



Upper Thames Tributaries Breeding Wader Survey 2005

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Top left: surface water in defunct drain, ©: Nick Droy

Top right: curlew, © RSPB Images

Bottom left: lapwing chick, © Mike Shurmer

Bottom right: snipe, ©: RSPB Images

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1. Summary:

The Upper Thames Tributaries Environmental Sensitive Area (UTTESA) was designated in 1994 and covers an area of 27,700 hectares of valleys of the River Thames and its tributaries the Glyme, Evenlode, Cherwell, Windrush and Ray catchments.

A baseline survey for breeding waders in the UTTESA was carried out in 1994 and a follow up survey was carried out in 1997. This suggested a decline in lapwing, redshank and snipe however, curlew appeared to be more stable (Allwood, 1995). During the 2005 survey, 5171 hectares (19% of the UTTESA) comprising of 61 sites, involving 91 landowners were surveyed. This comprised 75% of the previous survey area in 1994 and 1997. This area was further supplemented by the inclusion of land, which had been entered in to ESA agreements subsequent to 1997.

The survey was conducted using the standard breeding wader survey methodology of O'Brien and Smith (1992). In addition to this, details on land use and habitat were collected, all the data was then quantified and compared to previous survey data.

The following breeding wader populations were found:

Lapwing (<i>Vanellus vanellus</i>)	116 pairs (2.3 prs/km ²)
Common Snipe (<i>Gallinago gallinago</i>)	8 drummers (0.1 prs/km ²)
Common Redshank (<i>Tringa totanus</i>)	29 pairs (0.5 prs/km ²)
Curlew (<i>Numenius arquata</i>)	65 pairs (1.2 prs/km ²)

Lapwing, redshank and curlew populations have increased since 1997 while snipe populations have remained unchanged. However, the increases in lapwing and redshank populations are due to the high numbers of pairs on the RSPB's Otmoor Nature reserve, which accounts for 54 pairs (40%) and 24 pairs (82%) respectively and does not represent the entire UTTESA. Only curlew have increased uniformly across all the catchments.

Breeding lapwings occurred in the highest densities on the Otmoor basin and Thames floodplain. However, 80% of lapwings occur on four sites in the UTTESA, suggesting high levels of aggregation. Lapwings occurred on fewer sites than in 1997 and densities have changed little since 1994 despite the dramatic increase in birds on the Otmoor basin.

Redshank are now largely confined to the Otmoor basin with no successful breeding records outside of it. Through comparing data with the previous surveys, there is a strong association between redshank and fields with shallow pools that are grazed cattle, which has decreased since 1994.

While snipe numbers have not changed since 1997, they have become locally extinct as a breeding species in a further two catchments. The lack of suitable rough grassland and soils that remain damp and soft enough for snipe to probe during the breeding season outside the Otmoor basin is a major limiting factor.

Curlew occurred in important concentrations on the Thames floodplain, the Otmoor basin and the Upper Ray floodplain. The increase in fields cut for hay appears to have benefited curlew while the stock exclusion supplement and delaying when fields may be cut may have increased the opportunities of breeding success.

The Otmoor basin accounts for 66% of all the breeding redshank, snipe and lapwing. Redshank and snipe are now successfully breeding exclusively in this area. This has resulted in these three species all

experiencing high levels of aggregation, which could make them more vulnerable to the potential threats of climate change, land-use change and low productivity.

Apart from the Otmoor basin, all of the other geographical areas were unable to maintain sufficient water levels on site to create optimal habitat for breeding waders except curlew. The Thames floodplain, which has traditionally supported high number of breeding waders, is starting to decline in density, despite an increase in the curlew population. However, the Thames remains a very important catchment for breeding waders, which requires more proactive management to ensure more waders are not lost. Elsewhere in the UTTESA breeding waders were restricted to a few remaining fragmented areas of suitable habitat.

The effective drainage across much of the UTTESA was demonstrated by a 45% reduction of the area of 'wet' fields and standing water between the first two visits. This, together with the intensive management of a large proportion of grassland in the survey area, remains the largest limiting factor to all the wader species, particularly snipe and redshank in the UTTESA.

The UTTESA has had a limited impact on the population and distribution of breeding waders, due to varying uptake. Land in the higher tiers (tier 2 - wet grassland management and tier 3b - arable reversion to wet grassland) has been able to support waders at high densities. However, these two tiers remain the tiers with the lowest uptake in the UTTESA.

This survey has highlighted the value of regular, long term and site specific support for farmers managing their land for breeding waders. Without such support, the complex management required for breeding waders is often difficult to implement and sustain. With the advent of the Higher Level Stewardship scheme, there are increasing opportunities for wader conservation, however these need to be carefully targeted to ensure the greatest opportunities for success. Through the results, six key areas have been identified as an initial focus for targeted action for wader conservation.

1. Introduction

The Upper Thames Tributaries Environmentally Sensitive Area (UTTESA) was designated in March 1994 and covers 27,700 ha of the River Thames and its tributaries the Windrush, Glyme, Cherwell, Evenlode and Ray.

A baseline survey of breeding waders was carried out in April - June of 1994, covering 42 sites totalling 3,096.4 ha (approximately 11% of the UTTESA). The follow up survey was conducted in 1997 and covered 44 sites comprising of a total area of 3092.1ha. The survey was conducted on a field-by-field basis.

During these surveys, small populations of curlew, snipe, redshank and lapwing were found, however all occurring at a relatively low density, below former levels and potential capacity. The 1997 survey results showed a disturbing trend as waders experienced a further decline.

A repeat survey of all baseline and 1997 sites plus additional areas was conducted in April - June of 2005, using the standard methodology, as in the previous surveys. The survey covered an area of 5177ha (19% of the UTTESA).

1.1 The Upper Thames Tributaries Environmentally Sensitive Area

The Environmentally Sensitive Areas (ESA) scheme was launched in 1987, and currently occupies 10% of agricultural land in England. The UTTESA was designated in 1994 because of its river valley grasslands and other valuable wetland areas. These areas are important for their rare and scarce plant species, and rich invertebrate fauna as well as providing a valuable habitat for many wintering and breeding wildfowl and wading birds.

The river valleys radiate westwards, northwards and to the northeast of Oxford. The UTTESA is contained largely within Oxfordshire with extensions into Buckinghamshire, Northamptonshire and Gloucestershire (see appendix 1). Although there is considerable variety within the landscape of the Upper Thames Tributaries ESA, the geography of the area is one of mainly narrow river valleys containing a patchwork of hedged fields all set within an open rolling landscape. The main exceptions to this are the Thames and the Ray valleys, the latter including the wide flat area of Otmoor. These two valleys have open floodplains defined by distant hills.

The neutral grasslands of the river valleys were traditionally used for summer grazing and hay production with extensive flooding naturally fertilising the land in winter. In recent decades, however, increasingly efficient drainage has led to intensification of farming practices allowing conversion of grassland to arable, and grassland improvement for sheep pasturing, dairying and silage production. The loss of lowland wet grassland and its associated wildlife has been thoroughly documented over the last fifteen years, eg Williams *et al* (1988), Housden *et al* (1991). The remaining areas of unimproved extensively managed lowland wet grassland are therefore of considerable botanical and ornithological significance and may function as refuge from which species are able to spread into similar habitat in the future, should it become available.

1.1.1 The principle objectives of the Upper Thames Tributaries Environmental Sensitive Area

“To maintain and enhance the distinctive landscape character of the river valleys and associated nature conservation interest and historical resources by encouraging the sensitive management of the grassland and surrounding features.”

In the UTTESA, there are five main tiers; the specific objectives of these are:

“To maintain, enhance and extend the nature conservation interest of the extensively managed river valley grassland by encouraging appropriate management and increasing the grassland area through arable reversion.”

Tier 1A agreements specify a permanent grassland management regime with restrictions on both grazing and the use of fertilisers and herbicides. There is an unfertilised headland supplement available to protect and enhance species rich areas adjacent to hedges and watercourses. The maintenance of existing water levels is required through the selective maintenance of mole drains.

Tier 1B agreements specify an extensive permanent grassland management regime with, in addition to Tier 1A prescriptions, additional restrictions on stocking rates, cutting dates for hay and silage and the prohibition of fertilisers apart from farmyard manure. Stock exclusion and hay making supplements are available in spring, with the aim of improving the nesting success of breeding waders, particularly curlew.

Tier 2 agreements specify a wet grassland management regime, which in addition to Tier 1 prescriptions requires maintenance of ditch, and watercourse levels at not more than 30cm below mean field level. Stocking rates are further restricted during early spring and all use of fertiliser is prohibited. Since 1999, a new conservation plan item promotes the establishment of shallow scrapes to provide improved feeding areas for wetland birds as well as grassland management plans for grazing, mowing and water level management.

Tier 3A agreements allow for the reversion of arable land to extensive permanent grassland permitting the operation of Tier 1 and subsequent Tiers. This prescription specifies establishment of a permanent grass sward within seven months and during this time prohibits use of fertiliser, herbicide and insecticide etc. After this period all remaining Tier1A and all Tier 1B prescriptions must be observed.

Tier 3B agreements allow for the reversion of arable land to wet grassland. Management prescriptions are as for Tier 3A with addition of all Tier 2 prescriptions after the first seven months of the agreement.

In addition, Conservation Plan Capital Works available under the scheme include restoration of ponds, ditches, hedges, fen habitats and reed beds and provision of bunds, sluices and other works to control water levels.

The area of land occupied by each tier is reflected in table 1.

Table 1: Area of land under tiers in hectares

	Tier 1	Tier 2	Tier 3	Total
1994	2463	355	307	3125
1997	4162	381	572	5115
2005	6639	408	2775	7842

1.2 Key Species

Britain and Ireland support significant breeding populations of wader species, commonly associated with lowland wet grassland. The first systematic survey of breeding waders on lowland wet grassland was carried out in 1982 (Smith, 1983). Wilson *et al* (2003) stated that the majority of surveys of breeding waders in England, Wales or the UK as a whole have documented declines in the last 10 to 20 years for Lapwing, Snipe, Curlew and Redshank

Lapwing (*Vanellus vanellus*), Curlew (*Numenius arquata*), Snipe (*Gallinago gallinago*) and Redshank (*Tringa tetanus*) are all regarded as declining by BirdLife International 2004 and are all amber listed by the Birds of Conservation Concern (Gregory *et al.* 2002).

The results of the Breeding Waders of Wet Meadows Survey 2002 (BWWMS) demonstrated alarming declines in numbers and site occupancy for most of the waders in most regions of England and Wales between 1982 and 2002 as stated by Wilson *et al* (2003). Lapwing and redshank populations decreased in all nine government regions, while Snipe and Curlew decreased in eight out of nine, the exceptions in both

cases being increases in very small populations by a single pair (Snipe in Wales, Curlew in East Midlands). Overall, Lapwing numbers declined significantly by 36.8% between 1982 and 2002, Snipe by 61.8%, Curlew by 38.9% and Redshank by 28.7%, with the most marked declines in the west, especially in Wales and West Midlands.

Lowland wet grassland is described as a key habitat for breeding waders by Ausden and Hirons (2001), who go on to suggest that declines in numbers of breeding lapwings, redshank and snipe on lowland wet grassland have been associated with land drainage and other forms of agricultural intensification. The UTTESA identifies these waders as indicator species of wet grassland management, as stated by the Wader Study Group (2003), 'Waders with their range of specialised feeding and migration ecologies, are sensitive indicators of change in their environment. The task to ensure the favourable conservation status of waders is inseparable from that of ensuring the conservation and wise use of their wetlands and other habitats.' Increases in wader populations have been related to management involving the raising of water levels and increasing areas of flooding as part of management of nature reserves and other key sites, as described further in this report.

For the first time, surveyors were also asked to note the presence or absence of a number of priority farmland birds (see appendix 6). These species were chosen due to their status as species of conservation concern (Gregory *et al* 2001) and form part of a suite of priority farmland birds for RSPB conservation action. Whilst this method is not the standard method used for estimating breeding pairs of such widespread species, this type of data can provide useful figures to benchmark an index of the population, from which comparisons can be made with future data gathered in a similar method (S Wooten, *pers comms*).

1.2.1 Northern Lapwing, *Vanellus vanellus*

Lapwing are currently classified by the IUCN as vulnerable due to the recent declines in their populations across Europe, which represents 50% of its total population. (BirdLife 2005)

The current estimated breeding population for the UK is 137,00 – 174,000 as stated by BirdLife (2004). Wilson *et al* (2005) established that overall, Lapwing numbers declined across England and Wales significantly by 36.8% between 1982 and 2002. In the UTTESA, the population declined from 69 breeding pairs in 1994, to 45.5 in 1997, at a rate of decline of 34.1% Allwood (1997).

1.2.2 Common Redshank, *Tringa totanus*

In Europe, the common redshank's status is referred to as moderate continuing to decline. (BirdLife 2005) The UK breeding population is currently estimated as 31,400 – 44,400 breeding pairs, which Wilson *et al* (2005) describes as having declined by 28.4% since 1982. Allwood (1997) described the UTTESA population as having declined by 46.2% from 19.5 pairs in 1994 to 10.5 pairs in 1997 (46.15%), which is a slightly higher rate of decline than the national rate.

1.2.3 Common Snipe, *Gallinago gallinago*

Snipe have recently suffered moderate declines (>10%) across the whole of Europe as suggested by BirdLife (2005). The UK estimated population is 60,000 breeding pairs, which are declining on wet grasslands at a rate of 61.8% - the highest rate of all wader species in the 2002 BWWM survey (Wilson *et al*, 2004). However, he goes on to state that for the South East government region (which the UTTESA is part of), snipe are declining at a rate of 90.5% indicating that this region faces a crisis in the snipe population. 'The dramatic declines in snipe are of particular concern because, as this species nests predominantly in wet pastures, marshes, bogs and fens (Mason & Macdonald 1976), lowland wet grasslands support a significant proportion of the breeding population, especially in lowland England and Wales.' (Wilson *et al*, 2003)

Allwood (1997) describes the snipe population in UTTESA as having declined from 23 drumming males in 1994 to eight in 1997, which is a decline of 65.22%, higher than the national figure.

1.2.4 Eurasian Curlew, *Numenius arquata*

BirdLife International (2005) describes the curlew as declining across Europe and the United Kingdom's curlew population of 99,500 – 125,000 is acknowledged to be of international importance. Recent studies suggest that it has declined by 10% across Europe and the BWWM survey describes the national decline rate of 38.9% (Wilson *et al* 2005). While Allwood (1997) describes the UTTESA's curlew population to be declining by 34.8%, from 23 pairs in 1994 to 15 pairs in 1997, lower than the national decline.

1.3 Previous survey data:

Previous breeding wader surveys within the UTTESA include the baseline survey carried out by Weaver (1994) for the RSPB and later the follow up by Allwood (1997) by the RSPB, in co-operation with FRCA. Prior to establishment of the UTTESA, the Breeding Waders of Wet Meadows Survey, organised by the BTO (British Trust for Ornithology) was carried out during 1982 (Smith 1983), as a partial re-survey in 1989 with a full re-survey repeated in 2002.

The 1982 survey, which encompassed a portion of the UTTESA, found all four species of wader present at low density. Snipe and redshank in the UTTESA were found to be dependant on the presence of wet or damp areas of pasture as a food resource, a finding confirmed in subsequent surveys. Also noted was the fact that lapwings were exhibiting a tendency towards nesting on cultivated farmland. Concern was expressed about future losses of habitat and the subsequent impact on breeding wader populations.

Weaver (1994) again found small populations of all four species at low densities, but comparable with other population estimates of lowland wet grassland at the time. As expected, snipe and redshank were only recorded at sites with areas of permanent or temporary surface wetness. The majority of lapwings were found on spring tillage, whilst curlew, although not restricted to wet conditions were at their highest densities where fields remained surface water or damp throughout the survey period.

The follow up survey carried out by Allwood (1997) found that all four species had further declined in numbers and population density since the establishment of the UTTESA.

