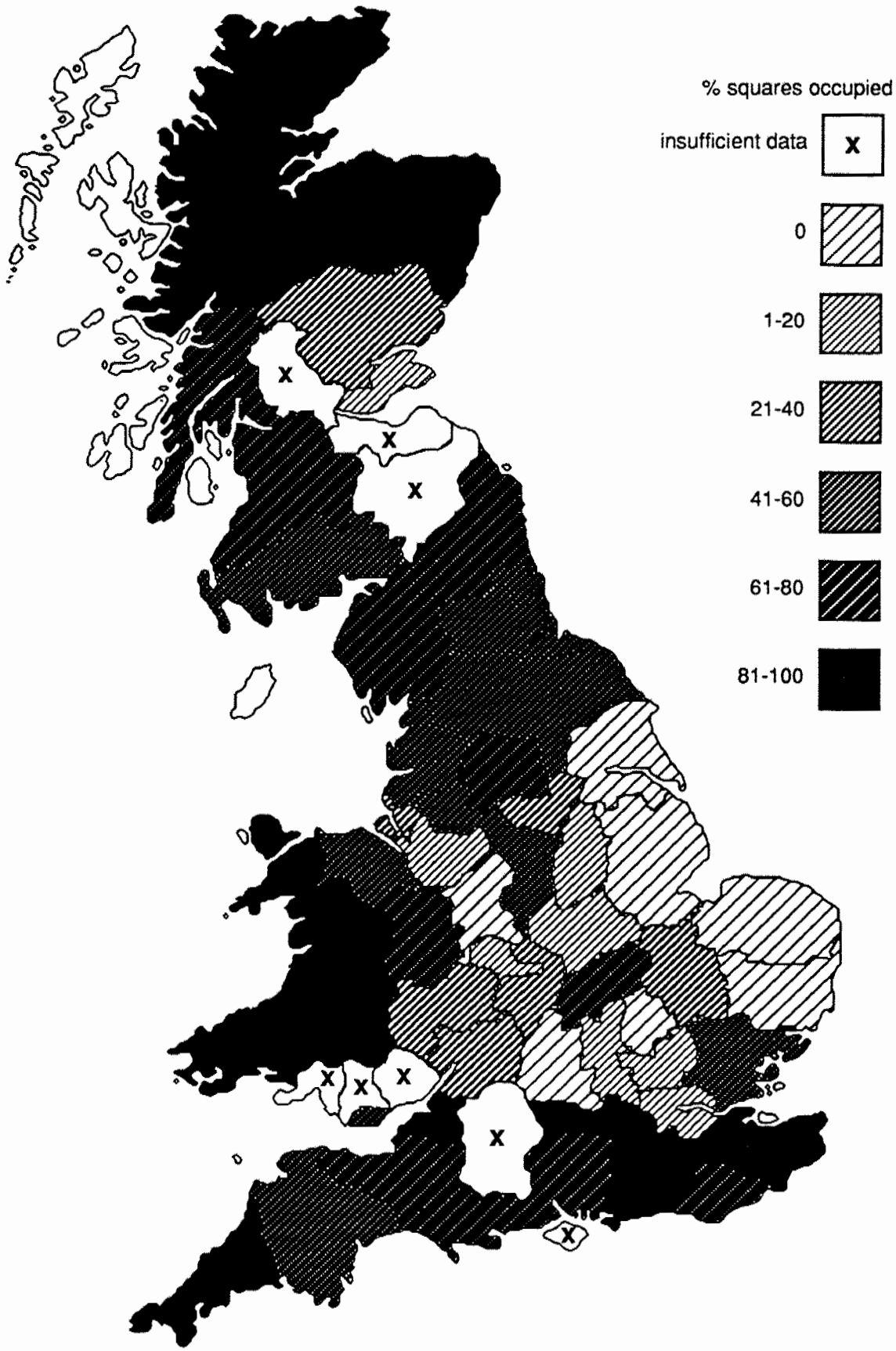
(b) Toad- found in 355 adequately surveyed squares



