CHAPTER 2

CHARACTERISTICS OF WATER-BODIES SURVEYED

2.1 Introduction

This chapter reviews the responses entered in the qualitative descriptive sections of the national survey pond questionnaires, 1987 to 1992. It does not include data from the 1983-6 crested newt survey which are described in Oldham and Nicholson (1986). Specifically, the information describing water-body types, their uses, harmful activities to which they are subject, the occurrence of fish, and tendencies of sites to desiccate is analyzed and summarised. However, it should be borne in mind that not all recorders will have been sufficiently familiar with the water-bodies they described for all the information to be regarded as fact. Some of the responses, particularly to the "harmful activities" section, are undoubtedly speculative. They are nonetheless of interest in so far as they reveal perceptions and concerns of members of the public.

In the following sections, water-body types, uses etc are described for the sample as a whole. The "uses", "threats", "fish presence" and "desiccation tendencies" are then reported for each of the pond types identified.

2.2 Water-body types

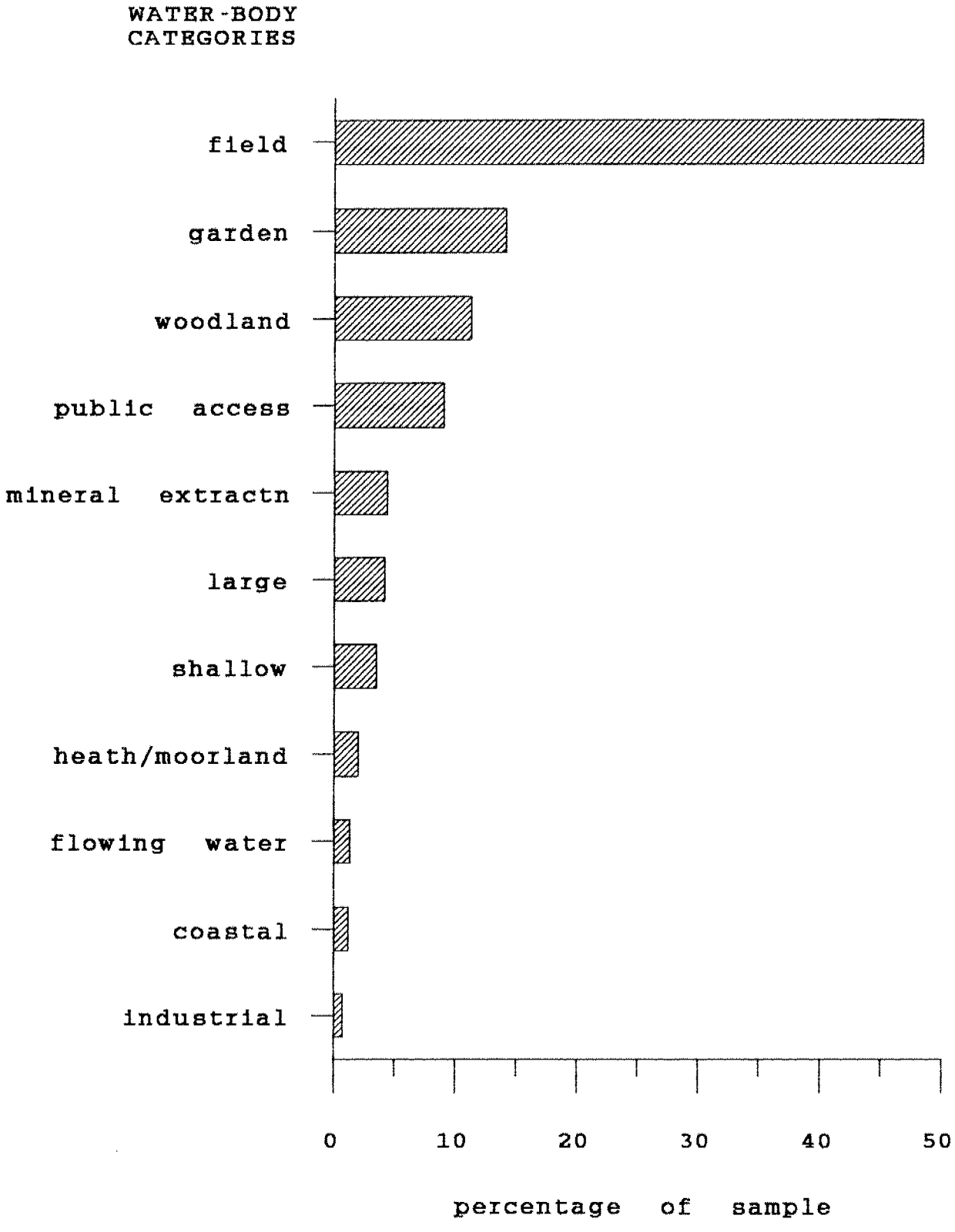
Overall, 4,469 questionnaires were returned in which the type of water-body was recorded. The fifty-eight types are listed in Appendix (8). However, to produce this list, some rationalising of types was necessary. Because not all recorders were aware of the origins of the ponds they described, to analyze for example, "dew ponds", "marl pits", "moat sites" etc separately would have been meaningless as many others would have been recorded simply as field ponds. Therefore, it was decided to include small or medium sized

sites, situated in enclosed farmland, in the one category, "field" ponds. The decision was also based on the assumption that the amphibian complement of a pond is more likely to be a consequence of its current use and situation than its origin.

The types were grouped into eleven categories based upon their situation, size and physical characteristics. Some categories, such as "garden", "woodland", "mineral extraction" or "flowing" are self explanatory, but the rationale behind others requires some explanation. Some of the categories describe particular physical pond characteristics; "large", for instance included lakes, lochs and reservoirs. The "shallow" group however was more heterogeneous, ranging from fens to flooded fields. "Heath and moorland" ponds were surrounded by Ericaceous vegetation, not situated in enclosed landscapes and possibly acidic. "Coastal" sites were mainly represented by dune slack and scrapes, but also included saltmarsh. The "industrial" group, difficult to define, consisted of a diverse set of ponds situated in industrial or urban railway settings and included waste disposal sites. The group entitled "public access" was probably the least unified, comprising a wide range of water-bodies not allocated to any of the other types by their recorders, but whose common factor was limited or complete public access. Included in this category were village ponds and those on common land, urban and rural parkland, hospital and school grounds and golf courses.

