RSPB Titchwell Marsh

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Abstract

During the early 1970s, the RSPB bought all the tidal marsh in the parish of Titchwell, Norfolk, and developed a quarter of it primarily for the benefit of birds. Changes included the formation of freshwater reedbed, open freshwater marsh and open brackish marsh. These areas attracted new breeding species such as Marsh Harrier *Circus aeruginosus*, Eurasian Bittern *Botaurus stellaris* and Pied Avocet *Recurvirostra avosetta* as well as a

wide range of migrating and wintering waders and wildfowl. The consequential and huge increase in the number of visits by birdwatchers also led to an increase in sightings of rare passerines. The reserve's long-term future is likely to be influenced by the rate of sea-level rise and the RSPB's ability to address its potential effects on the freshwater habitats.

Introduction

RSPB Titchwell Marsh reserve in Norfolk lies 10km east of Hunstanton and sits between the A149 coast road and the sea. It forms just one section of the 40-km-long coastal plain between Hunstanton to the west and Weybourne to the east. The principal natural habitats in the area are foreshore, sand and shingle beach, sand dune, saltmarsh and tidal reedbed but, during the last few centuries, sea walls have been built to enclose grazing marshes and, in a few places, arable fields. Titchwell Marsh has had a chequered history of natural saltmarsh, farmland, reversion to saltmarsh and then part-conversion into managed wetlands for nature conservation.

The reserve is 10 km east of Hunstanton and lies between the main A149 coast road and the sea. In 1972, 170 ha of tidal land were purchased by the RSPB and, in 1993, a block of 13 ha of reedbed, field and copses was added; 60 of these 183 ha have been actively managed over the last 50 years. With an expanse of leased foreshore to the north and west, the present total holding is over 330 ha and, between 1994 and 2013, there was an additional agreement over 75 ha of Thornham saltmarsh to the west of the main reserve. Being part of the coastal marshes, the reserve is included in a range of designations offering protection for wildlife: Area of Outstanding Natural Beauty (National Landscape) for the whole coast (1967); the North Norfolk Coast Site of Special Scientific Interest (nearly 8,000 ha); and Ramsar Site,

Special Protection Area and Special Area of Conservation, which broadly cover the same area.

A 72-ha section of tidal marsh, which was part of the original land purchase of the reserve, has never been managed in any way. This includes 58 ha of saltmarsh that, over the past 50 years, has naturally progressed from being dominated by Sea Aster *Tripolium pannonicum* to being dominated by Common Sea-lavender *Limonium vulgare*. The remaining 14 ha of the tidal marsh is a tidal reedbed, comprising Common Reed *Phragmites australis* on rising ground between the saltmarsh and arable farmland next to the coast road, and this habitat has not changed noticeably since 1973.

The part of the reserve which has been managed intensively since 1973 is more familiar to visitors: these 37 ha are divided into 10 ha of freshwater reedbed, 11 ha of open freshwater marsh and a 16-ha area that, in 2011, was converted from brackish marsh to saltmarsh. The freshwater reedbed is dominated by Common Reed, which grows in shallow water, and is home to breeding birds such as Eurasian Bittern *Botaurus stellaris*, Marsh Harrier *Circus aeruginosus*, Bearded Tit *Panurus biarmicus*, and Common Reed *Acrocephalus scirpaceus* and Sedge Warblers *A. schoenobaenus* and, in winter, is a roost area for harriers and egrets. The freshwater marsh holds a colony of Pied Avocets *Recurvirostra avosetta* and other breeding species such as Gadwall *Mareca strepera*, Common Coot *Fulica atra*, Black-headed Gull *Chroicocephalusridibundus* and occasionally Mediterranean Gull *Ichthyaetus melanocephalus,* while the shallow water and mud provide food and resting places for a wide range of waders and wildfowl in autumn and winter.

To the north of the new northern seawall – built in 2010 – is an area of

developing saltmarsh, where Common Shelducks *Tadorna tadorna*, Common Redshanks *Tringa totanus*, Eurasian Oystercatchers *Haematopus ostralegus*, Grey Plovers *Pluvialis squatarola* and Common Linnets *Linaria cannabina* find food when the tide is out. Beyond that is a much-depleted area of sand dunes, from where birders can scan the foreshore and sea.

History

Nine thousand years ago, Titchwell's current low-tide mark was in open, dry woodland of mainly birch *Betula* sp. and Common Juniper *Juniperus communis*. Global temperatures had been rising for a thousand years or more and they continued to do so; as a result, pine *Pinus* sp., elm *Ulmus* sp., oak *Quercus* sp., alder *Alnus* sp. and Hazel *Corylus avellana* came to dominate a forest that extended from eastern England across to what is now Denmark and the Netherlands. Higher temperatures also caused glaciers to melt and, by 4,500 years ago, sea water had spread through the forest and up to the present coastline; trees and bushes died and became compacted into a thick bed of peat, which now forms the floor of the southern North Sea (Funnell 1976). That peat provides anchorage for extensive beds of Blue Mussels *Mytilus edulis,* which attract the rafts of sea-ducks that we see today. About 2,000 years ago, a renewed rise in sea level led to the deposition of marine sediment along the present coastline and eventually the new land became sufficiently high for plants to grow despite the twice-daily inundation by tides: saltmarshes had begun to form.

Marine sediment adds about 7 mm to a developing saltmarsh's surface every year and, by 1639, the saltmarsh had risen sufficiently at Overy Staithe for a seawall to be built to enclose land for human use. The saltmarsh in Titchwell parish and the adjacent parishes of Thornham and Brancaster developed in

the same way. Here, a wide, winding channel four miles long formed from east to west through the centre of the saltmarsh, which enabled small, sea-going boats to reach the harbours of each village. Titchwell's harbour was just north of the church. Despite the inconvenience of tides and the need to build across the channel in two places, a seawall was formed around the saltmarsh in Titchwell in the late 1600s and, although badly damaged in the early 1700s, it was effective again by 1786. Within the enclosed land, the east–west channel became a long, freshwater pool, later called 'The Gut' by locals, and excess fresh water ran through a one-way sluice in the western seawall into Thornham saltmarsh.

The seawalls kept the sea out for more than 160 years. Fresh water accumulated quickly and, when the outlet sluice was closed during high tides, water had to be pumped over the seawall. During the early years, the land was entirely pasture, with dairy cows, bullocks, sheep and working horses, but later it was also used to produce potatoes, wheat, mustard and massive wild mushrooms. In 1902, the Reverend W. E. Thompson found Bogbean *Menyanthes trifoliata*, Green-winged Orchid *Anacamptis morio,* Broad-leaved Helleborine *Epipactis helleborine* and Common Meadow-rue *Thalictrum flavum*growing there, too. He also found a 'genuine peat bog – the only one known in the district' in the southwest corner of the marsh, where there was Common Cottongrass *Eriophorum angustifolium*, Bog Pimpernel *Lysimachia tenella*, Star Sedge *Carex echinata* and other plants of more acid habitats (Thompson 1903).

In the 1940s, the army requisitioned some of the farmland and constructed a training ground for tank operators. There was a concrete hardstanding for tanks (T–T in fig. 1) and two low earth banks, 450 and 900 m away, behind which targets were moved back and forth using steel cables and pulleys

operated from pillboxes. Additionally, several earth mounds positioned at various distances housed pop-up targets. Many shells flew well beyond the furthest target and hit the back of the seawall.

Then, on 31st January 1953, the northern seawall was destroyed by the infamous surge-tide: pastures became saltmarsh again, The Gut became the east–west tidal channel once more, and a newly carved channel connected The Gut directly to the sea. On both sides of the new channel, shingle spits developed. As accumulation of marine sediment had been prevented in the area for more than 160 years, the land level was similar to that of 1786 (a metre lower than the nearby, un-reclaimed saltmarsh), so a low-level saltmarsh community of plants developed: Glasswort *Salicornia* agg., Annual Sea-blite *Suaeda maritima* and Sea Aster, amongst others. On higher fields along the southern edge, where a line of freshwater springs emerged from the ancient-peat/marine sediment interface, a reedbed grew on land where previously there had been cattle. The new saltmarsh and new (tidal) reedbed remained largely unaffected by humans for the next 17 years until, in 1970, some rare birds appeared.

A pair of Montagu's Harriers *Circus pygargus* established a breeding territory near the eastern end of the reedbed in 1970 and, in the following two years, they nested farther east in Brancaster freshwater marsh. In those three years, they fledged a total of 13 young. Although the female returned to the reserve in 1973, the male did not and the nest, with infertile eggs, was flooded by spring tides. A female was present in May and June in both 1974 and 1975 but she failed to attract a male. The species was sporadically seen again over the following years, such as in 1980, when a male was resident for a week, but he failed to attract a passing female.

78. Looking eastwards over the Brackish Marsh (left) and the Freshwater Marsh (right), with the saltmarsh beyond, RSPB Titchwell, Norfolk, 1984.

This harrier activity led the RSPB's reserves managers to appoint a watcher in 1971 and 1972, as well as to appreciate the range of habitats contained within one landholding on the market. With the potential for creating new habitats and an adjacent main road for visitor access, the land was purchased in 1972. Thus, Titchwell Marsh reserve was born.

At that time, the UK breeding populations of Marsh Harrier and Bittern were in a parlous state: just one pair of Marsh Harriers in 1971, at RSPB Minsmere, Suffolk, and just 40 booming male Bitterns, the species having suffered from a continuing decline (Hawke & Jose 1996). Even Avocets were restricted to just two breeding sites (RSPB Havergate Island, Suffolk, and Minsmere), with

a total of about 120 pairs (Piotrowski 2003). The Management Plan for the new reserve at Titchwell Marsh therefore aimed to provide conditions suitable for these species to breed: a freshwater reedbed and shallow, open, freshwater and brackish pools.