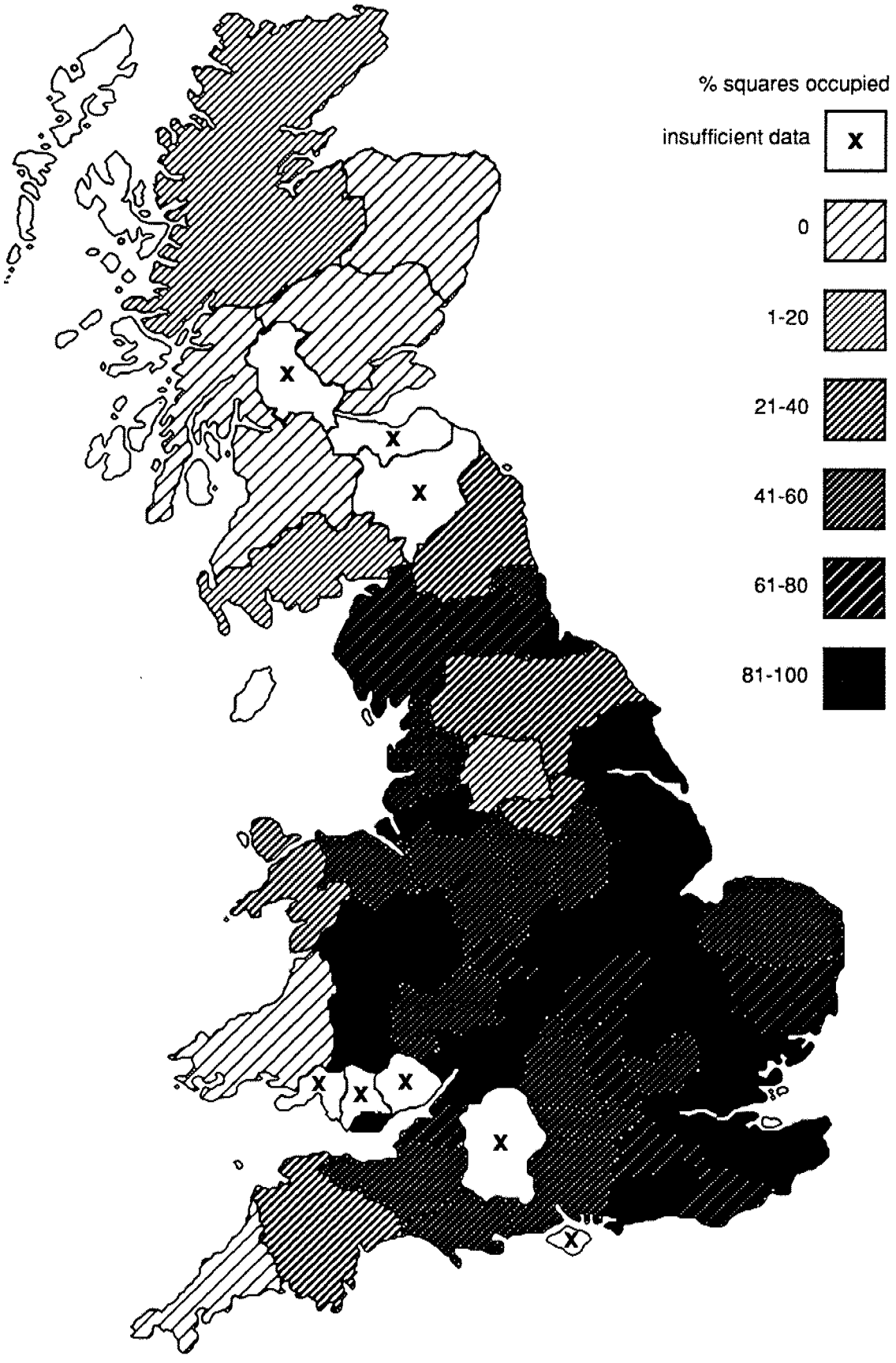
(c) Smooth newt- found in 302 adequately surveyed squares