Figure 2.1 shows the proportions of each group represented in the survey sample. The largest category was that of "field" with 2,166 sites (48.5% of the sample), almost three and a half times the number represented in the second group, "garden" ponds (632 sites, 14.1%). "Woodland" (including forest) ponds and "public access" sites accounted for 11.3 and 8.9% respectively. The next three categories, "sites of mineral extraction", "large" and "shallow" represented 12% of the sample, and the four smallest groups, "heath/moorland", "flowing" and "coastal" accounted for approximately five percent of the total.

Figure 2.1
Proportions of each water-body type recorded in 4,469 pond questionnaires between 1987 and 1992



Thus, field ponds were those most frequently described by the national survey recorders. Only one in seven of the pond questionnaires referred to a garden site, providing a useful sample of this type of water-body for analysis, but not, as was originally feared, sufficient to overwhelm the study. Several extensive forestry commission surveys resulted in the relatively high representation of woodland sites in the sample.

Most of the recorders, surveying voluntarily in their own time, will probably have chosen the most numerous and accessible ponds within their home area. Western and upland Britain where, by virtue of climate and geomorphology, standing water would be expected to be abundant, was under-surveyed. Low human population densities therefore probably resulted in under-representation of moorland and other upland pond types in the sample.

2.3 Water-body uses and users

Out of a total of 4,667 pond questionnaires, 2,382 (51.0%) recorded a use or user for the site. Appendix (9) lists the 123 use or users described. Nine categories were identified overall, including such diverse groups as "livestock", "sport" and "alien herpetofauna". The scope of some of the categories, such as "livestock", and the two herpetological groups are obvious, but others may need clarification. The "birds" category included both wild and domestic varieties; while "pets" was essentially cats drinking and dogs swimming! "Wild mammals" listed were those for which ponds provided drinking sites (eg deer) or those which were observed in, or in the immediate vicinity of, the site, (eg bats, water shrew, otter). Specific "functions" lists uses pertaining to water storage or mineral properties of ponds, referring mainly to water abstraction or mineral extraction. "Sport" refers to energetic or otherwise disturbance-creating human activities taking place on and in the water, or close to the pond. Included are, for example, boating and canoeing, motor-cycling and BMX trail-riding, curling and skating. Anglers, because of

their fairly sedentary behaviour are not included in this, but in the "general recreation" group. This latter category refers to non-sporting human activities, some not centred on the water itself, and most not obviously disruptive to the pond and its environs. Included are children, bird watchers, tourists and anglers.

Figure 2.2 shows the proportions of sites in each of the nine use categories. The largest single category of users was "birds" (24.3%) of which ducks comprised 59.2% (670 sites). Use by livestock for drinking, and by human beings for general recreation were reported with approximately equal frequency (16.9 and 16.3% of the sites respectively). These three were the major uses perceived by the survey recorders. "Sport" took place in 99 sites (2.1%) and "wild mammals", "pets", and native and alien herpetofauna not included in the survey each "used" less than 2% of ponds described. Only 1.5% of ponds (68) apparently functioned as water storage units or mineral extraction sites.

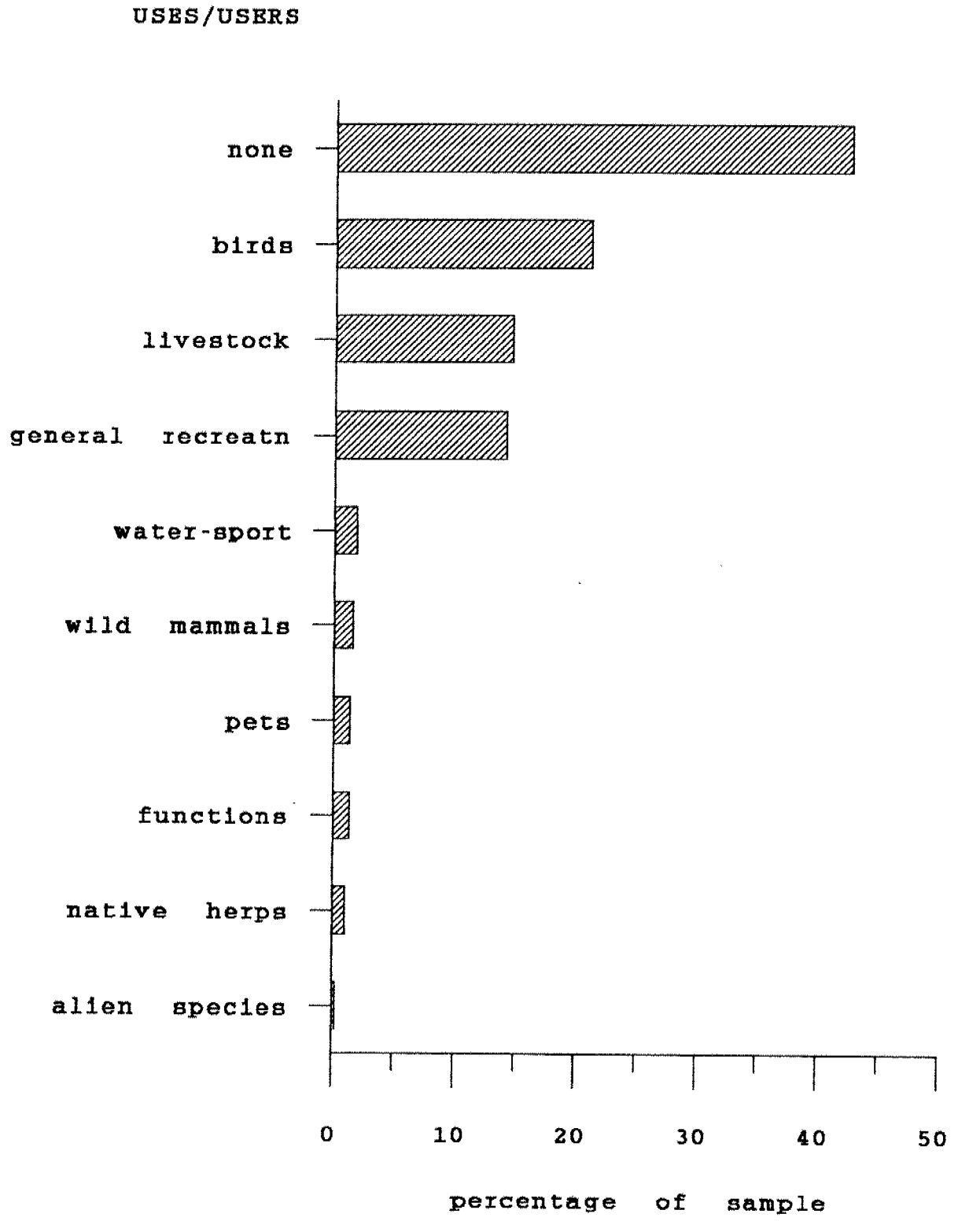
Not surprisingly, the uses and users most frequently reported were those most easily observed incidentally, which included human activities, farm stock and large conspicuous birds. Wild animal information is probably quantitatively unreliable.

