

North Thames Estuary and Marshes – Breeding bird survey 2024

February 2026

Natural England Commissioned Report NECR631

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Catalogue code: NECR631

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Keywords

Territorial behaviour, Breeding Birds, North Thames, Lowland Scrub, Open Water, Estuary, Thames

Acknowledgements

Natural England would like to thank all the landowners of the survey area for providing access and related assistance.

Citation

David Darrell-Lambert. 2024. North Thames Marshes and Estuary – Breeding birds survey 2024. *Natural England Commissioned Report* NECR631. Natural England.

Foreword

Bird Brain UK Ltd was commissioned by Natural England to undertake a breeding bird survey to update the evidence relating to the status of breeding birds within the study area around the Mucking Flats and Marshes Site of Special Scientific Interest (SSSI). The study area covered the majority of breeding bird habitats between Mucking village in the north-east, through Coalhouse Fort at the bend of the river, to the Tilbury Cruise Terminal in the south-west. The aim of the survey evidence collected is to inform proposals to enlarge the Mucking Flats and Marshes SSSI. The report does not itself make a case for notification, rather it provides an objective record of survey findings to support Natural England's independent assessment of special interest.

The locations of the nesting sites of some species (including those listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended), and selected others) have been redacted to protect them from disturbance.¹

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

¹ Regulation 12(5)(g) of the Environmental Information Regulations 2004.

These species are afforded the highest level of legal protection available to wild birds, being listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended). They are at risk from disturbance. Nests are also sometimes targeted by criminals wishing to obtain eggs for their illegal collections. To release and subsequently place into the public domain the location details of schedule 1 species' nesting site would place this site at risk of disturbance or deliberate interference.

In applying this exception, we have had to balance the public interest in withholding the information against the public interest in disclosure. Whilst Natural England believes in openness and transparency, as a public body, Natural England has a duty to protect the nesting sites of species vulnerable to disturbance or persecution. It is not in the public interest for the location of nest sites of vulnerable species to be publicised as that could lead to these nesting sites being adversely affected.

We feel there is little public interest in releasing this information and we believe that these are legitimate reasons to allow Natural England to engage this exception and withhold the information

Executive summary

Bird Brain UK Limited was commissioned to carry out a breeding birds survey across the North Thames Estuary and Marshes. The area covered was from Mucking village in the north to Tilbury Fort in the south. Sixty-one survey visits were completed from February to July 2024 comprising of 24 long-eared Owl survey visits and 37 breeding bird survey visits. The majority of the survey area was covered by six breeding birds survey visits per compartment with only a few areas where this was not possible (access limitations being the issue).

129 species were recorded of which 75 were 'confirmed' or 'probable' breeders, including eight Schedule 1 listed species (barn owl, Cetti's warbler, kingfisher, little ringed plover, peregrine, hobby, bearded tit and black redstart). 35 target species were recorded breeding which are detailed in the report in the Bird Population species section. Nationally important numbers of Cetti's warbler were located with 176 pairs which is equal to 5.1% of the UK population (this excluded an additional 42 'possible' breeding pairs, which would (if included) increase this to 6.3%. Pochard numbers are also significant with 4.5% of the GB population. Pochard (Common Pochard) is listed on IUCN as vulnerable and decreasing and therefore the population here is also of global significance (International Union for Conservation of Nature and Natural Resource, 2025).

The rich diversity and abundance of species reflect the mixture of habitats present and that the majority of the site is undisturbed. The large amount of wetland habitat with mixed scrubland nearby explains the high numbers of Cetti's warblers present.

The largest total number of any individual species counted was (non-breeding) black-tailed godwit with 9,044 from 8 dates from late March to late April. The single largest count was 3,940 on 18th April which represents 10.1% of the UK wintering population (Woodward. I, Aebischer. N, Burnell. D, Easton. M, Forst. T, Hall. C, Stroud. D and Noble. D 2020). This illustrates the importance of the mudflats as a feeding area of migrant waders in the area.

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Introduction

The aim of the survey was to update the evidence of the status of breeding birds within the study area. This is to inform Natural England's considerations regarding notification of the area (or parts of it) as an extension to the existing Mucking Flats and Marshes Site of Special Scientific Interest (SSSI) under Section 28C of the Wildlife and Countryside Act 1981. The Mucking Flats and Marshes SSSI is also part of the Thames Estuary and Marshes Special Protection Area (SPA).

The current land usage varies from conservation management to private ownership, of which there are several industrial areas, including for the extraction of coal ash. The area is dissected by various waterways and several vegetation-fringed waterbodies. Large sections are covered by extensive undisturbed areas of grassland and scrub habitat, mostly on restored landfill/quarry. The edges are bordered by intertidal mudflats and saltings. Remaining habitats include coastal grasslands, fen and several pockets of woodland.

Methods

Breeding birds

The site was surveyed from March to July 2024, with six visits (no closer than ten days apart) starting one hour before sunrise (or when the first signs of territorial behaviour were noted) and completed within six hours approximately. The start times varied with weather conditions as birds will sing at their earliest during bright cloudless dawns. The surveys only continued up to this duration whilst territorial behaviour was still at its peak. When it curtailed then the survey would finish earlier. All birds were recorded and mapped with their behaviour noted. The objective was to record evidence of breeding. Standard breeding status codes were used to define breeding activity (see appendix 5). Age and sex were also recorded, including for young birds.

All transects, where physically possible, were close enough to suitable habitat to ensure all species could be heard. Areas of high-quality habitat or density of pairs received greater coverage than e.g. bare arable farmland with little or no bird activity. Surveys were completed in optimum field conditions (little or no wind or rain). The species were prioritised according to their conservation status and if they were target species (with reference to the survey specification). BTO species codes were used to log the species' vocalisations (see appendix 6).

Surveyors carried passive recorders during the majority of surveys and also parabolic recording equipment to record rare or unusual observations.

The categorisation of breeding status was based on factors such as birds constantly holding territory, second birds present indicating a pair, anxious behaviour, nesting

material being carried or nest building, copulation and or the presence of recently fledged young, this is not an exclusive list of behavioural traits. This enabled the data to be split into 'confirmed', 'probable' or 'possible' breeding pairs, in line with the standard breeding status definitions. Birds building nests, copulating, carrying food to nests, occupied nests and or fledged young were assigned as 'confirmed' pairs for example. Where birds were on territory singing or displaying from the same location on two or more visits, these were recorded as 'probable' breeding pairs. Any birds singing or displaying on just one occasion were considered only as 'possible' breeders. These were expected to be wandering, unpaired birds.

Therefore, for example, a population estimate of 20 to 25 pairs represents 20 pairs either 'confirmed' to be breeding or 'probable' breeders and an additional 5 'possible' pairs. The productivity of each pair was not estimated as this would be impractical and likely impossible for some species or pairs.

Long-eared Owl survey

Long-eared owl (LE) surveys were completed at dusk with all other target species records also mapped but these were not the primary focus. Thermal image cameras were used to locate both perched and feeding birds. As with the breeding bird surveys, passive recorders and a parabolic dish were used for evidence gathering and as a back up to primary methods. These surveys started an hour before sunset at the latest and ran for up to four hours. Any additional areas were also checked where weather permitted extra surveys. The four key factors to determine an area's suitability for LE were:

1. Scrub or copse for nesting in;
2. Long grassland nearby for feeding;
3. Livestock close by; and
4. Close proximity to a body of water (as per long term monitoring in southern England) (Green & Green, 2012).

During all breeding bird surveys, areas that included long-eared owl habitat or where they had been heard or seen, were surveyed first to encapsulate any long-eared owl that may still be vocal. This also included surveys which covered the timeframe when young birds should be out calling (Green & Green, 2012).

Results

Breeding bird survey

During the survey, 128 species of bird were recorded of which 75 species were either 'confirmed' or 'probable' breeders. Bird populations were calculated for 36 species: greylag goose, mute swan, shelduck, shoveler, gadwall, teal, pochard, tufted duck, cuckoo, stock dove, water rail, little grebe, great crested grebe, lapwing, ringed plover,

little ringed plover, redshank, long-eared owl, kingfisher, jay, bearded tit, Cetti's warbler, long-tailed tit, sedge warbler, reed warbler, grasshopper warbler, lesser whitethroat, goldcrest, nightingale, yellow wagtail, grey wagtail, linnet, corn bunting, reed bunting, stonechat and hobby.

Bird Populations

The table below lists all the target species that were confirmed or probably breeding, consistent with the standard breeding status definitions e.g. young located, active nests, nest building, adults carrying food to nests, adult copulating or birds on territory. The highest level of breeding evidence is recorded in the notes section.

Table 1: Target breeding species population sizes.

Cells left blank where no species were recorded.