(d) Palmate newt- found in 211 adequately surveyed squares



(e) Crested newt- found in 238 adequately surveyed squares



within those, its median percentage occupancy of 10km squares was only 57%, (Fig 3.3(d)). It was found in 81-100% of squares in 11 (23%) counties. Thus, neither the smooth nor the palmate newt was found within every county, but the smooth was more widespread in a greater number of the areas in which it did occur. Even within the counties within its range, the palmate newt tended to have a limited distribution, being ubiquitous in counties only in south west England, south east England, west Wales and north west Scotland. As stated earlier, it was also found in other parts of the country, but its range was small and patchy in counties where the smooth newt was ubiquitous. However, in south east England, mid Wales and the county of Avon, both species occurred in over 80% of grid squares.

Triturus cristatus was found in 49 counties, and, unlike those of the palmate and smooth newts, it occurred in a relatively discrete area. Apart from some 19th century introductions to highland estates, the crested newt was found in eastern lowland Britain, and was for the most part absent from sites to the north of the highland boundary fault. It was ubiquitous (found in over 80% of surveyed 10km squares) within 17 (35%) of counties in which it occurred (Fig 3.3(e)). In 23 (47%) counties though it was found in 60% or fewer 10km squares. This suggests that although occupying a wide range nationally, the crested newt was only ubiquitous in about one third of the counties within it. Throughout the remainder, the species was not widespread on a local scale.

3.5 Distributions of Candidate SSSI's and Multi-species sites

3.5.1 Rationale

English Nature has suggested a conservation strategy for great crested newts, and for sites of outstanding amphibian conservation value whereby the best recorded sites throughout the country are afforded SSSI status ("Herptile Sites" contract annex, 1989). As an initial target, it was proposed that the "top" one percent of recorded sites be designated.

The criteria for designation were based on two factors; firstly, the crested newt has to be regarded as a special case due to its totally protected status (WCA 1981). Thus, all recorded *T. cristatus* breeding sites in which fifty or more animals have been counted during one torch count were candidate SSSI's. The second criterion for special site status was that the water-body has an outstanding amphibian community - ie an assemblage of four or more species. In the following sections the numbers and distributions of sites outstanding on the basis of either their crested newt populations or amphibian communities are described.