2.4 Harmful activities

The interpretation of the data presented below must be qualified by the realisation that these are threats *perceived* or *assumed* by recorders. Not all of the items listed would be considered threatening to ponds or amphibians by biologists, but are reported here to indicate the perceptions and concerns of members of the public.

A total of 1,628 of the 4,667 recorded water-bodies (34.9%) were reported to be "threatened" by one or more harmful activities. Appendix 10 lists the 83 different threats described. From these, 14 categories were identified; the

Figure 2.2
Proportions of uses/users recorded at 4,667 water-bodies between 1987 and 1992.



proportions of the recorded sites perceived to be under threat from each of the groups are illustrated in Figure 2.3.

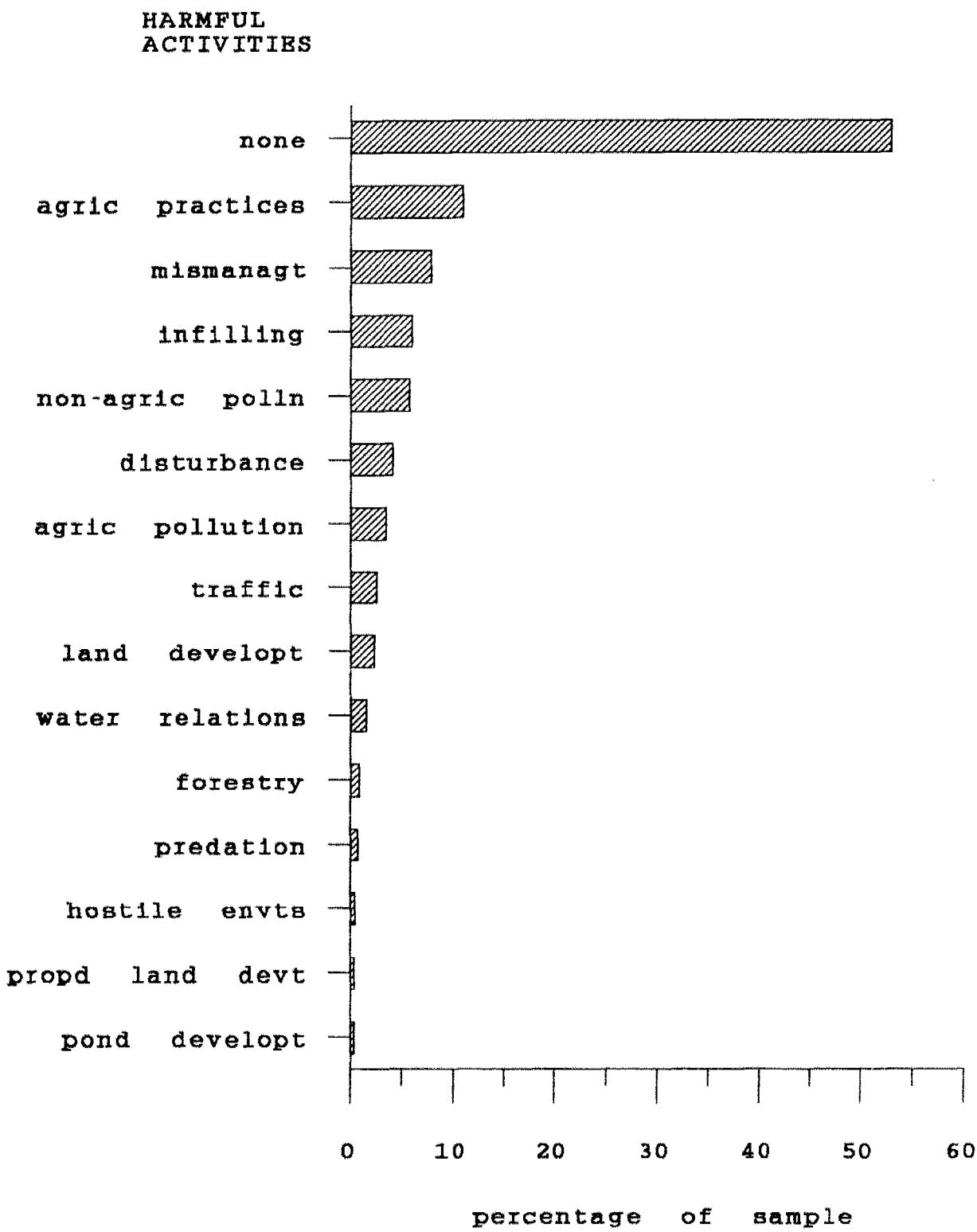
There was some overlap between "uses" and "threats". For example, livestock are recorded as users in 16.9% of sites and causers of trampling damage in 1.3%. This, and other physical threats from agricultural practices potentially affected 13.5% of sites. "Ploughing", the most commonly reported of these threats, was cited as the "harmful activity" in 85.5% of the above. The items listed in the category "disturbance" (affecting 5.1% of ponds) also suggested that users may be abusers, including, for example, anglers, children, water-sportsmen and ducks.