Species confirmed as breeding	BTO code	Confirmed pairs	Probable pairs	Possible pairs	Notes
Greylag Goose	GJ	6	9		Fledged broods recorded
Mute Swan	MS	4	1	2	Fledged broods recorded
Shelduck	SH	6	40		Fledged broods recorded
Shoveler	SV	2	2		Nest site located
Gadwall	GA	1	16	7	Fledged broods recorded
Teal	T.	1		4	Nest site located
Pochard	PO	10	21	14	Fledged broods recorded
Tufted Duck	TU	2	47	2	Fledged broods recorded
Cuckoo	CK		15	4	Bonded pairs seen and males consistently holding territory
Stock Dove	SD		13	15	Territorial birds continuously present
Water Rail	WA	1	2	10	Fledged broods recorded
Little Grebe	LG	7	12	12	Fledged broods recorded
Great Crested Grebe	GG	4	3	2	Fledged broods recorded
Lapwing	L.		4		Bonded pairs on display flight
Ringed Plover	RP	1		2	Observed doing distraction display
Little Ringed Plover	LP	1	4		Fledged broods recorded

Species confirmed as breeding	BTO code	Confirmed pairs	Probable pairs	Possible pairs	Notes
Redshank	RK	2	1	1	Bonded pairs giving distress calls when predators were present
Long-eared Owl	LEO		3		Territorial pairs with both male and female calls
Kingfisher	KF	1	1		Fledged broods recorded
Bearded Tit	BR	1		1	Fledged broods recorded
Jay	J.		4		Territorial birds continuously present
Cetti's Warbler	CW	3	173	42	Fledged broods recorded
Long-tailed Tit	LT	16	11	6	Fledged broods recorded
Sedge Warbler	SW		31	60	Territorial birds continuously present
Reed Warbler	RW	6	92	170	Fledged broods recorded
Grasshopper Warbler	GH		7	11	Territorial birds continuously present
Lesser Whitethroat	LW		30	35	Territorial birds continuously present
Goldcrest	GC		1	1	Territorial birds continuously present
Nightingale	N.		52	45	Territorial birds continuously present
Yellow Wagtail	YW		2		Territorial birds continuously present
Grey Wagtail	GY	2	1		Fledged broods recorded
Linnet	LI	2	67	69	Fledged broods recorded
Corn Bunting	CB	3	30	8	Nest building recorded.
Reed Bunting	RB		7	26	Territorial birds continuously present
Stonechat	SC	2	2	3	Territorial birds continuously present
Hobby	HY		1		Displaying pair

‘Possible’ breeding species

Two more species were recorded as ‘possible’ breeders, using the standard breeding status definitions, on the site. Some of these may have bred in the survey area, but this was not either probable or confirmed and they may have bred outside the survey area.

Table 2: Possible breeding species recorded during the survey.

Species	BTO code	Maximum count	Reason for not probable or confirmed breeding
Buzzard	BZ	5	Frequently seen but no nests were located. Initial observations indicated they might be breeding at L11 Coalhouse Battery but subsequent visits did not confirm this.
Lesser Redpoll	LR	1	One was in song flight on 29 th March at C5 Mucking Landfill West over the scrub. It was not recorded subsequently and hasn't been recorded breeding in Essex in recent years. Probably just a migrant singing.

For each recorded species there is a breeding status map showing their locations within the survey area, these can be found in appendix 3.

Greylag Goose

During the surveys six pairs were confirmed to be breeding and nine were probable breeders. These were all focused around the northern waterbodies with the majority around Golden Gate Lake except for two pairs on Tilbury Fort Marshes. They were recorded across the site and will breed some distance from waterbodies, however locating nest sites can be very difficult with pairs remaining tight on a nest whilst people pass by in close proximity (per author's observations).

The total number of confirmed and probable breeding records for greylag goose is therefore 15 pairs. As no 'possible' breeding species were recorded, the population estimate is 15 pairs.

Mute Swan

Four pairs successfully fledged young across the site. They were located on the large waterbodies present at Wharf Road Fisheries (west), Golden Gate Lake, East Tilbury

Quarry Scrape and Goshem's Pool. An additional pair was also present on Wharf Road Fisheries (east).

The total number of confirmed and probable breeding records for Mute Swan is therefore five pairs. The population estimate is five-seven pairs.

Shelduck

The surveys confirmed six pairs and a further 40 probable breeding pairs. With the species' preference to nest in rabbit burrows and in dense vegetation, confirming breeding requires observations of fledged young. The high number of probable pairs without fledged young subsequently observed, may reflect the lack of food available during the spring, prolific predation and/or issues with high water levels which may have flooded out their nests. Their distribution was widespread reflecting the abundance of nesting habitat for this species across the site.

The total number of confirmed and probable breeding records for shelduck is therefore 46 pairs. The population estimate is 46 as no additional 'possible' records were made.

Mareca, Anas, Spatula and Aythya species of duck

The following species of duck, are likely to have been under-recorded as it is hard to confirm they are breeding as the main evidence is fledged young. This requires the young to be alive and in view during the surveys. Nests are normally difficult to locate, and some individuals will not move when someone passes close by. Population estimates are therefore frequently unrecorded due to high mortality rates and weather conditions which may decrease success rates (e.g. cold weather and prolonged periods of rain which can decimate recently fledged ducklings). With all species the total number includes confirmed and probable numbers. The total population is correct whilst the confirmed number is likely to be under recorded. Bonded pairs frequenting the same areas were recorded as probable pairs (Gilbert, Gibbons & Evan, 1998; Castell, Ferguson-Lees & Leech 2011).

Shoveler

Two pairs of shoveler were confirmed with females either using distraction display or flying up from nests sites. Both were in the same ditch running north from the East Tilbury Quarry Scrape or the lake due north of here. Another two probable pairs were thought to have attempted to breed on the East Tilbury Quarry Scrape.

The total number of confirmed and probable breeding records for Shoveler is therefore four pairs. The population estimate is four pairs as no additional 'possible' records were made.

Gadwall

One pair were confirmed to be breeding, and 16 pairs were probable breeders. A female was seen with two recently fledged young (a week old) on 19th April. This was in an area where no other signs of breeding were observed for this species, highlighting the difficulties of surveying breeding ducks. A further 16 pairs were recorded across the site with the majority on, or besides, the large waterbodies on the site. The highest concentration was at the scrape on the East Tilbury Quarry section with four pairs.

The total number of confirmed and probable records for gadwall is therefore 17 pairs. The population estimate is 17-24 pairs.

Teal

One female teal was disturbed from the reedbed on the lake north of the East Tilbury Quarry Scrape on 30th March. It used the distraction display method to draw the observer away from the nest site. The same, or another female teal, was flushed from the same area on 18th June. The bird was reluctant to leave the area staying close to the reedbed. Both behaviours are indicative of birds with active nests or young. To minimise disturbance no nest was searched for.

The total number of confirmed and probable records for teal is therefore one pair. The population estimate is one pair, as no additional 'possible' records were made.

Pochard

Across the survey area ten pairs were confirmed to be breeding with five broods located, one active nest and four pairs copulating away from the locations where broods or nests were located which excludes double counting. A further 21 pairs were located which were either displaying pairs or bonded pairs frequenting specific areas. Their distribution was focused around the larger waterbodies in Ashfields & Goshem's Farm, East Tilbury Quarry, Mucking Landfill site and Mucking Wetlands survey compartments, which contain typical habitat for this species. The total number of confirmed and probable records for pochard is therefore 31 pairs. The population estimate is 31-45 pairs.

Tufted Duck

The surveys located two confirmed pairs and 47 probable breeding pairs. The species' main fledging period is August, the surveys finished in July and so did not cover the main fledging period. The confirmed pairs would likely be higher if the survey had continued throughout August. Confirmed breeding was located on the scrape on East Tilbury Quarry and the lake north of Linford Wood. Probable pairs were present on all waterbodies with the highest densities on Golden Gate Lake.

The total number of confirmed and probable records for tufted Duck is therefore 49 pairs. The population estimate is 49-51 pairs.

Cuckoo

For this species 15 probable breeding pairs were recorded from birds holding territory for prolonged periods. Given the species' breeding method is brood parasitism, confirming their success requires more resource and therefore accounts for why no young were recorded. With the abundant supply of host parents available, meadow pipit, dunnock, reed warblers etc, it is likely that many eggs were laid.

The species distribution followed the host species' habitat preference, so they were present across the scrub, reedbeds and wooded areas, avoiding the open grass areas. They favoured the Bowaters scrubland across to DHL landfill, the southern and western edges of Mucking Landfill Site and across Mucking Wetlands/Thameside Nature Park.

The total number of confirmed and probable records for cuckoo is therefore 15 pairs. The population estimate is 15-19 pairs.

Stock Dove

Thirteen probable pairs of stock dove were located. This species can range over large areas on display flight or singing which therefore makes calculating the population a challenge. The bulk of the population came from Mucking Wetlands where the large mature trees would provide a multitude of holes for them to nest in.

The total number of confirmed and probable records for stock dove is therefore 13 pairs. The population estimate is 13-28 pairs.

Water Rail

One pair of water rail were recorded feeding recently fledged young and another two pairs were probable breeders. This species is very secretive, breeding in dense aquatic habitat making it very difficult to confirm breeding. This, coupled with the fact it is not a frequent singing species makes it a difficult species to survey. The confirmed pair were recorded in the Mucking Wetland along the southern edge, on a small pool. Two probable pairs were recorded by the small lake south of Golden Gate Lake and along the ditch that lies due southeast of this location.

The total number of confirmed and probable records for water rail is therefore three pairs. The population estimate is three-13 pairs.

Little Grebe

Seven broods were confirmed across the site and a further 12 pairs as probable breeders. Every waterbody supported them and only at Golden Gate Lake and Wharf Road fishing lakes were they not confirmed to have bred successfully. There were, however, early indicators suggesting they were attempting to breed at both locations. It is possible they failed at both locations. The highest density was on the East Tilbury Quarry Scrape. If the birds present on Golden Gate Lake were confirmed, then this would hold the largest aggregation with three pairs.

The total number of confirmed and probable records for little grebe is therefore 19 pairs. The population estimate is 19-31 pairs.

Great Crested Grebe

All the main waterbodies supported this species with the exception of the East Tilbury Quarry Scrape and an unlikely location was a territorial bird on the moat around Tilbury Fort. Golden Gate Lake supported two pairs which were not confirmed to have been successful. The single pairs on two sets of fishing lakes along Wharf Road and the two lakes on Mucking Landfill Site (C5 and C1) all were confirmed with fledged young.

The total number of confirmed and probable records for great crested grebe is therefore seven. The population estimate is seven-nine pairs.

Lapwing

Four probable pairs were located on the scrape at East Tilbury Quarry. It is likely these were heavily disturbed by the regular footfall of dog walkers who frequently walked beside it. Regular disturbance for ground nesting birds increases mortality for these species. With a high population of badgers in particular, ground nesting birds become more susceptible to predation by this species during dry summers, when other food sources such as earthworms become harder to acquire.