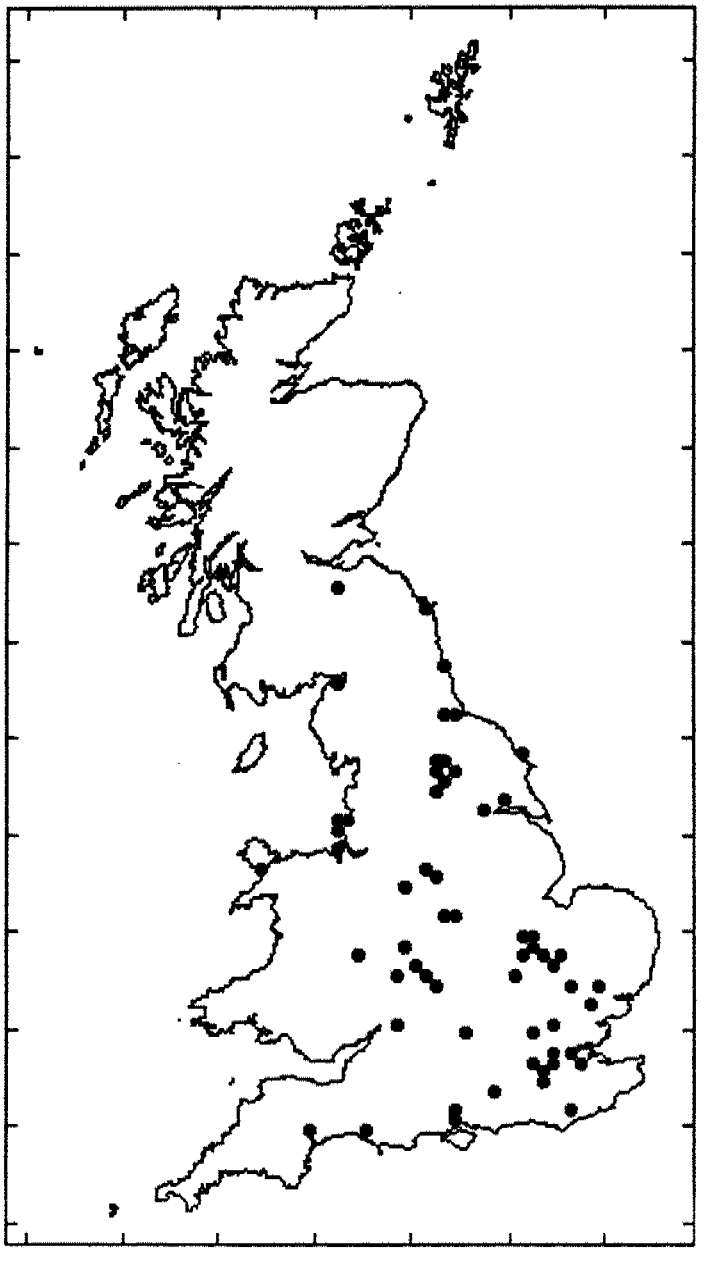
3.5.2 Key crested newt sites

There were 3,221 crested newt sites on the amphibian site database. However, the standard status assessment, the night count, had been met at only 907 (28%), hence there was a lack of quantitative data; the list of 65 candidate sites whose individual night counts exceeded 50, presented in Appendix 12, must therefore be far from complete. Figure 3.4 shows that the sites were spread throughout the species' range and included water-bodies in Devon, East Sussex, Gwynedd and Scotland. Key sites were present in 29 counties within 10 of the Country Agency regions; over 75% of them falling within EM, NEE, SEE and WM regions. There was a suggestion of aggregations of sites in Cambridgeshire, in the south east just south of London and in North Yorkshire. However, most of the records were likely to be attributable to the intensive recording efforts of a few surveyors: on the present evidence, little of biogeographical import should be read into the distribution pattern.

The list (Appendix 12) represents 0.6% of all sites recorded since 1983 and 2.0% of all recorded crested newt sites. Swan and Oldham 1989 estimated the total number of crested newt sites nationally to be about 18,000, therefore this list represents approximately 0.4% of that total.

Fig 3.4

Distribution of "candidate" crested newt SSSIs - sites at which at least 50 crested newts have been counted by torchlight between 1983 and 1992.



3.5.3 Amphibian Community sites

3.5.3.1 Community Score

As crested newts (the only totally protected widespread amphibian species) have a limited distribution across Great Britain, sites from which they are absent but which support otherwise excellent assemblages of species have previously lacked conservation status. A scoring system allocating points both for numbers of species and population sizes (based on counts of animals) was devised by Arnold Cooke of English Nature (see Swan and Oldham 1989) as a method of assigning a conservation value to multi-species sites. It was envisaged that sites scoring 10 or more points would become candidate amphibian community SSSIs.

"Community" scores were calculated for every site on the database, and the score frequency histogram is illustrated in Figure 3.5. On the basis of 10 points qualifying sites for SSSI designation, only seven from this list would become candidates; over 90% of all sites scored three points or less, the median score overall being just one. As with the crested newt list, lack of count data probably reduced the scores of many sites; a pond may score one point for containing four species but will score nothing further for any of those species unless counts are recorded. Due to the shortage of high scoring sites, the criterion for candidature was therefore lowered to a score of eight or over; Appendix 13 lists the 42 water-bodies which comprised the top scoring 0.4% of recorded sites.