Within 18 months of buying the land, a bank was built to impound fresh water. This was at the eastern end of the reserve and it enclosed a 2.5-ha enclave of tidal reeds that, long ago, was Titchwell harbour. Fresh water from a spring soon filled the area, now called Church Marsh, and a new outlet sluice directed water westwards; it was the first indication that fresh water might be plentiful. That was in 1974; just a few years later, in 1979, the reserve's first booming Bittern was heard there.

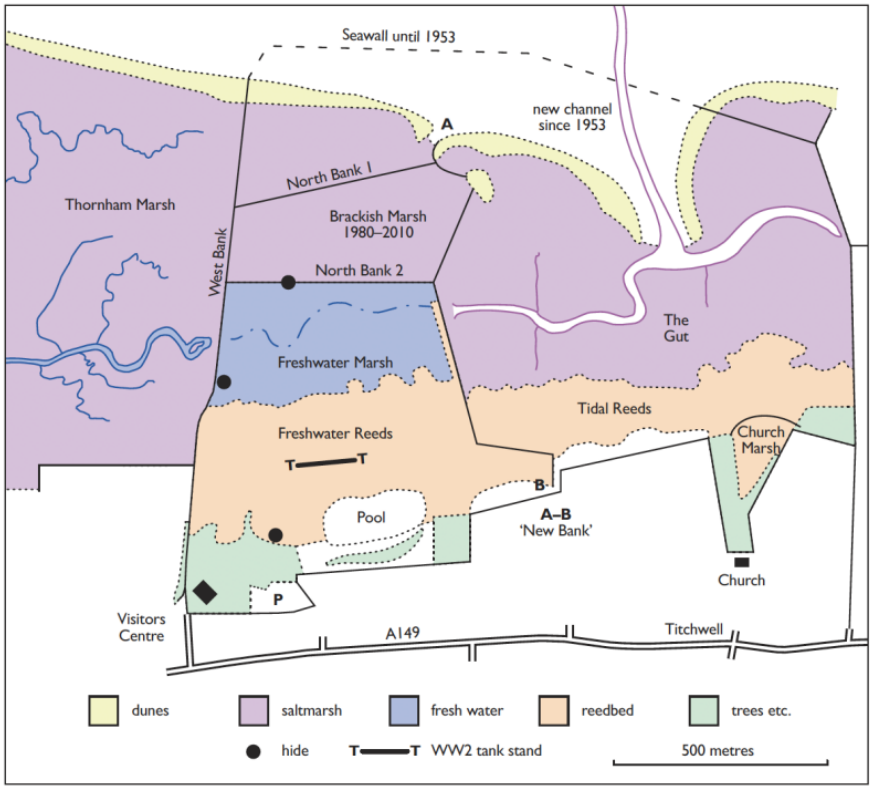

Fig. 1. Map of RSPB Titchwell Marsh, showing principal habitat types present

on the reserve since 2011.

Once that bank had been built, the major work began: from 1974 to 1978 a seawall 1,000 m long – 'the New Bank', A–B in fig. 1 – was constructed between sand dunes in the north and arable fields farther south. Resources were a problem: the budget was limited (no Heritage Lottery Fund, EU or Landfill Tax grants then), so the seawall had to be prepared in four sections to spread the cost. Furthermore, excavators at that time – 10-RB draglines – were small, not the speedier hydraulic machines of today. Two severe storm tides didn't help – one on 3rd January 1976 and another on 11th January 1978 (dates etched on one's mind) – and caused significant breaches in the new bank, with much time and money needed to repair the damage. Relatively minor work was not so minor either. For example, providing a 600-mm-diameter precast concrete pipe to bring sea water through the new bank into the proposed Brackish Marsh was going to cost J500. To avoid that expenditure, fifteen 45-gallon oil drums were acquired, their ends were cut out and they were laid end to end on a bed of concrete and covered with more concrete; sand and shingle came from the beach and fresh water from the Tern Hide roof, while cement and reinforcing mesh were transported by punt during high tides; there were no quad bikes, 4x4 trucks or tracked dumpers.

The new Freshwater Marsh was flooded with fresh water for a few months in 1979 but it wasn't until 1980 that long-term and controlled flooding was possible. By 1981, funding was much improved and a new 500-m-long seawall (North Bank 1 in fig. 1) was built to protect the enclosed land further, while most of the West Bank's crest was raised to the same level as North Bank 1. This created three divisions on the reserve that, for subsequent

management actions and consequential ecological issues, are best considered as three separate major habitats: Freshwater Reedbed, Freshwater Marsh and Brackish Marsh.

79. View looking west over the main tidal creek ('The Gut') as it is being filled to carry the new bank, RSPB Titchwell, Norfolk, 1975.

Freshwater Reedbed

Water entered the reedbed from three sources: the Church Marsh outlet to the east, springs in a willow *Salix* copse to the south, and via a main ditch in Thornham Marsh to the west; additionally, all new pipes and ditches headed towards the reedbed. One problem was having to work around a 13-ha block of our neighbour's land so that he could drain an arable field (and the old tank

hardstanding) through the RSPB's reedbeds, which were at a higher water level; the problem was resolved in 1993 when the RSPB bought the whole block, which added 6 ha to the reedbed. However, when water accumulated in the initial 10 ha of reedbed, it connected directly with the Freshwater Marsh, so when the level in the latter was lowered, water was pulled out of the reedbed because it was on rising ground. Therefore, in 1983, the main reedbed was surrounded by a bank including an outlet sluice. That meant that the two freshwater habitats became independent.

Ecological features were next to be created. A good reedbed contains many pools and channels with sinuous edges and gentle slopes for Bitterns to readily find and catch fish. The perimeter channel was supplemented first by what became known as 'upside-down holes'. An excavator dug a pit of, say, 20 m by 10 m width and 2.5 m depth. The top 1.25 m of excavated material, which contained reed rhizomes, was kept separate from the underlying rhizome-free clay and the pit was then back-filled in reverse order, with the rhizome-free clay now on the surface. The result was a shallow pool, free of reeds, into which adjacent reeds could spread gradually during subsequent years; a reed-edge advancing through shallow water is attractive to birds such as Bitterns, Reed Warblers and Bearded Tits. In total, 12 of these 'upside-down holes' were dug between 1988 and 1993.

80. A shallow pool created by inverting the upper 2.5 metres of reedbed (see main text), RSPB Titchwell, Norfolk.

Bitterns bred in the early 1980s but then ceased. Surveys found few fish in the reedbed so, in 1994 and 1995, 12,000 small European Eels *Anguilla anguilla* were released into the channels and new pools. However, this failed to re-establish the Bittern as a breeding species. Therefore, in April 2000 – by which time there was even more open water – 500 Rudd *Scardinius erythrophthalmus* were introduced and three years later the population had expanded to the equivalent of 1,150 fish per ha of open water (Gurney 2007). Bitterns returned as a breeding species in 2003 and their subsequent behaviour suggests that they've nested in some years since then, too.

Much of the reedbed was mown, raked and burnt on a rotational basis to reduce the accumulation of fallen reeds and a consequential rise in ground level. One large area was managed in this way by dividing the reedbed into

eight parallel strips 12 m wide and by mowing one strip per year from 1990 to 1997. Observations from small hides overlooking the strips showed that Bearded Tits took food to nests preferentially in 2–3-year-old reed (with sparse reed litter) rather than 4–7-year-old reed; this disproved the belief that mowing very old reedbed would be detrimental for the Bearded Tits. Another area of reedbed was mown, burnt and immediately reflooded and that remains as an open pool to this day.

There was still a shortage of deep pools for fish refuges in winter. Although two had been dug in 1998, two more were added in 2003 and the spoil used to enlarge the reedbed's perimeter bank. This task involved excavators and tracked dumpers persistently moving over much of the reedbed; once the area had been reflooded soon afterwards, reed regrowth was delayed for several years. The resulting shallow, open pools have attracted ducks, Grey Herons *Ardea cinerea*, egrets, Bitterns and even a Purple Heron *A. purpurea*.

81. Eurasian Bittern *Botaurus stellaris*, RSPB Titchwell, Norfolk, January 2023.

The next major habitat project occurred in 2021, when new channels were formed in reedbed that had been mown only since its acquisition in 1993. This incorporated an arrangement of pools and islands with a potential new breeding species for Titchwell Marsh in mind – Eurasian Spoonbill *Platalea leucorodia*.

82. Eurasian Spoonbill *Platalea leucorodia*, May, RSPB Titchwell, Norfolk, May 2023.

Finally, an unexpected event occurred in 1984. On relatively high, unmanaged, peaty ground in the southwest corner of the reedbed, rank vegetation was cleared during winter 1983/84 and, in summer, seeds germinated that had lain hidden in the peat for many decades. These were plants of more acid

conditions (see ‘Other wildlife’) and they were an apt supplement to the Bog Bean and orchids that Reverend Thompson had found 82 years earlier!

Freshwater Marsh

Initially, the reedbed was expected to expand steadily northwards across 75% of the open Freshwater Marsh until it reached The Gut, which, at 2 m deep, was expected to halt its progress. But this was not the case: the reeds began to spread northwards and six permanent transects across the reed-edge showed it had advanced by an average of 1.3 m per year between 1977 and 1981 (Sills 1983a). However, that rate of spread more or less ceased in subsequent years and the current northern edge of the reedbed is similar to that of the early 1980s; hence, the Freshwater Marsh today is four times larger than initially expected.