The most pronounced changes occurred in the Thames valley catchment, which in 1997 held 24 pairs of breeding waders compared with 57 pairs in 1994. The only geographically distinct area that held a sizeable stable population of breeding waders was the Otmoor basin, which experienced small increases in lapwing and redshank. The Otmoor basin possessed all but two of the breeding snipe records with six pairs present in 1997. Despite this, snipe numbers were still down markedly at Otmoor and concerns were raised that the species could be lost as a breeding bird in the near future, if the decline in population continued.

In 2002, a full repeat of the 1982 Breeding Waders of Wet Meadows Survey was organised by BTO (Wilson *et al* 2005). This survey covered a relatively small area (9%) of the UTTESA and did not coincide with the RSPB 1994 and 1997 survey areas, however it suggested a further decline in waders, as no redshank or snipe were recorded outside Otmoor. This highlighted the need for a further, more detailed survey, to provide a more conclusive assessment of the breeding wader population in the UTTESA. This subsequently led to the repeat survey being conducted in 2005. Since the 1997 survey, the method for estimating curlew numbers has been adapted. However, previous survey data was re-analysed to ensure that the data was comparable to 2005 results, and demonstrated that there were no significant changes in previous population estimates.

1.4 The aims of the Upper Thames Tributaries Wader Project

The objectives for the 2005 breeding wader survey are as follows:

- To assess the current breeding wader population and compare with previous surveys.
- To evaluate the success of the UTTESA in providing habitat for breeding waders and increasing wader numbers.

- To trial and evaluate novel approaches to the use of landowners and/or volunteers to monitor breeding wader populations and habitat condition, assessing
 - Cost effectiveness
 - Value of involving volunteers
 - Time requirements
 - Practicality
- To identify key wader sites within the UTTESA for targeted action
- To assist DEFRA RDS in the provision of advice to agreement holders at key sites and failing sites.



Wilkinson

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2. Survey sites:

2.1 Site selection:

During the 2005 survey 5171.84 hectares, comprising of 61 sites were surveyed. These included 75% of the previously surveyed area in 1994 and 1997. This area was further supplemented by the inclusion of land, which had subsequent to 1997 entered in to UTTESA agreements.

Of these additional sites, 17 sites had UTTESA agreements, others were added at the request of landowners, and many sites had increased survey coverage.

Whilst the largest proportion of sites (97%) were grassland, a small number of sites also included arable land and set-aside along with small areas of fen, unmanaged land and gravel extraction works.

As in the 1994 baseline, and 1997 survey, all sites were allocated an identification code based on an A3 sized area of the appropriate OS 1:25000 Pathfinder sheet (Appendix 1) together with the initial letter of the site name. These codes were retained for the 2005 survey. In addition to this, the sites were all mapped onto the RSPB's GIS package, Merlin, and a grid reference was given to each site.

2.2 Survey coverage and access:

Permission for access onto private land was sought in advance of the survey period through a joint letter by DEFRA and the RSPB to the individual landowners. Landowners who did not reply were contacted by telephone. Nine sites were not resurveyed either due to landowners declining to allow access or changes in ownership which prevented contact with current owners.

Once sites were allocated, the surveyors telephoned the landowner to organise a pre-survey visit to complete health and safety checks and plan the survey route.

3. Methodology:

3.1 Preparation and fieldwork:

RSPB volunteers and staff surveyed the sites. Prior to the survey, the landowners themselves, local ornithological societies, local RSPB groups and the public were approached to participate. Volunteers attended an evening theoretical and a morning practical training session on how to conduct breeding wader surveys. They also received an information pack, detailing the methodology and providing examples of completed survey information. Data were recorded on a recording form as well as on a large-scale map of the site showing the boundaries of the recording area, which were provided to the surveyors prior to the survey start date.

Data collection methods were consistent with earlier surveys conducted in the area using the O'Brien and Smith (1992) methodology; this is the standard methodology for surveying waders in inland wet grasslands (Gilbert *et al.* 1998).

Three morning visits were made to each site between the 15th of April and the 19th June with at least two weeks between visits as listed below.

Visit one - 15 April and 30 April

Visit two - 1 May and 21 May

Visit three - 22 May and 19 June

Observers were asked to complete the survey within the first three hours of dawn or dusk were possible and to avoid adverse weather conditions of rain and moderate to high wind. Sites were surveyed using a whole area, field-by-field search method, which involved walking to within 100 metres of all points within the survey area.

3.2 Analysis of data:

All data from the recording sheets were entered into Microsoft Access and Excel for further analysis. Each site had a summary sheet of the information, which was filed by site code.

Birds nesting habitat can be affected by seasonal or annual variation in weather conditions. It is useful to take account of the meteorological data when interpreting these results. Therefore, data have been compared with both 1994 and 1997 data, as 1994 was meteorologically more like 2005 than 1997, which was a comparably drier period due to the below average rainfall in 1996 as recorded by the Meteorological Office's Oxford weather station (see appendix 2). The data set now spans a ten-year period allowing for a more detailed understanding of the breeding wader population trends to be formed.

3.2.1 Interpreting wader numbers:

As in previous surveys, observers were asked to estimate the number of pairs present and the total number of individual birds. A pair was defined as paired birds, displaying/singing individuals, nest, broods or other single birds not in flocks. The estimated number of pairs of each wader species at each site was calculated as follows:

Lapwing: - the total number of non-flocking individuals was recorded for each field. From this, the maximum number of individuals per site between mid April and late May was divided by two, to estimate the total number of pairs.

Snipe – the total number of drumming or chipping birds in each field was reported, with the maximum over the three visits as the number of pairs. However, if no snipe were recorded in May then the figure should not be recorded.

Curlew – the total number of individuals (excluding birds in flocks) in each field on each visit. Transform the mean number of individuals (excluding birds in apparent flocks) counted over three visits at each site using the formula $(\text{mean count} \times 0.71) + 0.1$ to give the estimated pairs per site. However, if no curlew were recorded then the figure is zero and not 0.1. (Grant *et al.* 2000)

Redshank – the total number of birds seen in each field on each visit. Report the mean number of birds on the site on all visits.

Where methods of estimating breeding pairs have been adapted, previous years data were reanalysed to ensure that the results were the same, however the change in number was not significant. The curlew method changed from the previous BTO standard methodology to the current Grant *et al* method, which is the present standard methodology.

Habitat composition

The surveyors made estimates of land use in each field, which was later, confirmed by the farmer. Areas of hay, silage, rough grassland or semi improved grassland; arable land and other land use types were estimated in both surveys. The categories corresponded to those used for previous surveys and the BWWM surveys. Areas were calculated in hectares using Merlin and compared using percentage of area in proportion to previous data.

Evidence of livestock, sward height, and surface wetness and ditch levels were also collected, to gain an insight into conditions at the site.

Sward height was recorded excluding the height of inflorescence and seeds using 10cm intervals for each field, during each visit. An estimation of extent of tussocky vegetation in each visit was also recorded. Tussocky vegetation comprised of Rushes (*Juncus spp.*) and sedges (*Carex spp.*) and tussock forming grass species. Ditch levels were measured in 30 cm gradations from field surface level.

3.3 Volunteer participation:

Volunteer feedback following participation was measured using a questionnaire, which was circulated amongst all participants (see appendix 4). The project officer also used a semi structured interviewing technique to interview volunteers during site visits and at the thank you event.

3.4 Farmer perceptions:

Farmers were selected using a random stratified sampling method for a telephone interview after the survey and during follow-up visits. The survey consisted of some structured and some semi structured questions in a questionnaire. Most interviews lasted between 10 – 20 minutes.

4. Results:

4.1 Presentation and analysis of results

The results of the 60 sites surveyed are summarised by river valley. Individual site results are in appendix 5. The Otmoor basin has been included as a separate geographical unit due to its particular importance. These tables detail three main aspects of the survey – breeding wader population and distribution, land–use and management and habitat features of importance to breeding waders. The results also compare the 2005 survey with previous survey data from 1994 and 1997.

Figures showing the distribution of the breeding waders within the UTTESA are also included and several aspects of fieldwork are presented in pictorial form. The performance of individual sites is also assessed by means of an index and this is extended to populations of breeding waders within the survey area as a whole. All areas are in hectares unless otherwise stated.



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Table 2 Summary of breeding waders across catchments

River Catchment	Area (Ha)	Total %	Lapwing		Snipe		Redshank		Curlew		Total waders	
			No. pairs	Prs/km ²	No. pairs	Prs/km ²	No. pairs	Prs/km ²	No. pairs	Prs/km ²	No. pairs	Prs/km ²
Cherwell catchment	702.65	14%	3.00	0.43	0.00	0	0	0	6.89	0.98	9.89	1.37
Evenlode catchment	26.90	1%	0	0	0	0	0	0	0	0	0	0
Glyme catchment	118.60	2%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Otmoor Basin	1008.02	19%	68.00	6.75	8.00	0.79	26.00	2.58	19.63	1.95	121.63	12.07
Upper Ray Basin	959.21	19%	7.50	0.67	0.00	0	0.00	0	12.92	1.16	20.42	1.83
Thames catchment	1997.92	39%	35.00	1.84	0.00	0	2.33	0.12	24.43	1.22	61.76	3.24
Windrush catchment	358.51	7%	3.00	0.86	0.00	0.00	0.66	0.19	1.28	0.37	4.94	1.42
Total:	5171.81	100%	116.50	2.25	8.00	0.15	29	0.56	65.15	1.26	218.64	4.23

Table 3 Summary of land use in catchments

Catchments	Total area		Grassland							ESA				Tussocks (ha)	Arable land						
	Area (ha)	%	Total	RG	SG	IG	CH	CS	SA	Tier 3b	Tier 2	Tier 1b	Tier 1a		Total	SC	SR	AC	AR	B	RC
Cherwell	702.65	14%	559.19	133.63	185.62	79.30	120.02	0	48.30	5.50	0.80	179.86	153.42	11.97	8.09	8.09	0	0	0	0	0
Evenlode	26.90	1%	27.02	23.57	3.45	0	0	0	0	0	1.64	19.43	0	0.68	0	0	0	0	0	0	0
Glyme	118.60	2%	32.14	0	32.14	0	0	0	0	0	0	12.40	13.07	0.00	57.37	27.83	0	21.57	7.97	0	0
Otmoor	1008.02	19%	1008.02	650.57	27.59	0	270.97	0	58.89	339.63	165.75	83.53	21.92	63.13	0	0	0	0	0	0	0
Upper Ray	959.21	19%	872.32	124.03	315.79	57.67	140.25	0	13.50	84.78	0.00	203.74	149.05	32.40	64.16	0	0	32.15	29.41	0	0
Thames	1997.91	39%	1695.88	100.87	711.10	223.03	205.67	129.23	286.95	391.38	54.01	274.18	236.60	92.01	197.08	83.39	0	71.35	0.00	42.36	0
Windrush	358.51	7%	358.51	179.66	68.24	22.02	79.71	15.50	0	61.40	40.68	86.81	20.04	46.60	0	0	0	0	0	0	0
Total	5171.81	100	4553.07	1212.33	1343.93	382.03	816.62	144.73	407.64	882.68	262.87	859.96	594.10	246.79	326.69	119.31	0	125.06	37.38	42.36	0

RG - rough grassland, SG - semi improved grassland, IG - improved grassland, CH - hay cut, CS - silage cut, SA - set aside, SC - spring crop, AC - autumn crop, AR - autumn rape, B - bare ground,

Table 4 Summary of habitat features

Catchments	Tussocky veg		Wet Fields						Standing water					
	Area	%	Visit1		Visit 2		Visit 3		Visit1		Visit 2		Visit 3	
			Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
Cherwell	11.97	0.26	43.64	0.96	7.52	0.17	7.52	0.17	1.89	0.04	0.75	0.02	0.75	0.02
Evenlode	0.68	0.01	5.02	0.11	5.02	0.11	18.03	0.40	0.05	0.00	0.05	0.00	3.31	0.07
Glyme	0.00	0.00	30.75	0.68	30.75	0.68	0.00	0.00	3.75	0.08	3.75	0.08	0.00	0.00
Otmoor	63.13	1.39	757.26	16.63	741.58	16.29	224.28	4.93	133.97	2.94	97.85	2.15	71.76	1.58
Upper Ray	32.40	0.71	412.67	9.06	78.47	1.72	8.74	0.19	115.79	2.54	25.56	0.56	4.22	0.09
Thames	91.98	2.02	345.75	7.59	82.64	1.82	40.68	0.89	82.41	1.81	66.32	1.46	43.59	0.96
Windrush	46.60	1.02	146.66	3.22	38.97	0.86	11.61	0.25	8.88	0.20	1.78	0.04	1.55	0.03
Total	246.76	5.42	1741.76	38.25	984.95	21.63	310.85	6.83	346.74	7.62	196.05	4.31	125.17	2.75

4.2 Wader Distribution:

Waders were recorded on five of the seven catchments namely: the Thames, Windrush, Cherwell, Upper Ray and the Otmoor basin. Of these, the Otmoor basin held the majority of breeding waders (58% of the total wader population) and highlights the increasing aggregation of waders on to this core site. This is a trend, which appears to be increasing with time as snipe are now confined to the Otmoor basin, as are the only records of nesting redshank.

Only lapwing and curlew occurred on all of the five catchments as reflected in table 2. Snipe have become lost as a breeding species on the Windrush and the Cherwell catchments since 1997. Redshank occur on three catchments namely the Otmoor basin, the Thames and the Windrush, but are not known to have successfully bred outside the Otmoor basin.

4.2.1 Lapwing

Lapwing are the most numerous wader in the survey area. However, 80% of the population is limited to just four sites. Otmoor supports 68 breeding pairs (58% of the total population) and only one other site (Northmoor on the river Thames) contains more than ten breeding pairs. In total an estimated 116.5 breeding pairs were recorded at an overall density of 2.25 pairs / km². Out of the 61 sites surveyed, 16 sites contained breeding lapwing (26%).

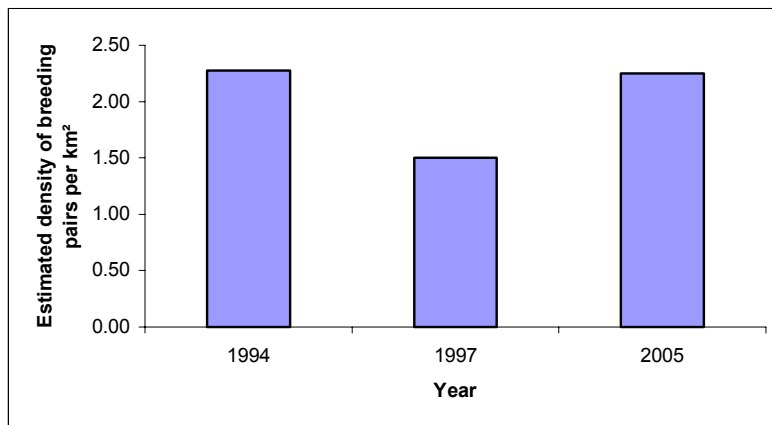
Eleven of these sites were in the Thames catchment, however the greatest concentrations occurred in the Otmoor basin. Away from this, the second largest population on a single site was recorded at Northmoor on the Thames, which held 13 pairs. The Thames catchment held the second highest population, with an estimated 35 breeding pairs, while the other catchments had smaller populations: Cherwell 3 pairs, the Upper Ray 5.5 pairs and the Windrush 3 pairs.

Whilst the lapwing densities have increased since 1997 (1.5pairs/km²), they have not changed significantly since 1994 (2.28 pairs/km²). The lapwing population density is currently still below the national estimated density of 3.57 (Wilson *et al*, 2005).

Although lapwing populations appear to be returning to the baseline survey level, this is due to the increase in the population at the RSPB's Otmoor Nature reserve, where numbers have increased significantly since 1997 (from 25 pairs to 68, an increase of 172%).