Fig 3.6 shows the distribution of the highest scoring amphibian community sites throughout Britain. There was some overlap between these and the candidate crested newt sites - 14 were listed in both appendices. "Community" sites were absent from the east midlands and much of east Anglia, and found generally to the west and south east of the crested newt's distribution range. Nonetheless, most were situated in "lowland" Britain. Eight of the Country Agency regions

Fig 3.5

Frequency histogram of "community scores" calculated for sites recorded between 1983 and 1992.

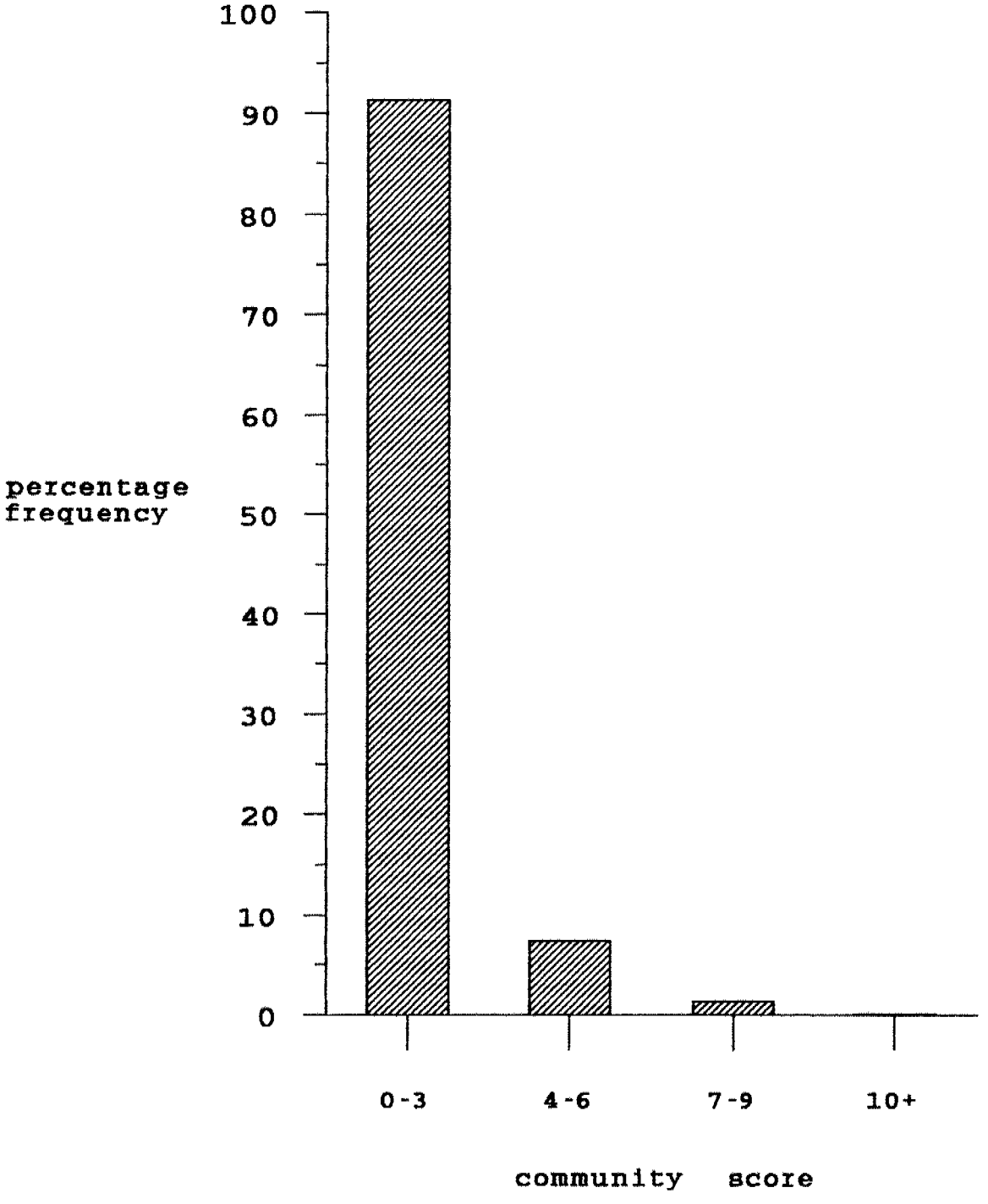
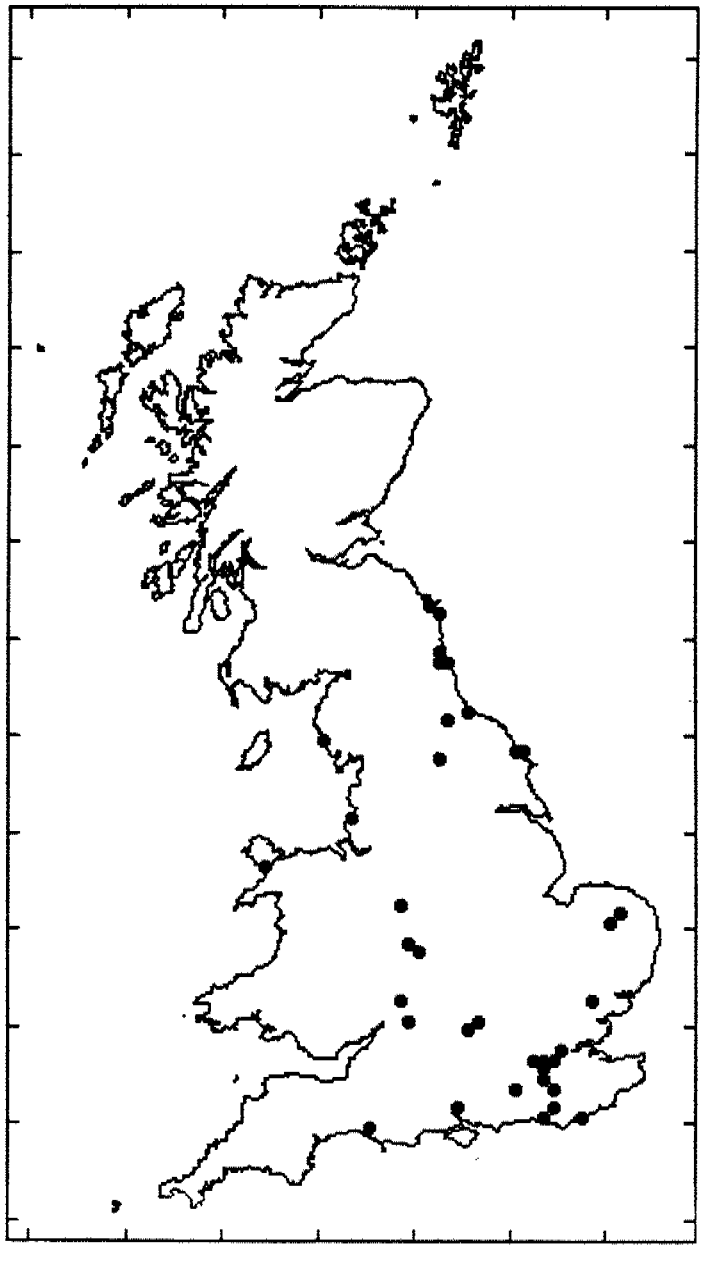


Fig 3.6

Distribution of sites with exceptional species assemblages; ie whose "community" score exceeded seven.



contained candidate amphibian community sites, of which the largest aggregation (13 sites) was within SEE region.