The "water-body development" and "actual" and "proposed land development" categories, (recorded for a combined total of 3.6% of sites) included residential and industrial building work, road and railway development, and mineral extraction activities. The presence of areas of land close to the pond perceived to be inimical to amphibians are grouped under the heading "hostile environments" and were considered cause for concern in 0.5% of sites. This category probably overlaps with "land development" as "building sites" are included.

Infilling, either deliberately (0.5%), or by using the pond for disposal or storage of items such as household rubbish, building materials, agricultural waste or for unspecified dumping, emerged as another clear category, threatening 7.3% of sites.

More speculative were reports of "pollution", suspected in 11.3% of ponds, (agricultural, industrial, or road run-off for example). A pond in an arable setting say, is potentially at risk from nutrient enrichment, but not all recorders will have considered or recorded it as a threat. Thus, the numbers reported here should be regarded as an indication of a general level of concern, rather than an accurate assessment of pollution threats.

Figure 2.3
Proportions of activities perceived to be harmful at 4,667 water-bodies between 1987 and 1992.



Likewise, judgements of "mismanagement", reported for 9.7% of sites are subjective - one recorder's "timely clearance" will be another's "mismanagement". Aquatic and terrestrial vegetation clearance for example are recorded as threats for 0.6% of ponds, and neglect for 0.9%.

The recorders' perceptions of "predation" threats were anomalous. Amphibians were reported to be at risk from a variety of predators, including birds and domestic cats, and overall, predation was perceived as a significant threat in 0.8% of ponds. The risk from fish, however, was rarely considered, as "stocking with fish" was recorded as a threat in a negligible 0.04% of records.

The proximity of road and rail traffic, including car-parks, affecting 3.1% of sites, also concerned sufficient recorders to be included in a separate category.

The "forestry" group simply lists forestry practices potentially harmful to amphibians, such as tree-planting or felling and was reported in 1.0% of forms.

"Water relations" were thought to be a threat in 1.8% of ponds. These included increases in water-level, caused by land drainage and flood control measures; and decreases, caused by abstraction or a general lowering of the water-table.

2.5 Occurrence of fish

Recorders were aware of the presence or absence of fish in 3,663 sites. They were present in 35.8% of the total (1,313) and of those, the species were identified in 81.9% (1,076). Appendix 11 lists the 38 species or varieties named. The most commonly recorded fish were stickleback (10.2% of ponds), goldfish (8.1%) and several varieties each of carp and trout (6.1 and 4.8% respectively). Other types of fish, represented in between 1.5 and 2.9% of sites, were unspecified "coarse fish", minnow, orae, perch, pike, roach, rudd, and tench. Approximately the same number of types were recorded in garden

(Appendix 11 (a)) and non-garden sites, (Appendix 11 (b)) sites, (32 and 31 respectively) although the selection of species found in the two categories differed.

2.6 Site desiccation

On 3,608 questionnaires (77%) recorders claimed to be aware of the tendency of the recorded site to desiccate. In the 1987 forms, recorders were simply asked whether or not sites dried up ever, but on the 1988 version, this was refined to "every year", "only during drought" and "never". Combining the two questionnaire types, a total of 1,015 (28.1%) were recorded as drying out at some time, and 2,593 (71.9%) as permanently holding water. Of the 2,350 ponds for which desiccation information was supplied on the newer style forms, 12.0% were reported to dry out every year, 19.9% only during drought, and 66.2% never. Thus, desiccation apparently affected about one third of recorded sites.

2.7 Properties of the different water-body types

The water-body groupings in Fig 2.1 were derived from considerations not only of their physical characteristics, but also their settings. In the following sections, the size characteristics of the eleven categories are considered, and their uses and the threats to which they may be subject, compared. The distribution of fish between the groups is also described and the groups' tendencies to desiccate are investigated.

2.7.1 Water-body sizes

Area measurements were calculated for 3,921 non-flowing water-bodies, and maximum depths recorded for 3,882. Table 2.1 lists the ranges and medians of area measurements, and the median depth ranges, for each of the water-body categories. (NB, recorders were given a choice of three depth ranges to allocate to the recorded site - less than 0.5 metres, 0.5-2.0

Table 2.1

Area and depth of each water-body type recorded in the national amphibian survey, between 1987 and 1992.

Water-body type	Area (square metres)				Max Depth Range (metres)			
	median	max	min	N	% sites within each range			
					<0.5	0.5-2.0	>2.0	N
field	300	100,000	0.5	1,916	39.7	*53.1	7.3	1,890
garden	6	10,500	0.4	605	38.1	*58.1	3.8	601
woodland	288	218,750	1.0	461	37.9	*53.6	8.5	459
pub access	396	480,000	0.5	333	34.0	*53.9	12.0	332
min extr	612	150,544	4.0	158	23.9	*40.0	36.1	155
large	7,841	12,960,000	25.0	146	6.9	29.2	*63.9	144
shallow	200	280,000	1.0	145	*66.2	32.4	1.4	145
heath/moor	190	9,000	0.8	80	47.5	*45.0	7.5	80
coastal	32	30,000	1.0	51	*70.0	30.0	0.0	50
industrial	360	14,400	10.0	26	46.2	*34.6	19.2	26
ALL	240	12,960,000	0.4	3,921	38.5	*51.2	10.3	3,882

* median range

metres and over 2.0 metres) The median area for the whole sample was 240m², and median depth range, 0.5-2m.