Table 5 All sites with breeding lapwing

No.	Site name	Catchment	Area	Est. breeding pairs	Density
1	New Bridge	Windrush	44.68	1	2.24
2	Kelmscot	Thames	242.00	1	0.41
3	Chimney Meadows	Thames	208.40	0.5	0.24
4	Shifford (South)	Thames	137.10	5	3.65
5	Standlake Common	Thames	2.50	2.5	100.00
6	Tadpole Bridge	Thames	100.17	3	2.99
7	Farmoor	Thames	13.61	2	14.70
8	Broad Bridges	Thames	23.94	0.5	2.09
9	Minster Lovell	Windrush	72.95	2	2.74
10	Northmoor	Thames	97.10	13	13.39
11	Hinksey	Thames	122.19	2	1.64
12	Portmeadow	Thames	206.10	0.5	0.24
13	Grimsford to Williamscott	Cherwell	106.35	3	2.82
14	Otmoor	Otmoor	980.43	68	6.94
15	Wendlebury	Ray	73.113	3	4.10
16	Astley Bridge Farm	Ray	61.34	0.5	0.82
17	Ewelme Farm	Ray	159	3	1.89
18	Levereta	Ray	116.77	1	0.86
19	North Lease	Thames	125.36	5	3.99
	Total		2893.09	116.5	4.03

Figure 1 Changes in lapwing density 1994 – 2005

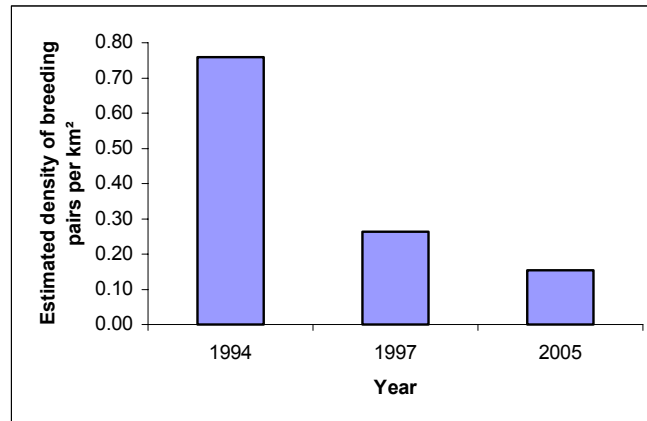
4.2.2 Snipe

Eight drumming or chipping snipe were recorded within the survey area at an overall density of 0.19 pairs/km². However, all these individuals were recorded on one area, the Otmoor basin.

Snipe have experienced the greatest decline of all the waders since the baseline survey from 23 in 1994 to 8 in 2005 (65% decline). In 1994, snipe occurred on the Cherwell, Windrush and the Otmoor basin, on 4 sites. However, by 2005, Snipe only occurred on the Otmoor basin. The increased survey area has further highlighted this decline, showing a decrease in snipe density.

Table 6 All sites containing breeding snipe

No.	Site name	Catchment	Area	Est. breeding pairs	Density
1	Otmoor	Otmoor	980.43	8	0.82
	Total		980.43	8	0.82

Figure 2 Changes in breeding snipe density 1994 – 2005

4.2.3 Redshank

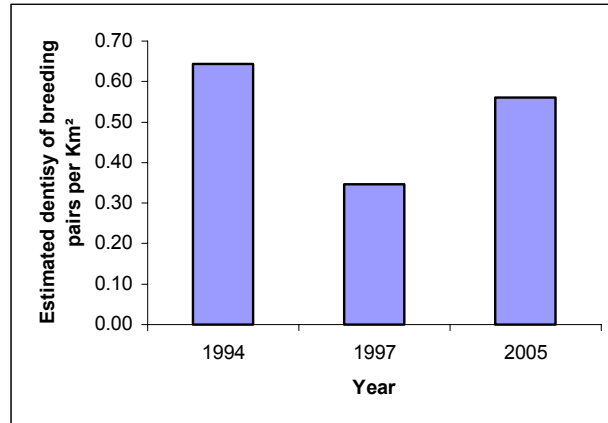
An estimated 28.5 pairs of breeding redshank were recorded at a density of 0.56 pairs p/km². The majority of the redshank population, 26 breeding pairs (90%) are located on the Otmoor basin, with isolated individuals recorded on the Thames and the Windrush catchment as shown in table 3.6.

Whilst the redshank population has dramatically increased since 1994 (19.5 pairs), this is the result of the RSPB's Otmoor nature reserve, which contains 26 pairs of redshank. Outside the reserve, redshank have declined in range and population. On the Thames, they declined from 10 pairs in 1994, to 3.4 pairs in 1997 and 2.3 pairs in 2005. The Windrush saw a decline from 5.5 pairs in 1994 to 3 in 1997 with no confirmed breeding pairs in 2005.

Figure 3 highlights the changes in redshank density, which for 2005 is 0.56 pairs p/km². This is an increase since 1997 (0.35 pairs/km²), but is below the 1994 density of 0.64 pairs/km². This is well below the national figure of 1.63 pairs/km².

Table 7 All sites with breeding redshank

No.	Site name	Catchment	Area	Est. breeding pairs	Density
1	Standlake Common	Thames	2.50	0.67	26.80
2	Portmeadow	Thames	206.10	0.67	0.33
3	Otmoor	Otmoor	980.43	26	2.65
	Total		1189.03	27.34	2.30

Figure 3 Changes in redshank density 1994 – 1997

4.2.4 Curlew

Curlew is the most widespread wader species in the UTTESA, with a large population above the national density figure. It is the only species to show significant increases across the UTTESA during this current survey. An estimated 65.15 pairs of curlew were recorded across the survey area. During the survey, curlew were recorded on 51% of the sites surveyed. They occurred in the highest numbers in the Thames valley, which had 24.43 pairs, the Otmoor basin held 19.63 pairs and Upper Ray 12.9 pairs. This is the only species, which has a higher density (1.26 pr/km²) than the national density (0.29) for lowland wet grassland.

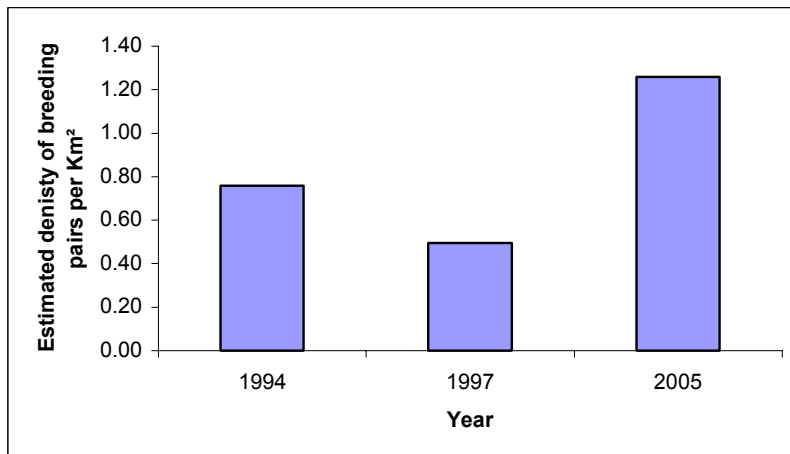
Curlew are also present on the Cherwell and the Windrush catchments. However, no birds were recorded on the Glyme and Evenlode. This is the only species, which has not had its population significantly increased by the RSPB's Otmoor Nature reserve.

This population appears to contrast with the national trends, which suggest a 33% decrease across England and Wales on lowland wet grassland (Wilson *et al*, 2005).

Table 8 All sites with breeding curlew

No.	Site name	Catchment	Area	Est. breeding pairs	Density
1	New Bridge	Windrush	44.68	1.28	2.86
1	Grafton Lock	Thames	57.09	1.18	2.07
3	Kelmscot	Thames	242.00	0.34	0.14
3	Spotted Cow	Thames	81.28	0.57	0.70
4	Radcot Bridge	Thames	61.90	0.57	0.92
5	Burrowmay Meadows	Thames	179.60	15.10	8.41
6	Chimney Meadows	Thames	208.40	3.89	1.87
8	Tadpole Bridge	Thames	100.17	0.34	0.34
9	Farmoor	Thames	13.61	0.34	2.50
7	Northmoor	Thames	97.10	1.05	1.08
8	Wytham	Thames	47.49	1.05	2.21
9	Somerton to Nell Bridge	Cherwell	220.39	2.94	1.33
10	Somerton to Nell Bridge	Cherwell	118.90	2.23	1.88
11	Grimsford to Williamscott	Cherwell	96.76	0.81	0.84
12	Grimsford to Williamscott	Cherwell	56.01	0.57	1.02
16	Grimsford to Williamscott	Cherwell	106.35	0.34	0.32
13	Otmoor	Otmoor	980.43	19.63	2.00
18	Manor Farm	Ray	30.48	0.34	1.12
14	Wendlebury	Ray	73.11	0.81	1.11
20	Astley Bridge Farm	Ray	61.34	0.34	0.55
15	Fencott	Ray	48.59	1.99	4.10
22	Four Winds	Ray	53.57	0.34	0.63
23	Folly Farm	Ray	74.10	0.34	0.46
16	Three Points	Ray	42.23	1.28	3.03
25	Cow Leys	Ray	45.67	0.34	0.74
17	Gallows Bridge/ Grange Farm	Ray	44.14	1.05	2.38
18	Gallows Bridge	Ray	33.02	3.89	11.78
19	Ewelme Farm	Ray	159.00	1.05	0.66
20	Lower Arncot	Ray	62.42	0.81	1.30
30	Oakapple Farm	Ray	51.74	0.34	0.66
	Sub Total		2504.15	65.15	49.67

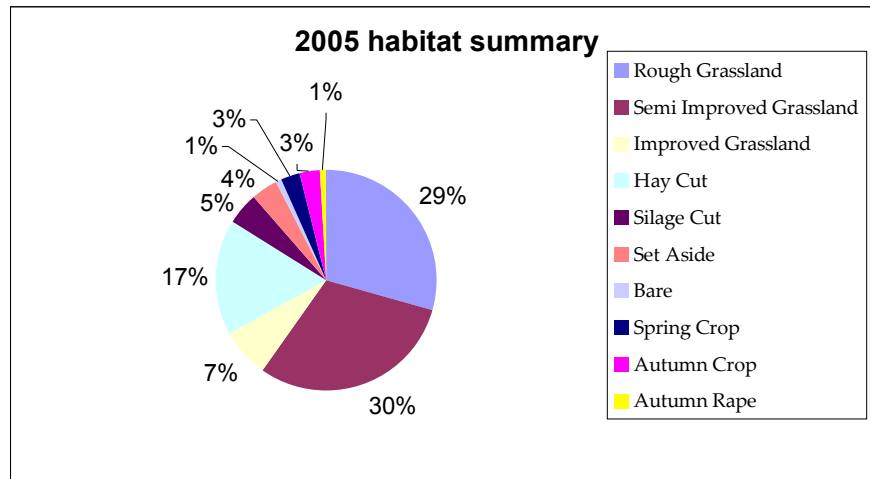
Figure 4 Changes in curlew density 1994 – 2005



4.3 Land use and management

Figure 3.5 describes the different land use types in the survey area. These are discussed in further detail below:

Figure 5 Land use types in the UTTESA



4.4.1 Grassland

The Upper Thames Tributaries' river valley bottoms would traditionally have been comprised of rough grassland or hay meadows, much of which would have been what we now term wet grassland or grazing marsh. These areas, which were grazed in the dryer late spring and summer months with livestock and/or cut for hay, would merge in to drier grassland areas with woodlands occurring further up the slopes. Much of the landscape has retained these features, if in a more fragmented and less biologically rich state. However, as agricultural management has developed and modernised over the past century, these habitats have been altered and managed in ways that leave less space for wildlife. Many of the damper areas of grassland have been more efficiently drained, which in turn has enabled more intensive agricultural use of the grasslands. This has taken the form of higher and earlier stocking rates, re-seeding of grasslands using aggressive, non-native grasses, increased inputs of fertiliser and, in some cases, the switch from grassland to arable cultivation. Another key factor is the switch from hay to silage production, which entails more inputs and an earlier and more frequent cutting regime. These changes have led to an associated reduction in the size of wetland bird populations (Williams & Bowers 1987, Wakeham-Dawson & Smith 2000, Vickery *et al.* 2002). It has been estimated that approximately 20,000km² of wet grassland were drained between 1940 and 1980 and that there are only around 30,000km² remaining (Wakeham-Dawson & Smith 2000). Lowland wet grassland is now a priority habitat and subject of the UK Government and Oxfordshire Biodiversity Action Plans.

Grassland remains the largest habitat in the survey area, comprising 88% of the total area, but this has been spilt into various categories dependent on the management type as described below. This is an important distinction, as different types of grassland and their associated management, will have a profound effect on the diversity of wildlife that it supports.

Unimproved pastures or rough grassland and hay meadows

For the purpose of this survey, rough grassland or unimproved pastures were defined as pasture which is unimproved or rough containing tussocky vegetation and may contain marshy areas. Hay meadows were fields, which were cut after the second visit or the breeding season and was generally similar to the rough pasture. Both of these grassland types were also generally more species rich and possessed a more varied sward structure than other grassland types described.

This accounts for 2534.95 hectares or 45% of the total survey area, approximately 45% of the total grassland area. This habitat use is most commonly associated with land, which is under some form of ESA agreement. While this does account for a large proportion of the survey, the survey was initially biased towards this habitat type. Included in this land use category are most of the regions SSSI's, many of which are managed as traditional hay meadows.

The largest areas of this land use type occur in the Thames catchment and the Otmoor Basin. The only other catchment with substantial land under this management type is the Upper Ray. However, the Otmoor basin contains the largest single unit of rough grassland, which is in keeping with previous surveys. Outside these two catchments, there are few substantial areas of this land management type. Those areas that remain are often small and fragmented, presumably relict patches of larger areas now reverted to a differing land use and type.

Hay meadows were also at their most extensive in the Thames valley, Otmoor Basin and Upper Ray. Hay meadows have become increasingly more widespread than in previous surveys and account for 18% of the total area surveyed. The stock exclusion and hay making supplements which were included as options after the UTTESA policy review in 1999, have further encouraged farmers to enter more land to hay cuts, which has been recorded across the area.

Hay meadows and rough grassland can provide good breeding and feeding habitat for waders. They tend to have more structural diversity, providing both nest sites with tussocks for concealment of nests and chicks, and shorter areas for feeding. They tend to be more botanically diverse and support good populations of soil invertebrates, which waders feed on. With the lower input systems associated with this type of grassland, in-field drainage may be more limited and less well maintained providing further important habitat elements for waders to utilise.

Semi improved grassland

Semi-improved grassland can be described for the purpose of this survey, as land, which has been drained and appears to be fertilised or had herbicide applied, it may also be suspected to have been reseeded. This grassland type accounts for the second largest land management type in the UTTESA, and occupies an area of 1409 hectares (25% of the survey area). The largest amounts of this habitat occur on the Upper Ray, Thames and Cherwell catchments.

The sward structure in these fields is generally uniform and closely grazed, providing little habitat for breeding waders. Much of this land is well drained with high stocking densities.

Improved grassland and silage:

Improved grassland can be described for the purpose of this survey as fields containing grass leys that appears to be fertilised. This grassland type accounts for 12% of the total survey area. Improved grassland and silage was most prevalent in the Thames where 378.58 hectares were recorded.

The cutting of silage may have a detrimental effect on the success rates of curlew, as the fields will be cut before the fledglings are able to move off the nest. This type of grassland is usually associated with high input, intensive management, which in general is less suitable for breeding waders. The sward tends to be more uniformed, and has less structural and species diversity. The more intensive cutting regime associated

with silage production also increases the risk of nest destruction and reduces the opportunities for re-laying of replacement clutches. This is particularly the case for curlew, which may utilise these fields for nesting.