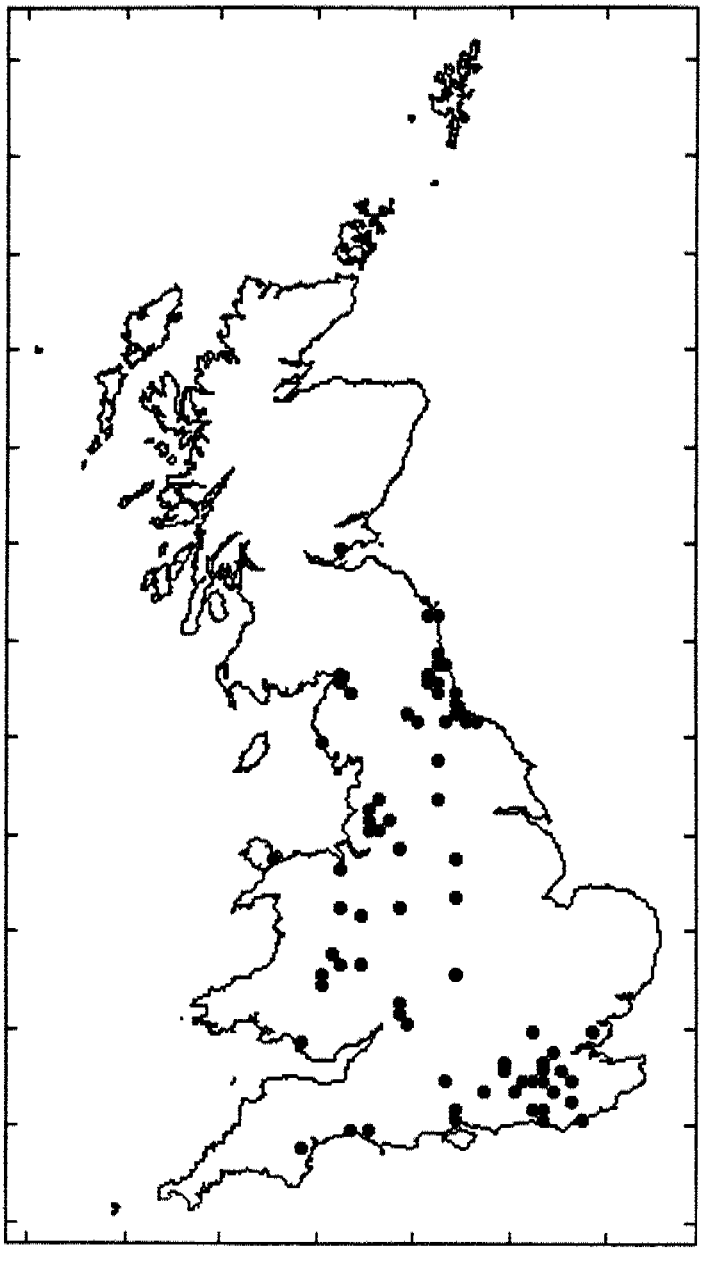
3.5.3.2 Five species sites

Combining the key crested newt and top-scoring community sites created a list of 77 water-bodies, 0.7% of recorded sites. Due to the shortage of site records for which night counts were made, many multi-species sites failed to accumulate sufficient points for designation on the community scoring system. Therefore, an additional list of sites containing all five of the widespread species was compiled (Appendix 14). The list comprised 104 sites, of which 22 were also included in either the key crested newt or community candidate lists. This relatively low degree of overlap indicated that many of the five species sites recorded low species counts, or none at all. Inclusion on the five species list did not require count data, just an indication of species presence.