The discontinuous process of building the new bank produced an unexpected ecological benefit. Before the last section of the bank was built, high tides could still flow into the soon-to-be Freshwater Marsh, but on a restricted basis. This emulated a mid-level saltmarsh suitable for Common Saltmarsh-grass *Puccinellia maritima,* which soon covered most of the ground. When long-term flooding with fresh water began in 1980, the former saltmarsh soon developed a thick layer of decomposing vegetation full of invertebrates, such as fly larvae and tiny crustaceans. These attracted hundreds, often thousands of birds. However, after three years, the layer of decomposing vegetation ceased to exist and was replaced by a simple arrangement of shallow water on top of soft, organic mud. Nevertheless, fly larvae such as non-biting midges (Chironomidae, ‘blood-worms’) were found to be abundant in the top 3 cm (typically 2,000–6,000 per square metre in October) reducing to 400–700 per square metre between depths of 3 to 6 cm and up to 200 per

square metre at depths of 6 to 9 cm (Sills 1988). This was good enough for most medium-sized waders. Where algae grew on damp but exposed mud surfaces, core samples revealed 10,000 fly larvae per square metre in late summer 1980: 4,300 non-biting midges, 2,700 owl-midges (Pyschodidae), 2,400 shore-flies (Ephydridae) and 600 biting midges (Ceratopogonidae). These all became available to small and short-billed waders such as Little Stints *Calidris minuta* and Ringed Plovers *Charadrius hiaticula*.

A much larger wading bird – the Spoonbill – became more frequent in the early 1980s and two things were done to encourage the species to nest. Using a system of pipes with mesh flaps and one sluice, sea water containing vast numbers of the marine form of Three-spined Stickleback *Gasterosteus aculeatus* was let into a detached channel of the Freshwater Reedbed, but only the water was allowed back out to sea. When the sluice was opened, the fish instinctively swam into the Freshwater Marsh, where Spoonbills caught them… but at a much lower rate than in the Netherlands. Additionally, 19 life-size polystyrene models of Spoonbills on nests were placed on islands in the Freshwater Reedbed in spring 1984. Although real Spoonbills took notice of them, the experiment didn't work in encouraging the birds to stay and breed, and another 27 years elapsed before the species nested in Norfolk, at Holkham NNR (Bloomfield 2021).

83. Pied Avocets *Recurvirostra avosetta*, RSPB Titchwell, Norfolk, February 2006.

But can, or should, this simple system of shallow water and mud remain indefinitely? In 2021, with the aim of having three different regimes at any one time – one shallow water, another drained and the third with vegetation – two low banks containing water-control structures were built across the marsh to divide it into three compartments that could be 'rotated' over time. The result should be a wider range of bird species that breed, feed or rest within a more complex habitat.

Brackish Marsh

This marsh was separated from the Freshwater Marsh by a low bank built by the army in the 1940s. Once the first section of the new bank had been completed, the area (initially 16 ha) was maintained as a seawater flood by

introducing water through the oil-drum pipe during high tides. Sampling by net in the incoming torrent showed that the commonest marine animals were Three-spined Sticklebacks in spring and the Common Goby *Pomatoschistus microps* and Common Ditch Shrimps *Palaemon varians* in autumn. These species are, however, fast swimmers and of little interest to most wader species. Ragworms *Hediste diversicolor* were quite numerous in the mud (400–4,000 per square metre) and they were available to probing waders, such as godwits and shanks, but not usually to Avocets. However, as soon as the Freshwater Marsh was under a controlled flooding regime in 1980, water was let into the Brackish Marsh. At first, the brackish water salinity was held at 10–12 parts per thousand (ppt) – a third that of seawater – but subsequent mud-core sampling revealed a reduction in the size and density of ragworms and only a few hundred fly larvae per square metre within the upper zone of mud, which was still not suitable for attracting breeding Avocets. Therefore, the salinity was raised to 20–25 ppt and an estuarine amphipod crustacean, the European Mud Scud *Corophium volutator,* soon colonised the marsh. These amphipods moved slowly on top of, and just within, the mud surface. Densities were only 100–400 per square metre in 1982 but, from the summer of 1983 to the summer of 1987, they increased from 3,000 per square metre to 14,000 per square metre. With a supply of suitable food now available, four pairs of Avocets nested in 1984 and they have continued as a breeding species ever since; the Brackish Marsh at Titchwell formed the sixth long-term and generally successful Avocet nest area in the UK (Sills 1988). Vast numbers of Slender Opossum Shrimps *Neomysis integer* also occurred in late summer and became a food supply for post-breeding Avocets, Common Greenshanks *Tringa nebularia* and sometimes Spoonbills.

Such an open area of mud, shallow water and slightly higher ridges and islands (many made by hand) attracted large numbers of other birds, for example wintering Eurasian Wigeons *Mareca penelope* and Brent Geese *Branta bernicla*, early summer gatherings of Grey Plovers and Ruddy Turnstones *Arenaria interpres*, and autumnal roosts of Red Knot *Calidris canutus.*

However, the low bank was converted into a seawall in 2010 (North Bank 2 on fig. 1) to protect the freshwater habitats against the threat of a rising sea level. After its completion, a major breach was made in the new bank so that tides once again flowed twice daily into the hitherto Brackish Marsh.

Saltmarshes

After the three new areas were developed, 58 ha of saltmarsh remained in the parish of Titchwell. The surge tide of January 1953 flooded the farmland and, for the last 70 years, marine sediment has been deposited by the tides at a rate of about 7 mm per year – approximately 50 cm in total. As a result, the dominant plant has changed from Sea Aster (in 1973) to Common Sea-lavender. Some areas are now sufficiently high for ground-nesting birds such as Common Redshank (three or four pairs in recent years), although they often select lower land for nest sites and, as a result, lose their eggs during high tides. Thornham saltmarsh, to the west of Titchwell, has never been reclaimed, so it developed into a high-level saltmarsh long ago. Between 2000 and 2013, surveys revealed 30–40 pairs of Redshank each year as well as other breeding species such as Eurasian Skylark *Alauda arvensis*, Common Shelduck and Common Reed Bunting *Emberiza schoeniclus*.

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84. Saltmarsh and tidal reedbed looking southeastwards towards Titchwell church, RSPB Titchwell, Norfolk, 1973.

Other habitats

While the three new wetland habitats were being formed, two other areas of the reserve received attention: the shingle spit by the sea, and small plantations nearer to the coast road.

The shingle spit developed soon after the 1953 storm tide had demolished the original northern seawall and it undoubtedly continued to change during the following 20 years. By 1973, there were about 2 ha at a level suitable for terns to nest on, and about 3.5 ha ten years later, by which point the spit had not only increased in length and width but had also risen and moved southwards across the saltmarsh. Little Terns *Sternula albifrons* had bred here since 1953 and, by 1982, they had increased to 67 pairs. Subsequently,

they declined to a few pairs in 2005, two pairs in a short-lived breeding attempt in 2016 and none in recent years. A study was made between 1974 and 1977 (Sills 1983a) that showed Little Terns initially nested over the whole spit, but eventually they suffered from predation by gulls, Red Foxes *Vulpes vulpes* and Oystercatchers, competition for nesting spaces from Common Terns *Sterna hirundo*, of which there were fewer than ten pairs until 1980 before they increased to 110–135 pairs, and the development of sand dunes. Although embryonic dunes, less than 50 cm high, were removed by hand or bulldozer in 1979 and 1986 – and the spit consequently made larger – dunes continued to develop so that almost all of the shingle spit is now permanently covered with a sand-dune system.

A cordon was erected every summer to deter entry to the tern colony by people; clutches of eggs in imminent danger from spring tides were experimentally and successfully saved (Sills 1983b); and egg thieves were usually deterred and sometimes caught.

Other birds used the area as well. Between the mid 1970s and the mid 1980s, the spit became a roost site for waders during spring tides between August and October. Fairly typical numbers were 15,000–40,000 Knots, 1,000–3,000 Bar-tailed Godwits *Limosa lapponica*, 500–1,500 Oystercatchers, 160–700 Grey Plovers, 100–150 Sanderlings *Calidris alba*, 60–200 Ringed Plovers, 100–150 Turnstones and 60–150 Dunlins *C. alpina*. Shingle spits with a wide, sandy beach on the seaward side are inevitably ephemeral – but at least this one lasted for 40 years.

When the reserve was purchased in 1972, there were only two small areas of trees and shrubs: one with tall willow trees south of the reedbed and the other with young willow bushes near today’s visitor centre. With the aim of

benefiting breeding passerines, migrants fresh in off the sea and wintering thrushes, four more areas of trees and scrub were planted with native species: a hectare in an old field north of the church in 1975/76; 1.25 ha around the visitor centre and car park in 1978; 1.3 ha on arable land in the southeast corner of the reserve, where 50 large Hawthorn *Crataegus monogyna* root plates from a neighbouring farmer's hedge were planted in 1983; and more than a hectare bordering a large pool (now named Patsy's Pool in memory of volunteer Pat Vincent) near the tank hardstanding in 2011. A further hectare of mature willow bushes was bought in 1993 and, together, these stands of vegetation accommodate a wide range of birds throughout the year.

The area containing Patsy's Pool has had a rather chequered history. Initially, the 4-ha field belonged to the neighbouring farmer, who lightly grazed it with cattle and under-drained it for cereal crops. He eventually sold it to the RSPB in 1993. Cattle grazing continued but, in 2003, more than 600 m of wide ditches were created and, for a few years, they accommodated wetland plants and birds. In 2010, half of the area was excavated to provide thousands of cubic metres of clay for the second North Bank and the resulting pit was fashioned into Patsy's Pool, destined to become a reedbed; currently it is part-way between the two habitats.

Current habitat management

Once the Brackish Marsh (now called the Volunteer Marsh) had been returned to a tidal regime in 2011, the Freshwater Reedbed and Freshwater Marsh remained, plus a third, terrestrial, habitat.