The total number of confirmed and probable records for lapwing is therefore four pairs. The population estimate is also four pairs, as no additional 'possible' breeding was recorded.

Ringed Plover

A pair was frequently observed at the southern end of the Ashfield & Goshem's Farm compartment at G4. The pair were observed in the distraction display feigning a broken wing, which confirmed the presence of at least a nest with eggs or fledged young.

The total number of confirmed and probable records for ringed plover is therefore one pair. The population estimate is one-three pairs.

Little Ringed Plover

One pair was confirmed as breeding and four pairs were probable breeders. Three pairs were located [REDACTED]. One pair was confirmed to have produced one young and the other two pairs were present throughout the surveys displaying although no young or nests were located. Another pair were present at [REDACTED]. This section had [REDACTED] and is a very suitable nesting habitat for them. This species requires bare ground to breed and vegetated areas are less suitable for them.

The total number of confirmed and probable records for little ringed plover is therefore five pairs. The population estimate is also five pairs as no additional 'possible' breeding was recorded.

Redshank

Three pairs were located of which two were confirmed. The only breeding site was the East Tilbury Quarry scrape, two pairs were confirmed with them either defending their nest or in distraction display. An additional pair were present displaying but with no further evidence.

The total number of confirmed and probable records for redshank is therefore three pairs. The population estimate is three-four pairs.

Long-eared Owls

Three territories were identified with two in [REDACTED] and one at the [REDACTED]. None were confirmed breeding with no young being located. All of these areas were close to water, have scrub for nesting and roosting in, were near areas of long grassland and one was near livestock. These are known preferred habitat features for long-eared owl breeding sites (Green and Green, 2012). They were both in remote areas with little or no access. Disturbance is an issue for this species as females will abandon nests early in the breeding season (Hardey and others, 2009).

The total number of confirmed and probable records for long-eared owl is therefore three pairs. The population estimate is also three pairs, as no additional 'possible' breeding was recorded.

Kingfisher

One pair was confirmed to have bred and another probably bred. Birds were heard displaying at [REDACTED]. At the end of the season at least one juvenile was heard calling here which confirmed their success. A probable pair were present in [REDACTED]. They were present from April to July.

The total number of confirmed and probable records for kingfisher is therefore two pairs. The population estimate is also two pairs, as no additional 'possible' breeding was recorded.

Jay

Four probable pairs of jay were identified on the site. The main congregation was at the northern end of the site and smaller numbers across the Low Street/Bowaters scrubland. This is expected with the large amounts of scrub and mature trees. This species is very secretive and therefore recording no confirmed pairs is expected (per authors observations; Castell, Ferguson-Lees & Leech, 2011)

The total number of confirmed and probable records for jay is therefore four pairs. The population estimate is four pairs.

Bearded Tit

The site supported one confirmed pair. During the surveys one pair were possibly breeding with birds heard calling in [REDACTED]. With a small bird population, they tend to be less vocal as there is less competition for territories or mates. Paul Wood, the official Wetland Bird Survey (WeBS) recorder, observed two recently fledged juveniles on 27th May in the same area. This confirms a pair bred successfully on the site. This record has been submitted to the Essex Field Club via the Essex Bird Recorder.

The total number of confirmed and probable records for bearded tit is therefore one pair. The population estimate is one-two pairs.

Cetti's Warbler

For this cryptic species, three pairs were confirmed breeding and 173 were probable breeding pairs from records of birds holding territory for prolonged periods. In addition, 42 possible breeding pairs were located from occasional singing birds. The low number of confirmed pairs is a direct reflection of the secretive nature of this species.

Due to the high levels of this species present, the area is saturated with territories. Cetti's warblers are present in most habitats except arable farmland and the more substantial

woodland belts. This species favoured the vegetated ditches and damp areas, with highest densities in [REDACTED].

The total number of confirmed and probable records for Cetti's warbler is therefore 176 pairs. The population estimate is 176-218 pairs.

Long-tailed Tit

During the surveys 16 pairs were confirmed and 11 were 'probable breeders'. This species frequented the mature scrub area and were not present in grassland habitat. The main areas supporting this species, were the scrub areas of Goshem's Farm, Linford Wood, Mucking Wetlands and the scrub that runs south from Golden Gate Lake.

The total number of confirmed and probable records for long-tailed tit is therefore 27 pairs. The population estimate is 27-33 pairs.

Sedge Warbler

The surveys recorded 31 pairs of probable breeders. This species' favoured habitat of reedbeds and dense low vegetation makes confirmation of breeding more difficult compared to other species which pose in the open carrying food (confirming an active nest with young being fed). The main population followed the ditches and waterbodies along the eastern edge of Mucking Landfill, East Tilbury Quarry and the Fields East of Coalhouse Battery. The presence of an additional 60 possible pairs indicates under-recording is probable due to the species' discreet behaviour of breeding in dense cover or in wetland areas.

The total number of confirmed and probable records for sedge warbler is therefore 31 pairs. The population estimate is 31-91 pairs.

Reed Warbler

Six pairs were confirmed to have bred and 92 pairs were 'probable breeders'. The species was present in all reed/sedge based aquatic habitat from the margins of lakes to ditches. It favoured the reedbeds but the majority of the habitat occupied was secondary (in preference) which included bushes beside waterbodies too. The majority were in the Mucking Wetlands compartment and around the reed fringed lakes and ditches across Mucking Landfill Site and East Tilbury Quarry. The ditches in DHL landfill, Ashfields & Goshems Farm and Tilbury Fort Marshes compartments were also strongholds for the species. Without hearing the distinctive calls of the young begging for food, confirming breeding is difficult (per author's observations). Some pairs were only detected when these calls were heard. It is likely that the 170 possible pairs not included in the breeding totals, were breeding birds but could not be confirmed. Late returning migrants tend not to

sing for long durations as they pair up immediately to breed. Therefore, they may only get recorded singing once and therefore only recorded as possible pairs.

The total number of confirmed and probable records for reed warbler is therefore 98 pairs. The population estimate is 98-268.

Grasshopper Warbler

Across the breeding season seven probable pairs were located with an additional 11 possible pairs. This species' crepuscular nature makes confirming territories more difficult. Several territories were located during long-eared owl surveys outside of the normal hours of breeding bird surveys (singing up to two hours after sunset). The two main areas were the SSSI area north of Coalhouse Fort and the scrub along the south-west edge of the Mucking Tip. This species has tendency go silent once paired up and with minimum gap of ten days between surveying an area it is likely the majority of the possible pairs did actually attempt to breed.

The total number of confirmed and probable records for grasshopper warbler is therefore seven pairs. The population estimate is seven-18 pairs.

Lesser Whitethroat

No confirmed pairs were located and 30 pairs were probable breeders. When on territory this species is elusive as it tends to sing from cover. Confirming breeding is difficult given the species stops singing once it is paired up (Castell, Ferguson-Lees & Leech, 2011). Thus, the additional 35 possible pairs are likely to be breeding birds as these birds only sang once in their individual locations. Their range across the area followed scrub and dense hedgerows e.g. Mucking Wetlands (excluding all reedbeds), southern and western edge of Mucking Landfill Site, the northern end of DHL Landfill, the scrub in Ashfields & Goshem's Farm and the more developed hedgerows of Tilbury Fort Marshes.

The total number of confirmed and probable records for lesser whitethroat is therefore 30 pairs. The population estimate is 65 pairs.

Goldcrest

One goldcrest was recorded singing from the Wharf Road Fishers on several dates in March, the same or another bird was heard calling in that area later in the surveys. Another male was singing in the Bowater Scrubland, this bird was recorded as a possible pair as it was heard singing on one date. There are very little suitable breeding areas for this species in the form of Holly or conifer trees thus only a small population is present.

The total number of confirmed and probable records for goldcrest is therefore one pair. The population estimate is one-two pairs.

Nightingale

During the surveys 52 pairs were probable breeders and a further 45 pairs possible breeders. The results are distorted by the secretive nature of this species and the fact it favours areas of dense vegetation, thus making it difficult to confirm their breeding status. Three main stronghold areas for nightingale were the scrub around the small pool at the southern end of Ashfields, the Bowaters scrub, the scrub along the southwest corner of Mucking Landfill Site and more scattered distribution across Mucking wetlands/Thameside Nature Park. This distribution mirrors that for Cetti's warbler albeit at a lower abundance.

The total number of confirmed and probable records for nightingale is therefore 52. The population estimate is 52-97 pairs.

Yellow Wagtail

Two pairs were probable breeders. An adult was alarming at the surveyor's presence on 17th June at the south end of Ashfield & Goshem's Farm compartment. The bird's nervous behaviour indicated that there was an active nest or recently fledged young close by. At the southern end of East Tilbury Quarry, a male yellow wagtail was singing on 27th May, and a bird was heard calling on 18th June. With low densities of the species in an area, their singing will be for a shorter period than areas with high densities. This is because they don't have the same level of competition and therefore save their energy (per author's observation). Without finding recently fledged young to confirm breeding, these pairs are recorded as 'probable' pairs. Although singing was not recorded on two survey visits, agitated behaviour is sufficient to conclude 'probable' breeding, according to standard breeding status behaviour definitions.

The total number of confirmed and probable records for yellow wagtail is therefore two. The population estimate is also two pairs, as no additional 'possible' breeding was recorded.

Grey Wagtail

Two pairs of grey wagtails were confirmed to have bred and another pair were considered to be probable breeders. One pair frequented the sluice-gate beside the World Ends pub and were seen nest building. Another pair raised young in the north of the Anglian Water Treatment works (sub-compartment K2). Another pair held territory at the southern end of the Anglian Water works. This species favours secretive places to nest and it is therefore hard to confirm breeding. They normally disperse over large ranges once the young fledge.