The site locations were, by definition, restricted to the crested newt distribution range, but the list included more sites on the edge of the range (Fig 3.7). Five species sites must also be within areas of palmate and smooth newt range overlap. Thus, aggregations occurred in south east England and Mid Wales where both species were widespread. Other areas of five species site aggregations were within counties where both species existed, but were not necessarily ubiquitous, such as Lancashire where smooth newts occupied 100% and palmate newts 50% of adequately surveyed 10km squares, or Cumbria, where the two species were present in 70 and 80% of squares respectively. Apart from the south east aggregations, the five species sites were all within counties containing both "lowland" and "marginal upland" land classes, according to the Institute of Terrestrial Ecology Land Classification Scheme (Bunce et al 1981, 1991). It seems that areas of lowland/upland interphase comprise habitats sufficiently diverse to support both small newt species yet productive enough to maintain crested newt populations.

Fig 3.7

Distribution of sites where all five of the widespread species have been recorded.



Within the south east corner of England also, both small newt species occurred together, even though the general land classification of this area is "Lowlands of southern England and East Anglia". However, the region contains land classes one and two, both of which have mean soil pH less than seven and include some heathlands on which smooth and palmate newts coexist. Five species sites were distributed amongst 12 Country Agency regions, the largest numbers occurring in NEE and SEE regions (25 sites in each).

3.5.4 Candidate site list

Combining the three criteria produced a set of 184 candidate amphibian SSSIs, representing 1.5% of all recorded sites.

A greater degree of overlap occurred between the Community and five species site lists (20 sites) than between the crested newt and either of the other two (14 and 5 sites respectively). It is possible that sites of high amphibian diversity occurring in areas of upland/lowland interphase are not productive enough to sustain the large populations of crested newts recorded elsewhere. Most recorded crested newt sites had low Community scores (median of two), but higher than recorded sites overall (median of one). Although 76.5% of crested newt sites had a community score of three or less, 1.5% scored over seven, compared to 0.4% of all other sites. Therefore, designating sites with community scores over seven would include over one percent of recorded *T.cristatus* breeding sites. Combining the three site lists, approximately 5% of recorded crested newt sites would be designated, almost one percent of the estimated crested newt site total for Great Britain.

Including the multi-species sites in the list, would also safeguard many palmate newt breeding sites. Although the species' main habitats are generally not regarded as being as threatened by agricultural and urban developments as the lowlands, it is nevertheless the rarest of the widespread species overall. Moreover, inclusion of some of its "lowland"

breeding sites on the candidate list could help to maintain its status in parts of Britain where the species was recorded to be rare and its distribution fragmentary.

3.5.5 Discussion

Considering the apparent scarcity of amphibian sites of high quality, it seems appropriate that the best crested newt and community sites should be afforded special protection status. There may however be shortfalls in proceeding with a conservation strategy aimed only at conserving the best recorded sites.

In implementing the conservation of the "candidate" sites, large areas of the country could emerge with very few or no protected amphibian habitats. Even within the centre of the crested newt's distribution range, the East Midlands, most sites are deemed not worthy of protection under these criteria. Fig 3.2(e) shows that there are many 100km^2 areas within the species' supposed range in which crested newts have not been recorded. Arguably, areas in which aquatic and terrestrial habitats have deteriorated to a state in which amphibians can no longer persist require more rather than less conservation input. The system might however encompass more of the country if "local" criteria were to be set and sites notified on the basis of regional standards.

However, relatively few sites would still be afforded special protection even under local guidelines, and conserving sites in isolation ignores, for example, considerations of metapopulation dynamics. Particular "key" sites may well have attained their status only because of their proximity to other water-bodies of perhaps much lower "conservation value".

Outside the distribution range of crested newts and the regions in which the candidate "community" sites are, much of western and northern Britain is unlikely to receive any amphibian conservation consideration at all. Recorded sites in these regions can be ranked (Appendix 15) and conserved

accordingly, but over such wide and remote areas a "flagship" approach seems inappropriate, (if only because of the practical difficulties of surveying enough sites to be sure of identifying "the best"). Due to a lack of research and survey, the effects of factors impinging upon these populations are largely unknown. Further systematic survey and monitoring work should probably therefore be instigated before a truly comprehensive national amphibian conservation strategy can be formulated.