BTO Research Report No. 112

Inventory of Ornithological Data for Thames Water Sewage Treatment Works

Part 2
Site Reports

by

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May 1993

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to Thames Water Utilities Limited

The Nunnery, Thetford, Norfolk IP24 2PU

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TWU PART 2

Contents

Introduction

Part 2 contains individual site reports for three STW's selected from the list in Part 1 for which there are ornithological data available from the BTO's CBC, OSR and Ringing Scheme. These data have been summarised and some additional references have been included.

1. AYLESBURY

Ornithological Sites Register (OSR)

The OSR entry for Aylesbury Sewage Farm covers the period 1970-1976 before the refurbishments of 1981-1983. The Sewage Farm (S.F.) is described as having a large wet grassland irrigation area, a sludge lagoon and some areas of scrub between the river Thame and the irrigation site.

The S.F. was reported to be 'of value' for breeding, passage and wintering birds. In particular the irrigation area was found to be valuable to birds in winter because the distribution of liquid waste on it meant that this area froze less quickly than surrounding land. In addition the irrigation area contained some great reedmace which provided a roost site for 200+ Yellow Wagtails and 1200+ Swallows.

The entry records few species of waders or wildfowl using the S.F. Mallard were the only species of wildfowl to breed there, and wintering species included Teal, Tufted Duck, Pochard and Canada Goose. The sole breeding wader recorded was Snipe, with Lapwing and Jack Snipe the only wintering waders in addition to Snipe. Several species of sandpipers and Redshank used the S.F. during migration periods.

Passerine species were far more numerous at all times of the year. Swallows, Fieldfares and Redwings used the S.F. as a stopover site during migration and hedgerow passerines such as Goldfinch, Dunnock, Linnet and Chaffinch were present all year. Reed Warbler, Sedge Warbler and Reed Bunting were amongst the regular breeding species.

Common Birds Census (CBC)

The Aylesbury Sewage Farm site has been systematically surveyed for the Common Birds Census from 1970 until the present day. Each year 14 visits are made to the site, spread between late March and the end of July, in order to map the territories of breeding birds. In this way a great deal of data has been collected on the breeding bird community at Aylesbury and this has been analysed for the purpose of this report in two different ways. First the whole community was studied to assess the broad changes in its composition during 1970-1992. Second, a selection of species was studied in greater detail to identify year to year population fluctuations, and to investigate these in the context of national trends and management changes to the site.

1. Breeding Bird Community

The CBC data collected at Aylesbury provides an overall list of the species that breed, or have bred there during 1970-1992. Instead of producing one list to cover the entire 1970-1992 period it is more useful to divide this period into 1970-1980 and 1984-1992. The reason for this is that during 1981-83 major refurbishments took place at the S.F. to create

Species	Changes in frequency of breeding birds breeding in 1984-1992 compared to 1970-1980
Mallard	no change
Tufted Duck	+
Kestrel	+
Red-legged Partridge	+
Moorhen	no change
Coot	+
Snipe	disappeared
Stock Dove	+
Wood Pigeon	+
Skylark	no change
Yellow Wagtail	no change
Pied Wagtail	no change
Wren	-
Dunnock	no change
Robin	+
Whinchat	- (slight)
Blackbird	no change
Song Thrush	-
Mistle Thrush	-
Grasshopper Warbler	disappeared
Sedge Warbler	-
Reed Warbler	-
Whitethroat	+ (slight)
Blue Tit	+
Great Tit	+

Table 1. Changes in frequency of breeding of birds that bred at Aylesbury S.F. during 1984-1992 compared to 1970-1980

Species	Changes in frequency of breeding birds breeding in 1984-1992 compared to 1970-1980
Magpie	+
Carrion Crow	+
Starling	+
House Sparrow	no change
Tree Sparrow	-
Chaffinch	+
Greenfinch	+
Goldfinch	no change
Linnet	no change
Bullfinch	disappeared
Yellowhammer	+
Reed Bunting	no change
Corn Bunting	+ (slight)
Water Rail	disappeared

Table 1 cont'd. Changes in frequency of breeding of birds that bred at Aylesbury S.F. during 1984-1992 compared to 1970-1980

a new tertiary treatment plant (Glue and Bodenham 1985). This had a pronounced effect on breeding bird populations at the time and possibly afterwards for some species. Comparing the two periods mentioned above allows for a rough assessment of how the composition of the bird community has changed during 1970-1992 and whether the man-made changes of 1981-83 are likely to have contributed to any such changes.