Freshwater Reedbed

These 16 ha were unmanaged, homogenous blocks of reed up to 1989. Subsequently, the need for greater structural diversity led to mowing and burning of reeds in winter, suppression of reed growth in shallow water, formation of channels and pools too deep for reeds to colonise, control of water levels, removal of excess willows, and introduction of fish suitable for Bitterns to feed on. These actions continue to stop the reedbed becoming willow carr devoid of water.

Every winter, about 2 ha of reed is mown and a study in the 1990s showed how that related to Bearded Tit nest habitat (Sills unpublished). However, some reed is never mown, for the benefit of certain invertebrates. Suppression of reed growth can be achieved either by moving a tracked excavator back and forth over a mown area followed immediately by reflooding or by mowing with an amphibious machine; regrowth will eventually occur, but repeated operations will maintain open, shallow water. Channels and pools are kept as open and as deep as possible so that fish can move freely throughout the reedbed and descend to lower depths in winter while the deeper parts are desilted ('slubbed out') periodically. Shallow-sided, reed-covered banks are re-profiled and/or mown usually every few years and often just one bank in any one year because, for example, most Reed Warblers require a few old stems to help support their nests. Removal of excess willow bushes (e.g. Grey Willow *Salix cinerea*) is carried out to ensure that they cover little more than 10% of the reedbed, and removal of willow trees (e.g. Crack Willow *S. fragilis*) occurs because they have little ecological value and draw much water from the habitat. However, Grey Willow, Goat Willow *S. caprea*, Hawthorn and Common Oak *Quercus robur* have been planted on a recently made complex of islands with the long-term potential of accommodating tree-nesting species.

Rudd have been successfully introduced in the past and electro-fishing surveys are now carried out every five years to ensure that their population remains suitable for breeding Bitterns and, perhaps eventually, other fish-eating reedbed birds. The water depth above general ground levels is kept at a suitable maximum (usually up to 80 cm) in early spring and then allowed to – or made to – fall during autumn to emulate natural processes of growth and decomposition of reeds and other plants.

These actions have resulted in about 15 species nesting in the reedbed annually and about ten others could nest if such measures keep the reedbed in a diverse and vibrant condition. A further action on the reedbed's edge involves twice-yearly mowing and raking to maintain open conditions for fenland plants such as orchids.

Freshwater Marsh

Management of this 11-ha area is less complex than management of the freshwater reedbed. Between 1980 and spring 2021, the water level over the whole area was typically kept high in winter and early spring, lowered in May for spring-passage waders, raised again for two months to increase the area for egg-laying midges, then lowered considerably from late August to late October for migrating waders in autumn. The only change during those years was the gradual sedimentation of ex-tidal creeks (which meant that they no longer attracted grebes and diving ducks) and the disappearance of organic matter, which reduced the variety and number of invertebrates. Therefore, in 2021, low banks were built to divide the marsh into three subdivisions. Periodically, one subdivision will contain shallow water and mud, another will contain terrestrial plants, and the third will contain decaying vegetation and water containing a greater biomass of invertebrates than there would

otherwise have been. It will take a few years to develop the rotational system.

85. The Freshwater Marsh, RSPB Titchwell, Norfolk, January 2009.

The low banks will be mown to provide roost sites for European Golden Plovers *Pluvialis apricaria* and Northern Lapwings *Vanellus vanellus*.

Excessive predation of Avocets' eggs by mammals occurred between 2009 and 2016, so an anti-predator fence has been erected around the eastern half of the marsh.

Between the new banks, 14 new islands were formed. The islands' crests vary in level: some are submerged for most of the year, thus devoid of vegetation, while some are higher, with managed vegetation suitable for nesting gulls and ducks. Others are intermediate, designed for nesting Avocets, Little

Ringed Plovers *Charadrius dubius* and, it is hoped in time, Kentish Plovers *Charadrius alexandrinus* and Black-winged Stilts *Himantopus himantopus*. The islands' surfaces will need maintaining for wintering, breeding and migrating birds; it is micro-management, but the effort may yield suitable and safe nest sites for more of Britain's rare breeding birds.

Trees and shrubs

The four plots planted between 1975 and 2011 contain in excess of 3,500 native trees or shrubs. Eventually, each plot may resemble dense woodland, so judicious coppicing, felling and ring-barking maintains the plots as more open and structurally diverse habitats for common breeding birds and, especially, for a wide range of small migrants that head for the nearest cover after crossing the North Sea.

Birds

Breeding species

In 1975, the standard Common Birds Census was carried out across the reserve during 16 visits between mid April and early July. Species that held territories defended by singing males (such as Reed Bunting) were mapped, while others (such as terns) were assessed by direct counts of nests. Most species nested on or close to the ground, so they were restricted to areas not reached by tides. One such area was the higher northwest quarter, which included the seawall, low banks and islands with rank grass and Shrubby Sea-blite *Suaeda vera*. Another area was sand dunes and shingle spits on both sides of the tidal channel formed in 1953. The third was land between tidal reedbeds and farmland where hitherto grazed land reverted to rank

vegetation such as Great Willowherb *Epilobium hirsutum*, Common Nettles *Urtica dioica*and brambles *Rubus fruticosus* agg. Birds that nested higher occupied the reedbed, a small deciduous copse, one small wood of willow trees, a patch of willow bushes and 400 m of hedgerow. Only 39 species bred on the reserve that year (table 1).

Table 1. Number of breeding pairs in 1975 based on a Common Birds Census. The area excludes the 13 ha of reedbed, field and copses purchased in 1993. * Denotes species on the 2021 IUCN Red List.

species	number	species	number
Common Shelduck *Tadorna tadorna*	4	Common Reed Warbler *Acrocephalus scirpaceus*	100
Mallard *Anas platyrhynchos*	4	Grasshopper Warbler *Locustella naevia**	2
Common Pheasant *Phasianus colchicus*	'few'	Blackcap *Sylvia atricapilla*	1
Red-legged Partridge *Alectoris rufa*	2	Eurasian Wren *Troglodytes troglodytes*	7
Common Cuckoo *Cuculus canorus*	1	Song Thrush *Turdus philomelos*	5
Stock Dove *Columba oenas*	1	Mistle Thrush *Turdus viscivorus*	1
Wood Pigeon *Columba palumbus*	7	Blackbird *Turdus merula*	5
European Turtle Dove *Streptopelia turtur**	1	Spotted Flycatcher *Muscicapa striata**	1
Common Moorhen *Gallinula chloropus*	4	European Robin *Erithacus rubecula*	1
Eurasian Oystercatcher *Haematopus ostralegus*	19	Tree Sparrow *Passer montanus**	3
Ringed Plover *Charadrius hiaticula**	26	Dunnock *Prunella modularis*	7
Common Redshank *Tringa totanus*	7	Yellow Wagtail *Motacilla flava**	1
Little Tern *Sternula albifrons*	26	Meadow Pipit *Anthus pratensis*	16
Common Tern *Sterna hirundo*	7	Common Chaffinch *Fringilla coelebs*	1
Eurasian Blue Tit *Cyanistes caeruleus*	2	Greenfinch *Chloris chloris*	1
Great Tit *Parus major*	2	Linnet *Linaria cannabina**	11
Bearded Tit *Panurus biarmicus*	8	Lesser Redpoll *Acanthis cabaret*	1
Eurasian Skylark *Alauda arvensis**	20	Yellowhammer *Emberiza citrinella**	2
Willow Warbler *Phylloscopus trochilus*	1	Common Reed Bunting *Emberiza schoeniclus*	43
Sedge Warbler *Acrocephalus schoenobaenus*	20		

After 1979, new freshwater habitats were developing and 22 additional species were added to the list of birds nesting by 1982, although no formal survey of numbers was carried out. Most of these species were expected – but they also included Bittern, Marsh Harrier and Lapwing, which were less expected at the time.

Since then, multiple other species have been recorded breeding, with some being one-offs and others permanently establishing themselves.

They include a few species each of ducks, waders, gulls and raptors, plus a dozen or more relatively common passerines. Among the breeding wildfowl

are Eurasian Teal *Anas crecca* (broods seen in 1984, 2000 and 2021), Common Pochard *Aythya ferina* (a brood in 1986 and in most years since 1997), Red-crested Pochard *Netta rufina* (broods in nine years since 2009) and Northern Pintail *A. acuta* (a brood in 2011). Breeding by Garganey *Spatula querquedula* has been suspected but never confirmed.

New waders since 1982 include Avocet (first breeding in 1984), Little Ringed Plover (one or two pairs sporadically since 1990) and possibly a pair of Common Snipe *Gallinago gallinago* (recorded in 2005 and 2006). Most unexpected was a pair of Common Sandpipers *Actitis hypoleucos* with a chick on the Freshwater Marsh in 2009.

Highly exceptional was a pair of Little Gulls *Hydrocoloeus minutus* that, in June 2007, made a nest and laid two eggs on the reserve, but suffered predation (probably by a Coot) the following day. Far more numerous and successful are the Mediterranean Gulls that now breed at Titchwell. The species first bred in 1992 (one of the first two pairs in Norfolk), then again in 2013; nests subsequently increased to 11 in 2017, 56 in 2018 and 57 in 2019, though there were only five nests present in 2020 and just one in 2021.

Cliff Gilbert

86. Mediterranean Gull *Ichthyaetus melanocephalus*, RSPB Titchwell, Norfolk, May 2019.

Cliff Gilbert

87. Second-summer (3CY) Little Gull

Hydrocol-oeus minutus, RSPB Titchwell, Norfolk, May 2022.

Eurasian Sparrowhawk *Accipiter nisus*, Common Kestrel *Falco tinnunculus* and Barn Owl *Tyto alba* have also established themselves as breeders on the reserve, and a pair of Red Kites *Milvus milvus* nested in an old willow wood in 2022.