The total number of confirmed and probable records for grey wagtail is therefore three. The population estimate is also three pairs, as no additional 'possible' breeding was recorded.

Linnet

Two pairs were confirmed to have bred successfully and 67 pairs 'probable' breeders. This species will roam around large areas singing, which makes it difficult to pin down their breeding locations. They favoured Thameside Nature Park, the southern half of Mucking Landfill Site, the southern end of DHL Landfill and across the Ashfields & Goshem's Farm compartments.

The total number of confirmed and probable records for linnet is therefore 69. The population estimate is 69-138 pairs.

Corn Bunting

Thirty-three pairs were located during the surveys with three confirmed, 30 probable and a further eight possible breeding pairs. The species preferred the long grassland with pockets of scrub at Mucking Landfill site, East Tilbury Quarry and DHL Landfill. Confirmed pairs were located at Mucking Landfill site, East Tilbury Quarry and Low Street Pit & surrounds. That latter location had no records before a distressed adult was located near a nest site.

The total number of confirmed and probable records for corn bunting is therefore 33. The population estimate is 33-41 pairs.

Reed Bunting

During the surveys seven pairs were 'probable breeders' and a further 26 pairs possible breeders. This species occupies deep cover in the form of scrub and reedbeds therefore making it hard to confirm as breeding. It is likely the population is higher and that the 'possible' breeding records in fact represented breeding pairs. Their distribution matched suitable habitat following the ditches around the west edge of Ashfields & Goshem's Farm, along the saltings north from Coalhouse Fort up to Mucking Landfill Site and a few scattered locations north up to Mucking Wetlands.

The total number of confirmed and probable records for reed bunting is therefore seven. The population estimate is seven-33 pairs.

Stonechat

The survey confirmed two pairs bred, and a further two pairs as probable breeders. This species does not sing for long durations and therefore makes finding territories more difficult. Any aggressive calling during the breeding season illustrates an active nest site (Castell, Ferguson-Lees & Leech, 2011). Single pairs were confirmed to be breeding on B1 - Thameside Nature Park and Mucking Landfill (C3 the south section). Probable pairs were also recorded at East Tilbury Quarry scrape (D2) and East Tilbury Quarry (D1 the

northeast corner). Three more possible territories were in the south section of the Mucking Flats & Marshes SSSI specifically around SSSI Unit 1, indicating a higher population in the area but not significantly so.

The total number of confirmed and probable records for stonechat is therefore four. The population estimate is four-seven pairs.

Hobby

One probable pair was found. A pair were displaying in May over the [REDACTED] with a bird seen feeding in the same area in June. Also in June, an adult was seen carrying food over the [REDACTED], which is evidence of probable breeding using standard criteria, and may indicate a second pair. Hobbys can be very secretive, and searching for young in the nest when they are very vocal in early August can be most productive in terms of survey timing, however no survey visits were requested in August therefore confirming breeding with this behaviour was not possible. The two locations are [REDACTED] apart. This is within the foraging range of hobby, and so it is not possible to be certain if there is more than one pair in the survey area based on these observations alone.

The total number of confirmed and probable records for hobby is therefore one. The population estimate for hobby is one-two pairs.

Non-breeding species

47 species were recorded as 'not breeding' within the survey area. For the majority they are either only winter visitors to the area such as grey plover, or migrants just passing through such as wheatear. Some species were breeding outside of the survey area like swifts breeding in Low Street or breeding further afield for example avocet breeding at [REDACTED]. Details are given in the table below. Disaggregated records are available for wildfowl species.

Table 3: Non-breeding species recorded within the survey area.

Species	BTO code	Total birds counted (duplicated birds included)	Status	Notes
Wigeon	WN	1	non-breeding	Common wintering species
Goldeneye	GN	12	non-breeding	Common wintering species

Species	BTO code	Total birds counted (duplicated birds included)	Status	Notes
Nightjar	NJ	1	migrant	No suitable habitat for breeding present
Swift	SI	275	non-breeding	Breeds locally
Feral Pigeon	FP	87	non-breeding	Breeds locally
Avocet	AV	431	non-breeding	Common wintering species
Golden Plover	GP	1	migrant	No suitable breeding habitat
Grey Plover	GV	1	migrant	Common wintering species.
Whimbrel	WM	20	migrant	Breed in Northern Europe
Curlew	CU	64	non-breeding	Common wintering species
Black-tailed Godwit	BW	9,044	migrant	Max count 3,940 on 18th April - most on the mudflats.
Dunlin	DN	305	migrant	Common wintering species
Woodcock	WK	4	non-breeding	All birds were recorded on LE surveys, one bird was displaying (roding) but not subsequently
Snipe	SN	68	non-breeding	Common wintering species.
Common Sandpiper	CS	7	migrant	No suitable breeding habitat
Green Sandpiper	GE	5	migrant	Breed in Northern Europe
Greenshank	GK	2	migrant	Breed in Northern Europe
Black-headed Gull	BH	2,598	non-breeding	Breeds locally
Mediterranean Gull	MU	100	non-breeding	Breeds locally
Common Gull	CM	10	non-breeding	Common wintering species
Great Black-backed Gull	GB	19	non-breeding	Common wintering species
Herring Gull	HG	312	non-breeding	Common wintering species
Lesser Black-backed Gull	LB	24	non-breeding	Common wintering species
Sandwich Tern	TE	1	migrant	No nearly breeding sites
Common Tern	CN	2	non-breeding	Breeds locally
Cormorant	CA	133	non-breeding	Common wintering species
Cattle Egret	EC	1	migrant	Rare breeding species
Grey Heron	H	24	non-breeding	Breeds locally in Warren Gorge, Chafford Gorges.

Species	BTO code	Total birds counted (duplicated birds included)	Status	Notes
Little Egret	ET	89	non-breeding	Breeds locally in Warren Gorge, Chafford Gorges.
Marsh Harrier	MR	6	non-breeding	seen occasionally and thought to be breeding off site
Sand Martin	SM	38	migrant	Breeds locally
House Martin	HM	16	migrant	Breeds locally
Willow Warbler	WW	11	migrant	Common migrant species
Garden Warbler	GW	4	migrant	Common migrant species
Starling	SG	2,648	non-breeding	Breeds locally
Mistle Thrush	M	5	non-breeding	Breeds locally
Redwing	RE	42	non-breeding	Common wintering species.
Fieldfare	FF	62	non-breeding	Common wintering species.
Ring Ouzel	RZ	1	migrant	Scarce migrant species
Spotted Flycatcher	SF	1	migrant	Scarce migrant species
Redstart	RT	1	migrant	Scarce migrant species
Whinchat	WC	2	migrant	Common migrant species
Wheatear	W	15	migrant	Common migrant species
Tree Pipit	TP	1	migrant	Scarce migrant species
Rock Pipit	RC	1	non-breeding	Common wintering species
Siskin	SK	5	migrant	Common wintering species
Yellowhammer	Y	2	migrant	Scarce winter species

A number of these species could potentially breed within the survey area, as suitable habitat is present. These include black-headed gull, Mediterranean gull, common tern, cormorant, cattle egret, grey heron, little egret, marsh harrier, garden warbler (which was recorded as breeding in 2022), starling and mistle thrush.

Hybrid species

Two species of hybrids were recorded. One Canada x greylag goose was recorded on 31st May on the Tilbury Fort Marshes, up to two birds had been present during the 2023/24 winter here. This is one of the commonest hybrid geese to encounter in the UK. On 8th April an adult black-headed x Mediterranean gull was seen on the East Tilbury Quarry (Walsh Site). This is a rare hybrid to observe and possibly came from the gull colonies across the River Thames at Cliffe Pool RSPB reserve.

Non-breeding species

Marsh harrier were recorded on four survey visits with a pair flying up river along the middle of the River Thames on 17th April, an adult female hunting on the east side of East Tilbury Quarry on 18th April, an adult male was seen feeding over the Ash A2 on Ashfields & Goshem's Farm and an adult male was seen flying west over Tilbury2 surrounds, later seen feeding over the Tilbury Fort Marshes on 28th May. The reedbeds within the survey area are not primary breeding habitat but birds have recorded breeding in similar sized area at Sizewell C, Suffolk (author's personal observation). It would be possible for this species to breed on the site. This is a common species along the Thames Estuary, however, due to the sensitive nature of this species, breeding sites are not advertised. The closest pairs are within five kilometres of the site.

Avocets were recorded feeding on the foreshore along the whole length of the survey area throughout the surveys. An adult displaying [REDACTED] on 27th May was the only bird showing breeding behaviour on suitable nesting habitat. No further sightings were made after this observation. The habitat here is ideal for this species and it is surprising this species is not breeding on the site given ubiquitous status in the area. The closest population is at [REDACTED], this species breeds at numerous sites on both sides of the Thames Estuary.

There are three species which were not recorded breeding but for which the survey area holds suitable breeding habitat. Cormorant, grey heron and little egret are all tree nesting species favouring wooded islands on waterbodies. Golden Gate Lake has many suitable islands for them. There is already a nocturnal cormorant and little egret roost there. Little egret colonised Walthamstow Wetlands, London and Warren Gorge EWT, Chafford Hundred, Essex after starting to roost there. Cormorants did the same at Walthamstow Wetlands in the 1990s (author's personal observation).

The scrape on East Tilbury Quarry could host both black-headed and Mediterranean gulls. The water here is shallow and may not be attractive enough for these species as it may make it more prone to predation from foxes. There is a large population of both species just across the river on RSPB Cliffe Pools which may be a magnet for both species in the area (Kent Ornithological Society, 2022).

The effects of climate change may mean that recent colonisers such as black-winged stilt, spoonbill, cattle egret and bee-eater may start to breed in the area.