From Table 1 it can be seen that four species out of the thirty-nine that bred at least once during 1979-1980 did not breed during 1984-1992. Eleven species showed no change in breeding frequency, whilst seventeen showed an increase and seven showed a decrease. In addition a number of species that did not breed during 1970-1980 bred at Aylesbury during 1984-1992, as listed in the table below:

New breeding species 1984-1992	
Little Grebe	Green Woodpecker
Gadwall	Great Spotted Woodpecker
Sparrowhawk	Meadow Pipit
Pheasant	Grey Wagtail
Lapwing	Lesser Whitethroat
Collared Dove	Blackcap
Cuckoo	Willow Warbler
Little Owl	Long-tailed Tit
Kingfisher	

Table 2. New breeding species at Aylesbury 1984-1992

Seventeen new species bred at Aylesbury during the period after the refurbishment of the wetland irrigation area. It can be seen therefore that despite the loss of four breeding species, overall bird species diversity at the S.F. has increased during the last eleven years. Many of the species to arrive recently are passerines, with only a few wetland species attracted: Little Grebe, Gadwall, Lapwing and Kingfisher. The species composition of the bird community changed slightly with the loss of Snipe and Water Rail which both inhabit aquatic vegetation such as reedbeds. Other species found in reedbeds on the site, like Sedge Warbler and Reed Warbler, have shown a decline in breeding frequency during 1984-1992, possibly associated with the loss of habitat. From a conservation point of view, those species which no longer occur at Aylesbury S.F. are amongst those affected by losses of wetland habitats nationally, although neither Snipe nor Water Rail were numerous at Aylesbury.

2. Individual Species

Using the CBC data for Aylesbury, numbers of breeding pairs were plotted against year for a selection of breeding species, to illustrate the fluctuations in their breeding populations over the period 1970-1992 (Figure 1). These fluctuations can be explained by both local and more widespread factors acting on the populations. National population trends for these species have been plotted using CBC index values (Figure 2) and comparing them with the population trends at Aylesbury gives an indication of whether factors external to the S.F. have influenced breeding numbers. At the same time, discussions of the changes at Aylesbury S.F. and the effects these have had on its breeding birds highlight the local factors at work. These discussions are contained within the references mentioned below and are summarised under the heading 'Additional References'.

a) Chaffinch

The Chaffinch population at Aylesbury has been on the increase since 1984. Before this time the breeding population had fluctuated for a number of years probably as a result of local factors affecting the S.F.. Chaffinches were present at the S.F. in 1975 and 1976 but did not breed and this was ascribed to the cutting back of peripheral hedgerow and scrub on the site with the concomitant loss of nesting sites (Glue and Bodenham 1977). Glue and Bodenham (1985) reported more specifically that the Chaffinch population disappeared in 1975 due to the felling of diseased elms and the loss of nestboxes on these trees. The Chaffinch population started breeding again in 1977 and in 1980 and 1981 it began to rise towards its previous levels. However the population appears to have been depressed by the creation of the new tertiary treatment plant and the resulting drying-out of the irrigation area during 1982-83. Glue and Bodenham (1985) report that Chaffinches were amongst several hedgerow passerine species to be affected by a loss of food supply at this time. The breeding population has since recovered to the extent that it is now larger than that of the early 1970 s.

The national trend for Chaffinch during 1970-1992 is a steady increase. The population at Aylesbury would appear to be broadly following this trend, with some deviations due to local management strategies, as detailed above.

b) Blackbird

The breeding population of Blackbirds at Aylesbury has remained fairly stable over the last twenty-three years, in contrast to the national population which has been experiencing a steady decline. In 1976 the number of breeding Blackbirds at the S.F. increased due to the drying-up of surrounding meadows and the greater abundance of food at the S.F. (Glue and Bodenham 1985). Conversely, the drying-out and re-grading of the irrigation area during 1982-83 caused a drop in the Blackbird population at Aylesbury due to a loss of food supply (Glue and Bodenham 1985). Numbers have since recovered and reached a peak in 1990.

c) Yellow Wagtail

The CBC index for Yellow Wagtail reveals that the national population has fluctuated about the datum level set in 1970, with a large increase in the mid 1970 s. At Aylesbury, the Yellow Wagtail population did not reflect this increase but remained fairly level. It responded to local factors in the form of flooding on the irrigation area in 1980 and 1981 with a rise in breeding numbers (Glue and Bodenham 1985). As the tertiary treatment area dried out in subsequent years the number of Yellow Wagtail territories decreased. As with the national trend, numbers of breeding Yellow Wagtails at Aylesbury rose in 1991 and then fell quite sharply in 1992.

d) Pied Wagtail

Pied Wagtail numbers at Aylesbury show trends that correspond to local factors and also to more widespread factors affecting the UK population. The CBC index of the national population reached a peak in 1975. Like many other species at the S.F. Pied Wagtails

responded to the flood conditions in 1980/81 and the new food sources by increasing their number of territories on the site. This was followed by a decline to their lowest breeding numbers in 1986, and then a recovery which corresponds more or less with the national population trend.

e) Tree Sparrow

The Aylesbury population reflects the national decline in Tree Sparrow numbers, as illustrated by the CBC index values for the last twenty-three years. The sudden increase in territories in 1971 at Aylesbury matches the national picture. At Aylesbury, local factors contributed to the increase because nest boxes were put up over the 1970/71 winter to encourage hole-nesters such as Tree Sparrows (Glue and Bodenham 1974). Since 1986 Tree Sparrows have not bred at Aylesbury and have only been present in three years. Over the same time period the national index has been at an all time low level.