Among the 14 species of passerines recorded breeding, the more notable include a pair of Willow Tits *Poecile montanus*from 1995 to 1998, and a pair of Cetti's Warblers in 1996 with between three and 11 pairs annually since 2003.

Perhaps the most noticeable loss from the reserve has been European Turtle Dove *Streptopelia turtur*: five or six pairs bred each year between 1998 and 2001, before declining to just one pair in 2020 and none since.

The reserve is home to a number of key species, listed below in order of their arrival as a breeding species onto the reserve:

Little Terns

The species is known to have nested at Titchwell since at least 1953. Between 1973 and 1982, the colony increased from 22 to 67 pairs but subsequently declined to 24 pairs by 1990, 12 pairs in 1991, between five and 10 pairs from 1992 to 2005 and only two pairs by 2016. Predation and sand-dune development were the main causes (see 'History').

Bearded Tits

Bearded Tits began breeding in the tidal reedbed in 1966 and numbered about eight pairs in 1973. After 40% of the reedbed was converted to a freshwater regime in 1980, breeding pairs increased to between 10 and 25 annually from 1990.

88. Male Bearded Tit *Panurus biarmicus*, RSPB Titchwell, Norfolk, April 2006.

Eurasian Bittern

A booming Bittern was first heard in 1979 and successful breeding almost certainly occurred every year from 1980 to 1984. However, between 1985 and 1991, there was either no sign of young being reared or an apparent absence of breeding birds. Eleven years followed with no indication of a booming male, let alone a female and nest. However, from 2003 to 2022 – following

the introduction of Rudd into the reedbed – booming from one male was heard every year and from two males in 2008 and 2009. As with most Bittern activity, breeding success often remained a mystery but young fledged in at least seven of those 20 years.

Marsh Harrier

A pair of Marsh Harriers first nested in the new Freshwater Reedbed in 1980 and there has generally been between one and five nests on the reserve each year since then, with the addition of one of the reserve male's secondary females in a neighbouring reedbed in some years. In four years (2003, 2009, 2016 and 2019), there were six nests and in two years (2017 and 2018) there were eight. They are generally successful in rearing young: on average about three fledged per nest. A study carried out between 1980 and 1983 (Sills 1984, 1985) showed that once the eggs had hatched, the male hunted across 900–1,200 hectares of mainly arable land with low-growing crops. He brought back prey at the rate of 5–10 items per ten hours for his primary female's nestlings; the prey were often young Rabbits *Oryctolagus cuniculus*, young Starlings and a dozen other species of bird or mammal.

David Tilping

89. Male Marsh Harrier *Circus aeruginosus*, RSPB Titchwell, Norfolk, April 2008.

Pied Avocet

Four pairs of Avocets bred in 1984 and, despite the depredations of egg thieves, the population increased to 49 pairs in 1990 and then varied between 23 and 37 pairs until 2003. Since then, fluctuations have been greater: 97 pairs bred in 2022, with nests on newly created islands; between 40 and 80 pairs in nine other years between 2003 and 2023; 20–40 pairs in seven years; and 5–10 pairs in two years. Red Foxes have been the main culprit in predation, and a recently erected fence aims to solve that problem.

Black-headed Gull

Black-headed Gulls first nested on the reserve in 1976 (four pairs), with the population increasing within a few years to 1,100 pairs on the then Brackish Marsh and shingle spit. They predated eggs and young of other species but also formed a protective 'umbrella' over the marshes during the breeding season when, for example, a bird of prey appeared. During the last 20 years, numbers have varied from 50 to 200 pairs, with peaks of 500–700 pairs in 2017–19.

About 97 species of bird have bred or are suspected to have bred on the reserve at some point since 1973 (table 2); some 60 more than were recorded breeding in 1975.

Table 2. Species that have bred on the reserve at least once between 1973 and 2022. Those in **bold** have bred between 2018 and 2022. An asterisk signifies a species on the 2021 IUCN Red List. Data mainly from Sills (1983a), the reserve's database, and *Norfolk Bird & Mammal Reports*. (Scientific names of species that appear in table 1 are not repeated here.)

Canada Goose *Branta canadensis*
Greylag Goose *Anser anser*
Mute Swan *Cygnus olor*
Common Shelduck
Garganey *Spatula querquedula*
Northern Shoveler *Spatula clypeata*
Gadwall *Mareca strepera*
Mallard
Northern Pintail *Anas acuta*
Eurasian Teal *Anas crecca*
Red-crested Pochard *Netta rufina*
Common Pochard *Aythya ferina**
Tufted Duck *Aythya fuligula*
Grey Partridge *Perdix perdix**
Common Pheasant
Red-legged Partridge
Common Cuckoo*
Stock Dove
Wood Pigeon
European Turtle Dove*
Eurasian Collared Dove *Streptopelia decaocto*
Water Rail *Rallus aquaticus*
Common Moorhen
Common Coot
Little Grebe *Tachybaptus ruficollis*
Great Crested Grebe *Podiceps cristatus*
Eurasian Oystercatcher
Pied Avocet *Recurvirostra avosetta*
Northern Lapwing *Vanellus vanellus**
Ringed Plover*
Little Ringed Plover *Charadrius dubius*
Common Snipe *Gallinago gallinago*
Common Sandpiper *Actitis hypoleucos*
Common Redshank
Black-headed Gull *Chroicocephalus ridibundus*
Little Gull *Hydrocoloeus minutus*
Mediterranean Gull *Ichthyaetus melanocephalus*
European Herring Gull *Larus argentatus**
Lesser Black-backed Gull *Larus fuscus*
Little Tern
Common Tern
Eurasian Bittern *Botaurus stellaris*
Eurasian Sparrowhawk *Accipiter nisus*
Marsh Harrier
Montagu's Harrier *Circus pygargus**
Red Kite *Milvus milvus*
Common Buzzard *Buteo buteo*
Barn Owl *Tyto alba*
Tawny Owl *Strix aluco*
Great Spotted Woodpecker *Dendrocopos major*
Common Kestrel *Falco tinnunculus*
Eurasian Jay *Garrulus glandarius*
Magpie *Pica pica*
Jackdaw *Coloeus monedula*
Carrion Crow *Corvus corone*
Coal Tit *Periparus ater*
Marsh Tit *Poecile palustris**
Willow Tit*
Blue Tit
Great Tit
Bearded Tit
Eurasian Skylark*
Barn Swallow *Hirundo rustica*
Cetti's Warbler *Cettia cetti*
Long-tailed Tit *Aegithalos caudatus*
Willow Warbler
Common Chiffchaff *Phylloscopus collybita*
Sedge Warbler
Common Reed Warbler
Grasshopper Warbler*
Blackcap
Garden Warbler *Sylvia borin*
Lesser Whitethroat *Curruca curruca*
Common Whitethroat *Curruca communis*
Goldcrest *Regulus regulus*
Eurasian Wren
Eurasian Treecreeper *Certhia familiaris*
Common Starling *Sturnus vulgaris**
Song Thrush
Mistle Thrush*
Blackbird
Spotted Flycatcher*
European Robin
Tree Sparrow*
House Sparrow *Passer domesticus**
Dunnock
Yellow Wagtail*
Pied Wagtail *Motacilla alba*
Meadow Pipit
Common Chaffinch
Eurasian Bullfinch *Pyrrhula pyrrhula*
Greenfinch*
Linnet*
Lesser Redpoll*
Goldfinch *Carduelis carduelis*
Yellowhammer*
Common Reed Bunting

Non-breeding species

The dramatic habitat changes also led to far more non-breeding birds. The conversion of saltmarsh into freshwater and brackish marshes took place during the late 1970s and early 1980s and the following examples – of 13

species often linked to fresh water – show how some responded.

Northern Shoveler

Northern Shoveler *Spatula clypeata* was not regular on the reserve prior to the late 1970s. Breeding was first proved in 1977, after which – though unlikely to be directly related to the breeding event – autumn counts rose to around 100 to 140 birds each year. Peak counts since 2000 have been similar, with the highest number being 280 in October 2006.

Eurasian Wigeon

Prior to 1980, the wintering flock of Eurasian Wigeon, usually present on the saltmarsh, was often fewer than 100 birds. Post-1980, late autumn counts increased to 300–500 and, rose further during the first two decades of this century to 600–1,000. Numbers have varied a little more since 2018, with peak counts of between 350 and 750. Typically, Wigeon at Titchwell feed on the saltmarsh or Freshwater Marsh during the day and roost on the sea.

Northern Pintail

Pintails were historically scarce at Titchwell, with just seven birds on two occasions between 1973 and 1979. However, by 1990, spring and/or autumn counts had risen to around 30 birds per year, sometimes as high as 70. From the late 1990s onwards, counts between October and December typically reached a peak of 100 to 400 (exceptionally 650 in December 2014), though much lower numbers – between 10 and 50 – have become the norm since 2016.

Eurasian Teal

The wintering population of Teal at Titchwell was typically 200–300 birds prior to 1980 but, with the development of the new marshes, this increased to 800–1,300 birds, with peak counts typically occurring in late autumn. Birds frequently roost on the Brackish and Freshwater Marshes during the day and fly to stubble fields to feed at night. During the last 20 years, the number of wintering birds has remained stable, although peak counts in the past decade have reached as high as 2,500, with the peak in numbers now typically occurring in December.

Pied Avocet

Although this has been one of the regular breeding species since 1984 (initially on the Brackish Marsh), the Freshwater Marsh increasingly became a midsummer gathering ground from the early 1990s so that peak counts of 100–200 birds were not uncommon prior to 2005. Since then, summer counts have included 320 in July 2006, 350 in July 2013, 670 in July 2017, 860 in July 2019 and 760 in July 2021.