Set-a-side

Set-a-side is present along the Thames and Cherwell catchments, where it accounts for 72.3 and 77.8 hectares respectively. The nature of the vegetation inside these fields varied considerably across the sites. In most fields, the sward structure was too tall and the vegetation was often moribund allowing for little opportunities for breeding waders to utilise the site. However, in some circumstances lapwing in particular can make good use of this land use type for breeding, particularly when located adjacent to rough pasture or damp grassland.

4.7.2 Arable land

Arable land accounted for 6% of the total survey area. The amount of arable land has decreased from previous years which may be accounted for by the uptake of the UTTESA's tier 3 agreement, which is arable reversion to grassland.

Spring sown crops:

Spring tillage accounts for 161 hectares (3%) of the survey area. The largest proportion of this occurred in the Thames catchment. Fields with spring crops have held lapwings at a density of (8.9 breeding pairs/ km²) in keeping with previous surveys. This means that is a very important habitat for Lapwing, although other wader species are unlikely to utilise this habitat to any great extent. As with set aside, lapwings will see most benefit where spring crops are adjacent to rough grassland or wet grassland to provide enhanced feeding opportunities for chicks.

Autumn sown crops

Autumn sown crops account for 162.5 hectares (3%), most autumn cropping occurs on the Thames and in the Upper Ray. While there has been a decrease in the area of cropping, it should be noted that Otmoor basin has seen 100 hectares reverted to grassland. Apart from one other reversion on the windrush, there has been very little change in cropping. Autumn crops, due to their greater height and density than spring-sown crops at nesting time, provide few opportunities for breeding waders.

4.8 Habitat features:

Previous surveys of breeding waders highlighted the importance to waders of scattered tussocky vegetation as part of a varied mosaic of sward structure and surface / standing water (Allwood 1997).

4.8.1 Wetness and standing water

During the first visit in April, 31% of the grassland area surveyed was classified as 'wet' (fields where the majority of fields were comprised of surface splashing or were squelchy underfoot). By the second visit in May this figure had dropped to 12% and by the third and final visit of the survey, only 2% of the grassland was classified as 'wet'. As illustrated in figure 3.6 the average rate of loss of wet area is 45% between the first and second visit and 65% between the second and third visit.

When comparing the different catchments' ability to retain wet fields, the Otmoor basin's ability to retain wet areas is superior when compared to the other catchments; this is illustrated in figure 6. While the Thames survey area was almost double the size of the Otmoor basin and the Upper Ray floodplain survey area, there is considerably less 'wet' area proportionately between the three. The Otmoor Basin is also the only catchment that is able to maintain water levels between the first and second visits.

Considering the large proportion of attempted rewetting of fields, which has been undertaken through the formation of the RSPB's nature reserve and the ESA scheme there has been little change in area of wet fields in the UTTESA. The increase in area is in proportion with the increase in land surveyed. The total area of standing water has increased since the 1997 figure but is in keeping with the proportion of standing water in the 1994 survey. Standing water occupied 6% of the grassland survey and had decreased to 3% by the final visit as indicated in figure 3.7. The largest proportion of this habitat occurs in the Otmoor basin.

This habitat is vital for redshank, lapwing and snipe. The lack of standing water and wet areas on many of the sites may account for the low numbers of these species outside Otmoor.

Figure 6 Seasonal changes in area of wet fields in catchments (Apr – June)

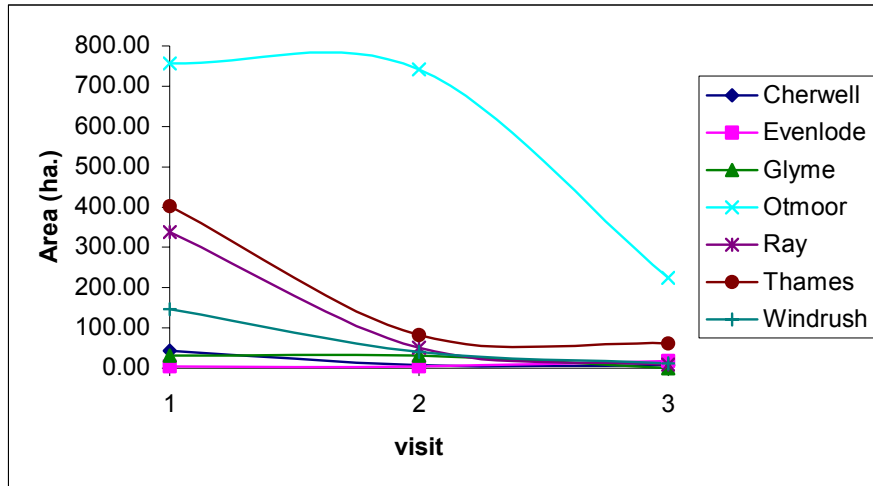
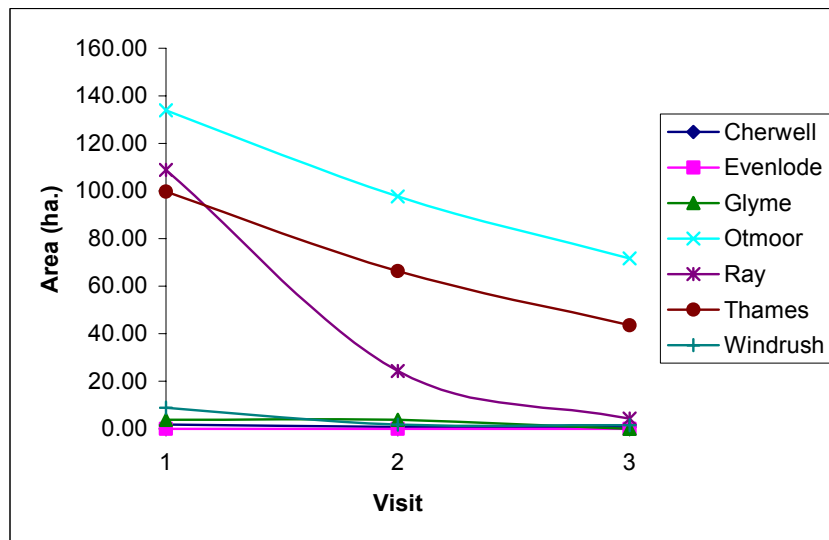


Figure 7 Seasonal changes of standing water in catchments (Apr – June)



4.8.2 Tussocky vegetation

Tussocky vegetation accounted for 246.7 hectares of grassland (5.4%), which is a marginal increase from the 241 hectares recorded in 1997 and a decrease from the 363 hectares recorded in 1994. Typically, *Juncus* and *Carex spp.* are associated with poor drainage on wet soils. These two aspects of the habitat are closely linked and reflect the quality of habitat present on a site. The largest continuous area of tussocky vegetation occurs

in the Otmoor basin. There was considerable difference in the area of rush in fields across the various sites. Whilst the area of rush on some sites did increase during the survey period with the new growth, many farmers control rush growth during summer and autumn, and hence the extent in general declined throughout the survey period. In addition, as cattle are turned out to graze, they can initially reduce the amount of tussocks. However, in the longer term, cattle grazing is the best method to produce structural diversity.

The catchment that possesses the largest area of tussocky vegetation is the Thames, with 91.98ha, however this is comprised of scattered and fragmented parcels of land. The single largest unit of tussocky vegetation occurs in the Otmoor basin. Whilst the survey area has been increased, there is now proportionally less tussocky vegetation in the UTTESA than previously recorded. This has been a universal 8% decrease across all the catchments.

4.8.1 Waders on Tiers

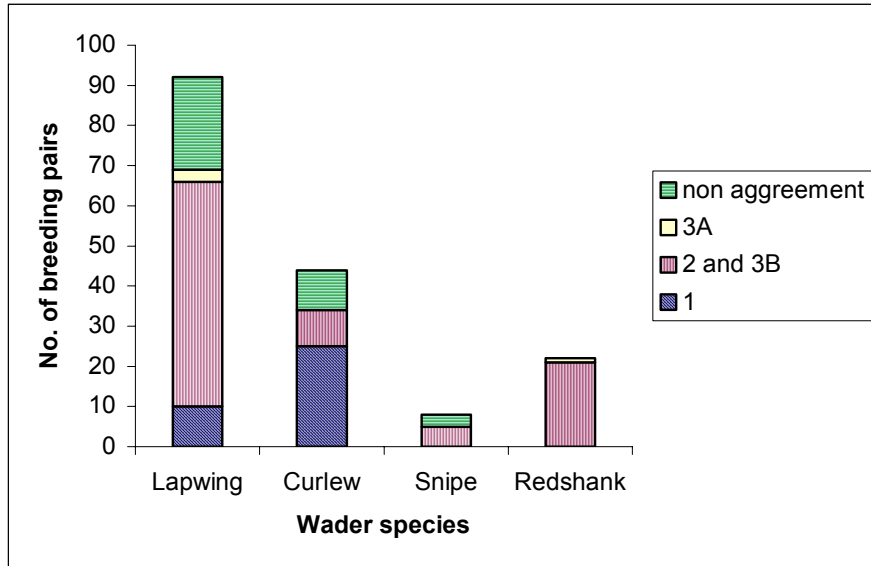
As indicated earlier in the introduction, tier 1 is the most basic tier which regulates grassland management, tier 2 is for wet grassland management and 3a arable reversion to grassland and tier 3b arable reversion to wet grassland.

Tiers 2 and 3b had a higher density of waders than the other tiers, (table 3.1). All waders occurring on tier 3b were recorded on the Otmoor Nature reserve. Curlew were recorded most frequently on tier 1, lapwing were more evenly distributed across all the tiers, redshank were recorded on tier 2 and 3b and snipe on tier 2 as indicated in figure 8. However, higher tier land tends to be situated on land inherently better suited to waders and wet grassland beforehand so some caution should be taken when drawing conclusions from such figures.

Table 9 Wader densities per tier in the UTTESA

Tier	Area	No of waders	Density
1a	594.10	22	3.70
1b	859.96	13	1.51
2	262.87	23	8.75
3a	630.33	4	0.63
3b	882.68	68	7.70
3c	20.8	0	0
4	4.4	0	0
Subtotal	3255.14	130	3.99
Non tier	1921.73	36	1.87

Figure 8 Tier preferences of Waders in UTTESA



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Images

5. Discussion

5.1 Overview of population changes:

The populations of breeding lapwing, redshank and snipe have continued to decline across the UTTESA with the exception of the Otmoor basin. All of these species are now confined to a few sites. 80% of the lapwing population is confined to four sites; 90% of the redshank population and the entire breeding snipe population is confined to one site. This forms part of the national trend of aggregation of these species to a few key sites as suggested by Wilson *et al* 2003, who describes 90% of the snipe population confined to 3% of the wet meadows surveyed in the 2002, BWWMS. The changes are most pronounced on the Thames and Windrush catchments where all three species have declined. As in previous surveys, no waders were recorded in the Glyme and Evenlode catchment and these areas would appear to be generally less suitable for breeding waders, due to their restricted floodplains and steep wooded valley sides.

The breeding curlew populations in the Upper Ray and Cherwell catchments have seen an increase. Apart from the curlew populations, these catchments have a very small number of waders present.

As highlighted in previous surveys, the Otmoor basin continues to be the only area which consistently holds stable populations of breeding waders. This is also the only catchment with breeding snipe. However, this population is extremely localised and could therefore be highly vulnerable to factors such as further changes of land use in the area, or the predicted effects of climate change.

5.1.1 Lapwing

While, lapwings occupy a wide variety of habitats, their range has continued to decline. As previously mentioned, four sites support 80% of all breeding lapwings recorded. Aggregation also increased significantly in lapwing across England and Wales, with 50% recorded on less than 8% of the area surveyed in the BWWM 2002 survey as described by Wilson *et al* 2002. Aggregation of this scale further increases the potential threats of climate change, land-use change and low productivity. Anecdotally, recent studies at the RSPB's Otmoor Nature reserve suggest that the productivity of the site is low (N Lambert *pers comm.*), this was also noted during the survey where very few young birds were observed early in the season and large flocks were also observed suggesting many had failed to breed.

Outside the Otmoor reserve, 30% of lapwing sites occurred on spring crops, which only accounts for 6% of the total survey area. This may indicate that the birds have a strong preference for this habitat, and that suitable habitat is not present within the grassland areas of the UTTESA (which cover 97% of the survey area).

Lapwing require wet areas of grassland to feed on, or wet features such as ditches and scrapes where they can easily access aquatic prey (Ausden, 2001). In many damp fields the sward was either, too long (>10cm) or dried out too quickly to support them. This unsuitable sward height can nullify the potential benefits of successful hydrological management.

5.1.2 Snipe

Snipe have traditionally occurred throughout the UTTESA in low densities. In 2005, breeding snipe were only found on the Otmoor basin, having been lost on two catchments (the Cherwell and Windrush) as a breeding species. All breeding snipe observed were limited to rough grassland, which contained wet areas or contained surface water that remained throughout the breeding season.

This small population is now highly vulnerable to fluctuations in productivity and predation similar to those previously mentioned. The predicted effects of climate change may present particular problems for snipe. As spring and summer are predicted to be drier and warmer, so wet grasslands, and their associated wet features, may dry out earlier. Snipe tend to breed later than other wader species of lowland wet grassland,

and hence are already more vulnerable to this factor. Climate change may exacerbate this factor still further, and place real pressure on future breeding birds.

5.1.3 Redshank

As with the two previous species, redshank are also becoming increasingly aggregated across the UTTESA, with only four of the seven sites from 1997 still holding redshank. Redshank were predominantly observed in fields which cattle grazed and which contained pools of standing water. When comparing 2005 with previous years, fewer cattle were recorded grazing sites to create the right sward conditions for redshank. As mentioned earlier, one pair bred outside the Othmoor basin, but failed due to suspected predation.

5.1.4 Curlew

Curlew are the most successful wader in the UTTESA, occurring on the most sites and increasing uniformly across the UTTESA. This is the only species, which has been able to increase their population and colonise new sites across the area. As demonstrated earlier, they have increased on five of the seven catchments. Curlews are mostly commonly observed on grassland and more specifically land used for making hay and silage with 59% of curlew observed on this land type. These waders are also able to make good use of semi-improved grassland and rough grassland alike and therefore have larger areas of habitat available to them. The UTTESA support an excellent population of curlew, which is above the national density for lowland wet grassland. The ability to provide rough grassland through the ESA schemes has benefited curlew by providing good breeding habitat.

5.2 Habitat changes.

5.2.1 Grassland

It is widely acknowledged that wet grassland is declining in extent across the UK (Wakeham-Dawson & Smith 2000) and currently a high proportion of lowland grassland is managed intensively. This has resulted in increased levels of inorganic nitrogen and stocking densities, a switch from hay to silage, which have caused a change in the structure of grassland, changing the suitability of grasslands as feeding and breeding habitat for birds (Vickery *et al* (2001).

5.2.1.1 Rough grassland and Hay cuts

Rough grassland has increased proportionally with the increase in survey area. Much of the rough grassland contains small quantities of tussocky vegetation and is either wet or has small areas of standing water on it. This would suggest that this land does have potential to support breeding waders. This habitat supports the highest numbers of waders in UTTESA with 48% of all observations occurring on this habitat. There appears to be a decrease in the proportion of fields, which are grazed by cattle in the survey area. While in previous years 21% of the fields surveyed were cattle grazed, in 2005 this figure had halved to just 11%, which could have a profound impact on the quality of the available habitat.

5.2.1.2 Semi Improved Grassland

Semi improved grassland is one of the largest land use types in the UTTESA survey area and is the second most favoured habitat for breeding waders with 19% of all observations occurring on the habitat type. While birds have been observed feeding on it in most cases, this habitat does not appear to support many nesting pairs of breeding waders.