f) Reed Bunting

Trends in breeding numbers of Reed Buntings at Aylesbury have deviated from the national index. At the S.F. their population remained very stable during 1970-1981, whilst in the country as a whole Reed Buntings reached a peak in 1975, began a decline which levelled off in 1982 and the population has remained stable at this new lower level since. At Aylesbury, Reed Buntings were the dominant breeding species in the wet irrigation area (Glue and Bodenham 1977). They reached a peak in 1976 during the drought which affected neighbouring areas, and maintained but did not increase the number of territories when their habitat was flooded in 1980/81 (Glue and Bodenham 1985). The subsequent drying-out of the wet irrigation area had a devastating effect on Reed Buntings and numbers fell to a low of 4 territories in 1984. Since then the breeding population has recovered, although from 1990 to the present it has been declining again.

g) Reed Warbler

Reed Warbler, like Reed Bunting, was one of the dominant breeding species at Aylesbury, being found on the irrigation area. Since 1982, its population has fluctuated considerably and has suffered an overall decline from the numbers of 1975-1982. The national population has been steadily increasing during the last twenty-three years so Reed Warblers at Aylesbury appear to be influenced by local factors. These include the refurbishment of the irrigation area in 1982/83 which resulted in breeding failure of Reed Warblers in 1983 and 1984. They returned in 1985 but failed again in 1986 and 1987. Since then they have bred every year but at a lower level than previously.

h) Sedge Warbler

The UK Sedge Warbler population has shown extreme fluctuations during 1970-1992 and the overall trend has been a gradual decline in numbers. At Aylesbury, Sedge Warblers are one of the most abundant breeding species and their numbers have remained fairly steady despite the national decline. Only in the mid-eighties (1983-1986) did the breeding population at the S.F. crash. Sedge Warblers were present in 1983 but there was no evidence of breeding;

passerine species, Reed Warbler and Reed Bunting, Sedge Warblers were affected by the drainage and re-grading operations on the irrigation area during 1982-83 (Glue and Bodenham 1985). They did not return to breed until 1987. Across the country as a whole Sedge Warblers experienced a drop in breeding numbers at the same time as the Aylesbury population failed to breed. The factors causing this national decline may have exacerbated the effects of the refurbishments at the S.F.. Sedge Warblers are trans-Saharan migrants and suffered high mortality in their winter quarters as a result of drought in the Sahel region of West Africa (Peach *et al* 1991). Since then, Sedge Warblers have bred every year with a peak in 1989 corresponding to a national peak in breeding numbers. Like Reed Bunting and Reed Warbler, the breeding population has decreased in the last season censused (1992).

Additional References

The long-term monitoring of breeding birds at Aylesbury Sewage Farm has led to several publications relating directly to the site or including it as an example in more general studies of sewage works. Most of the literature was published before or during the construction of the new tertiary treatment plant.

Glue and Bodenham (1974) reported on the first three years of Common Birds Census (CBC) work at Aylesbury Sewage Farm (1970-1972). The wet grassland surface irrigation area was found to be ornithologically the most valuable section of the S.F., supporting nine breeding species of which Reed Bunting was the dominant. Other areas important for breeding birds included the peripheral fringe of hedgerow and scrub where Sedge Warblers, Goldfinches and Blackbirds were most abundant amongst the sixteen breeding species, and the buildings, lawns and sludge beds where 13 species bred.

The irrigation area was also important for wintering birds because it froze less readily in cold weather due to the distribution of liquid sewage. Wildfowl and waders were attracted to this area, with peak counts of 120 Mallard, 35 Teal, 32 Snipe and 16 Lapwing. Water Pipit, Jack Snipe, Redshank, Curlew and Water Rail were also passage and winter visitors. Migrant Green Sandpipers and Common Sandpipers used the channels carrying the refined liquid sewage as a feeding site and some over-wintered.

During the period of this study nest-boxes were provided on the site and were utilised by a number of different species, substantially increasing the breeding numbers of hole-nesting species on the S.F.. Tree Sparrows, Great Tits, Blue Tits and Pied Wagtails occupied nest-boxes and bred successfully.

Glue and Bodenham (1977) summarised the trends in the breeding bird community of Aylesbury Sewage Farm between 1970 and 1977. During 1970-1972 31 species of bird bred at the S.F.. Over the next three years an expansion programme at the Works meant that much of the peripheral hedgerow and scrub was cut back and some trees were cut down, removing most of the nest boxes in place at the Works. The result of this was a depletion in the bird community with the loss of breeding species such as Great Tit, Robin and Chaffinch. In 1976, despite the reduction in suitable breeding cover, the breeding densities of several species were the highest ever in seven years of census work. This was ascribed

of several species were the highest ever in seven years of census work. This was ascribed to the effect of the drought on adjacent water meadows and drainage ditches which were baked dry, forcing a greater number of birds to rely upon the S.F. for breeding, feeding and roosting.

In an article for the *Effluent and Water Treatment Journal* **(Fuller and Glue 1981)** the continuing importance of the wetland irrigation area at Aylesbury was discussed. Common Birds Census data for 1978 and 1979, as for 1970-72 (Glue and Bodenham 1974), revealed the dominance of wetland species on this part of the S.F. Wildfowl such as Mallard and Tufted Duck bred, but the highest densities were achieved by small marshland passerines. Reed Warbler, Sedge Warbler and Reed Bunting were found in greater numbers than any other breeding species at the Works with 19, 26 and 40 territories in 1978 and 1979, combined.

The bird community of the irrigation area was compared with that of the scrub and hedge habitat on the S.F.. The latter supported a similar number of breeding species to the irrigation area, but a far higher density of birds. Unlike the species using the irrigation area, few of the scrub birds were localised in distribution; most were species that breed in a wide variety of woodland, scrub and farmland habitats. Thus the irrigation area had great ornithological interest because of the specialised wetland species that it attracted; the scrub was also an important habitat on the S.F. because of the contribution it made to the density and richness of the bird community at the site as a whole.

Glue and Bodenham (1985) reported on the results of their Common Birds Census at Aylesbury S.F. over the fourteen breeding seasons 1970-1983. During this period a total of 47 species bred, with a maximum of 34 in 1981 and a minimum of 19 in 1975. The total number of territories also fluctuated over the period, from 95 in 1970 to 202 in 1981 before declining sharply to 66 in 1983. The composition of the breeding bird community holding these territories changed significantly during 1970-1983 and reasons for these changes are given below.

The erection of nestboxes over the 1970-71 winter encouraged the number of breeding pairs of Tree Sparrows to escalate from 2 to 17 pairs in 1971, the largest breeding population of this species at Aylesbury during 1970-1983. Other hole-nesters such as Great Tits and Blue Tits did not respond so noticeably to the provision of artificial nesting places. The loss of scrub, hedgerow and trees on the other hand had a negative effect on bird populations, with Sedge Warbler and Reed Bunting losing breeding cover as a result of the loss of a storm irrigation area, and the Chaffinch population disappearing in 1975 due to the felling of diseased elms.

The drought of 1976 dried up watermeadows surrounding the S.F. and as a result an increasing number of birds were attracted to the constant water source of the sewage works and used it as a feeding, roosting and breeding site. Sedge Warbler and Reed Bunting reached their highest densities in this year of the 1970-1983 period. Blackbird and Song Thrush also increased, while Tufted Duck and Whinchat held territory for the first time. Conversely, cold winter temperatures during 1978-79 and 1981-82 had an adverse effect on the number of birds at the S.F., affecting in particular Wrens and to a lesser extent Skylarks

and Dunnocks.

In May of 1980 progressive overloading of the irrigation area led to flooding which persisted throughout the autumn and winter. These floodwater conditions benefitted late nesting wetland species such as Tufted Duck and Yellow Wagtail, and later on attracted more waders than previously, including Greenshank, Ruff and Jack Snipe for the first time. The following spring rain increased the flooding to unprecedented levels and a record number of waterfowl utilised this new source of food and nesting sites. Mallard, Tufted Duck, Moorhen and Coot populations were higher then ever before and Little Grebe, Mute Swan and Lapwing bred for the first time. With the change in conditions, Sedge Warbler and Reed Bunting maintained but did not increase their territories. Reed Warbler however increased its number of territories to the highest count for 1970-1983 (13 territories).

As a result of the flooding, major refurbishment of the irrigation area was instigated in 1982. Over the summer of 1982 the grassland dried out and in the autumn the accumulated organic top soil was removed. The following summer the area was bare before being graded and seeded. These major works caused dramatic changes in the breeding bird community. Coot and Tufted Duck failed to breed while Mallard and Moorhen were reduced to two and single pairs respectively in 1983. Sedge and Reed Warbler failed to breed while Reed Buntings had only four territories. Hedgerow passerines such as Dunnock, Blackbird, Chaffinch and Goldfinch also appeared to be affected, presumably by a loss of food supply.

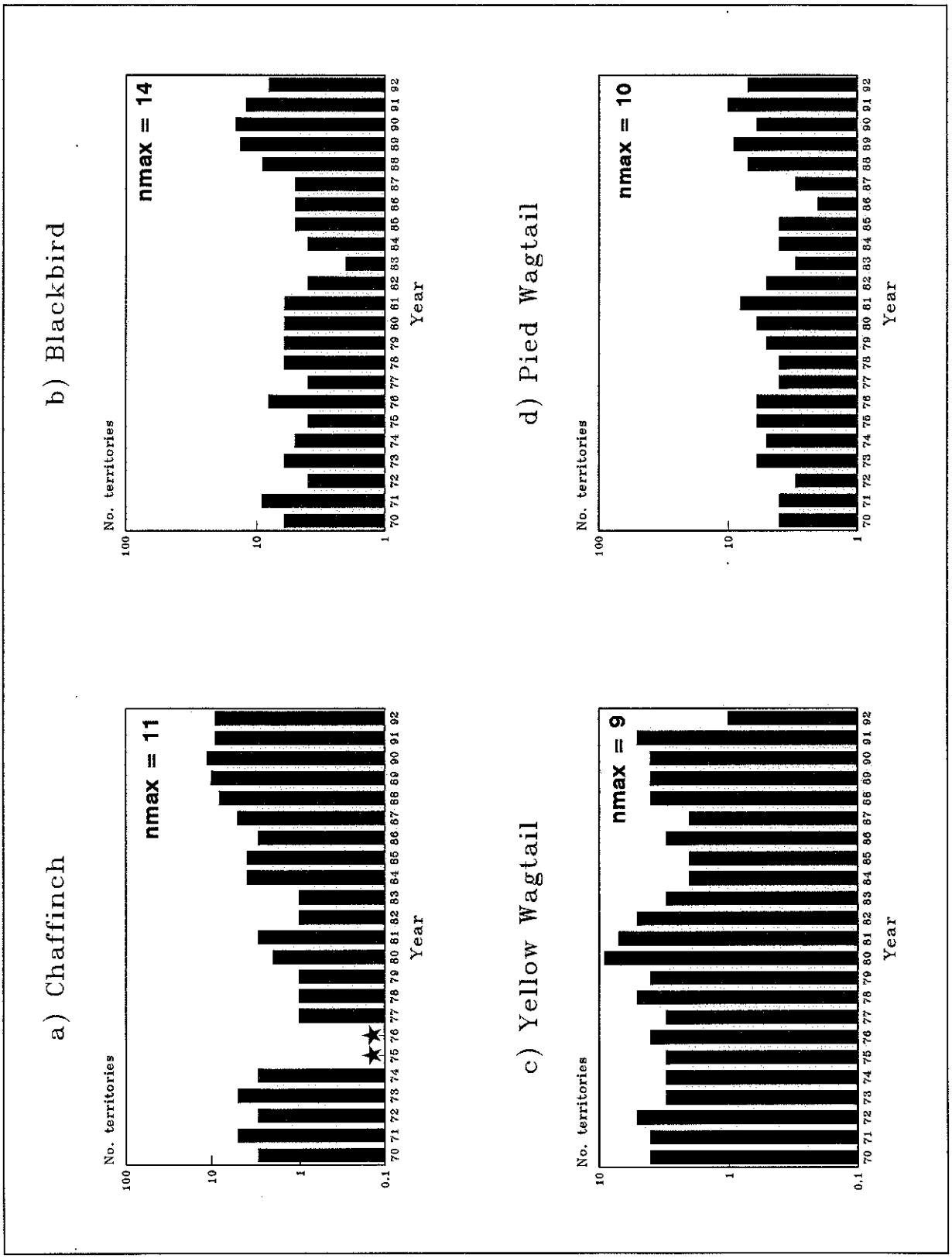

Figure 1 Number of territories (log 10 scale) at Aylesbury Sewage Farm in 1970 to 1992 for (a) Chaffinch, (b) Blackbird, (c) Yellow Wagtail, (d) Pied Wagtail, (e) Tree Sparrow, (f) Reed Bunting, (g) Reed Warbler, (h) Sedge Warbler. nmax is the maximum number of territories recorded in any one year.

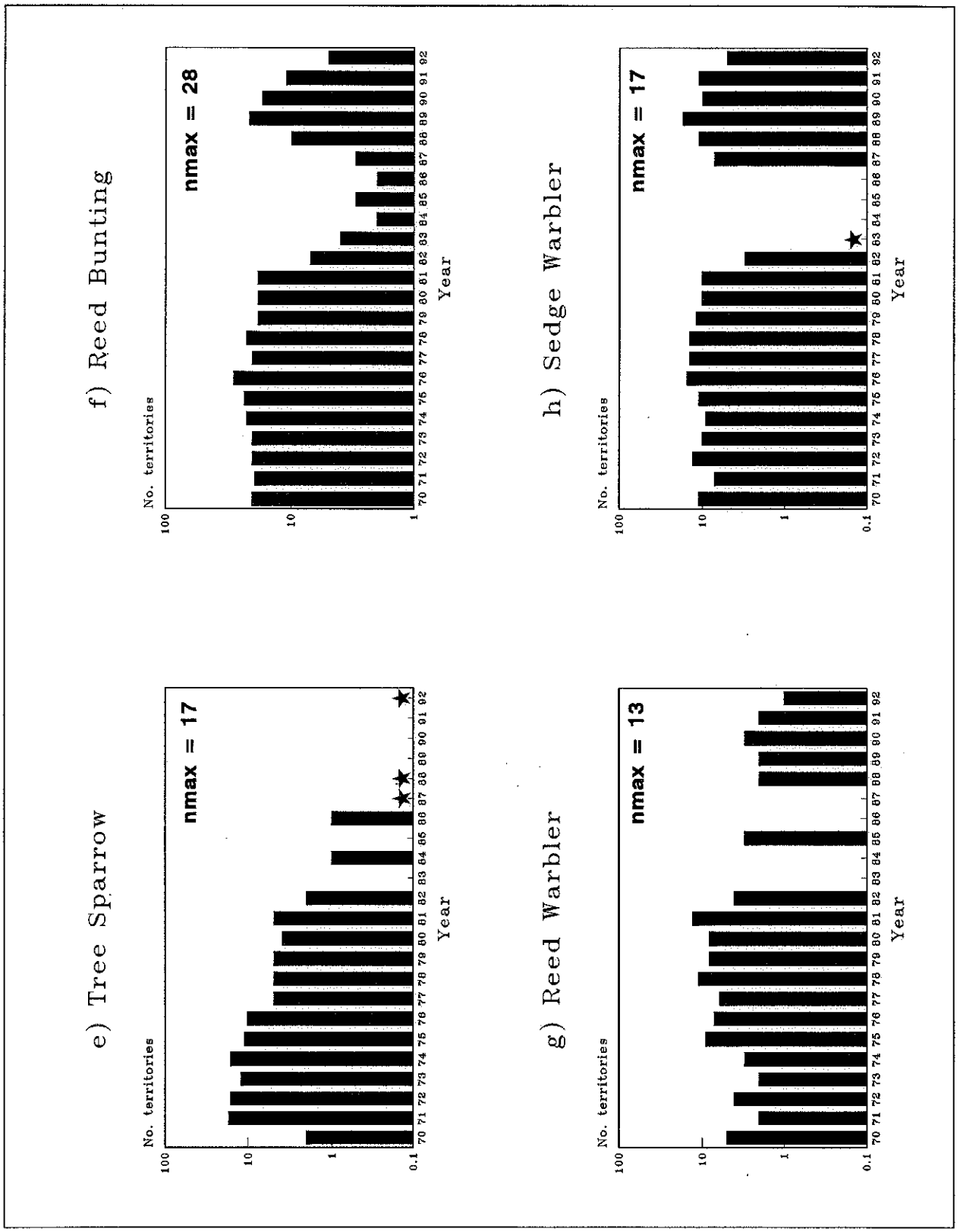

Figure 1 cont. Number of territories (log 10 scale) at Aylesbury Sewage Farm in 1970 to 1992 for (a) Chaffinch, (b) Blackbird, (c) Yellow Wagtail, (d) Pied Wagtail, (e) Tree Sparrow, (f) Reed Bunting, (g) Reed Warbler, (h) Sedge Warbler. nmax is the maximum number of territories recorded in any one year. ★ = species present but not breeding.

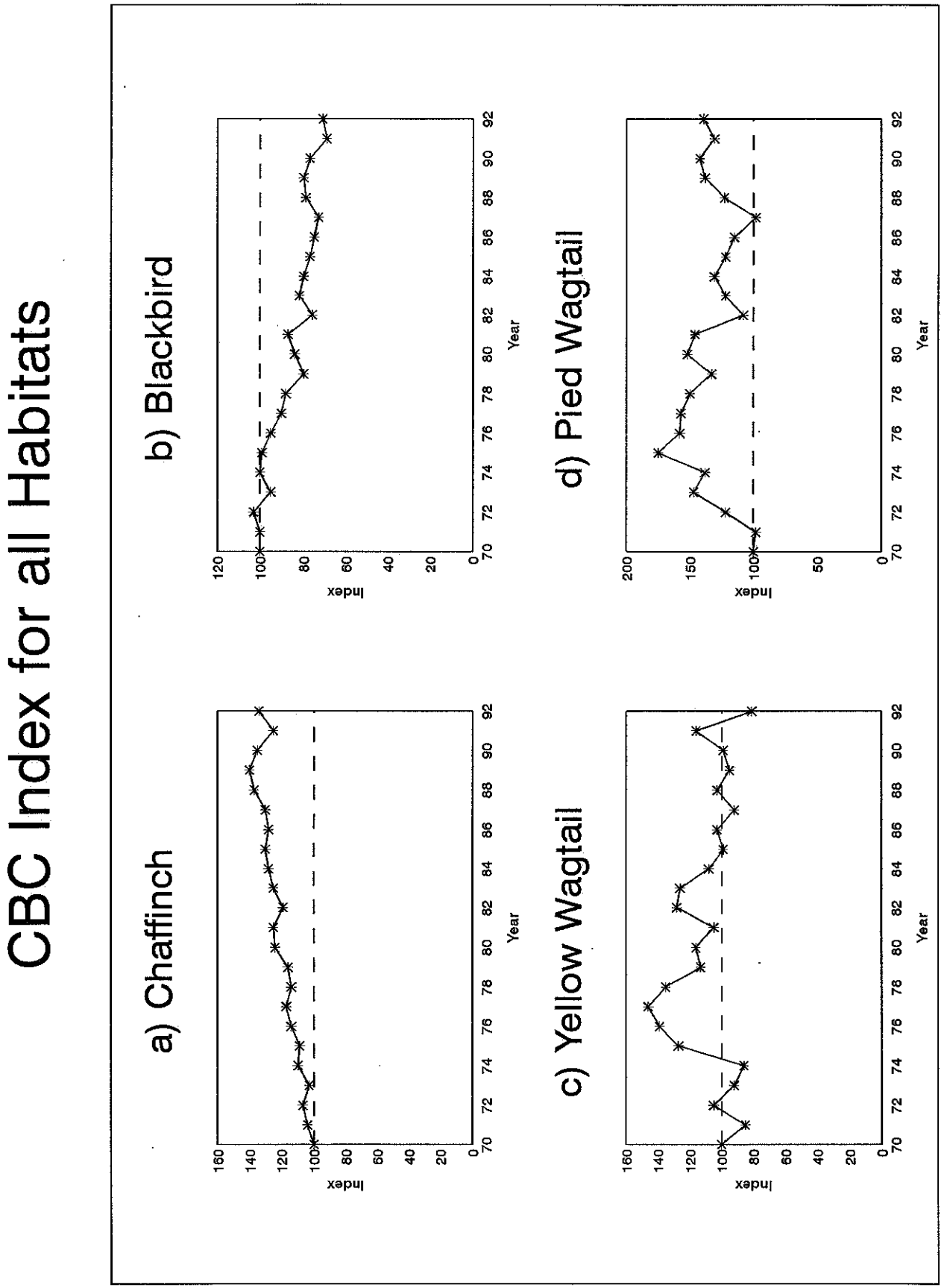

Figure 2 National CBC index of breeding territories in all habitats for 1970 to 1992 for (a) Chaffinch, (b) Blackbird, (c) Yellow Wagtail, (d) Pied Wagtail, (e) Tree Sparrow, (f) Reed Bunting, (g) Reed Warbler, (h) Sedge Warbler.

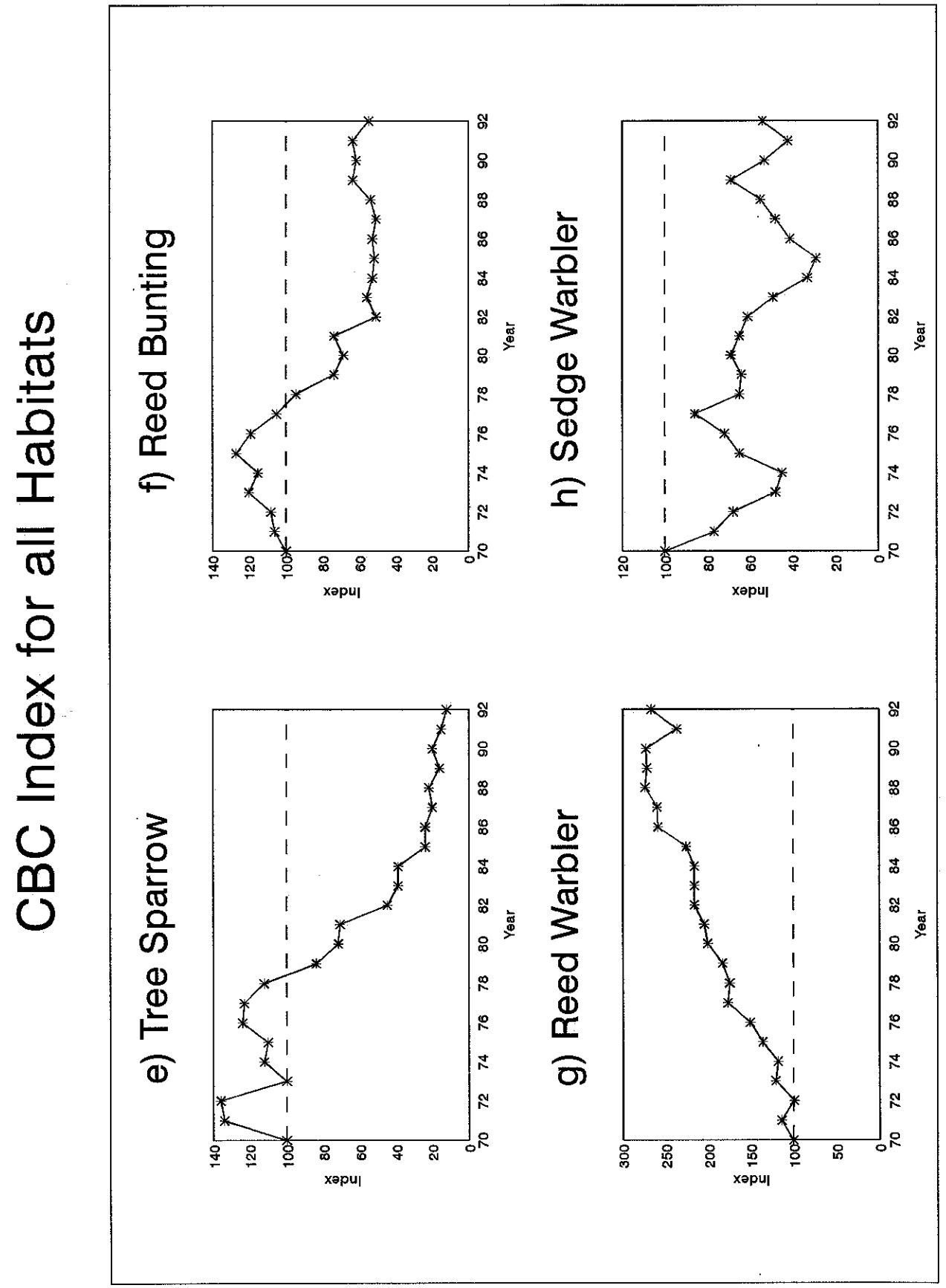

Figure 2 cont. National CBC index of breeding territories in all habitats for 1970 to 1992 for (a) Chaffinch, (b) Blackbird, (c) Yellow Wagtail, (d) Pied Wagtail, (e) Tree Sparrow, (f) Reed Bunting, (g) Reed Warbler, (h) Sedge Warbler.

2. SWINDON

Ornithological Sites Register (OSR)

During the period of the OSR entry (1968-1974) Swindon Sewage Farm contained sludge beds, a storm water marsh, filter beds and some open grassland with remnant hedgerows and a belt of scrub. The entry notes that some trees and hedges had been recently removed, reducing the cover available for passerines.

The main ornithological interest at this time was the waders and warblers that used the Sewage Farm during their migration in spring and autumn. Sedge Warblers, Reed Warblers, Whitethroats and the occasional Aquatic Warbler are recorded as passage visitors. Waders visiting the Sewage Farm on passage included Golden Plover, Green Sandpiper, Ruff and Stone Curlew.

A 'reasonable' number of birds were reported to breed regularly at the Sewage Farm. Breeding species included Yellow Wagtail, Sedge Warbler, Goldfinch, Bullfinch, Reed Bunting and Tree Sparrow. No species bred in very great numbers, perhaps due to the lack of cover.

Ringing

Little ringing has taken place at Swindon S.F., due to the lack of cover for passerines. Sight records of birds using the S.F. were collected between 1953 and 1983. During this period modernisation of the S.F. took place and by the 1970s bird habitat was reduced substantially.

For this report sight record data were provided for a selection of species. Teal, Shoveler and Tufted Duck were all recorded at the S.F.. Teal were present in the greatest numbers during September, with a maximum count of 55 during September 1980, indicating passage to wintering grounds elsewhere. Teal were recorded infrequently during the winter months, and not at all during May to July. There are a few records of Shoveler and Tufted Duck for 1953-1983 as passage and winter visitors. Tufted Ducks were observed to breed in 1979.

Water Rail have been sighted occasionally, usually as single birds. Lapwing flocks were present in the autumn and winter, with a maximum of c.400 observed in August 1968. The only breeding record for Lapwing was of one pair in April 1954. Large numbers of Snipe have been recorded at the S.F., during the autumn and winter, with a maximum of c.100 on November 8th 1970. Snipe have been recorded in every month except May and June.

House Martins were infrequent visitors, as were Fieldfares which were occasionally recorded in large flocks of up to 300 at the S.F. in winter.

Reed Warblers were observed to breed in 1954 and 1955 but their habitat was destroyed in

1956 and there are no breeding records after that. Sedge Warblers also bred in the 1950s and probably up to 1965, but all records since then are from August and September only. Evidence of breeding by Reed Buntings was apparent in 1954-1956; it is thought that approximately 20 pairs bred in 1954. The only record since then is of c.30 in December 1972.

Pied Wagtails were a common visitor at Swindon S.F., though sight records only exist for 1953-1970. They have been recorded all year round apart from May and June. There are sight records of Tree Sparrows at the S.F., mainly from the 1950s and early 1960s. They were observed principally in the winter but there are also some spring and summer records. They have not been observed to breed at the S.F. but may have bred nearby.

3. LUTON

Ornithological Sites Register (OSR)

The entry for Luton Sewage Works (known as East Hyde) in the OSR covers the period 1968-1975. At this time effluent was discharged into the River Lea and three acres of adjacent wasteland were used for sludge-tipping.

The filter beds were the main feeding grounds for birds using the site. Species found at the Sewage Works in winter included 'numerous' Black-headed Gulls, Rooks, Song Thrushes, Mistle Thrushes, Redwings, Meadow Pipits, Pied Wagtails, Chaffinches and House Sparrows. House Martins and Swallows also used the site as a late autumn feeding ground prior to migration. During the breeding season Little Grebe, Kingfisher and Grey Wagtail were among the species that bred here. The site also supported breeding Sedge Warblers and Reed Buntings. The belt of mature trees and scrub along the disused railway line provided a home for passerines such as Tree Sparrows, Yellowhammers, Goldfinches, Whitethroats and Blackcaps.

Ringing

Ringing at the site took place from 1985 to 1990 inclusive, before the works were modernied, and concentrated on Swifts and House Martins. House Martins using the site for feeding, over the clinker beds, came from at least one local breeding colony.

The use of the site by Swifts and hirundines attracted several raptor species, notably Hobby. Reed Warblers have been recorded regularly at the site, at least since 1990. This is the only species ringed at Luton S.F. and not recorded in the OSR entry.

In winter, Meadow Pipts and wagtails, primarily Pied Wagtails, collected on the site, and occasional Corn Buntings are of note. In spite of the small numbers of birds ringed over this period (a total of 233 birds of 28 species), several ringing recoveries were generated, most notably a Meadow Pipit caught in Iceland during autumn migration.

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