Phase 1 Habitat survey

The habitat was divided into 12 distinct types based on the JNCC phase 1 habitat classification. Any small areas of habitat change within the survey area have been excluded where it is less than 10m² approximately. Any small sections of reeds were included within the main habitat present so small sections of reed on a lake would fall

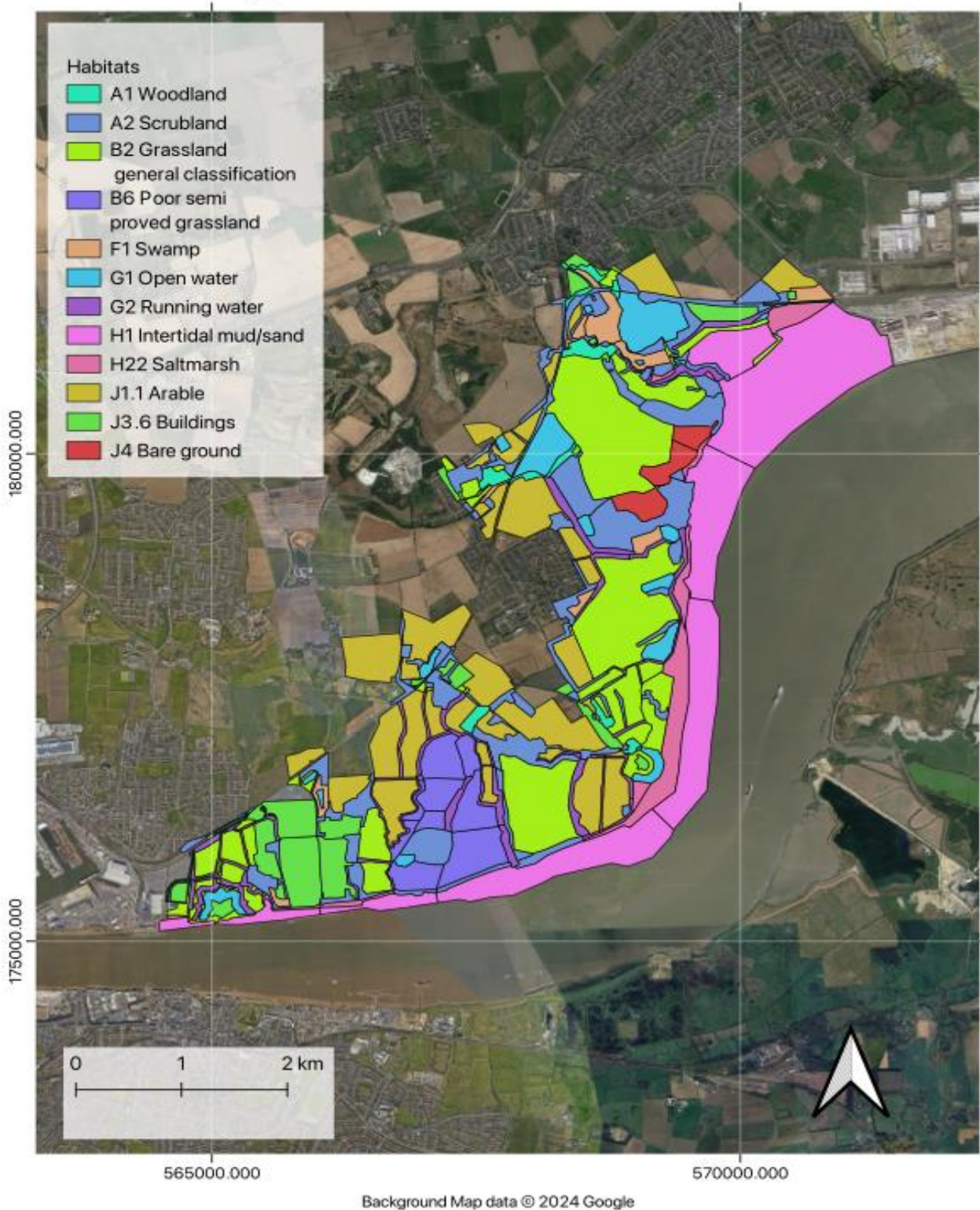
under 'G1 Open Water'. Similarly, all ditches were marked up as 'G2 Running Water' without attempting to split out what element was reedbed or scrub overlapping it. The largest habitat present was 'B2 Grassland' covering 45% of the survey area and this held 11% of all target species. 'G1 Open Water' provided a higher density of total birds as cover (12%) and supported 30% of target species. This was boosted by large numbers of wildfowl present on these areas and the smaller pockets of mixed margins such as reedbeds holding large numbers of reed warblers and Cetti's warbler. Both species are numerous across the survey area. Many paired birds covered areas that overlapped more than one type of habitat. This makes determining where they bred impossible. If a Cetti's warbler sang from scrub during one survey visit, and neighbouring reedbed on the next visit then this will be recorded on both habitats. Therefore, the total birds recorded in the table 4 does not indicate the total number of pairs breeding in each habitat but an indication of the densities present.

Table 4: Phase 1 Habitat Types Present.

Habitat type	% cover within survey area.	Target species breeding on site (total birds recorded)
A1 Woodland	2%	52 (1%)
A2 Scrubland	22%	928 (16%)
B2 Grassland - general classification	45%	598 (11%)
B6 Poor semi-improved grassland	1%	85 (2%)
F1 Swamp	1%	244 (4%)
G1 Open water	12%	1,674 (30%)
G2 Running water	3%	691 (12%)
H1 Intertidal mud/sand	9%	1,109 (20%)
H22 Saltmarsh	2%	39 (1%)
J1.1 Arable	2%	157 (3%)
J3.6 Buildings	0.5%	21 (0.3%)

Habitat type	% cover within survey area.	Target species breeding on site (total birds recorded)
J4 Bare ground	0.4%	44 (0.7%)

Habitat types



Map showing how the survey area has been classified per habitat type.

Limitations

Two main factors affected the survey, access and weather conditions. In both cases, measures were taken to reduce the impact on the data collected. The least impacting was the weather.

Access

Some areas with restricted access were only staffed during more typical office hours and therefore dawn surveys in these areas were not possible, especially during the early surveys in June (starting at 03:30 hrs). In some places there were accessibility issues due to overgrown vegetation. All possible attempts were made to collect data from outside of these areas. It is possible that some species were not confirmed as breeding because of access issues, such as peregrines potentially nesting [REDACTED]. All problematic areas are listed below. Although there were some access issues, this is not thought to have significantly affected the overall survey findings.

Table 5. Locations where access issues were encountered.

Sub-compartment	Reason for limiting surveys	Measure taken to minimise the impact	Note
A4 – Wharf Road Fisheries (East)	Combination lock was changed.	Surveyed from outside.	This possibly affected being able to confirm breeding pochard and nightingale in this location.
A5 – Wharf Road Fisheries (West)	Access available after surveys had commenced.	Surveyed from outside.	Unlikely to have affected ability to record any songbirds that were present, however it may have impacted on the ability to confirm some water birds as breeding in this location.
A9 – Grove House Wood – the west edged that curved around the railway to the south	No clear access into this area.	Surveyed from the outside.	Likely that some pairs were missed as a result.

Sub-compartment	Reason for limiting surveys	Measure taken to minimise the impact	Note
C4 – Mucking Landfill North – East	An area of active works.	Viewed from the outside.	
C9 – Linford Wood – the area south of here	Access available after surveys had commenced.	Viewed from the outside.	Most birds encountered had young so were more conspicuous. Access limitation is likely to have had a minimal impact, although some records may have been missed.
G3 – Goshems Landfill	Coal ash extraction area.	Viewed from the outside.	Likely to have had minimal impact as bare ground was unsuitable for most species.
G9 – Ash C1, compartment G	Coal ash extraction area.	Viewed from the outside.	Minimal impact as bare ground was unsuitable for most species. Safe access might have confirmed if [REDACTED] bred here.
G10 – Ash C1, compartment G	Thick vegetation.	Early in the surveys it was accessible but later too overgrown.	It is likely that confirmed breeding of only a few pairs of birds was missed.
G11 – Ash C3	A site compound and area to store heavy machinery.	Viewed from the outside.	Unsuitable for breeding birds because of lack of nesting areas.
G15 – Ash A3, Compartment G Pylon area.	Thick vegetation.	Concentrated listening was undertaken here.	All territorial birds would have been identified.
K2 – Infill North of Sewage Treatment Works	No access behind Port gates to the south.	Viewed from the outside.	The area was observed from the road which ran

Sub-compartment	Reason for limiting surveys	Measure taken to minimise the impact	Note
			down the east edge which gave near complete coverage.
K3 – Anglian Water Sewage Treatment Works South	No access before operational hours.	Viewed from outside.	Minimal impact as had clear view and ability to hear birds calling across this area and it was also accessible later in the survey.

Weather conditions

During the survey period some visits were cancelled due to poor weather and then rescheduled. This impacted the early long-eared owl surveys in February. One was completed in February, and the rest were completed in early March. It is considered unlikely that this had a significant impact on the survey results.

Conclusions

With large areas of undisturbed land and diverse habitats, wildlife has benefited with substantial numbers of breeding birds present. This is reflected by the highest bird species count for any one survey visit of 72 species on 18th April on the East Tilbury Quarry section (this total includes breeding and non-breeding migrant birds).

The large sections of grasslands especially on the East Tilbury Quarry and Mucking Landfill sites were free from dog walkers and as a result supported large numbers of breeding skylark. Low numbers of meadow pipit bred as a comparison reflecting the local trends of decreasing population (author's personal observation). The majority were found in the grassland habitat, with additional pairs in the Coalhouse Fort area and Thameside Nature Park. The skylark's thicker bill enables it to feed on a more varied diet including seeds, whereas the meadow pipit's thin bill limits its food to a more invertebrate-based diet.