5.2.1.3 Improved grassland and Silage cuts

Curlew and lapwing generally use this habitat before the silage has been cut. While 13% of all waders utilise this habitat, this is due to a single site with a large quantities of curlew on it rather than a trend through out

the UTTESA. Silage cuts may have a negative impact on curlew who will nest in the fields, but will not be able to get their chicks off the fields before the silage is cut, perhaps leading to high mortality rates. The area of silage has not increased with the increase in survey area, which may suggest that less silage is being produced than previously. This may increase curlew populations as more fields move into hay cut regime, which offers increased opportunities for higher productivity levels.

5.2.2 Arable land

There has been a decrease in the percentage of arable land in the survey area, particularly evident in the area of land under spring cropping, which has reduced since 1997. This may have a potentially negative effect upon lapwing populations, which utilize this habitat for nesting. The survey demonstrated that spring cropping has the same density of breeding lapwing on it as wet grassland, which emphasises its importance to lapwings.

5.3 The relationships between waders and the different ESA tiers

As Ausden and Hirons (2001) state "Within ESA's, populations of breeding waders fare better on land under high tiers than land managed under low tiers. Land managed under the higher tiers also supports more pairs of breeding waders per £ of ESA grant than land managed under lower tiers." The survey results suggest that the UTTESA is no different with tier 2 and 3b supporting the highest density of waders and no significant difference in density amongst the other tiers.

While tier 2 and 3b offer good opportunities to recreate habitat for these species, the limited area occupied by these tiers may result in the aggregation of wader species if the area of these tiers do not increase. However, at present a large proportion of the sites under tier 3b area do not seem to be able to maintain water levels or create the ideal sward structure for waders at the start of the breeding season for these species.

These tiers are the two least popular tiers for farmers who are not prepared in most cases to rewet their fields. Those farmers that have entered this scheme are struggling in many cases to reproduce the hydrological and ecological conditions for breeding waders. The high clay content of the soils in many areas of the UTT will have a low hydraulic conductivity (RSPB, 1997). The implications of this for wader management are that the maintenance of high water levels in ditches is likely to be less effective at maintaining the in-field water tables. Therefore, in some cases, creating more in field features such as ditches and scrapes, may be a more effective method of wader habitat creation.

These sites also need to take into consideration the surrounding landscape. In some cases, land under these options is surrounded by tall hedges and have trees present either on, or in, close proximity (within 100m) to the site. This increases the edge effect, which further limits the habitat available to waders.

The other tiers offer little habitat for redshank, snipe and lapwing and waders observed on this tier are mainly curlew. The stock exclusion supplement appears to provide further opportunities for increased productivity of curlew.

5.4. Site wetness and wet features

Site wetness is the most important variable determining the size and species diversity of breeding waders (Brand Hartley, 1999). Since 1994, we have seen little change in the area of wet fields in the survey. These areas have decreased in proportion to the overall area of grassland. This indicates that while there has been an increase in land under the wet grassland and arable reversion to wet grassland management tiers

throughout the UTTESA, the extent of wet grassland is still declining. Otmoor remains the only site to have large areas of wet fields and standing water.

The Upper Ray catchment has large areas that were wet at the start of the survey suggesting this area has a large amount of potential for higher rates of wet grassland recreation and breeding waders, however these sites dry out the quickest of all the catchments.

In order to facilitate the expansion of habitat for waders, these sites need to maintain wet features for longer in the breeding season. The RSPB on Otmoor provides an example of the potential success of creating wet features to provide areas of standing water available to waders and subsequently the impact this has had on the breeding population. While many farmers cannot be expected to reproduce these features on the same scale, use of the micro-topography of fields will ensure that these features are able to effectively hold water for waders as suggested by the RSPB (1997) and Brand Hartley (1997).

To maximise the effectiveness of wet grassland management for waders, the creation of wet features for waders is vital, and water budgeting must occur to ensure that these sites are able to retain the required water levels. With this in mind, levelling surveys may be required to be carried out to identify the most effective places for scrape or grip creation. Where feasible it is beneficial to utilise outside experience or specialised staff to further ensure success, until specialist training can be provided for staff overseeing the implementation of these features.

5.5 The Importance of the Otmoor Basin

The Otmoor Basin occupies a fifth of the survey area and accounts for 58% of the UTTESA's breeding wader population. As can be seen from the results of the survey, Otmoor is of crucial importance to breeding waders within the UTTESA. Without the numbers of waders present at this site there would be very little in the way of breeding waders in the UTTESA. Breeding waders on this site have been closely monitored during each breeding season since the inception of the UTTESA and populations of each species are increasing since the creation of the RSPB's Otmoor Nature reserve. This site was also described by Wilson *et al.* 2003 as a site with a particularly high concentration of lapwing. During 2003 the numbers of lapwing peaked with over 100 breeding pairs of lapwing being recorded on the RSPB reserve. The full impact of Otmoor can be fully appreciated by reanalysing our data without Otmoor. To do this wader density for each species and the density of waders per tier were reanalysed.

Figure 9 Lapwing density 1994 -2005

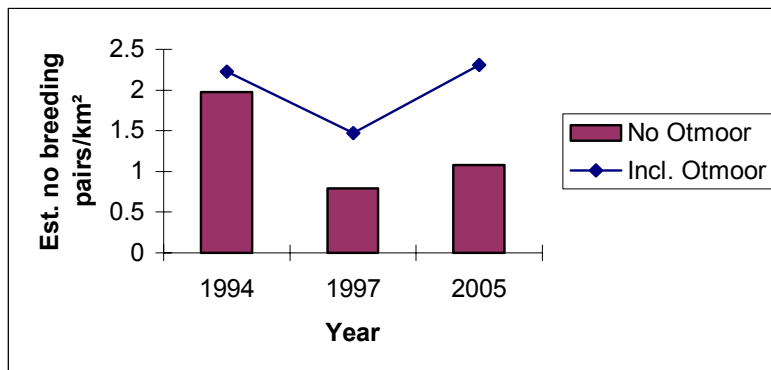


Figure 10 Snipe density 1994 - 2005

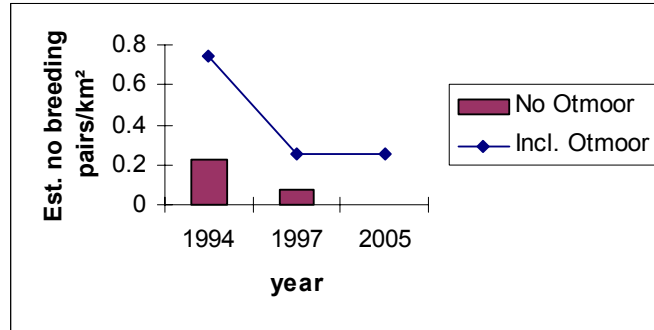


Figure 11 Redshank density 1994 – 2005

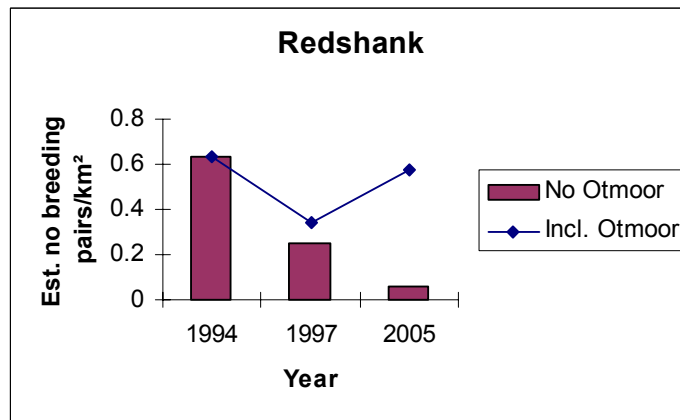
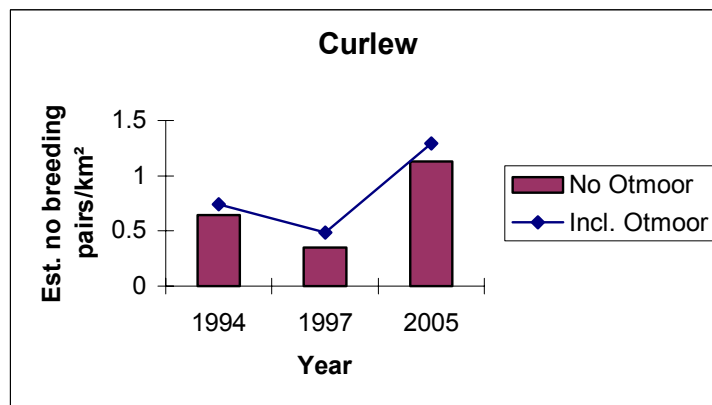


Figure 12 Curlew density 1994 – 2005



As these tables indicate, the Otmoor Basin has a notable impact on wader populations. These results further highlight the amount of aggregation of three of the four species, which are heavily dependant on the Otmoor basin. Without the Otmoor Basin, waders would be facing severe difficulties and redshank and snipe would almost certainly be lost as a breeding species.

5.6 Key sites:

In an attempt to move towards a more landscape-based approach, key geographic areas have been identified using the data collected over the past ten years, to provide a focus for wader conservation action and habitat restoration work. These areas were selected utilizing the following criteria:

-
- Sites that have contained at least five pairs of breeding waders, or contained more than one species of breeding wader, or supported breeding snipe.
 - Areas with a wide valley bottom with wet areas and regular flooding.
 - Areas where groups of landowners are presently managing wet grassland for waders under the existing ESA agreements or are interested in entering the Higher Level Scheme.

These areas should act as starting points to expand the range of breeding waders. These areas offer the best opportunities for success in the short term. A map of these is provided in appendix 7.

Site one: The Otmoor Basin (SP5613)

This is undoubtedly the single most important geographical area for waders in the UTTESA. This site provides the highest quality wader habitat in the survey area, with the RSPB's reserve and the SSSI being the main components of this. Otmoor contains the only breeding snipe in the area and 56% of the total wader population. Discounting curlew, which are a lower priority for conservation work in lowland England, this figure rises to 66% of the population. While the RSPB reserve and the SSSI are present, these areas need to be buffered by other high quality habitat to ensure that the populations are protected and have suitable habitat to expand into. There is a danger that without other similar habitat available to waders an ecological trap may be formed with populations becoming subject to other environmental pressures such as climate change.

Site two Upper Ray (SP6420)

This area boasts high curlew populations and the habitat data collected suggested that there are further habitat creation opportunities. At present a partnership of organisations including BBOWT, Wild Cru and FWAG are operating the Upper Thames Project in this area with additional support from EA, Defra and RSPB. Their presence has already encouraged several farmers to consider wetland rehabilitation options, which will further create opportunities for wader habitat. While curlew are the main target species in the area, other species such as lapwing and redshank should also be encouraged. There is currently a small lapwing population in the area utilising arable land close to the existing wet grassland. However, more scrapes and feeding areas could encourage more redshank and lapwing. The proximity to Otmoor could result in this site acting as an overflow site for Otmoor.

Site three Somerton to Nell Bridge (SP4931)

This site presently supports four pairs of curlew. However, snipe were also recorded breeding here in the 1994 survey. The large open nature of this site, regular flooding, large overwintering wader population and the fact that several landowners are considering wader options as part of a new HLS application, makes it an ideal candidate. The creation of scrapes could encourage lapwing and redshank to nest in the area. These features together with the alluvial soil with high organic matter could potentially provide future snipe habitat in the medium term

Site Four Upper Windrush (SP1815)

Unlike the lower sections of the Windrush, this area is more open in nature and less enclosed. This section of the river has in the past supported all four waders species, however snipe have recently become locally extinct, highlighting the need for renewed support to these farmers. Like the rest of the UTTESA, this area needs to improve the habitat quality available to waders, particularly water control and surrounding vegetation management. Lapwing, redshank and snipe would be the three main target species here.

Site five Northmoor to Shifford (SP4104)

This area supports most of the Thames's lapwing population. Redshank and curlew were also present at this site. The presence of more wet features would further enhance the potential of the site for redshank. The presence of large areas of gravel pits could create additional areas of wet grassland and reedbed, which may provide additional habitat for waders if carefully planned.

Site six Chimney to Kelmscott (SU3093)

This site had one of the highest densities of waders in 1994 with redshank, lapwing and curlew present in the area. In 2005, only lapwing and curlew were present on sites, with curlew numbers vastly greater than previous surveys. The lack of wet features in the area limits the potential for waders. To address this issue, more wet features such as scrapes and grips need to be implemented. The presence of large numbers of cattle offer some opportunities for good wet grassland management however, the inability of sites to maintain high water levels needs to be addressed.

5.7 Comparing the UTTESA with other important wader areas.

The UTTESA was compared with other key sites for breeding waders in southern England in an attempt to gauge the importance of this site for waders. This data is provided from the Wilson et al 2003 and is not directly comparable due to the surveys not being conducted in the same year. However, this provides a useful index of the importance of the UTTESA when compared to other areas.

Table 10 Comparison of the UTTESA with other important areas for breeding waders

Wader site	Area surveyed (Ha)	No Lapwing (Pairs/km ²)	No. Snipe (Pairs/km ²)	No. Redshank (Pairs/km ²)	No Curlew (Pairs/km ²)	Total no. of waders (Pairs/km ²)
Upper Thames Tributaries ESA	5174	116 (2.3)	8 (0.1)	29 (0.5)	65(1.2)	218 (4.21)
Severn & Avon Vales Natural Area ¹	6446	109(1.6)	1 (0.01)	45 (0.6)	34 (0.5)	189 (2.9)
Nene Washes ²	570(?)	223 (39.1)	106 (18.5)	64 (11.22)	0	393 (68.94)
North Kent Marshes ESA ²	71100	808 (1.13)	0	648 (0.9)	0	1456 (20.48)
Somerset Levels ²	10990	145 (1.31)	39 (0.35)	44 (0.4)	35(0.3)	263 (2.3)

¹ Wilson A, Smart M, 2003

² Wilson *et al*, 2003

6. Conclusion and Recommendations

While there has been an increase in breeding wader populations since the 1997 survey, curlew are the only species of wader to have increased throughout the UTT. Lapwing and redshank are becoming further aggregated and breeding snipe only occur on the Othmoor basin. This is part of a steady long-term decline, which only the development of the RSPB's Othmoor nature reserve has been able to reverse. Outside the Othmoor basin, breeding waders are now well below former levels and potential carrying capacity. All, but the curlew are below the national density for lowland wet grassland.

There is a proven relationship between breeding waders and features such as standing water, tussocky vegetation and wet field conditions. It is predictable therefore, that there has not been a widespread increase in the wader population, given that these habitat conditions have not increased in extent. The Othmoor basin provides an example of where suitable habitat is provided and the wader population has increased dramatically and thus supports the largest population of breeding waders and the entire snipe population within the UTT.

Therefore as reported in the 1994 and 1997 reports, the best way to improve the wader populations is to restore and create more suitable habitat for breeding waders. This will primarily involve increasing the amount of standing water, wet fields and tussocky areas available to breeding waders. Present efforts to restore and create more habitat outside the Othmoor basin have been largely unsuccessful however, the introduction of new schemes does offer some new opportunities to address this. However, for this to be success, regular long term on the ground support is required to assist farmers to work within the dynamics of wader and wetland management. The survey has highlighted the potential for success once farmers are enthused and supported in implementing wader conservation management, but for HLS to realise its potential for breeding waders, a more robust and effective farmer support structure needs to put in place.

6.1. Recommendations:

6.1.2 Monitoring:

There is an urgent need for increased population monitoring (Wader Study Group, 2003), and the Upper Thames Tributaries is no exception.

- Regular monitoring of key sites by volunteers – The project has recruited, trained and supported local volunteers in the area, who could continue to monitor the key sites. Regular monitoring would provide more detailed survey data, ensuring a greater insight into wader distribution and populations.
- Annual monitoring of sites receiving HLS grants for breeding waders – Sites that have entered the HLS options for breeding waders would benefit from annual species and habitat monitoring. The annual monitoring would provide useful feedback to farmers on the progress of their management, and encourage farmers to conduct their own evaluation the site conditions. Ideally, this would be conducted on an annual basis.