Northern Lapwing

In the mid 1970s, Lapwings were recorded migrating west along the coast at Titchwell, with movements beginning in June and sometimes reaching the rate of 100–150 birds per hour. However, it wasn't until November 1977 that any were seen on the ground within the reserve, when 63 roosted on the Brackish Marsh. Up to 1987, maximum counts on the new marshes were still around 50–200; post-1988, counts in October/November reached 700–1,000. Late-autumn counts in more recent years have seen figures of 1,000–3,000, more typically around 1,000–1,500 in the past two decades; 2008, 2017 and 2022 were exceptional years, with high counts of between 2,500 and 5,000

recorded in January.

European Golden Plover

Golden Plovers have increased on the reserve more than any other species. From the mid 1970s through the 1980s, birds numbered in the hundreds. However, from 1990 to 1994, autumn peak counts rose to between 1,500 and 3,000. Since then, peak counts have reached as high as 5,000–6,000 in 2003 and 2004, though 1,000–4,000 is more typical. Golden Plovers at Titchwell typically rest on the Freshwater Marsh during the day and fly to cereal stubble or ploughed land during the night to feed.

Black-tailed Godwit

The first Black-tailed Godwit *Limosa limosa* was not seen on the reserve at Titchwell until September 1978. Two or three occurred in May 1979 and again in spring 1981, but it wasn't until November 1982 that the Freshwater Marsh's increased supply of mud-dwelling invertebrates led to an autumn peak of 50–65. During 1986–89, there were autumn maximum counts of 100–200, rising to 300 in the early 1990s and to 600 in August 1999. Since then, peak counts have generally been between 350 and 550, with the greatest numbers typically recorded between June and September. High counts were 700 in June 2011, 800 in October 2018 and 2,200 in March 2019.

Ruff

Only six Ruff *Calidris pugnax* were seen on the reserve between 1973 and 1979, mostly in August and September. Peak autumn numbers increased to 30–70 between 1980 and 1989, then rose to 100–200 in the early 1990s. Peak counts since then have varied from about 100 to 150, between August

and October, with 200 in autumn 2003.

Curlew Sandpiper

Prior to 1979, counts of Curlew Sandpipers *C. ferruginea* on the reserve were typically in the region of 5–10 birds, with birds usually seen in August and September. Numbers have since increased to 20–40 birds at peak times – almost always during September – with higher counts of 100 in September 1999 and 120 in September 2005. Peak counts in the two decades since then have typically been lower, at between 10 and 20, though 33 were on the reserve in August 2016.

Little Stint

There were rarely more than one or two Little Stints recorded at a time on the reserve before 1979. Peak counts of 10–20 became the norm after 1980 – usually occurring between late August and late October – and that remains unchanged to this day. Exceptional high counts, during marked influxes, occurred in September 1983 (73 birds), September 1996 (90) and September 1998 (115).

Spotted Redshank

Prior to 1979, records of Spotted Redshanks *T. erythropus* at Titchwell typically consisted of single birds, with around ten observations per year. From 1980 to 1982, there were counts of 5–8 between early August and early October, usually on the Brackish Marsh. Since then, peak counts have increased to 20–30, occasionally more than 50, though the last decade has seen peak counts typically around 10–20 individuals, usually in July.

Common Greenshank

Records of more than half a dozen Greenshanks were rare on the reserve before 1979, with peak counts reaching 10–25 on the Freshwater Marsh or Brackish Marsh in the early 1980s. By 2010, autumn counts had risen to 20–50 birds at the peak of autumn migration. Since then, numbers have declined a little with high counts typically around 10–20 in August/September, though over 40 were recorded in September 2013 and August 2014.

The principally non-breeding species listed above began to occur in much larger numbers after the new habitats had been developed. However, there are other non-breeding species at Titchwell that occur outside the bounds of the reserve habitat management.

Common Scoters *Melanitta nigra*, Velvet Scoters *M. fusca,* Common Eiders *Somateria mollissima* and Long-tailed Ducks *Clangula hyemalis* regularly occur offshore, the first sometimes in the thousands, attracted by mussels that grow on the peat bed of a long-gone post-glacial forest.

Winter waders are more irregular. They gather in large numbers only during high tides and especially the spring tides of autumn when their feeding areas in the Wash are under deep water. The species and numbers are described earlier (see ‘Other habitats’ under ‘History’). The flocks are a spectacular sight for observers who wait for the appropriate time and tide. However, numbers have declined since sand dunes developed on the shingle spits.

Other regular species – perhaps noted more often owing to their appeal to birders – include Snow Bunting *Plectrophenax nivalis,* Shore Lark *Eremophila alpestris* and Purple Sandpiper *Calidris maritima* on the beach in winter, Spoonbill, egrets and Spotted Crake *Porzana porzana* on the Freshwater

Marsh during spring and autumn, and huge numbers of Pink-footed Geese *Anser brachyrhynchus* that winter in Norfolk and fly between offshore roost sites and inland sugar-beet fields.

Les Bunyan

91. Shore Lark *Eremophila alpestris*, RSPB Titchwell, Norfolk, January 2018.

Cliff Gilbert

90. Spotted Crake *Porzana porzana*, RSPB Titchwell, Norfolk, August 2014.

Beyond these often-numerous species, there are fairly regular or common non-breeders which use the reserve for feeding or resting. Those which are not mentioned elsewhere are listed in Appendix 1.

92. Pectoral Sandpiper *Calidris melanotos*, RSPB Titchwell, Norfolk, September 2021.

Less numerous species

The north Norfolk coast is undoubtedly one of the better areas in Britain for

its diversity of bird life, especially vagrants, and a number of rare species have been observed at Titchwell over the past five decades.

The following list is not intended to form a definitive account of all less common birds seen on the reserve since 1973; rather, it aims to convey roughly how often selected species may be found over a long span of years. In most cases, sightings relate to single birds, unless stated otherwise. The 90 species are in order from those most frequently seen to those 38 seen in just one or two years; records included run up to December 2023.

Grey Phalarope

Phalaropus fulicarius: first recorded in 1980 and seen in 25 years since. Occasionally in January, mostly September to November. Two together in 2017 and 2021 and seven together in 2020.

Red-backed Shrike

Lanius collurio: first recorded in May 1976 and seen in another 15 years up to 2006. Seen in only four years between 2012 and 2022. Almost half occurred in May/June and the rest between July and October. Usually singles but two in August 1977.

Red-necked Phalarope

Phalaropus lobatus: first recorded in September 1981 and then in 16 years since. Usually July to September.

93. Red-necked Phalarope *Phalaropus lobatus*, RSPB Titchwell, Norfolk, August 2018.

Black-winged Stilt

Himantopus himantopus: first recorded in July 1982 and then in 16 years up to 2010, but none since. Most annual records refer to a long-staying individual, which was present until 2005; a group of five occurred in June 2010.

94. Black-winged Stilt *Himantopus himantopus*, RSPB Titchwell, Norfolk, May 2017.

Great Grey Shrike

Lanius excubitor: seen every year from 1973 to 1977, then in 11 years between 1987 and 2015. Occurred most frequently in October but also in January, February, April, September and November.

Red-breasted Flycatcher

Ficedula parva: first recorded in October 1973 and then in 15 years since, mostly in September to November.

Great White Egret

Ardea alba: first recorded in October 1983 (the second record for Norfolk) and in at least 14 years since. Up to five have occurred together on the reserve in recent years.

Leach's Storm-petrel

Hydrobates leucorhous: seen in 12 years since 1984, all between September and November.

Eurasian Wryneck

Jynx torquilla: seen in at least 11 years since 1974. Usually in August–October but one in April 2018.

White-rumped Sandpiper

Calidris fuscicollis: first recorded in October 1980 and seen in another three years up to 1985. Recorded in five years between 2002 and 2008, and again in 2015 and 2022. All recorded between July and October.

Icterine Warbler

Hippolais icterina: first recorded in 1974 and in nine years since. Mainly August/September but also in May 1984, June 1992, June 2002, May 2008 and July 2011; usually singles.

Hawfinch

Coccothraustes coccothraustes: seen in ten years since 2003. Mainly in October/November but also in December 2009, March/April 2012 and

January 2020. Usually one or two, but flocks of ten and 19 occurred in October 2017.

Kentish Plover

Charadrius alexandrinus: first recorded in August 1974 and in another eight years up to 1998. Records in April, May, August and September.

Eurasian Dotterel

Charadrius morinellus: the first record was of three together in August 1985, then birds were seen in another three years up to 2002. Next seen in 2008, 2016, 2017, 2021 and 2022. All records August to November.

Glossy Ibis

Plegadis falcinellus: first recorded in October 1982 then in six years between 2011 and 2022. In May once, otherwise all between August and January.

95. Glossy Ibis *Plegadis falcinellus*, RSPB Titchwell, Norfolk, April 2016.

Green-winged Teal

Anas carolinensis: recorded in at least seven years between the first in November 1988 and the most recent in April 2015.

European Bee-eater

Merops apiaster: recorded in seven years between 1988 and 2021. Usually April to June; three together in 2004.

Pallas's Leaf Warbler

Phylloscopus proregulus: first recorded in November 2000 then in six years between 2003 and 2020. Most often during October.

Barred Warbler

Curruca nisoria: first in August 1974 then in another five years between 1984 and 2014. Mainly in August to September.

Purple Heron

Ardea purpurea: first recorded in October 1982 and in five years since. Usually April to July and October.

Broad-billed Sandpiper

Calidris falcinellus: first recorded in September 1983 and in another five years up to 2004. Seen in May/June and August/September.