As discussed previously Cetti's warbler were present and exceeded the nationally important threshold by holding more than 1% of the GB population. The survey area holds 5.1% of the GB population, illustrating the importance of the survey area to this species (Woodward *et al* 2020). This species has benefited from the wetland habitat present within the survey area and more recently the reduced number of subzero winters which previously have caused the population to contract due to a lack of food availability.

The thick and deep pockets of mature scrubland e.g. Bowater Scrubland supported high densities of nightingale. These areas also happen to have reduced access or lack frequent footfall which probably adds to the attraction of these locations. Maintaining such undisturbed conditions may be essential to retaining these high numbers. There were also very few sightings of muntjac deer, which are known to over-graze areas and specifically affect the breeding success of summer breeding migrants (Newson *et al*, 2012).

The low breeding success rate for pochard is reflected in national trends. This is likely to be affected by a breeding cycle occurring during wetter and colder months compared to tufted duck, a similar species. Pochards hatch young during June and July, whilst tufted duck hatch their young primarily in August. There may also be a link with the breeding cycles of ground-based predators too. Foxes and badgers were seen frequently during the survey. Badgers are known to switch to feeding on ground-nesting birds during drier periods, when earthworms are more difficult to source in harder ground conditions. In detailed studies in central London, some sites held up to 17 pairs of pochard: however, only eight nests were located with zero young fledged (author's personal observation). This demonstrates the vulnerability of this species and may mean counts are lower than might otherwise be the case. The survey area is not favourable to locate nesting ducks and more intense efforts to confirm breeding for additional pairs is likely to cause more disturbance than the benefit such efforts would produce. However, reasonable efforts were made to conclude breeding status for pochard for this survey within these constraints.

The long-eared owl is a tricky species to locate, and the low numbers recorded could also reflect a poor breeding season, or that the productivity of these pairs is low. Local observers have recorded them producing young in both these areas [REDACTED] in previous years (pers. comm. Paul Wood). Tawny owl were also present in the [REDACTED] and fledged at least one young. This species frequently displaces long-eared owl from breeding sites which also may be an issue here (pers. comm. Paul Larkin, studies completed at RSPB Cliffe Pools). Where the two species met on site was the area where most vocalisations were heard. The tawny owls in the area are not understood to regularly breed here so their movement around the local woods may benefit long-eared owls (pers. comm. Steve Swinney).

Whilst the survey methods followed established guidelines and best practise in order to meet the requested brief, they could also be enhanced to give a more detailed picture, building on the experience of this survey. For the breeding bird surveys, additional focus should be placed on the East Tilbury Quarry scrape. This should have specific survey effort monitoring the activities here every two weeks from April through to July. The survey should switch between watching the southern and the northern sections alternately and starting at before dawn too. Surveys early in the season would identify paired-up birds, then nesting sites and finally at the end, their success rates. This specific area suffers with dog walkers walking along the south section coming in from East Tilbury urban area and therefore causing disturbance. This could be minimised with shielding so that they do not disturb the breeding and roosting birds here. This was a primary roost area at high tide for black-tailed godwits. Mudflats provide important feeding areas for waders and the

numbers for black-tailed godwits exceed national and international levels (Woodward and others, 2024). This is for both feeding on the mudflats and roosting on the scrape.

Similarly, improvements could be made to the long-eared owl survey as well (although again, best practise of four visits was followed for this survey). Increasing the number of survey visits to six and covering more areas may have produced additional records. Surveying six times would allow an earlier start and to finish later in the breeding season. This would help identify pairs which are not frequently vocal and also any late breeding birds too. Areas which should also be checked are 'A3 – Stanford Wharf Creekside Mosaic' and 'B1 – Thameside Nature Park'. These areas were checked during the surveys once they were identified suitable areas for long-eared owls.

A black redstart was heard singing at the [REDACTED] during surveys. Focused surveys for this species across the survey area could identify more territories. This species has a tendency to sing before first light but is incredibly fickle. Specific survey across the site would clarify how many territories are present. These surveys are generally labour intensive as this species frequents [REDACTED] and therefore static passive recorders are unable to detect their presence across areas over background noise. They should be focused on the [REDACTED]. See [information on black redstarts](#) for more details.

Marsh harrier was only found foraging within the survey area. There are sufficient areas for them to nest in but perhaps expanding the reedbeds across the site would encourage this species to breed within the survey area.

Enhancements

Several improvements could be made to the survey area to benefit breeding birds. Simple steps such as limiting (or otherwise managing) access, as much as possible, to grassland areas where skylarks are breeding will mean they will retain disturbance-free areas. Minimising footfall will always benefit such ground-nesting species. This would mean restricting access across East Tilbury Quarry, Mucking Landfill Site, DHL Landfill and the Ashfield & Goshem's Farm areas. A similar approach should also be undertaken for the area around the scrape on East Tilbury Quarry. The ground nesting birds here are disturbed by people and domestic animals who use the area. Either limiting access or extensive screening would help to reduce disturbance for species such as [REDACTED].

Installing wicker baskets in remote areas such as [REDACTED] would provide additional safe areas for long-eared owls to nest. This species readily utilises these facilities and they have been used in other strongholds for this species such as in the Pitsea area (Hardey *et al* and others, 2009). Restricting access to these areas would also be beneficial to this species as they are prone to disturbance.

As mentioned previously, extending reedbeds or creating more is likely to encourage marsh harriers to nest in the area and provide more feeding areas for them. Barn owls were regularly seen [REDACTED] which indicates a good small mammal population here.

The installation of barn owl nest boxes in remote areas would provide safe areas for them to breed on site.

Creating more scrapes would enhance the site further and would provide additional areas for waders to roost at hightide plus potential breeding areas for them. This would also generate nesting facilities for other target species such as pochard (and the other species of duck), little grebes and attract various species of gulls to nest here too.

Appendices

Appendix 1 – survey times and weather conditions

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
19/02/2024	██████████	Long-eared Owl	16:26	19:09	12c	0%	none	none	excellent
05/03/2024	██████████	Long-eared Owl	17:22	20:26	8c	100%	none	none	excellent
06/03/2024	██████████	Long-eared Owl	17:55	20:07	7-9c	0%	none	none	excellent
08/03/2024	██████████	Long-eared Owl	17:14	20:06	6c	70%	s up to 8kph	none	excellent
09/03/2024	██████████	Long-eared Owl	17:21	20:17	9c	20%	none	none	excellent
11/03/2024	Mucking Landfill	Breeding birds	05:42	11:07	7c	100%	none	none	excellent
13/03/2024	Coalhouse fort area,	Breeding birds	05:41	12:01	12c	100	SW up to 10kph	none	excellent

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
	Bowaters and DHL land								
14/03/2024	various	Breeding birds	05:17	12:15	8-15c	10%	none	none	excellent
15/03/2024	Tilbury Fort	Breeding birds	05:07	11:28	12-17c	up to 100%	SW up to 12kph	light rain twice	excellent
20/03/2024	██████████	Long-eared Owl	17:29	19:40	14-17c	30%	none	none	excellent
27/03/2024	Tilbury Fort	Breeding birds	05:29	10:54	5-11c	10%	none	none	excellent
28/03/2024	Coalhouse fort area, Bowaters and DHL land	Breeding birds	05:09	10:35	5-10c	50%	SW up to 12kph	none	excellent
29/03/2024	Mucking Landfill	Breeding birds	04:52	10:58	7-12c	up to 100%	S up to 5kph	none	excellent
30/03/2024	East Tilbury Quarry	Breeding birds	05:06	05:06	5-12c	up to 100%	none	none	excellent
31/03/2024	Thameside NR and	Breeding birds	05:55	10:34	7-11c	up to 100%	NE up to 8 kph	none	excellent

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
	Mucking Wetlands								
02/04/2024	various	Breeding birds	04:56	10:34	8-11c	up to 100%	none	frequent light showers	excellent
03/04/2024	Mucking Wetlands	Breeding birds	05:11	05:11	8-11c	50%	SW up to 10kph	frequent light showers	excellent
03/04/2024	██████████	Long-eared Owl	19:17	21:58	7-11c	50%	W up to 10 kph	none	excellent
05/04/2024	██████████	Long-eared Owl	18:51	22:13	12-15c	100%	SW up to 9kph	none	excellent
06/04/2024	██████████	Long-eared Owl	19:12	21:25	14-17c	90%	SW up to 8kph	none	excellent
07/04/2024	██████████	Long-eared Owl	18:59	22:06	11-15c	10%	SW up to 10kph	none	excellent
08/04/2024	Low street	Breeding birds	14:13	17:23	14-15c	0%	SE up to 10kph	none	excellent

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
14/04/2024	██████████	Long-eared Owl	19:25	20:37	8-13c	90%	W up to 7kph	none	excellent
15/04/2024	Fields east of Coalhouse Battery	Breeding birds	05:27	09:37	8- 12c	10%	SW up to 8kph	none	excellent
17/04/2024	Tilbury Fort	Breeding birds	05:06	10:05	6-10c	90%	NW up to 10kph	none	excellent
18/04/2024	Coalhouse fort area, Bowaters and DHL land	Breeding birds	04:52	09:43	3-12c	0%	N up to 5kph	none	excellent
19/04/2024	East Tilbury Quarry	Breeding birds	05:03	09:50	7-12c%	10-100%	NW up to 10kph	none	excellent
20/04/2024	██████████	Long-eared Owl	17:29	19:40	12-17c	30%	none	none	excellent
22/04/2024	Bowater Scrubland	Breeding birds	05:08	09:57	13c	0%	NW up to 5kph	none	excellent
22/04/2024	██████████	Long-eared Owl	19:07	22:02	2-9c	100%	none	none	excellent