6.1.3 Policy and environmental stewardship schemes

- All potential HLS farmers would benefit from attendance at wet grassland/wader training days prior to, or shortly after, beginning an HLS scheme. Training would assist farmers to become more involved in developing realistic and achievable indicators of success for the site and increase the opportunities of success. Training before the agreement would highlight the requirements of the agreement and training after entry would provide the skills to help farmers achieve these requirements.
- Many farmers perceive these options as being complex and the raised water levels as disincentives to enter these options, introductory training days could increase the awareness of potential incentives for entering these options.

6.1.4 Awareness

- Increased awareness of wetland bird declines - in many cases, farmers are unaware of the current trends in the wader population. During the project, much has been done to promote awareness of waders, this needs to be continued and developed.

6.1.5 Wet grassland restoration

- Site selection needs to be more critical in assessing potential sites for breeding waders. Selection must take into account the soil type, topography, scrub, trees and capability of controlling water levels. These factors will all impact on the productivity of a site for waders.
- Increased creation of grips and wet features. - When wet grassland sites are being created and restored, a series of surface water features such as grips and pools should be planned. This will provide good feeding and nest habitat for breeding waders while also providing a more effective measure of field conditions than ditch levels. Dutt (2004) suggests that a mix of grips and scrapes may be more useful than surface flooding in fields. A levelling survey should be used to sight these features, or more simply by winter mapping of low lying or flooded areas.
- Wet grassland restoration needs careful consideration to minimise the edge effect from tall vegetation. Tall willows and hedges now surround many sites; this will reduce the potential breeding habitat available to waders. Trees or hedges should not be taller than two meters in height in surrounding field boundaries. A 50-meter shadow should be used to measure the amount of habitat unsuitable for breeding waders due to these tall hedges or trees. Studies have shown snipe nesting within 200m of trees can suffer up to 80% predation, those further away can suffer as little as 20% predation.
- Lapwing plots created near wet features if situated within a mixed farming operation - where there are suitable areas of wet grassland, HLS options such as lapwing plots and spring cropping could be encouraged adjacent to these features to provide additional nesting habitat.
- Where farmers are requested to maintain water levels using water control structures, gauge boards should be introduced to provide farmers with measures of water levels. These levels will have to be decided on a site-by-site basis, dependant on local conditions.
- To ensure that the features are as effective as possible, staff should receive further training in wetland rehabilitation to design features and calculate the required water budget to maintain water levels. Many new water features dry out too quickly because they are too shallow or cross drainage features such as land drains and are unable to retain water. Additional water sources may be needed to charge features or alternatively, features may need to be deeper to prevent sites drying out too quickly.

6.1.6 Volunteer involvement:

- Volunteer participation has several benefits for the survey and future wader management. This should be encouraged for any further surveys of this nature. Working with volunteers requires specialist skills to make sure that their potential benefits are realised. Therefore, projects involving volunteers should be managed by organisations with the appropriate skills and experience such as the RSPB.
- Volunteer training is important to ensure that the correct methodology is used. All volunteers should attend a training session every second year and receive a booklet prior to each survey. All resources including site contact details and maps should be presented to the volunteers one month before the start of the survey. This will ensure that the volunteers have enough time to conduct their pre-survey site visits and that any issues can be resolved before the start of the survey.
- Email is a valuable resource to have available to volunteers as it allows effective responses to queries. Due to the altruistic nature of volunteering and isolated nature of the survey, good support and encouragement is vital to ensure good feedback. This is especially true where volunteers have not recorded waders on their first and second visit. They can lose motivation and need support to ensure they complete the survey.

The essence of the problem is simple - if suitable habitat is present within the Upper Thames Tributaries, as on Otmoor, then breeding waders will prosper. If the present situation away from Otmoor is allowed to continue then wader numbers will continue to be confined to increasingly fewer fragments of suitable habitat, mostly within existing protected areas.

This survey has highlighted the value of regular, long term and site specific support for farmers managing their land for breeding waders. Without such support, the complex management required for breeding waders is often difficult to implement and sustain. With the new Higher Level Schemes starting, there are increasing opportunities for wader conservation, however these need to be carefully targeted to ensure the greatest opportunities for success. Through the results, six key areas have been identified as an initial focus for targeted action for wader conservation



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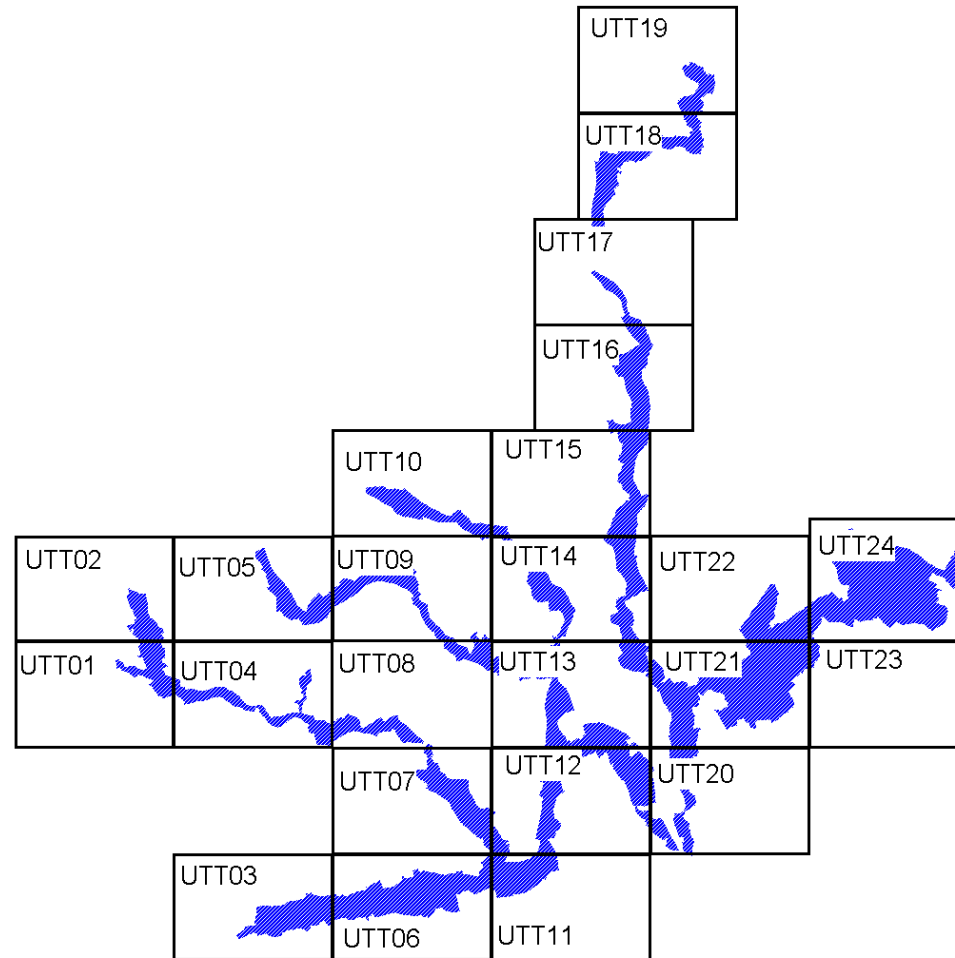
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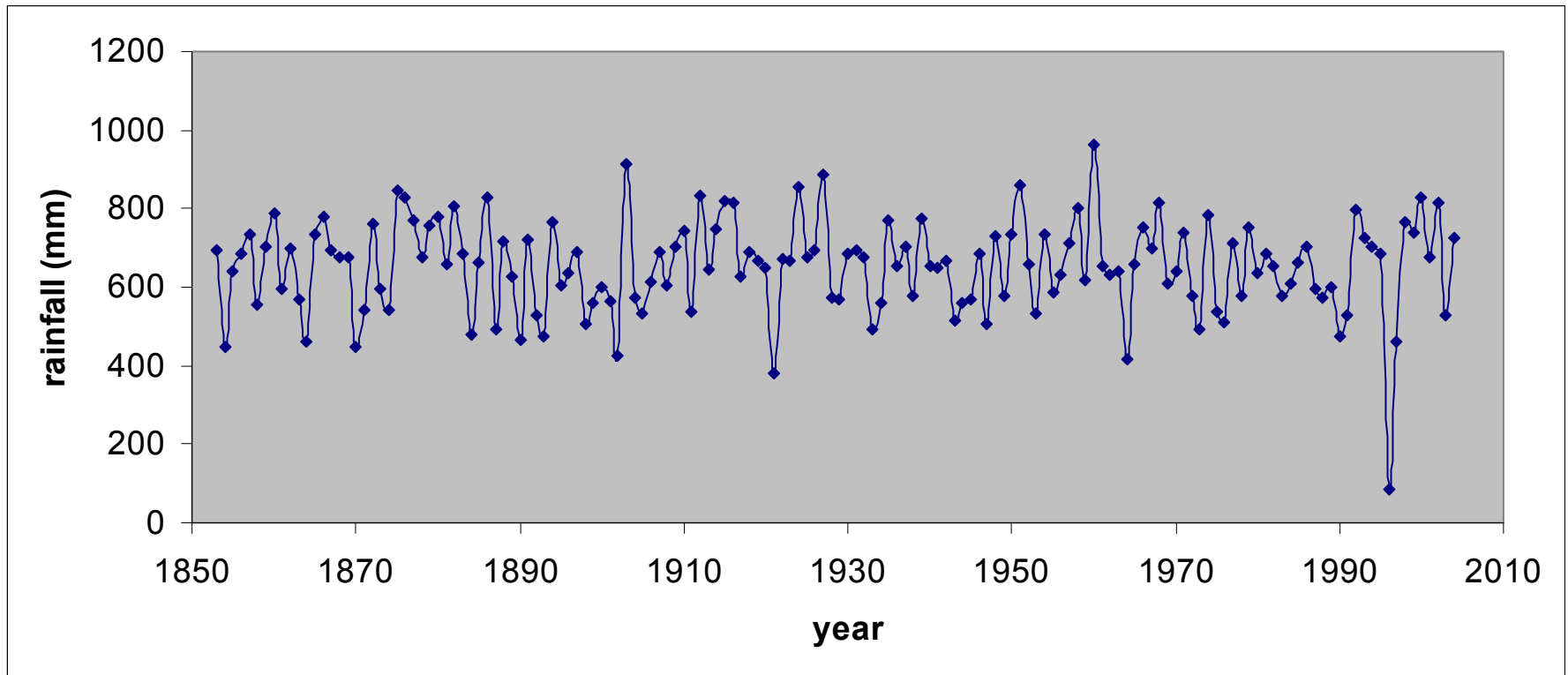
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Appendices

Appendix 1 Map of Upper Thames Tributaries Environmentally Sensitive Area:

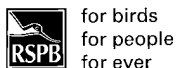


Appendix 2 Figure of rainfall data of Oxford



Source Met Office, Oxford weather station

Appendix 3 data recording sheet



Upper Thames Tributaries Wader Survey Form

Please complete a separate sheet for each survey. Please read the instruction sheet carefully before conducting the survey. Complete the form with a black pen and

in block capitals

Observer						Weather conditions						Visit no.	
Site name						Grid Reference						Date:	
Site code						Start time						Finish time	
	Waders					Habitat							
Field no.	Lapwing (L)	Snipe (Sn)	Redshank (Rk)	Curlew (Cu)	Other species	Management				Vegetation		Wetness	Ditch level
	Total no.	Drummers	Total no.	Pairs		Type	Tier	Stock	Cut	Sward	Tussocks		
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

Other species of conservation significance			
Species	Present	Species	Present
Bullfinch		Skylark	
Corn bunting		Yellow hammer	
Linnet		Reed bunting	
Turtle Dove		Grasshopper Warbler	
Tree sparrow		Yellow wagtail	
Grey partridge			

Please note that these are all priority species for the central England Region of the RSPB,. While this survey is only for waders, we are interested to note what other species are present. Please feel free to add any further species you identify which may be of interest.

Landowner participation:

Any other comments:

Please use the space below to fill in any further notes on the site:

Once the survey is complete please return to: RSPB; FREEPOST OF 1412, OXON, OX16 9YU; FAO: DREW MCVEY

Appendix 4 Volunteer Information

See attached separate document

Appendix 5: Site summaries

Table 1: Summary of waders present on survey sites

Site Code	Site Name	Area	Lapwing		Snipe		Redshank		Curlew		Total waders	
			no. pairs	Prs/km ²	no. pairs	Prs/km ²	no. pairs	Prs/km ²	no. pairs	Prs/km ²	no. pairs	Prs/km ²
Cherwell valley												
UTT14/N01	Northbrook	12.75	0	0	0	0	0	0	0	0	0	0
UTT14/P01	Pigeon Lock To Enslow	40	0	0	0	0	0	0	0	0	0	0
UTT15/M01	Lower Heyford To Somerton	21.01	0	0	0	0	0	0	0	0	0	0
UTT16/S01	Somerton To Nell Bridge	220.39	0	0	0	0	0	0	2.94	1.33	2.94	1.33
UTT16/S02	Somerton To Nell Bridge	118.9	0	0	0	0	0	0	2.23	1.88	2.23	1.88
UTT18/G01	Grimsford To Williamscott	96.76	0	0	0	0	0	0	0.81	0.84	0.81	0.84
UTT18/G02	Grimsford To Williamscott	56.01	0	0	0	0	0	0	0.57	1.02	0.57	1.02
UTT18/G03	Grimsford To Williamscott	106.35	3	2.82	0	0	0	0	0.34	0.32	3.34	3.14
UTT18/M01	Mill House Farm	30.48	0	0	0	0	0	0	0	0	0	0
	Subtotal	702.65	3.00	0.43	0.00	0	0	0	6.89	0.98	9.89	1.37
Evenlode valley												
UTT05/001	Ascott	18.03	0	0	0	0	0	0	0	0	0	0
UTT09/C02	Catsham	5.42	0	0	0	0	0	0	0	0	0	0
UTT09/S01	Snipe Bog	3.45	0	0	0	0	0	0	0	0	0	0
	Subtotal	26.90	0	0	0	0	0	0	0	0	0	0
Glyme Valley												
UTT15/R01	Radford Bridge	118.60	0	0	0	0	0	0	0	0	0	0
	Subtotal	118.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Otmoor Basin												
utt21/001	Otmoor	980.43	68	6.94	8	0.82	26	2.65	19.63	2.00	121.63	12.41
UTT21/R01	Rectory Farm	27.59	0	0	0	0	0	0	0	0	0	0
	Subtotal	1008.02	68.00	6.75	8.00	0.79	26.00	2.58	19.63	1.95	121.63	12.07
Upper Ray Basin												
UTT22/M01	Manor Farm	30.48	0	0	0	0	0	0	0.34	1.12	0.34	1.12
UTT22/W01	Wendlebury	73.113	3	4.10	0	0	0	0	0.81	1.11	3.81	5.21
UTT23/A01	Astley Bridge Farm	61.34	0.5	0.82	0	0	0	0	0.34	0.55	0.84	1.37
UTT23/H01	Fencott	48.59	0	0	0	0	0	0	1.99	4.10	1.99	4.10
UTT23/H02	Four Winds	53.57	0	0	0	0	0	0	0.34	0.63	0.34	0.63
UTT24/B01	Three Points	42.23	0	0	0	0	0	0	1.28	3.03	1.28	3.03