Arctic Redpoll

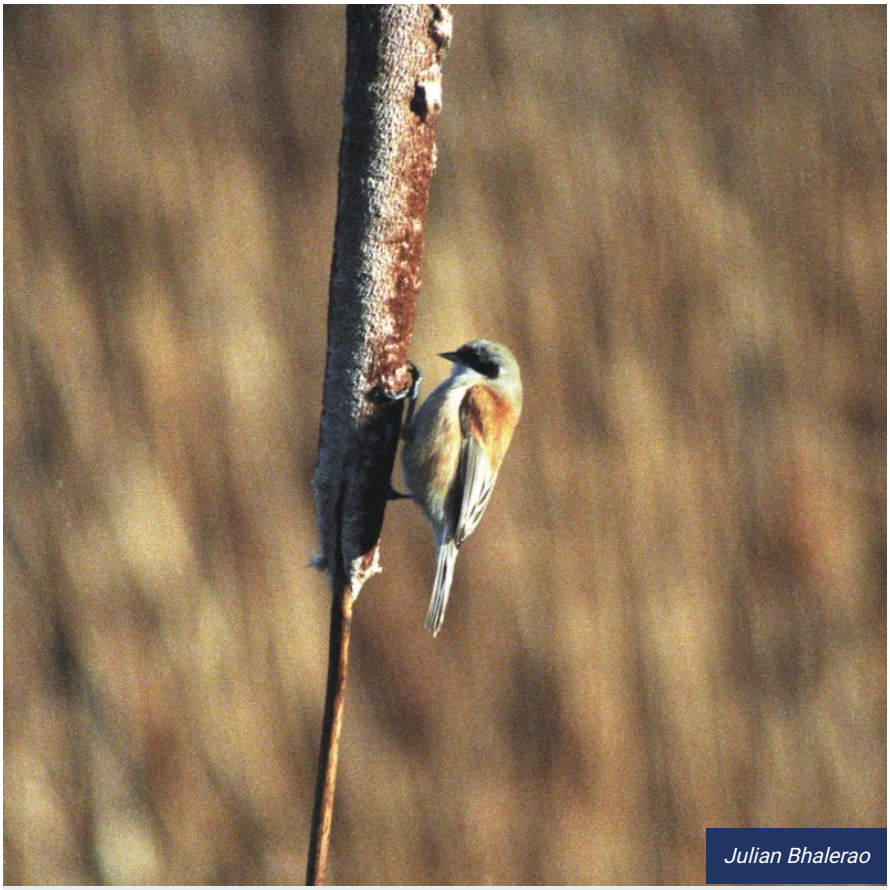
Acanthis hornemanni exilipes: first seen in November 1984 and in five years since to 2012. Always November to April.

Alpine Swift

Tachymarptis melba: first recorded in April 1985 and in five years since to May 2021. Always April to July.

Eurasian Penduline Tit

Remiz pendulinus: first noted in May 1991 and in five years since to October 2014. All October to May.



96. Penduline Tit *Remiz pendulinus*, RSPB Titchwell, Norfolk, January 1998.

White-winged Black Tern

Chlidonias leucopterus: first recorded in September 1974 and in four years since to 2003. In June, July, September or October.

‘Red-spotted Bluethroat’

Luscinia svecica svecica: first seen in 1975 and in four years since to 2006 but mainly 1975 to 1985. All in May but once in October.

Eurasian Hoopoe

Upupa epops: first recorded in May 1980 and in another four years to 1998. All but one in May.

Collared Pratincole

Glareola pratincola: first recorded in July 1994 and in another four years to 1999. All records in May to July.

Surf Scoter

Melanitta perspicillata: first seen in April 1997 and in another four years up to 2007. Two together in April 1997.

Western Cattle Egret

Bubulcus ibis: one or two in September 2011, May 2019, August 2020, April 2021 and a group of seven in June 2022.

Baird's Sandpiper

Calidris bairdii: first recorded in May 1983 then in August 1993, September 2004 and September 2012.

Red-footed Falcon

Falco vespertinus: first recorded in May/June 1984 then in June 1986, May 1991 and May 1992.

Blue-winged Teal

Spatula discors: first seen in June 1984 then in August/September 1990, October 1999 and July 2000.

White-tailed Eagle

Haliaeetus albicilla: first recorded in November 1985 then in January 1990, January 2005 and April 2011.

Long-billed Dowitcher

Limnodromus scolopaceus: first recorded in June 1989 then in June 1997, September 2007 and December 2022.

Red-rumped Swallow

Cecropis daurica: first recorded in November 1994 (three birds roosted in a neighbouring reedbed) then April 2009, October 2012 and December 2015, the first December sighting in the UK.

European Storm-petrel

Hydrobates pelagicus: singles in October 1998, August 2006 and 2007 and September 2020.

Buff-breasted Sandpiper

Calidris subruficollis: September 2000, August 2006, July 2010 and August 2011.

Lesser Yellowlegs

Tringa flavipes: July/August 2018, June/July 2019, May 2020 and July 2022.

97. Lesser Yellowlegs *Tringa flavipes*, RSPB Titchwell, Norfolk, July 2019.

Sabine's Gull

Xema sabini: recorded in September 1978, October 1997 and September/November 2007 but undoubtedly under-recorded. Groups of seven and ten in autumn 2007.

Gull-billed Tern

Gelochelidon nilotica: first recorded in July 1980, then November 2001 and May 2011.

Great Reed Warbler

Acrocephalus arundinaceus: first seen in May 1984 then June 1993 and May 2019.

Pacific Golden Plover

Pluvialis fulva: July 1989, June 2016 and July 2021.

Siberian Stonechat

Saxicola maurus: Octobers of 1991, 2003 and 2016.

Black Kite

Milvus migrans: May 1993, April 2001 and April 2007.

Red-flanked Bluetail

Tarsiger cyanurus: first recorded in autumn 1999, by a non-birder who saw 'a robin with a blue tail' on the dune edge (Kimber 2014); also March 2017 and October 2018.

Eurasian Stone-curlew

Burhinus oedicnemus: May 2003, July 2016 and September 2020.

Greenish Warbler

Phylloscopus trochiloides: August 2005, a male singing in May 2018 and one in August 2020.

Little Bittern

Ixobrychus minutus: male in June 2007, fledged juvenile in October 2007; then in September 2011 and October/November 2019.

98. Male Little Bittern *Ixobrychus minutus*, RSPB Titchwell, Norfolk, May 2017.

Citrine Wagtail

Motacilla citreola: May 2008, August 2020 and May 2022.

Rose-coloured Starling

Pastor roseus: in 2009, 2012 and June (two), September, October 2021.

Seen in only two years since 1973:

Arctic Warbler

Phylloscopus borealis September 1973 and July 1975;

Marsh

Sandpiper

Tringa stagnatilis May 1984 and August 1987;

Whiskered Tern

Chlidonias hybrida June 1987 and October 2006;

Red-throated Pipit

Anthus cervinus May 1992 and May 1995;

Franklin's Gull

Leucophaeus pipixcan July 1992 and May 1998;

Marsh

Warbler

Acrocephalus palustris June 1993 and June 1994;

B

lack-winged Pratincole

Glareola nordmanni July/August 1999 (third record for Norfolk) and May/June 2009;

King Eider

Somateria spectabilis December 2004 and January 2005;

Dartford Warbler

Curruca undata January 2007 and April 2019;

Iberian Chiffchaff

Phylloscopus ibericus April 2010 and April 2011;

Northern Harrier

*Circus hudsonius*November 2010 to February 2011 (third UK record); and

Dusky Warbler

Phylloscopus fuscatus October 2016 and November 2020.

99. Black-winged Pratincole *Glareola nordmanni*, RSPB Titchwell, Norfolk, June 2009.

Seen in only one year since 1973:

Booted Warbler

Iduna caligata September 1982 (first for Norfolk);

Wilson's Phalarope

Phalaropus tricolor June/July 1983;

Ross's Gull

Rhodostethia rosea May 1984;

Woodchat Shrike

Lanius senator August 1986;

Sociable Plover

Vanellus gregarius September 1988 (second for Norfolk);

Lesser Crested Tern

Thalasseus bengalensis September 1988;

Ring-necked Duck

Aythya collaris April 1993;

Oriental Pratincole

Glareolamaldivarum August 1993; (sixth for Norfolk);

Laughing Gull

Leucophaeus atricilla May 1998; **American/Pacific Golden Plover** *Pluvialis dominica/fulva* July 1991;

White-billed Diver

Gavia adamsii January 2001 (sixth for Norfolk);

Red-breasted Goose

Branta ruficollis August/September 2001;

Black-crowned N

ight Heron

Nycticorax nycticorax male in April 2002;

Hume’s Warbler

Phylloscopus humei October 2003;

T

hrush Nightingale

Luscinia luscinia male singing in May 2004;

S

tilt Sandpiper

Calidris himantopus May 2005;

Caspian Tern

Hydroprogne caspia June 2011;

Desert Wheatear

Oenanthe deserti November 2011;

Slender-billed Gull

Chroicocephalus genei May 2014 (fifth for Norfolk);

Great Knot

Calidris tenuirostris June/July 2016;

Ferruginous Duck

Aythya nyroca male in December 2016;

S

nowy Owl

Bubo scandiacus March 2018; **American Golden Plover** September 2018;

American Wigeon

Mareca americana May 2018;

Black Stork

Ciconia nigra June 2019;

Semipalmated

Sandpiper

Calidris pusilla July 2019; and

S

potted Sandpiper

Actitis macularius June 2022.

100. Red-breasted Goose *Branta ruficollis*, RSPB Titchwell, Norfolk, September 2001.

Julian Bhalerao

101. Black-crowned Night Heron *Nycticorax nycticorax*, RSPB Titchwell, Norfolk, May 2002.

102. Snowy Owl *Bubo scandiacus*, RSPB Snettisham, Norfolk, March 2018. The same bird was seen at RSPB Titchwell.

Les Bunyan

103. Spotted Sandpiper *Actitis macularius*, RSPB Titchwell, Norfolk, June 2022.

Data comes mainly from *Norfolk Bird and Mammal Reports* 1973 to 2022 and Taylor *et al.* (1999).

Other wildlife

Flowering plants

There was a glimpse back to bygone days in the mid 1980s: to the days of tiny pastures and hayfields when men mowed grass with scythes. In one of those old pastures in 1984, an area was cleared of rank vegetation (also with scythes) and within a year or two new plants appeared: Ragged-Robin *Lychnis flos-cuculi*, Lesser Spearwort *Ranunculus flammula*, Marsh

Pennywort *Hydrocotyle vulgaris*, 46 flowering spikes of Southern Marsh-orchid *Dactylorhiza praetermissa* and, remarkably, a line of Bog Pimpernel around the edge of a nearby, recently excavated pond remaining from the time that Rev. Thompson found it in 1902! These days, the orchids are sometimes counted in hundreds – if Reeve's Muntjacs *Muntiacus reevesi* leave them alone – and a boardwalk enables visitors to see them easily. Another plant of cattle-trodden pasture is the inconspicuous Mousetail *Myosurus minimus*. It was first noted in the early 1980s, in soil that had been dragged up from a field and placed on top of a concrete pillbox in the 1940s. More noticeable is the Nationally Scarce Marsh Sow-thistle *Sonchus palustris* found in 2021; both are hangers-on from past times, unlike the Bogbean and Green-winged Orchid mentioned earlier. The sow-thistle is one of 12 Nationally Scarce species on the reserve. Others are Sea-heath *Frankenia laevis* in the dune slacks (alongside Matted Sea-lavender *Limonium bellidifolium*, Nationally Rare); two species of glasswort, *Salicornia pusilla* and *Sarcocornia perennis* on the saltmarsh; Sharp Rush *Juncus acutus* on higher saltmarsh; Slender Hare's-ear *Bupleurum tenuissimum*; and four species of grass. Far more familiar, though still Nationally Scarce, are long lines of Shrubby Sea-blite and thickets of Sea-buckthorn *Hippophae rhamnoides*, both places for migrating birds and their following of birders. So far, more than 370 species of flowering plants have been identified and more species of long-gone pastures and meadows may yet raise their flowers towards the sun.

Non-avian animals

A total of 29 species of mammal have been recorded on the reserve, including European Otter *Lutra lutra* and Water Vole *Arvicola amphibius*; 27

species of dragonfly, including the rare Lesser Emperor *Anax parthenope*; 33 species of butterfly, including Marbled White *Melanargia galathea* and Camberwell Beauty *Nymphalis antiopa*; more than 700 species of moth, including 22 Nationally Scarce species, such as Coast Dart *Euxoa cursoria*, Rosy Wave *Scopula emutaria*, Bedstraw Hawk-moth *Hyles gallii* and Silver-streaked Case-bearer *Coleophora limoniella;* and 424 species of beetle,including 65 that are listed as Nationally Scarce.

Visitors

Throughout 1973, there were reckoned to be about 500 'birdwatcher visits' to the reserve – and most visitors were known to RSPB staff there. After that, visits to the new reserve increased – and continued to do so. Space for car parking soon became a problem and, in 1978, a 1-ha field was purchased and the first car park was made. By 1984, the same area accommodated a visitor centre, toilets and associated paths and plantations. Four hides were built: in 1974, 1981, 1982 and 1999. One (in the dunes) has been removed and two others modified.

In 1982, the muddy path on the crest of the western seawall was widened and topped with hardcore for the first time so that people could easily pass one another. That May Bank Holiday Sunday, a record 400 people visited the reserve, part of the 25,000 people who visited that year (also a record at the time). By 1998, the annual total was 128,000, including 1,700 visitors in a single day, many of whom came to see the pair of American gulls that had pitched up on the reserve: a Laughing Gull and a Franklin's Gull. Since 2017, the annual visitor count has varied between 70,000 and 80,000, based on the current method of counting.

The future

Over its five decades, the reserve has added substantially to the British breeding population of several species of bird. Those given priority in the initial Management Plan were Avocet, Marsh Harrier and Bittern. The first two were still rare and localised in Britain in the 1970s; Avocets have done well on the reserve since 1984, despite much predation of eggs by mammals, while Marsh Harriers have fledged more than 300 young since their arrival in 1980. Bitterns were also rare at the time that the reserve was purchased, but one or two pairs have bred since 1980, albeit inconsistently and with uncertain results. With the correct habitat management, these species will continue to breed – while new work at Titchwell may prompt further breeding species to colonise the reserve in future.

After the glaciers began to melt 10,000 years ago, sea levels gradually increased and eventually dumped sediment along the coast to form today's marshes. The sea level is still rising and that single factor is likely to determine the long-term future of freshwater habitats on the reserve; can the seawalls be made even higher and what might be the cost? Which should prevail: the processes of nature or the wishes of humans? The sea has given –and, eventually, the sea will probably take away. What it cannot take away are the benefits that the marshes have given to breeding, migrating and wintering birds; nor can it take away the pleasure and involvement experienced by many thousands of people who have visited the reserve during the last 50 years.

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Appendix 1. Regularly occurring, non-breeding species seen on the reserve since 1973 and not listed or mentioned elsewhere in the main text. Those marked in **bold** are typically recorded in each year.

Barnacle Goose *Branta leucopsis*
Taiga Bean Goose *Anser fabalis*
Tundra Bean Goose *A. serrirostris*
White-fronted Goose *A. albifrons*
Bewick's Swan *Cygnus columbianus*
Whooper Swan *C. cygnus*
Greater Scaup *Aythya marila*
Common Goldeneye *Bucephala clangula*
Smew *Mergellus albellus*
Goosander *Mergus merganser*
Red-breasted Merganser *M. serrator*
Common Quail *Coturnix coturnix* (in adjacent fields)
Common Swift *Apus apus*
Common Crane *Grus grus*
Red-necked Grebe *Podiceps grisegena*
Slavonian Grebe *P. auritus*
Black-necked Grebe *P. nigricollis*
Eurasian Curlew *Numenius arquata*
Temminck's Stint *Calidris temminckii*
Pectoral Sandpiper *C. melanotos*
Eurasian Woodcock *Scolopax rusticola*
Jack Snipe *Lymnocryptes minimus*
Green Sandpiper *Tringa ochropus*
Wood Sandpiper *T. glareola*
Kittiwake *Rissa tridactyla*
Common Gull *Larus canus*
Great Black-backed Gull *L. marinus*
Glaucous Gull *L. hyperboreus*
Iceland Gull *L. glaucoides*
Caspian Gull *L. cachinnans*
Yellow-legged Gull *L. michahellis*
Sandwich Tern *Thalasseus sandvicensis*
Roseate Tern *Sterna dougallii*
Arctic Tern *S. paradisaea*
Black Tern *Chlidonias niger*
Great Skua *Stercorarius skua*
Pomarine Skua *S. pomarinus*
Long-tailed Skua *S. longicaudus*
Little Auk *Alle alle*
Common Guillemot *Uria aalge*
Razorbill *Alca torda*
Black Guillemot *Cepphus grylle*
Puffin *Fratercula arctica*
Red-throated Diver *Gavia stellata*
Black-throated Diver *G. arctica*
Great Northern Diver *G. immer*
Northern Fulmar *Fulmarus glacialis*
Sooty Shearwater *Ardenna grisea*
Manx Shearwater *Puffinus puffinus*
Balearic Shearwater *P. mauretanicus*
Northern Gannet *Morus bassanus*
Great Cormorant *Phalacrocorax carbo*
European Shag *Gulosus aristotelis*
Little Egret *Egretta garzetta*
Osprey *Pandion haliaetus*
European Honey-buzzard *Pernis apivorus*
Northern Goshawk *Accipiter gentilis*
Hen Harrier *Circus cyaneus*
Rough-legged Buzzard *Buteo lagopus*
Little Owl *Athene noctua*
Long-eared Owl *Asio otus*
Short-eared Owl *A. flammeus*
Common Kingfisher *Alcedo atthis*
Lesser Spotted Woodpecker *Dryobates minor*
Green Woodpecker *Picus viridis*
Merlin *Falco columbarius*
Eurasian Hobby *F. subbuteo*
Peregrine Falcon *F. peregrinus*
Golden Oriole *Oriolus oriolus*
Rook *Corvus frugilegus*
Hooded Crow *C. cornix*
Common Raven *C. corax*
Bohemian Waxwing *Bombycilla garrulus*
Woodlark *Lullula arborea*
Sand Martin *Riparia riparia*
Common House Martin *Delichon urbicum*
Wood Warbler *Phylloscopus sibilatrix*
Yellow-browed Warbler *P. inornatus*
Firecrest *Regulus ignicapilla*
Eurasian Nuthatch *Sitta europaea*
Redwing *Turdus iliacus*
Fieldfare *T. pilaris*
Ring Ouzel *T. torquatus*
Common Nightingale *Luscinia megarhynchos*
Pied Flycatcher *Ficedula hypoleuca*
Black Redstart *Phoenicurus ochruros*
Common Redstart *P. phoenicurus*
Whinchat *Saxicola rubetra*
European Stonechat *S. rubicola*
Northern Wheatear *Oenanthe oenanthe*
Grey Wagtail *Motacilla cinerea*
Richard's Pipit *Anthus richardi*
Tawny Pipit *A. campestris*
Tree Pipit *A. trivialis*
Water Pipit *A. spinoletta*
Rock Pipit *A. petrosus*
Brambling *Fringilla montifringilla*
Twite *Linaria flavirostris*
Common Redpoll *Acanthis flammea*
Common Crossbill *Loxia curvirostra*
Eurasian Siskin *Spinus spinus*
Lapland Bunting *Calcarius lapponicus*
Corn Bunting *Emberiza calandra*

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Norman Sills

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