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
23/04/2024	various	Long-eared Owl	19:18	22:43	4-10c	10%	NW up to 4kph	none	excellent
24/04/2024	Mucking Landfill	Breeding birds	05:11	09:24	3-10c	10%	none	none	excellent
24/04/2024	various	Long-eared Owl	19:14	21:56	4-9c	100%	NW up to 4kph	none	excellent
26/04/2024	██████████	Long-eared Owl	19:24	22:21	3-11c	40%	E up to 5kph	none	excellent
29/04/2024	██████████	Long-eared Owl	19:24	22:03	6-12c	0%	none	none	excellent
02/05/2024	Tilbury Fort	Breeding birds	04:55	10:50	12c	100%	N up to 8kph	none	excellent
03/05/2024	Tilbury Fort	Breeding birds	04:55	10:25	10c	100%	SW 3 kph	none	excellent
04/05/2024	Coalhouse fort area, Bowaters and DHL land	Breeding birds	04:55	09:15	13c	5%	SE up to 5kph	none	excellent

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
04/05/2024	Mucking Landfill	Breeding birds	09:59	11:58	18c	10%	none	none	excellent
05/05/2024	Mucking Landfill	Breeding birds	05:15	10:55	9c	10%	SW up to 4kph	none	excellent
06/05/2024	Thameside NR and Mucking Wetlands	Breeding birds	04:50	09:50	10-13c	100%	NE up to 4kph	moderate	excellent
25/05/2024	various	Breeding birds	03:59	10:03	7-19c	10%	none	none	excellent
27/05/2024	Mucking Landfill	Breeding birds	03:54	08:47	12-17c	10%	SW up to 9kph	none	excellent
28/05/2024	East Tilbury Quarry	Breeding birds	03:59	09:41	9-14c	100%	SW up to 8kph	none	excellent
28/05/2024	██████████	Long-eared Owl	20:10	23:20	13c	100%	SW up to 10kph	none	excellent
29/05/2024	Bowater Scrubland	Breeding birds	03:55	09:08	12-17c	0%	South up to 5kph	none	excellent

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
29/05/2024	██████████	Long-eared Owl	20:10	23:30	16c	80%%	SW up to 10kph	none	Good
30/05/2024	Mucking Landfill	Breeding birds	03:47	08:55	12-14c	100%	South up to 5kph	none	excellent
30/05/2024	██████████	Long-eared Owl	20:00	23:05	12c	100%	NW up to 11 kph	none	excellent
31/05/2024	various	Breeding birds	03:49	09:29	12c	100%	N up to 10kph	none	excellent
31/05/2024	██████████	Long-eared Owl	20:00	23:05	13c	100%	North up to 11 kph	none	excellent
01/06/2024	██████████	Long-eared Owl	20:05	23:05	14c	85%	N up to 10kph	none	excellent
17/06/2024	Low street	Breeding birds	03:36	08:28	10-18c	0%	SW up to 8kph	none	excellent
18/06/2024	Coalhouse fort area,	Breeding birds	03:38	08:07	10-19c	10%	NE up to 5kph	none	excellent

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
	Bowaters and DHL land								
19/06/2024	East Tilbury Quarry	Breeding birds	03:24	09:17	12-18c	50%	NE up to 11kph	none	excellent
20/06/2024	Tilbury Fort and Ashfields area	Breeding birds	03:26	08:54	8-17c	0%	E up to 8kph	none	excellent
25/06/2024	Mucking Landfill	Breeding birds	03:38	08:20	12-19c	0%	none	none	vary good
27/06/2024	Thameside NR and Mucking Wetlands	Breeding birds	03:27	08:57	14-20c	10%	W up to 8kph	none	excellent
10/07/2024	Grove wood area, Linford wood, Low street area	Breeding birds	05:29	08:50	14-20c	75%	SW up to 10kph	none	excellent
11/07/2024	██████████	Long-eared Owl	21:17	22:56	13-18c	90%	none	none	excellent

Date	Survey area	Survey type	Start time	Finish time	Temp	Cloud cover	wind	Rain	Visibility
19/07/2024	██████████	Long-eared Owl	20:49	23:02	16-14c	0%	none	none	excellent
13/03/2024	Coalhouse fort area, Bowaters and DHL land	Breeding birds	05:41	12:01	12c	100	SW up to 10kph	none	excellent

Appendix 2 – Transect Route Maps

Transect maps were plotted using EBird from Cornell Lab of Ornithology. © *Natural England*; © *Cornell Lab of Ornithology 2025*; These maps are published using information licensed under the *Non-Commercial Government Licence v2.0*

<https://www.nationalarchives.gov.uk/doc/non-commercial-government-licence/version/2/>.



Tilbury Fort and Ash fields typical route



Tilbury Fort and Ash fields alternative route



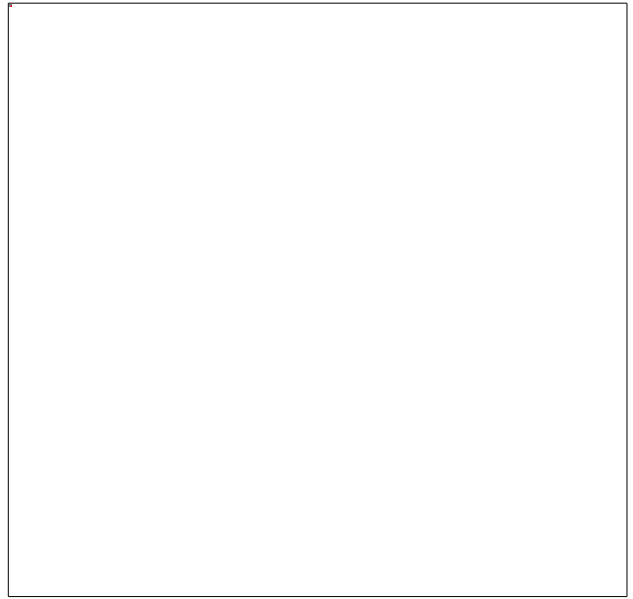
Bowater Scrub and DHL land typical route



East Tilbury Quarry typical route



Linford Wood alternative route

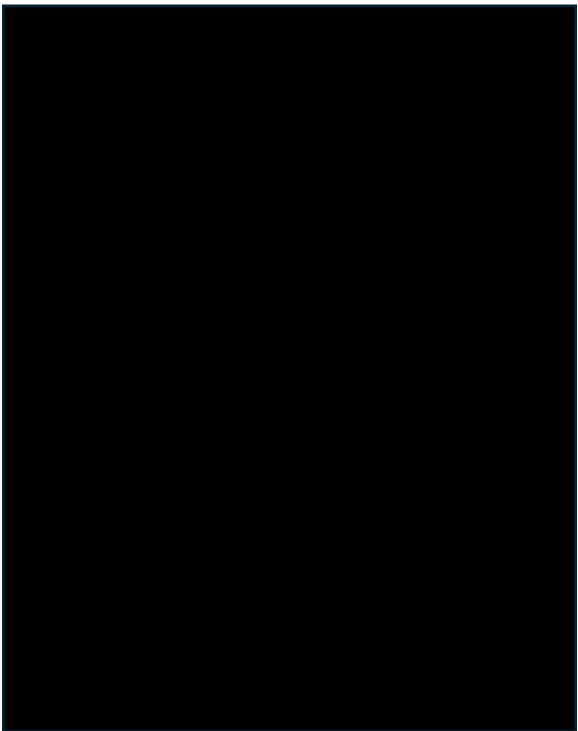
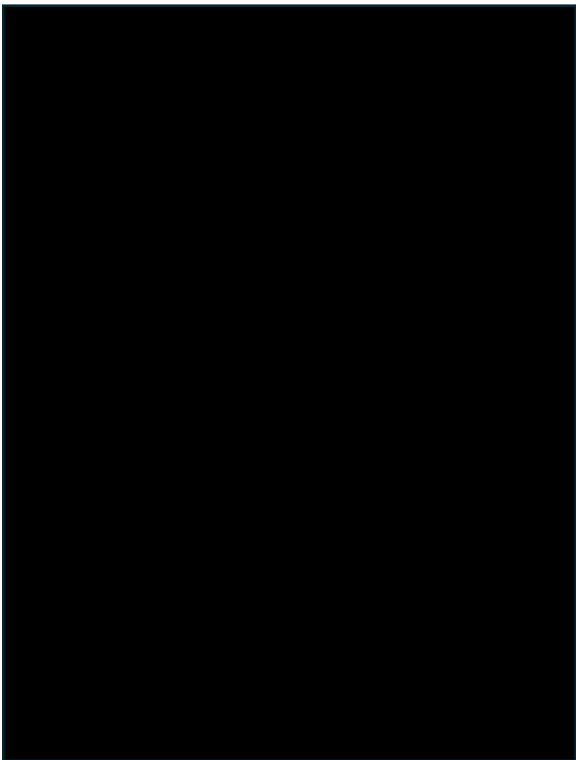


Grove House Wood typical route

Appendix 3 – Breeding status maps

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Corn Bunting breeding status



Hobby breeding status



Background Map data © 2024 Google

Stonechat breeding status



Appendix 4 – Equipment and field skills

Equipment

Binoculars Zeiss 10 x 42 Victory SF. Cameras Nikon Z8 with 400mm Nikkor lens. Sound recording equipment Telinga Pro8 MKII with Sound Devices Mixpre3 mkII recorder and passive recorder Roland R05 with lavalier mic.

Observer skills

David Darrell-Lambert – 40+ years birding experience, excellent knowledge of UK birds by sight and sound, ESAS (European Seabirds at Sea) qualified, schedule 1 licence holder, WeBs counter in Lea Valley and Thames Estuary 1998 to 2021, published various notes on bird ecology and vocalisation, chair of London Bird Club for ten years and also author of Birdwatching London.

Jamie Partridge – 30+ years birding experience, excellent knowledge of UK birds by sight and sound, published notes on Gulls identification and Honey Buzzard breeding surveys, rarity committee member for Kent and Sussex ornithological societies and has written for various local bird reports.