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UTT24/C01	Cow Leys	45.67	0	0	0	0	0	0	0	0.34	0.74	0.34	0.74
UTT24/E01	Essex Farm	0	0	0	0	0	0	0	0	0	0	0	0
UTT24/F01	Folly Farm	74.10	0	0	0	0	0	0	0	0.34	0.46	0.34	0.46
UTT24/G01	Grendon Underwood	0	0	0	0	0	0	0	0	0	0	0	0
UTT24/G02	Gallows Bridge/ Grange Farm	44.14	0	0	0	0	0	0	0	1.05	2.38	1.05	2.38
UTT24/G02	Gallows Bridge	33.02	0	0	0	0	0	0	0	3.89	11.78	3.89	11.78
UTT24/G044	Ewelme Farm	159	3	1.89	0	0	0	0	0	1.05	0.66	4.05	2.55
UTT24/L01	Levereta	116.77	1	0.86	0	0	0	0	0	0	0	1	0.86
UTT24/L02	Ludgerhall	0	0	0	0	0	0	0	0	0	0	0	0
UTT24/L03	Lower Arncot	62.42	0	0	0	0	0	0	0	0.81	1.30	0.81	1.30
UTT24/L04	Ludgerhall Green	43.95	0	0	0	0	0	0	0	0	0	0	0
UTT24/O01	Oakapple Farm	51.74	0	0	0	0	0	0	0	0.34	0.66	0.34	0.66
UTT24/P01	Piddington	19.07	0	0	0	0	0	0	0	0	0	0	0
Subtotal		959.21	7.50	0.67	0.00	0	0.00	0	0	12.92	1.16	20.42	1.83
Thames valley													
UTT03/G01	Grafton Lock	57.09	0	0	0	0	0	0.00	1.18	2.07	1.18	2.07	
UTT03/K01	Kelmscot	242.00	1	0.41	0	0	0	0	0.34	0.14	1.34	0.55	
UTT03/O01	Spotted Cow	81.28	0	0	0	0	0.33	0.41	0.57	0.70	0.9	1.11	
UTT03/R01	Radcot Bridge	61.90	0	0	0	0	0	0	0.57	0.92	0.57	0.92	
UTT06/B01	Burrowmay Meadows	179.60	0	0	0	0	0.33	0.18	15.1	8.41	15.43	8.59	
UTT06/C01	Chimney Meadows	208.40	0.5	0.24	0	0	0	0	3.89	1.87	4.39	2.11	
UTT06/S01	Shifford (South)	137.10	5	3.65	0	0	0	0	0	0	5	3.65	
UTT06/s02	Standlake Common	93.24	2.5	100.00	0	0	0.67	26.80	0	0	3.17	126.8	
UTT06/T01	Tadpole Bridge	100.17	3	2.99	0	0	0	0	0.34	0.34	3.34	3.33	
UTT07/F01	Farmoor	13.61	2	14.70	0	0	0	0	0.34	2.50	2.34	17.19	
UTT07/S01	Stanton	82.50	0	0	0	0	0	0	0	0	0	0	
UTT07/S02	Beard Mill	22.85	0	0	0	0	0.33	1.44	0	0	0.33	1.44	
UTT07/S03	Broad Bridges	23.94	0.5	2.09	0	0	0	0	0	0	0.5	2.09	
UTT11/N01	Northmoor	97.10	13	13.39	0	0	0	0	1.05	1.08	14.05	14.47	
UTT12/L01	Hinksey	122.19	2	1.64	0	0	0	0	0	0	2	1.64	
UTT12/P02	Portmeadow	206.10	0.5	0.24	0	0	0.67	0.33	0	0	1.17	0.57	
UTT12/S01	Swinford	96	0	0	0	0	0	0	0	0	0	0	
UTT12/W01	Wytham	47.49	0	0	0	0	0	0	1.05	2.21	1.05	2.21	
	North Lease	125.36	5	3.99	0	0	0	0	0	0	5	3.99	
Subtotal		1997.92	35.00	1.84	0.00	0	2.33	0.12	24.43	1.28	61.76	3.24	
Windrush catchment													

UTT01/S01	Sherbourne	104.92	0	0	0	0	0	0	0	0	0	0	0
UTT02/N01	New Bridge	44.68	1	2.24	0	0	0.33	0.74	1.28	2.86	2.61	5.84	
UTT04/s01	Swinbrook	9.38	0	0	0	0	0	0	0	0	0	0	
UTT08/C01	Crawley Meadows	59.43	0	0	0	0	0	0	0	0	0	0	
UTT08/M01	Minster Lovell	72.95	2	2.74	0	0	0.33	0.45	0	0	2.33	3.19	
UTT12/B01	Blenheim Estate	59.43	0	0	0	0	0	0	0	0	0	0	
UTT12/B02	Oxey Mead	7.73	0	0	0	0	0	0	0	0	0	0	
Subtotal		358.51	3.00	0.86	0.00	0.00	0.66	0.19	1.28	0.37	4.94	1.42	
Totals:		5171.81	116.50	2.28	8.00	0.16	29	0.57	65.15	1.28	218.64	4.28	

Table 2: Summary of habitat information from survey sites:

Site code	Site Name	Area Total	Grassland							ESA Agreement				Arable					
			Total	RG	SG	IG	CH	CS	SA	Tier 3b	Tier 2	Tier 1b	Tier 1a	Total	SC	SR	AC	AR	B
Cherwell catchment																			
UTT14/N01	Northbrook	12.75	40.00	0.00	12.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT14/P01	Pigeon Lock To Enslow	40.00	12.75	40.00	0.00	0.00	7.50	0.00	0.00	0.00	0.00	0.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT15/M01	Lower Heyford To Somerton	21.01	21.01	4.04	2.16	0.00	15.00	0.00	0.00	0.00	0.00	0.00	21.01	0.00	0.00	0.00	0.00	0.00	0.00
UTT16/S01	Somerton To Nell Bridge	220.39	81.29	5.64	6.16	0.00	48.20	0.00	21.29	0.00	0.80	3.30	49.18	8.09	8.09	0.00	0.00	0.00	0.00
UTT16/S02	Somerton To Nell Bridge	118.90	118.90	72.16	0.00	0.00	28.09	0.00	18.65	5.50	0.00	31.47	41.12	0.00	0.00	0.00	0.00	0.00	0.00
UTT18/G01	Grimsford To Williamscott	96.76	96.76	0.00	96.76	0.00	0.00	0.00	0.00	0.00	0.00	56.17	53.53	0.00	0.00	0.00	0.00	0.00	0.00
UTT18/G02	Grimsford To Williamscott	56.01	56.01	0.00	34.78	0.00	21.23	0.00	0.00	0.00	0.00	27.91	9.59	0.00	0.00	0.00	0.00	0.00	0.00
UTT18/G03	Grimsford To Williamscott	106.35	101.99	11.79	2.54	79.30	0.00	0.00	8.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT18/M01	Mill House Farm	30.48	30.48	0.00	30.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal		702.65	559.19	133.63	185.62	79.30	120.02	0.00	48.30	5.50	0.80	179.86	153.42	8.09	8.09	0.00	0.00	0.00	0.00
Evenlode catchment																			
UTT05/001	Ascott	18.03	18.03	18.03	0.00	0.00	0.00	0.00	0.00	0.00	1.64	13.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT09/C02	Catsham	5.42	5.54	5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT09/S01	Snipe Bog	3.45	3.45	0.00	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal		26.90	27.02	23.57	3.45	0.00	0.00	0.00	0.00	0.00	1.64	19.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Glyme catchment																			

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UTT15/R01	Radford Bridge	118.60	32.14	0.00	32.14	0.00	0.00	0.00	0.00	0.00	0.00	12.40	13.07	57.37	27.83	0.00	21.57	7.97	0.00
Subtotal		118.60	32.14	0.00	32.14	0.00	0.00	0.00	0.00	0.00	0.00	12.40	13.07	57.37	27.83	0.00	21.57	7.97	0.00
Otmoor catchment																			
utt21/001	Otmoor	980.43	980.43	650.57	0.00	0.00	270.97	0.00	58.89	339.63	165.75	83.53	21.92	0.00	0.00	0.00	0.00	0.00	0.00
UTT21/R01	Rectory Farm	27.59	27.59	0.00	27.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal		1008.02	1008.02	650.57	27.59	0.00	270.97	0.00	58.89	339.63	165.75	83.53	21.92	0.00	0.00	0.00	0.00	0.00	0.00
Ray catchment																			
UTT22/M01	Manor Farm	30.48	30.48	0.00	0.00	0.00	30.48	0.00	0.00	0.00	0.00	26.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT22/W01	Wendlebury	73.11	73.11	52.85	0.00	20.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT23/A01	Astley Bridge Farm	61.34	38.60	18.37	0.00	20.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.74	0.00	0.00
UTT23/H01	Fencott	48.59	48.59	0.00	27.87	0.00	20.72	0.00	0.00	0.00	0.00	0.00	48.59	0.00	0.00	0.00	0.00	0.00	0.00
UTT23/H02	Four Winds	53.57	24.16	0.00	0.00	0.00	21.96	0.00	2.20	3.50	0.00	0.00	22.18	29.41	0.00	0.00	0.00	29.41	0.00
UTT24/B01	Three Points	42.23	42.23	21.49	0.00	0.00	20.74	0.00	0.00	0.00	0.00	41.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/C01	Cow Leys	45.67	45.67	0.00	45.67	0.00	0.00	0.00	0.00	40.94	0.00	0.00	3.07	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/E01	Essex Farm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/F01	Folly Farm	74.10	74.10	10.28	63.82	0.00	10.28	0.00	0.00	0.00	0.00	74.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/G01	Grendon Underwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/G02	Gallows Bridge	44.14	44.14	0.00	26.97	17.18	0.00	0.00	0.00	0.00	0.00	44.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/G03	Gallows Bridge	33.02	33.02	0.00	16.02	0.00	17.00	0.00	0.00	8.27	0.00	6.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/G044	Ewelme Farm	159.00	159.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.34	0.00	0.00	0.00	0.00	0.00
UTT24/L01	Levereta	116.77	91.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/L02	Ludgerhall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/L03	Lower Arncot	62.42	62.42	15.34	47.08	0.00	0.00	0.00	0.00	23.03	0.00	0.00	31.26	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/L04	Ludgerhall Green	43.95	43.95	0.00	43.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.95	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/O01	Oakapple Farm	51.74	42.34	5.70	25.34	0.00	0.00	0.00	11.30	9.04	0.00	10.45	0.00	9.41	0.00	0.00	9.41	0.00	0.00
UTT24/P01	Piddington	19.07	19.07	0.00	19.07	0.00	19.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal		959.21	872.32	124.03	315.79	57.67	140.25	0.00	13.50	84.78	0.00	203.74	149.05	64.16	0.00	0.00	32.15	29.41	0.00
Thames catchment																			
UTT03/G01	Grafton Lock	57.09	57.09	0.00	28.59	28.50	0.00	0.00	0.00	12.66	0.00	0.00	45.33	0.00	0.00	0.00	0.00	0.00	0.00
UTT03/K01	Kelmscot	242.00	171.76	0.00	29.88	83.84	0.00	0.00	58.04	2.25	0.00	0.00	44.08	14.15	0.00	0.00	14.15	0.00	0.00
UTT03/O01	Spotted Cow	81.28	81.28	0.00	49.36	0.00	31.92	0.00	0.00	32.12	0.00	56.76	9.36	0.00	0.00	0.00	0.00	0.00	0.00
UTT03/R01	Radcot Bridge	61.90	48.15	0.00	39.25	0.00	0.00	0.00	0.00	8.90	0.00	0.00	0.00	13.75	13.75	0.00	0.00	0.00	0.00

UTT06/B01	Burrowmay Meadows	179.60	179.60	0.00	125.85	0.00	14.75	39.00	0.00	80.53	0.00	14.75	27.74	0.00	0.00	0.00	0.00	0.00	0.00
UTT06/C01	Chimney Meadows	208.40	208.40	0.00	0.00	0.00	42.56	0.00	165.84	58.53	21.21	88.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT06/S01	Shifford (South)	137.10	75.14	0.00	0.00	0.00	0.00	75.14	0.00	75.14	32.80	0.00	0.00	61.96	37.38	0.00	0.00	0.00	24.60
UTT06/s02	Standlake Common	93.24	42.11	0.00	42.11	0.00	11.11	0.00	0.00	6.78	0.00	6.63	0.00	6.98	0.00	0.00	0.00	0.00	6.98
UTT06/T01	Tadpole Bridge	100.17	80.27	30.00	0.00	6.66	0.00	0.00	43.62	4.19	0.00	0.00	19.23	19.90	0.00	0.00	19.90	0.00	0.00
UTT07/F01	Farmoor	13.61	13.61	0.00	0.00	0.00	0.00	0.00	13.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT07/S01	Stanton	82.50	69.85	8.18	42.05	13.78	0.00	0.00	5.85	20.44	0.00	28.03	0.00	10.61	0.00	0.00	10.61	0.00	0.00
UTT07/S02	Beard Mill	22.85	22.85	0.00	22.85	0.00	0.00	0.00	0.00	0.00	0.00	22.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT07/S03	Broad Bridges	23.94	23.94	0.00	23.94	0.00	0.00	0.00	0.00	0.00	0.00	4.19	23.94	0.00	0.00	0.00	0.00	0.00	0.00
UTT11/N01	Northmoor	97.10	58.85	0.00	30.93	0.00	27.92	0.00	0.00	4.39	0.00	5.69	50.51	35.57	8.88	0.00	26.69	0.00	0.00
UTT12/L01	Hinksey	122.19	122.19	0.00	50.19	0.00	72.00	0.00	0.00	21.84	0.00	24.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT12/P02	Portmeadow	206.10	206.10	0.00	206.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT12/S01	Swinford	96.00	96.00	3.00	20.00	73.00	0.00	0.00	0.00	63.61	0.00	21.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT12/W01	Wytham	47.49	47.49	0.90	0.00	0.00	5.42	0.00	0.00	0.00	0.00	0.00	16.42	0.00	0.00	0.00	0.00	0.00	0.00
	North Lease	125.36	91.20	58.80	0.00	17.26	0.00	15.09	0.00	0.00	0.00	0.00	0.00	34.16	23.38	0.00	0.00	0.00	10.78
	Subtotal	1997.91	1695.88	100.87	711.10	223.03	205.67	129.23	286.95	391.38	54.01	274.18	236.60	197.08	83.39	0.00	71.35	0.00	42.36
Windrush catchment																			
UTT01/S01	Sherbourne	104.92	104.92	17.48	58.86	0.00	35.18	0.00	0.00	45.07	0.00	36.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT02/N01	New Bridge	44.68	44.68	11.28	0.00	0.00	33.40	0.00	0.00	8.76	10.24	20.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT04/s01	Swinbrook	9.38	9.38	0.00	9.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT08/C01	Crawley Meadows	59.43	59.43	59.43	0.00	0.00	0.00	0.00	0.00	7.57	22.71	22.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT08/M01	Minster Lovell	72.95	72.95	61.82	0.00	0.00	11.13	0.00	0.00	0.00	0.00	7.17	3.24	0.00	0.00	0.00	0.00	0.00	0.00
UTT12/B01	Blenheim Estate	59.43	59.43	21.91	0.00	22.02	0.00	15.50	0.00	0.00	0.00	0.00	16.80	0.00	0.00	0.00	0.00	0.00	0.00
UTT12/B02	Oxey Mead	7.73	7.73	7.73	0.00	0.00	0.00	0.00	0.00	0.00	7.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	358.51	358.51	179.66	68.24	22.02	79.71	15.50	0.00	61.40	40.68	86.81	20.04	0.00	0.00	0.00	0.00	0.00	0.00
Totals:		5171.80	4553.07	1212.33	1343.93	382.03	816.62	144.73	407.64	882.68	262.87	859.96	594.10	326.69	119.31	0.00	125.06	37.38	42.36