Overall, the area range was immense, extending from 0.38m² to almost 13km². Forty-three sites measured less than one square metre, of which 30 were garden ponds, seven were field ponds, three were on moorland and the remainder were ditch and woodland sites. In contrast, 13 sites were recorded to have length or width measurements greater than 1,000m - six reservoirs, three lochs, one lake, and three marshes. Nine of these were in Scotland, two in W Yorkshire and two in E Sussex. The three marshes, Thackley in W Yorkshire, The Pells in E Sussex and Wardford Marsh in Grampian Region measured 7,500, 4,000 and 640,000m² respectively. The four sites described as lakes or lochs were in Fife, two of which were over 1km² (Loch Gelly, 1.2km², and Lochore, just over 2.0km²) Four of the six "reservoir" sites were also in Scotland, the others in E Sussex and W Yorkshire. Two of the reservoirs were over 1km², Thriepmuir in Lothian Region (1.3km²), and Bewl Water in E Sussex, the largest site on record, measuring 12.9km².

The area and depth characteristics of six of the ten non-flowing water-body types were relatively and predictably distinct. Table 2.1 shows that garden ponds had by far the smallest areas (median 6m²), but their median depth was within the 0.5-2.0 metre range (58.1% in this category). In contrast, the median area of the "large" group, which includes lakes and reservoirs, was 7,841m² with median depth range of over two metres. The dune slack ponds and other coastal sites were generally very small, their median areas being 32m² and the majority of them (70.0%) fell within the depth range of less then 0.5 metres. The sites of mineral extraction were quite diverse. Although overall they had the second largest median area (612m²) they ranged in size from 4.0 to 150,544m² and their median depth category was in the 0.5-2.0 metre range. This group includes large single sites, such as quarries, but also gravel and clay pit complexes comprising some smaller water-bodies. The shallow and heathland/moorland groups

presented similar median area values (200 and 190m^2) but the latter had a much smaller range, 0.8 to 9,000m^2 as opposed to 1.0 to 280,000m^2. Some of the marshes in the "shallow" category had extensive areas, as described above. In terms of depth also, the two groups were distinct, the median depth range for the heath/moor sites being 0.5-2.0 metres, and that for the shallow ones, less than 0.5 metres.

The following four remaining categories had similar size characteristics and were distinguished mainly by their settings and hinterlands. The median areas of the farm, woodland, industrial and public access sites ranged from 288 to 396m^2 and their median depths all fell within the 0.5-2.0 metre range. The industrial sites had the smallest area range (10 to 14,400m^2), and public access sites the greatest (1.0 to 480,000m^2). In general, these were groups of "medium-sized" ponds which numbered some small and also some extensive sites amongst them, but which differed principally in their surrounding terrestrial habitats.

2.7.2 Uses of the different groups of water-bodies

Approximately half the water-bodies described were recorded as having some use (Table 2.2). The "large" sites were most frequently reported to be useful (84.4% of them), and garden ponds the least (27.7%). "Birds" were found in about a quarter of all ponds, but in approximately half (48.9%) of those in the "large" category. Birds were also observed at about a quarter of farm, woodland, public access, mineral extraction, industrial and flowing sites.

Less than 20% of recorded ponds were used for stock watering (17.5%), and the two categories with the highest percentage of use by livestock did not include "field", with 24.8%, but "coastal" and "shallow" sites (42.3 and 37.8% respectively). Categories least used by livestock were public access and mineral extraction sites.

Table 2.2

Uses/users of each water-body type recorded in the national amphibian survey, between 1987 and 1992.

	percentage water-body usage									
water-body type	**birds**	**live-stock**	**genl recn**	**water sport**	**wild mamls**	**pets**	**func-tions**	**nat herps**	**intr spp**	**any**
field	25.7	24.8	13.2	1.2	1.3	1.1	0.6	0.6	0.3	55.4
garden	18.4	0.5	8.3	0.2	1.1	4.0	0.3	0.5	0.2	27.7
woodland	26.7	12.3	18.2	4.4	3.9	1.3	3.9	0.8	0.0	53.7
pub acc	23.4	1.9	28.6	2.5	1.2	1.2	0.9	0.7	0.2	46.8
min extr	23.6	9.2	20.0	5.1	3.6	2.1	3.1	0.5	0.0	49.7
large	48.9	14.5	51.1	8.1	5.4	0.5	10.2	0.0	0.5	84.4
shallow	17.9	37.8	11.5	3.2	1.3	0.0	1.3	1.9	0.0	57.7
heath/moor	19.5	29.9	5.7	1.1	0.0	2.3	2.3	0.0	0.0	51.7
flowing	26.3	26.3	43.9	10.5	0.0	1.8	0.0	0.0	0.0	73.7
coastal	3.8	42.3	5.8	0.0	0.0	0.0	0.0	34.0	0.0	69.2
industrial	25.8	6.5	16.1	0.0	0.0	3.2	3.2	0.0	0.0	38.7
ALL	24.8	17.5	16.5	2.2	1.8	1.6	1.5	0.9	0.2	51.8

The large sites were those most used by people for general recreation (51.1%), with 43.9% of flowing sites, and 28.6% of public access sites having recreational use also. Between ten and twenty percent of all mineral extraction, farm, woodland, industrial and shallow sites though were also reported to be used as areas of human recreation. "Water-sport", the recreation category potentially most disturbing to wildlife, took place in only 2.2% of water-bodies, flowing water and the large sites being those most frequently used (10.5 and 8.1% respectively). Heath/moorland and coastal sites had few reported "uses" possibly due to their relative inaccessibility.

"Coastal" ponds comprised the group most frequently host to native herpetofauna not included in the survey, many of which were natterjack toad breeding sites. Alien species were only recorded in nine of the national survey pond questionnaires; six of them describing field ponds, and one each a garden, public access site, and large water-body.

A low percentage of ponds were recorded as having specific functions associated with their water or mineral resources. Most of the reported uses were those most obvious, such as cattle or fellow human beings. For example, over 50% of the "large" sites, which included reservoirs, were reportedly used as recreation sites, but only 10.2% were associated with water-abstraction. Similarly, only 3.1% of mineral extraction sites were reported to have a quarrying function of any kind. In the following section, it will become apparent that some of the economic functions of water-bodies were regarded foremost as threats to amphibians by national survey recorders rather than as uses.

2.7.3 Harmful activities associated with the different water-body types.

Thirty-five percent of described sites were thought to be threatened by one or more factors, according to the national survey recorders (Table 2.3). Sites with an industrial

Table 2.3

Harmful activities recorded for each of the water-body types

harmful activity	percentage of sites affected											
	field	gar-den	wood-land	pub acc	min extr	large	shal-low	heath /moor	flow-ing	coas-tal	indus trial	total
agric practice	19.9	6.4	8.7	6.9	14.4	12.4	9.6	1.1	14.0	0.0	3.2	13.9
mismanage-ment	9.8	2.4	6.5	13.7	35.9	7.5	7.1	6.9	14.0	1.9	35.5	9.8
infilling	7.1	1.3	4.4	10.4	33.8	4.3	4.5	5.7	10.5	1.9	35.5	7.4
pollution												
non-agric	8.3	4.0	5.3	6.9	9.2	7.5	7.7	2.3	14.0	1.9	9.7	7.1
agric	6.3	2.7	2.6	1.7	1.5	4.3	5.1	0.0	5.3	0.0	0.0	4.4
distbnce	2.8	5.4	2.6	13.7	13.8	6.9	3.8	2.3	12.3	1.9	12.9	4.9
land devt												
actual	2.4	1.6	0.6	2.7	7.2	3.2	7.7	1.1	5.3	0.0	22.5	2.7
proposed	0.3	0.3	0.0	0.2	0.5	0.0	2.6	0.0	1.8	0.0	3.2	0.3
water-body devt	0.1	0.0	0.4	0.2	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4
traffic	2.2	6.2	4.2	3.2	2.6	2.2	4.5	0.0	5.3	0.0	0.0	3.2
water relations	1.7	1.1	1.4	0.7	1.0	4.8	2.6	3.4	0.0	5.8	3.2	1.7
forestry	0.2	0.0	2.4	1.2	1.5	7.5	0.6	2.3	3.5	0.0	0.0	0.9
predation	0.2	1.9	0.9	2.7	0.0	1.1	0.0	0.0	1.8	0.0	0.0	0.8
hostile envts	0.3	0.2	0.2	0.0	1.5	1.1	1.9	0.0	3.5	0.0	6.5	0.5
any	37.9	24.5	25.9	36.8	62.6	39.2	32.7	13.8	45.6	11.5	67.7	35.1

connection, the "industrial" and "mineral extraction" groups were those indicated to be most frequently at risk (67.7 and 62.6% of them respectively), the main threats in both cases being mismanagement, and infilling. Almost half of the flowing water sites surveyed (45.6%) were considered threatened, most frequently by agricultural practices, mismanagement, pollution and disturbance.

Public access and large sites were thought to suffer harmful activities at approximately equal frequency, 36.8 and 39.2% respectively. However, the distribution of threats differed between the two categories. The main harmful activities recorded likely to affect the large sites were the physical aspects of agricultural practice (12.4%); but mismanagement, pollution, disturbance and forestry also were each reported to threaten between six and eight percent of them. "Water relations", the category including abstraction was said to be a threat to 4.8%, although this is an economic function of many such sites. Public access sites, on the other hand, had agricultural practice cited as a threat in only 6.9%; mismanagement, disturbance and infilling affecting approximately twice that number, (10 to 14%).

"Agricultural practices" was the largest group of factors said to affect farm ponds (19.9% of sites), 37.9% of which overall were reported to be at risk. Mismanagement, pollution - both agricultural and non-agricultural - and infilling were each reported to affect between six and ten percent of farm ponds.

The "shallow" group of sites was reported to be threatened in 32.7% of cases, the most prevalent harmful factors said to be agricultural practices, pollution, land development and mismanagement.

Approximately one quarter of garden and woodland sites were reported to be under some threat. The factors affecting gardens most frequently were said to be adjacent agricultural practice (6.4% of sites), and traffic (6.2%). Woodland sites were reportedly threatened by agriculture (8.7% of ponds) and

mismanagement (6.5%), with pollution, traffic and infilling each cited as threats to between four and five percent of them. Heathland/moorland and coastal sites were subject to fewest obvious threats (13.8 and 11.5% of sites respectively). Mismanagement and infilling were apparently the biggest threats to the former, and desiccation the main recorded threat to the coastal ponds.

2.7.4 Prevalence of fish in the site categories

Fish were found most frequently in the large sites (84.3% of them) and least frequently in the coastal and heathland/moorland ponds (less than 4% each). Figure 2.4 illustrates that between 50 and 60% of garden, public access and flowing water sites contained fish, but that they were found in fewer than 30% of each of the remaining site categories.

2.7.5 Site desiccation

The groups of ponds apparently most prone to desiccation were coastal and shallow sites, with 81.6 and 64.3% respectively observed to dry up at some time (Figure 2.5). Almost half of the heathland/moorland ponds, also relatively small and shallow, were reported to dry up. Approximately one third of the medium-sized pond groups, woodland, farm and industrial, were reported to desiccate (34 to 37%), but the fourth group of similarly-sized ponds, public access sites, had a much lower drying out frequency (12.9%). This suggests that not only size, but "human attendance" is also a factor in site permanence. It is possible for example that popular village ponds will be less likely to be allowed to dry out than isolated field ponds.

Mineral extraction sites, although comprising a group containing generally larger ponds, dry out relatively frequently (27.8%). Also unexpected was the finding that 29.8% of recorded flowing water sites were known to dry up. The

Figure 2.4
Percentages of each water-body type in which fish presence was recorded, at 3,663 water-bodies between 1987 and 1992.

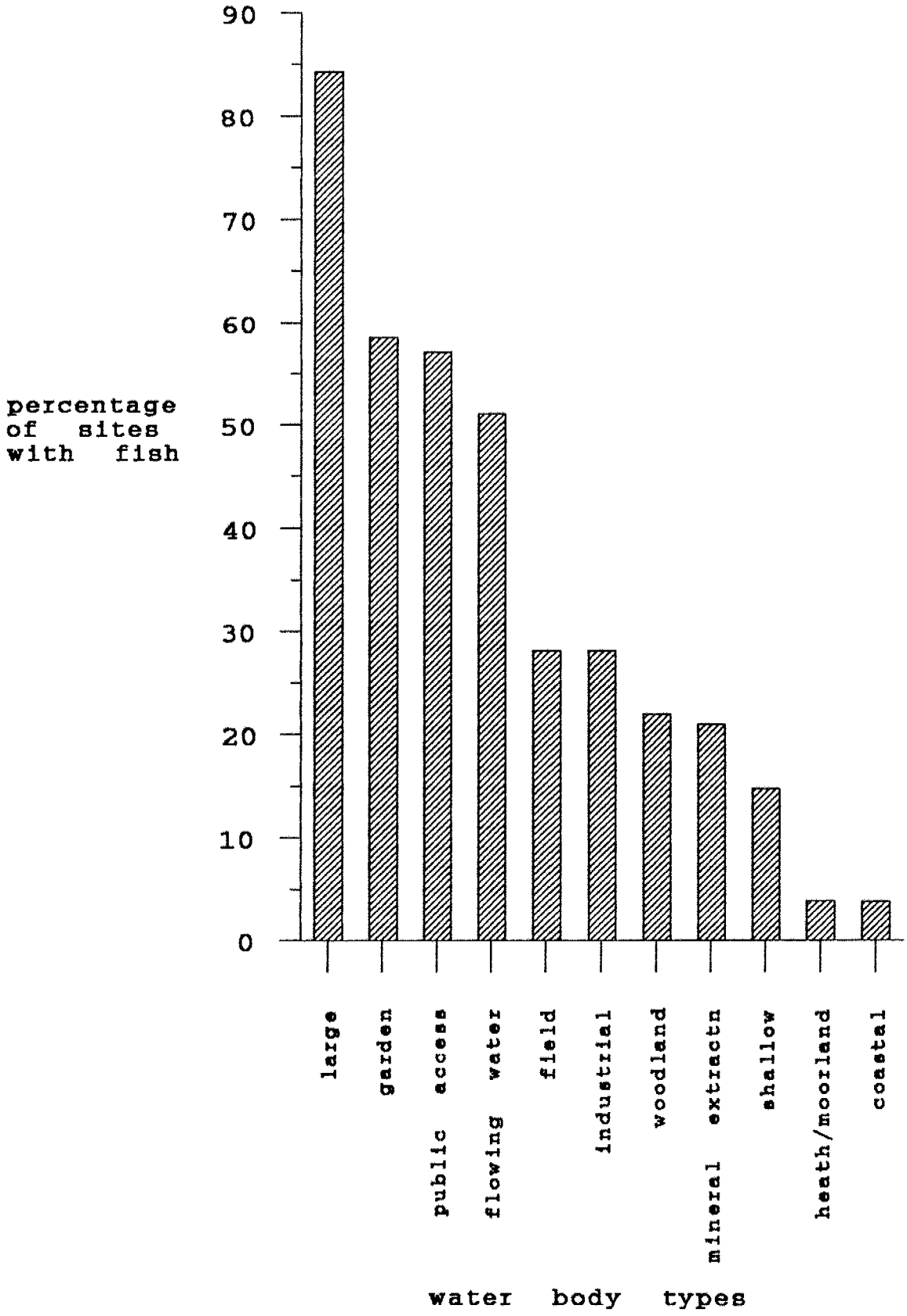
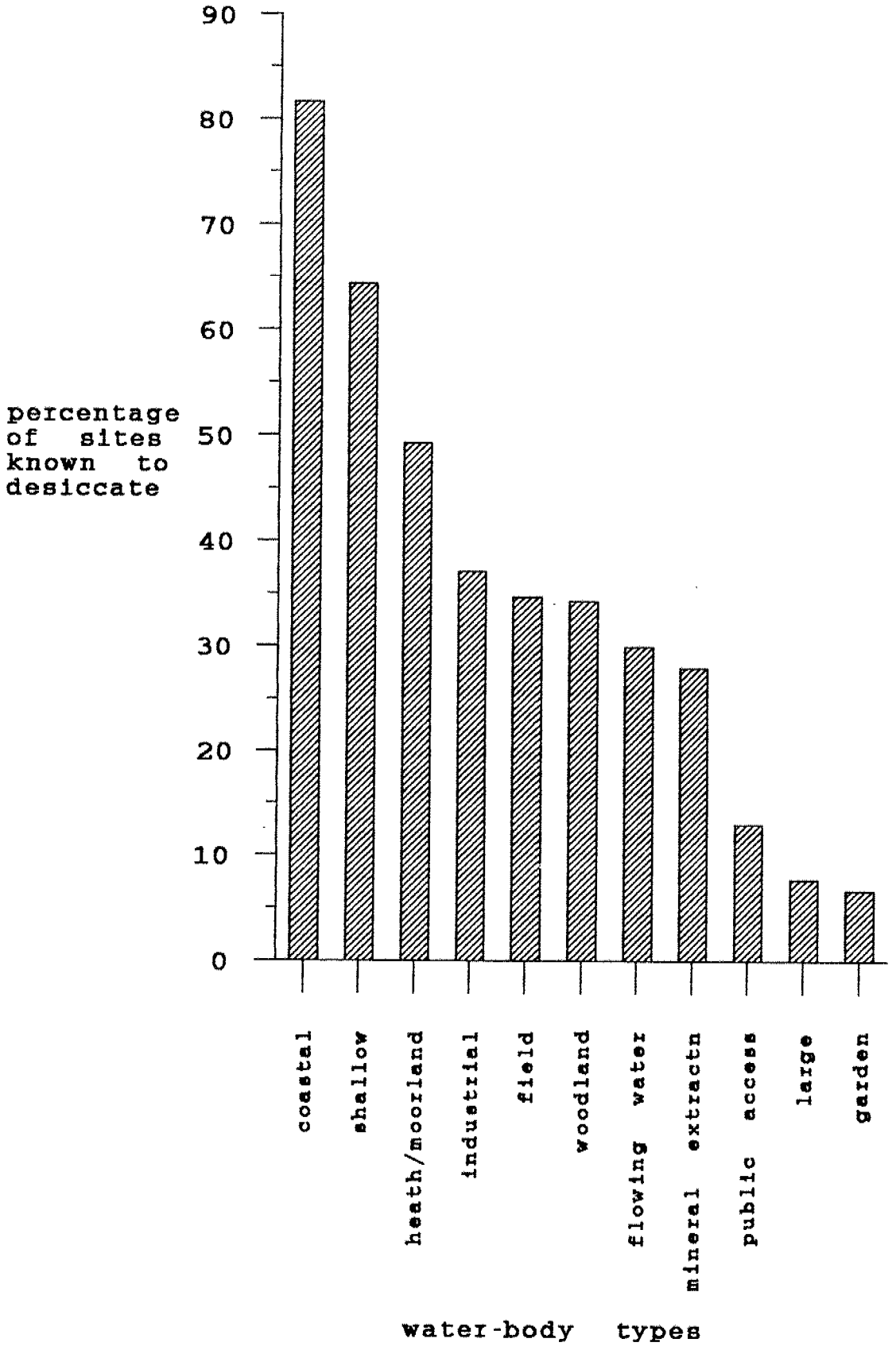


Figure 2.5
Percentages of each water-body type reported to dry up at some time: 3,608 sites recorded between 1987 and 1992.



category of large sites though shows a low probability of desiccation (7.7%).

Desiccation would therefore seem to depend on two factors, namely water-body size, and visibility; ie, where ponds were noticeable, and accessible to human beings, they were apparently less likely to be allowed to dry up. To some extent this suggestion is supported by the observation that a greater proportion of ponds used for livestock tended to dry up than those used for general recreation by people (47.7 as opposed to 19.9% respectively). However, overall, ponds with recorded "uses" had a similar likelihood of desiccation to those with no reported function (28.4 and 26.7% respectively).

2.8 Discussion

This chapter is intended to illustrate the diversity of water-bodies for which full descriptions are available. Also summarised are the uses, threats, presence of fish and desiccation tendencies associated with the different water-body types, as reported by the National Survey Recorders.

The sample encompasses a wide range of water-body structures and settings - from tiny garden ponds to boating lakes and reservoirs; from coastal dune land to urban industrial sites. As the purpose of this chapter was to provide an overview of the scope of the survey, sites have been grouped with the aim of presenting the sample as a series of recognisable categories, albeit subjectively.

Four of the eleven categories accounted for over 80% of the sample, but the importance of the small groups should not be under-estimated. For example, the "coastal" and "shallow" categories include several sites of national amphibian importance (See chapter 3).

The section describing "uses" gives an insight into perceptions of the survey recorders, for the most part not professional biologists. Those recorded are predominantly the

most obvious - ducks, cattle, people etc. It is likely that the real and economic functions of water-bodies (irrigation or fire fighting water storage for example) may not have been known and reported in some cases.

Over a third of the sample was considered threatened by one or more factors, some of which, such as infilling, are obvious to casual observers and reports of which are credible. Most reports of this particular threat suggest that deliberate destruction of ponds was not usually the aim, but that ponds were simply being used as a convenient holes in the ground in which to dispose of waste. Other suggestions of harmful activities, such as pollution, may also be based on actual observations of contamination, but may, on the other hand, be simply speculative. Nevertheless, the threat of pollution (thought to affect over 11% of sites) concerned a significant proportion of the recorders, and therefore warrants some consideration. Mismanagement, principally neglect and vegetation encroachment, and the use of adjacent land for development have also given cause for concern to a considerable number of recorders.

Recreational use and disturbance conflict at many sites, and probably related is the stocking of ponds with fish for angling. Fish stocking was not, however, recognised as a threat to amphibians, indicating a widespread ignorance of amphibian habitat requirements. Fish stocking is generally considered to be inimical to amphibians, but Swan and Oldham (1989) reported that some amphibian species occurred at higher than expected frequencies in fish ponds than in non-stocked sites. The implication of this apparent paradox is that even in the presence of fish, managed ponds are more likely to be occupied than neglected, encroached ones. (*NB, except by great crested newts which are extremely vulnerable to fish predation*).

Desiccation was a significant factor in small, shallow sites not generally accessible to the public. Those large enough to withstand drought, or those providing recreational areas for

people appeared less susceptible. Drying-out may prevent fish colonisation, but otherwise will not benefit amphibians if the water disappears before larval metamorphosis is complete. The isolation and lack of public attention which might have combined to increase the wildlife conservation value of such sites might also have contributed to their neglect, encroachment, desiccation and final demise.

2.9 Conclusions

This chapter has assessed qualitative information supplied by recorders. Later chapters will concentrate on numerical and more objective data. Here, however, the subjective assessments of recorders provide information on the concerns, prejudices and even recording abilities of members of the public, as well as supplying information on water-bodies in the UK.

It is apparent that water-bodies serve as recreational, economic and conservation resources. They are, however, subject to an array of threats associated both with their uses (eg recreation amenity, mineral extraction etc) and their obsolescence (eg neglect and vegetation encroachment, waste dumping etc). Conservation of ponds therefore will therefore have to include considerations of human as well as wildlife needs.

In the conservation of widespread species and their habitats, recognition of public perceptions could prove useful in the setting of realistic and pragmatic conservation goals. For example, considering the recreational use made of public access sites, the tendency of people to stock them with fish, and their vulnerability to vandalism, their potential as amphibian conservation sites may be limited. However, conservation initiatives centred on such sites could capitalise on educational, amenity and general aesthetic aspects. On the other hand, amphibian and other wildlife conservation initiatives, could perhaps be better directed towards the wider countryside in which the smaller, inaccessible and often neglected ponds are situated. Their

very inaccessibility, lack of human disturbance and reduced likelihood of having been stocked with fish increase their potential wildlife conservation value.