Appendix 5 – Standard Breeding Status Codes

Non-breeding
F – Flying over
M – Species observed but suspected to be still on M igration
U – Species observed but suspected to be s U mmerring non-breeder
Possible breeder
H – Species observed in breeding season in suitable nesting H abitat
S – S inging male present (or breeding calls heard) in breeding season in suitable breeding habitat
Probable breeding
P – P air observed in suitable nesting habitat in breeding season
T – Permanent T erritory presumed through registration of territorial behaviour (song etc) on at least two different days a week or more part at the same place or many individuals in one day
D – Courtship and D isplay (judged to be in or near potential breeding habitat; be cautious with wildfowl)
N – Visiting probable N est site
A – A gitated behaviour or anxiety calls from adults, suggesting probable presence of nest or young nearby
I – brood patch on adult examined in the hand, suggesting I ncubation
B – Nest B uilding or excavating nest-hole
Confirmed breeding
DD – D istraction- D isplay or injury feigning
UN – U sed N est or eggshells found (occupied or laid within period of survey)
FL – Recently F ledged young (nidicolous species) or downy young (nidifugous species). Careful consideration should be given to the likely provenance of any fledged juvenile capable of significant geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful. Be cautious, even if the record comes from suitable habitat,

ON – Adults entering or leaving nest-site in circumstances indicating **O**ccupied **N**est (including high, nests or nest holes, the contents of which can not be seen) or adults seen incubating

FF – Adult carrying **F**aecal sac or **F**ood for young

NE – **N**est containing **E**ggs

NY – **N**est with **Y**oung seen or heard

Appendix 6 – BTO Species Codes

AC	Arctic Skua	GA	Gadwall	LE	Long-eared Owl	SM	Sand Martin
AE	Arctic Tern	GX	Gannet	LT	Long-tailed Tit	SS	Sanderling
AV	Avocet	GW	Garden Warbler	MG	Magpie	TE	Sandwich Tern
BO	Barn Owl	GY	Garganey	MA	Mallard	VI	Savi's Warbler
BY	Barnacle Goose	GC	Goldcrest	MN	Mandarin Duck	SQ	Scarlet Rosefinch
BA	Bar-tailed Godwit	EA	Golden Eagle	MX	Manx Shearwater	SP	Scaup
BR	Bearded Tit	OL	Golden Oriole	MR	Marsh Harrier	CY	Scottish Crossbill
BS	Berwick's Swan	GF	Golden Pheasant	MT	Marsh Tit	SW	Sedge Warbler
BI	Bittern	GP	Golden Plover	MW	Marsh Warbler	NS	Serin
BK	Black Grouse	GN	Goldeneye	MP	Meadow Pipit	SA	Shag
TY	Black Guillemot	GO	Goldfinch	MU	Mediterranean Gull	SU	Shelduck
BX	Black Redstart	GD	Goosander	ML	Merlin	SX	Shorelark
BJ	Black Tern	GI	Goshawk	M.	Mistle Thrush	SE	Short-eared Owl
B.	Blackbird	GH	Grasshopper Warbler	MO	Montagu's Harrier	SV	Shoveler
BC	Blackcap	GB	Great Black-backed Gull	MH	Moorhen	SK	Siskin

BH	Black-headed Gull	GG	Great Crested Grebe	MS	Mute Swan	S.	Skylark
BN	Black-necked Grebe	ND	Great Northern Diver	N.	Nightingale	SZ	Slavonian Grebe
BW	Black-tailed Godwit	NX	Great Skua	NJ	Nightjar	SN	Snipe
BV	Black-throated Diver	GS	Great Spotted Woodpecker	NH	Nuthatch	SB	Snow Bunting
BT	Blue Tit	GT	Great Tit	OP	Osprey	ST	Song Thrush
BU	Bluethroat	GE	Great Sandpiper	OC	Oystercatcher	SH	Sparrowhawk
BL	Brambling	G.	Green Woodpecker	PX	Peafowl/Peacock	AK	Spotted Crake
BG	Brent Goose	GR	Greenfinch	PE	Peregrine	SF	Spotted Flycatcher
BF	Bullfinch	GK	Greenshank	PH	Pheasant	DR	Spotted Redshank
BZ	Buzzard	H.	Grey Heron	PF	Pied Flycatcher	SG	Starling
CG	Canada Goose	P.	Grey Partridge	PW	Pied Wagtail	SD	Stock Dove
CP	Capercaillie	GV	Grey Plover	PG	Pink-footed Goose	SC	Stonechat
C.	Carrion Crow	GL	Grey Wagtail	PT	Pintail	TN	Stone-curlew
CW	Cetti's Warbler	GJ	Greylag Goose	PO	Pochard	TM	Storm Petrel
CH	Chaffinch	GU	Guillemot	PM	Ptarmigan	SL	Swallow
CC	Chiffchaff	FW	Guineafowl (Helmeted)	PU	Puffin	SI	Swift
CF	Chough	HF	Hawfinch	PS	Purple Sandpiper	TO	Tawny Owl
CL	Cirl Bunting	HH	Hen Harrier	Q.	Quail	T.	Teal

CT	Coat Tit	HG	Herring Gull	RN	Raven	TK	Temminck's Stint
CD	Collared Dove	HY	Hobby	RA	Razorbill	TP	Tree Pipit
CM	Common Gull	HZ	Honey Buzzard	RG	Red Grouse	TS	Tree Sparrow
CS	Common Sandpiper	HC	Hooded Crow	KT	Red Kite	TC	Treecreeper
CX	Common Scoter	HP	Hoopoe	ED	Red-backed Shrike	TU	Tufted Duck
CN	Common Tern	HM	House Martin	RM	Red-breasted Merganser	TT	Turnstone
CO	Coot	HS	House Sparrow	RQ	Red-crested Pochard	TD	Turtle Dove
CA	Cormorant	JD	Jackdaw	FV	Red-footed Falcon	TW	Twite
CB	Corn Bunting	J.	Jay	RL	Red-legged Partridge	WA	Water Rail
CE	Corncrake	K.	Kestrel	NK	Red-necked Phalarope	W.	Wheatear
CI	Crested Tit	KF	Kingfisher	LR	Redpoll (Lesser)	WM	Whimbrel
CR	Crossbill (Common)	KI	Kittiwake	RK	Redshank	WC	Whinchat
CK	Cuckoo	KN	Knot	RT	Redstart	WG	White-fronted Goose
CU	Curlew	LM	Lady Amherst's Pheasant	RH	Red-throated Diver	WH	Whitethroat
DW	Dartford Warbler	LA	Lapland Bunting	RE	Redwing	WS	Whooper Swan
DI	Dipper	L.	Lapwing	RB	Reed Bunting	WN	Wigeon
DO	Dotterel	TL	Leach's Petrel	RW	Reed Warbler	WT	Willow Tit

DN	Dunlin	LB	Lesser Black-backed Gull	RZ	Ring Ouzel	WW	Willow Warbler
D.	Dunnock	LS	Lesser Spotted Woodpecker	RP	Ringed Plover	OD	Wood Sandpiper
EG	Egyptian Goose	LW	Lesser Whitethroat	RI	Ring-necked Parakeet	WO	Wood Warbler
E.	Eider	LI	Linnet	R.	Robin	WK	Woodcock
FP	Feral Pigeon	ET	Little Egret	DV	Rock Dove (not feral)	WL	Woodlark
ZL	Feral/hybrid goose	LG	Little Grebe	RC	Rock Pipit	WP	Woodpigeon
ZF	Feral/hybrid mallard type	LU	Little Gull	RO	Rook	WR	Wren
FF	Fieldfare	LO	Little Owl	RS	Roseate Tern	WY	Wryneck
FC	Firecrest	LP	Little Ringed Plover	RY	Ruddy Duck	YW	Yellow Wagtail
F.	Fulmar	AF	Little Tern	RU	Ruff	Y.	Yellowhammer

References

Castell. R., Ferguson-Lees. J. and Leech. D. 2011. A Field Guide To Monitoring Nests. BTO Books

Gilbert, G., Gibbons, D.W., & Evans, J. 1998. *Bird Monitoring Methods: A Manual of Techniques for UK Key Species*. The Royal Society for the protection of Birds.

Green. D, and Green P. 2012 Long-eared Owls on the Sussex Downs: notes recording methods, habitat requirements and population size. *The Sussex Bird Report 2011*, 291-298.

Hardey, J., Crick, H., Wenham, C., Riley, H., Etheridge, B. and Thompson, D. 2009. *Raptors A Field Guide For Surveys and Monitoring*. The Stationery Office.

International Union for Conservation of Nature and Natural Resources IUCN. 2025. The IUCN Red List of Threatened Species. Version 2025-1. www.iucnredlist.org (Accessed: 09.05.2025)

Kent Ornithological Society. 2022. The Kent bird report. 69, 2020. Kent Ornithological Society.

Newson, S.E., Johnston, A., Renwick, A.R., Baillie, S.B. and Fuller, R.J. 2012. Modelling large-scale relationships between increasing abundance of deer and changes in bird populations in lowland England. *Journal of Applied Ecology*, 49 part 1, 278-286.

Woodward. I, Aebischer. N, Burnell. D, Eaton. M, Forst. T, Hall. C, Stroud. D and Noble. D. 2020. Population estimates of birds in Great Britain and the United Kingdom. *British Birds*, 113, 69–104.

Woodward, I.D., Calbrade, N.A., Birtles, A., Feather, G.A., Peck, K., Wotton, S.R., Shaw, J.M., Balmer, D.E. and Frost, T.M. 2004. Waterbirds in the UK 2022/23: The Wetland Bird Survey and Goose & Swan Monitoring Programme. BTO/RSPB/JNCC/NatureScott. Thetford.