Table 3 summary of habitat features for sites surveyed

Site code	Site name	Tussocks		Wetness						Standing Water					
		Area	%	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3
Cherwell catchment															
UTT14/N01	Northbrook	1.15	0.03	12.75	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT14/P01	Pigeon Lock to Enslow	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT15/M01	LOWER HEYFORD TO SOMERTON	0.28	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT16/S01	Somerton to Nell Bridge	4.86	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT16/S02	Somerton to Nell Bridge	1.19	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT18/G01	Grimsford to Williamscott	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT18/G02	Grimsford to Williamscott	2.10	0.05	18.85	0.41	7.52	0.17	7.52	0.17	1.89	0.04	0.75	0.02	0.75	0.02
UTT18/G03	Grimsford to Williamscott	2.36	0.05	12.04	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT18/M01	MILL HOUSE FARM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal		11.97	0.26	43.64	0.96	7.52	0.17	7.52	0.17	1.89	0.04	0.75	0.02	0.75	0.02
Evenlode catchment															
UTT05/001	Ascott	0.50	0.01	5.02	0.11	5.02	0.11	18.03	0.40	0.05	0.00	0.05	0.00	3.31	0.07
UTT09/C02	CATSHAM	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT09/S01	SNIPE BOG	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal		0.68	0.01	5.02	0.11	5.02	0.11	18.03	0.40	0.05	0.00	0.05	0.00	3.31	0.07
Glyme catchment															
UTT15/R01	Radford Bridge	0.00	0.00	30.75	0.68	30.75	0.68	0.00	0.00	3.75	0.08	3.75	0.08	0.00	0.00
Subtotal		0.00	0.00	30.75	0.68	30.75	0.68	0.00	0.00	3.75	0.08	3.75	0.08	0.00	0.00
Otmoor catchment															
utt21/001	OTMOOR	60.83	0.00	733.30	16.11	717.62	15.76	224.28	4.93	131.62	2.89	96.85	2.13	71.26	1.57
UTT21/R01	Rectory Farm	2.31	0.05	23.96	0.53	23.96	0.53	0.00	0.00	2.35	0.05	1.00	0.02	0.50	0.01
Subtotal		63.13	0.05	757.26	16.63	741.58	16.29	224.28	4.93	133.97	2.94	97.85	2.15	71.76	1.58
Ray catchment															
UTT22/M01	MANOR FARM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT22/W01	WENDLEBURY	1.42	0.03	73.11	1.61	23.46	0.52	0.00	0.00	6.71	0.15	2.24	0.05	0.00	0.00
UTT23/A01	Astley Bridge Farm	3.66	0.08	7.52	0.17	0.00	0.00	0.00	0.00	3.19	0.07	3.19	0.07	3.19	0.07
UTT23/H01	Fencott	0.12	0.00	48.59	1.07	1.35	0.03	1.35	0.03	3.40	0.07	0.03	0.00	0.03	0.00
UTT23/H02	Four Winds	1.10	0.02	53.57	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/B01	Three Points	2.12	0.05	42.23	0.93	0.00	0.00	0.00	0.00	8.45	0.19	2.12	0.05	0.00	0.00
UTT24/C01	Cow Leys	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

UTT24/E01	Essex Farm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/F01	FOLLY FARM	2.85	0.06	74.10	1.63	10.07	0.22	0.00	0.00	74.10	1.63	10.07	0.22	0.00	0.00
UTT24/G01	Grendon underwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/G02	Gallows Bridge	5.18	0.11	44.14	0.97	0.00	0.00	0.00	0.00	3.16	0.07	0.00	0.00	0.00	0.00
UTT24/G03	Gallows Bridge	0.00	0.00	16.51	0.36	16.51	0.36	0.00	0.00	8.26	0.18	4.95	0.11	1.00	0.02
UTT24/G044	Ewelme Farm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/L01	Levereta	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/L02	Ludgerhall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/L03	Lower Amcot	7.16	0.16	8.95	0.20	8.95	0.20	0.00	0.00	1.62	0.04	1.62	0.04	0.00	0.00
UTT24/L04	Ludgerhall Green	8.80	0.19	43.95	0.97	18.14	0.40	7.39	0.16	6.91	0.15	1.35	0.03	0.00	0.00
UTT24/O01	Oakapple farm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT24/P01	Piddington	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal		32.40	0.71	412.67	9.06	78.47	1.72	8.74	0.19	115.79	2.54	25.56	0.56	4.22	0.09
Thames catchment															
UTT03/G01	Grafton Lock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT03/K01	Kelmscot	0.03	0.00	19.73	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT03/O01	Spotted Cow	0.00	0.00	56.48	1.24	0.00	0.00	20.24	0.44	17.37	0.38	0.00	0.00	0.00	0.00
UTT03/R01	Radcot Bridge	0.00	0.00	5.40	0.12	0.00	0.00	0.00	0.00	0.88	0.02	0.00	0.00	0.00	0.00
UTT06/B01	Burrowmay Meadows	0.00	0.00	5.67	0.12	5.67	0.12	5.67	0.12	0.00	0.00	0.00	0.00	0.00	0.00
UTT06/C01	Chimney Meadows	25.65	0.56	28.13	0.62	0.00	0.00	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.00
UTT06/S01	Shifford (South)	29.12	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT06/s02	Standlake Common	0.00	0.00	28.29	0.62	28.29	0.62	28.29	0.62	28.29	0.62	28.29	0.62	28.29	0.62
UTT06/T01	Tadpole Bridge	3.16	0.07	32.28	0.71	18.03	0.40	0.00	0.00	11.24	0.25	1.80	0.04	0.00	0.00
UTT07/F01	Farmoor	4.80	0.11	6.72	0.15	6.72	0.15	6.72	0.15	5.72	0.13	5.72	0.13	5.70	0.13
UTT07/S01	Stanton	0.29	0.01	82.50	1.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT07/S02	Beard Mill	1.70	0.04	8.43	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT07/S03	Broad Bridges	6.44	0.14	0.00	0.00	23.94	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT11/N01	Northmoor	7.88	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT12/L01	Hinksey	10.71	0.24	122.19	2.68	0.00	0.00	0.00	0.00	6.02	0.13	0.00	0.00	0.00	0.00
UTT12/P02	Portmeadow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.61	0.45	20.61	0.45	0.00	0.00
UTT12/S01	Swinford	1.92	0.04	0.00	0.00	0.00	0.00	0.00	0.00	9.60	0.21	9.60	0.21	9.60	0.21
UTT12/W01	Wytham	0.31	0.01	6.42	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.01	0.00	0.00
	North Lease	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal		92.01	2.02	402.23	8.83	82.64	1.82	60.92	1.34	99.78	2.19	66.32	1.46	43.59	0.96
Windrush catchment															
UTT01/S01	Sherbourne	21.47	0.47	77.02	1.69	0.00	0.00	0.00	0.00	7.72	0.17	0.00	0.00	0.00	0.00

Upper Thames Tributaries Wader Survey 2005

UTT02/N01	New Bridge	8.57	0.19	42.76	0.94	17.09	0.38	11.61	0.25	1.16	0.03	0.23	0.01	0.00	0.00
UTT04/s01	Swinbrook	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT08/C01	Crawley Meadows	8.75	0.19	11.17	0.25	6.57	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT08/M01	Minster Lovell	4.87	0.11	15.71	0.35	8.58	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT12/B01	Blenheim estate	0.24	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTT12/B02	Oxey Mead	2.71	0.06	0.00	0.00	7.73	0.17	0.00	0.00	0.00	0.00	1.55	0.03	1.55	0.03
	Subtotal	46.60	1.02	146.66	3.22	39.97	0.88	11.61	0.25	8.88	0.20	1.78	0.04	1.55	0.03
	Totals:	246.79	4.08	1798.24	39.50	985.95	21.65	331.09	7.27	364.11	8.00	196.06	4.31	125.17	2.75

Appendix 6: Other bird data

During the survey, the presence or absence of priority farmland bird species other than waders of conservation concern were recorded. The species recorded were skylark, yellowhammer, reed bunting, turtle dove, corn bunting, grasshopper warbler, linnets, bullfinch, tree sparrow, grey partridge and yellow wagtail. These species were chosen due to their status as species of conservation concern (Gregory *et al* 2001) and form part of a suite of priority farmland birds for RSPB conservation action.

Skylark, yellowhammer and reed bunting were the most common species recorded on all catchments while grasshopper warbler, turtle dove and grey partridge were the least recorded species, only being recorded on three catchments.

Of the three main species associated with wet grasslands (reed bunting, skylark and yellow wagtail), only the Otmoor basin, the Cherwell and the Thames floodplains had all three species recorded on them. Sherbourne Estate and Burrowmay Meadows had the most species recorded with nine, with eight species recorded on Otmoor.

Upper Thames Tributaries Wader Survey 2005

Site code	Site Name	Yellowhammer	Linnet	Corn bunting	Tree sparrow	Reed bunting	Grey partridge	Bullfinch	Turtle dove	Skylark	Grasshopper warbler	Yellow wagtail	Total no. of species
Cherwell catchment													
14/N01	Northbrook	y	y			y		y		y			2
UTT14/P01	Pigeon Lock To Enslow	y	y							y			1
15/M01	Lower Heyford To Somerton	y	y	y		y				y		y	2
UTT16/S01	Somerton To Nell Bridge	y				y				y			1
UTT16/S02	Somerton To Nell Bridge	y				y				y			1
UTT18/G01	Grimsford To Williamscott	y	y		y	y				y			1
UTT18/G02	Grimsford To Williamscott	y			y	y				y		y	2
UTT18/G03	Grimsford To Williamscott	y				y		y		y	y	y	4
UTT18/M01	Mill House Farm									y			1
Evenlode catchment													
05/A01	Ascott					y							0
UTT09/C01	Catsham					y				y			1
UTT09/S01	Snipe Bog									y			1
Glyme catchment													
15/R01	Radford Bridge	y					y			y		y	3
Upper Ray catchment													
UTT22/M01	Manor Farm	y	y			y	y				y		2
UTT22/W01	Wendlebury	y	y					y		y			2
UTT23/A01	Astley Bridge Farm	y			y	y	y			y			2
UTT23/H01	Fencott	y	y			y		y		y			2
UTT23/H02	Four Winds	y								y			1
UTT24/B01	Three Points	y	y			y				y			1
UTT24/C01	Cow Leys							y		y			2
UTT24/E01	Essex Farm									y			1
UTT24/F01	Folly Farm									y			1
UTT24/G02	Gallows Bridge	y	y	y	y	y		y		y			2
UTT24/L01	Levereta	y	y			y	y	y		y			1
UTT24/L03	Lower Arcot	y				y				y			1
UTT24/L04	Ludgerhall Green					y				y			1

UTT24/L04	Ludgerhall Green					y				y											1
UTT24/O01	Oakapple farm	y	y			y		y		y		y									2
UTT24/P01	Piddington	y										y									1
Otmoor Basin																					
UTT21/001	Otmoor	y	y			y		y		y		y		y						y	3
UTT21/R01	Rectory farm	y	y			y	y					y									1
Thames catchment																					
UTT03/001	Spotted Cow	y				y		y				y									1
UTT03/G01	Grafton Lock	y										y									1
UTT03/K01	Kelmscot				y	y															0
UTT03/R01	Radcot Bridge	y							y					y							1
UTT06/B01	Burrowmay Meadows	y	y	y	y	y		y		y		y								y	2
UTT06/C01	Chimney Meadows	y	y			y		y				y									1
UTT06/S01	Shifford (South)	y	y			y		y				y									1
UTT06/s02	Standlake Common		y			y															0
UTT06/T01	Tadpole Bridge	y				y						y									1
UTT07/S01	Stanton	y				y						y									1
UTT07/S02	Beard Mill	y				y						y									1
UTT07/S03	Broad Bridges	y	y			y						y									1
UTT11/N01	Northmoor	y	y			y						y								y	2
UTT12/L01	Hinksey					y						y									1
UTT12/P02	Portmeadow											y									1
UTT12/S01	Swinford	y	y									y									1
UTT12/W01	Wytham	y	y									y									1
Windrush catchment																					
01/S01	Sherbourne	y	y	y	y	y	y	y	y	y	y	y									1
UTT02/N01	New Bridge					y															0
04/S01	Swinbrook																				0
08/C01	Crawley Meadows	y	y			y						y									1
UTT08/M01	Minster Lovell	y				y			y			y									1
12/B01	Blenheim	y										y									1
12/B02	Oxey Mead											y									1
Total no of sites:		39	23	5	6	37	9	13	4	49	4	7									

Appendix 7: Changes in the wader population 1982 – 2005 including all BWWMS sites

SITE DETAILS		BREEDING POPULATIONS																			
Code	Name	LAPWING					SNIPE					REDSHANK					CURLEW				
		Est. no. pairs					No. drummers					Est. no. pairs					Est. no. pairs				
		1982	1989	1994	1997	2005	1982	1989	1994	1997	2005	1982	1989	1994	1997	2005	1982	1989	1994	1997	2005
THAMES VALLEY:																					
UTT03/K01	Kelmscott			8	3.5	1						?		1			?				1.34
UTT03/G01	Grafton Lock					0													1	1	1.18
UTT03/R01	Radcot Bridge					0															0.05
UTT03/R02	Radcot Lock					0															
UTT06/O01	Old Man's Bridge				1	0						?			0.3		?		1		0.5
UTT06/B01	Burrowmay Meadows	7			0.5	0					7				0.3		2		5	1	15.1
UTT06/C01	Chimney Meadows	42	13		0.5	0.5	1	2			7	5					2	5	2	1	3.89
UTT06/S01	Shifford (South)					5															0
UTT06/S02	Standlake Common			21	2.5	2.5								6	1.5	1			1		0
UTT11/N01	Northmoor	3			1.5	0					1										0
UTT12/P01	Pinkhill Meadows NR	2		2		2					1			3							0
UTT12/S01	Swinford	1	1		1	0							1						1		0
UTT12/C01	Cassington Meadows	8	3	2	3	0					1										1
UTT12/W01	Wytham					0															0
UTT12/P02	Port Meadow					0.5									0.5						0
UTT13/P01	Pixey and Yarnton Meads	2				0											2		4	2	
Sub totals		65	17	33	13.5	11	1	2			19	6	10	1.5	2.1		8	5	14	6	23.06
WINDRUSH VALLEY:																					
UTT02/N01	New Bridge			1	0.5	1		1							0.3						1.28
UTT01/S01	Sherbourne Estate		6	12	2	0		1		1			1	2.5	2						
UTT04/B01	Barrington Marshes			1		0		1							1						
UTT04/S01	Swinbrook					0					?										
UTT08/M01	Minster Lovell	3	1	1	1	2	8	1	3	1				3		0.3					
UTT08/C01	Crawley Meadows	8				0	3	1			4										
Sub totals		11	8	14	3.5	3	11	5	3	2	0	5	1	5.5	3	0.6					1.28
EVENLODE VALLEY:																					
UTT09/S01	Snipe Bog						?														

UTT09/C02	Catsham																				
UTT13/G01	Grindleyhill Bridge																				
Sub totals																					
GLYME VALLEY:																					
UTT15/R01	Radford Bridge																				
UTT14/W01	Wotton																				
UTT14/W02	Woodstock Meadows																				
Sub totals																					
CHERWELL VALLEY:																					
UTT18/T01	Trafford																				
UTT18/G01	Grimsbury to Williamscott	7	?	3	1.5	3															
UTT16/S01	Somerton to Nell Bridge																				
UTT15/H01	Heyford to Somerton																				
UTT14/N01	Northbrook																				
UTT14/P01	Pigeon Lock to Enslow																				
Sub totals		7		3	1.5	3															
UPPER RAY VALLEY:																					
UTT21/M01	Merton Pit																				
UTT24/L01	Lower Arncott																				
UTT24/L02	Launton Meadows																				
UTT24/L03	Leaches Farm																				
UTT24/G01	Grendon Underwood																				
UTT24/G02	Grange Farm																				
Sub totals		1		2		1															
OTMOOR:																					
UTT21/O01	Otmoor (North)																				
UTT21/O02	Otmoor (South)																				
		3	7	17	25	68	8	11	17	6	8	0	0	3	4	29	5	3	6	6	19.63
TOTALS	no. of sites	12	8	11	15	11	13	9	5	4	2	10	3	8	4	8	10	4	10	9	11
TOTALS	TOTALS	87	32	69	44.5	85	28	20	23	9	8	25	7	19.5	8.5	31.7	18	10	23	15	54.28

Appendix 7: Map of Key Areas:

