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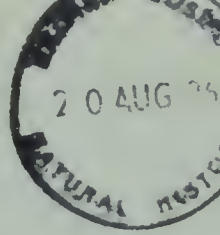
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TRANSACTIONS
OF
THE NORFOLK & NORWICH
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Edited by E. A. ELLIS

VOL. 20 PART 1

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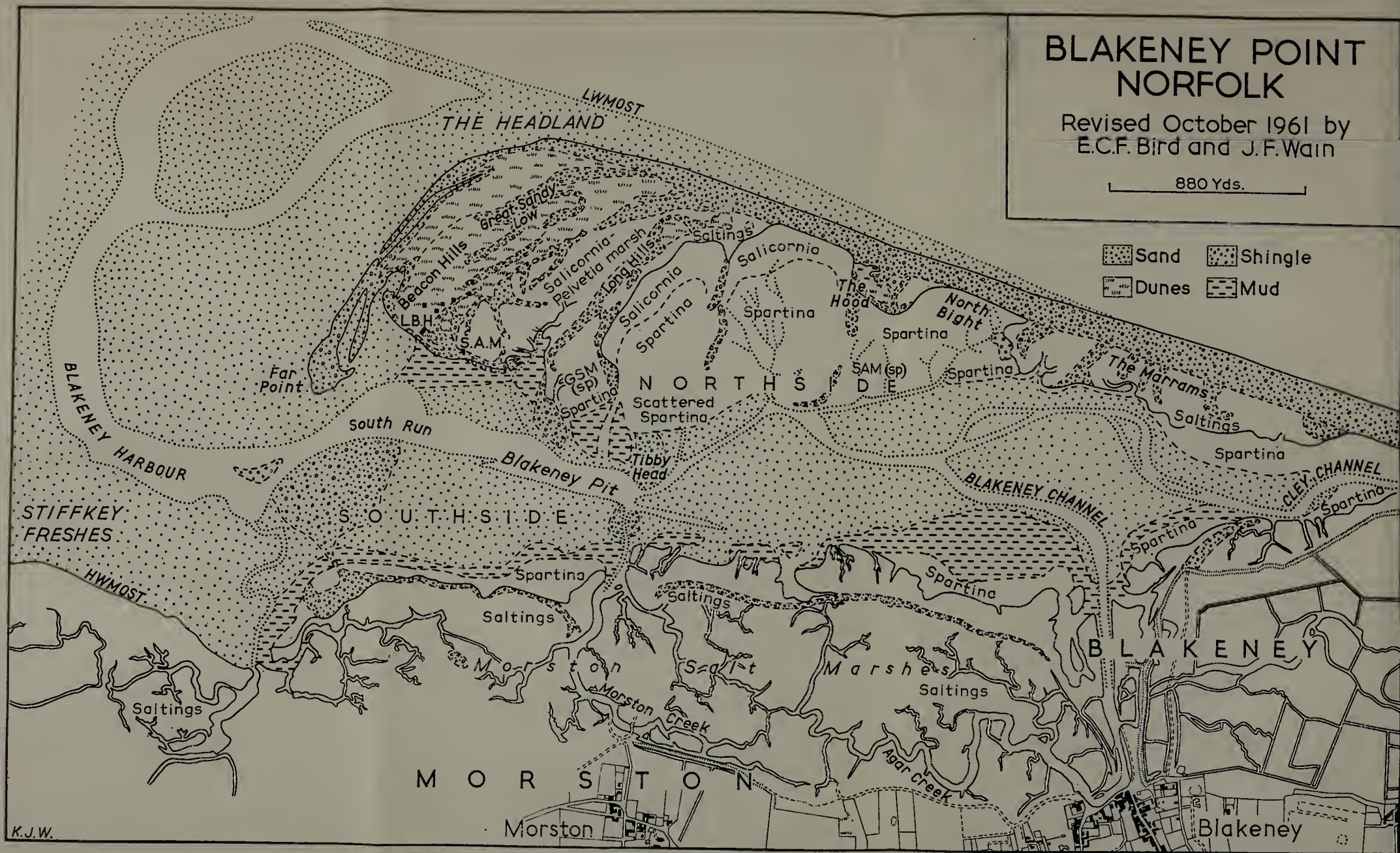


Figure 1. Blakeney Point in October 1961. GSM = General Salt Marsh. SAM = Salicornia-Aster marsh. (sp) = Spartina.

CHANGES AT BLAKENEY POINT SINCE 1953

BY E. C. F. BIRD AND JULIET WAIN

The outline of Blakeney Point is continually changing. The map prepared in 1946-47 (published in these TRANSACTIONS, Vol. XVI, page 283) was revised by Brearley and Chisholm in the summer of 1953 to take account of the effects of the storm surge of 31st January of that year (see Fig. 19 in *Scoll Head Island*, edited by J. A. Steers, 1960). There have since been further changes, and in October, 1961 a new survey was carried out to bring the map of the Point up to date once more (Fig. 1).

The main shingle bank has remained in position since 1953, but Far Point has been truncated and driven back to a new alignment, where it no longer protects the mouth of Stiffkey River. Gravel flats near the mouth of this river were apparently covered by sand in 1953, but now it is the mudflats south of Blakeney Pit which are covered by sand. Low-tide channels in the harbour have changed position, the Cley Channel taking a more northerly course, cutting back the edge of the North Side marshes and meandering close to Tibby Head, a tongue of gravel submerged at high tide.

Accumulation of inter-tidal sand-flats west of the Headland has resulted in a more northerly outflow from the harbour at low tide. The Headland has been widened by addition of low shingle ridges which have grown along the shore; and dunes have built up considerably between this shore and Great Sandy Low. There seems to be little evidence of any further westward prolongation of the Point in the alignment of the main shingle bank. In theory, the Point must have been prolonged in this alignment at intervals, in order to account for the separation of the successive recurved lateral ridges seen on the landward side of the main shingle bank.

The most obvious change in the marshlands is the spread of hybrid *Spartina*, which forms extensive meadows on former mud-flats and has all but displaced the patch of *Salicornia-Aster* marsh shown on previous maps south of The Hood. *Spartina* marshland is also extensive on the south side. The new survey includes low shingle banks traceable amid the south side marshes, banks which must have been built by the sea before the Point grew to outflank them and produce the sheltered environment which has encouraged the formation of the surrounding marshland.

We are grateful to Mr. K. Wass, who drafted the map here reproduced.

UNIVERSITY COLLEGE, LONDON.

A PRELIMINARY REPORT ON THE MARINE FAUNA
OF THE NORTH NORFOLK COAST

BY RICHARD HAMOND, B.Sc.

INTRODUCTION

Throughout the history of British Marine biology the East Coast from the Humber to the Thames has always had a reputation for being a faunistie desert, inhabited by relatively few species of which many were far more abundant elsewhere. The mid-Victorian naturalists, led by Philip Henry Gosse, Joshua Alder, and others, did all their original work in places where the fauna was exceptionally rich, and in which splendid laboratories were built as a direct result of the impetus given by these pioneers. The study of life in the sea has been extremely localised ever since, so that the coasts of Norfolk and of many other counties remain underinvestigated and underrated. The results of previous workers may be summarised as follows:—

F. W. Harmer (1871) published a list of the marine shelled Mollusea.

The German survey ship *Pommerania* fished near the Norfolk coast at stations P.105 to 115 inclusive (see below) on the 17th and 20th of August, 1872 (Metzger, 1875).

F. W. Harmer (1884) quoted his previous list with one or two additions.

A. H. Patterson collected near Yarmouth from 1878 to 1934 (unpublished notes) and published a list of marine invertebrates (1905, p. 325) in which some of the identifications appear to be very doubtful.

S. F. Harmer (later Sir Sidney Harmer, F.R.S., son of F. W. H.) dredged in Yarmouth Roads with his father on 20.VII.1899; among other things, according to Patterson's notes "they secured forty species of Mollusca and several common fishes". Some of their records were quoted by

Garstang (1900), who also quoted some of the *Pommerania* records (other than crustacea) together with some unpublished records from Cromer (by H. D. Geldart) and from Happisburgh (by R. A. Todd), but none of Patterson's records.

Stebbing (1900) quotes the *Pommerania* crustacea, but not those found by Patterson, in a general account dealing with land and freshwater crustacea as well.

Hart (1930) gave a brief description of Blakeney Harbour including the higher crustacea (Malacostraea).

Serventy (1934) described Seolt Head Island and gave a fauna list.

Gilson & al. (1944) listed additions made by them to the Scolt Head fauna.

Ellis (1952) gave a general account based on the two preceding papers.

Hamond (1957) dealt with the local Hydrozoa.

Pantin & al. (1960), in a revised account of Scolt Head, gave a fauna list including all previously published records from the Island as well as the animals seen by them there in 1959.

For the adjacent counties of Suffolk and Lincolnshire the most important works are those of Morley (1934, 1938, 1941) and Young (1955) respectively.

The only offshore records are by Patterson, the *Pommerania*, the Harmers, and Pantin and his party. A few specimens collected by this latter group appear to be all that remains of any of these author's collections. The present paper is based on fifteen years' work, both intertidally and offshore, and has resulted in a trebling of the number of species of invertebrates recognised in Norfolk waters. It is hoped in future papers to deal with particular aspects of the fauna and to give some impression of the uniqueness of the Norfolk coast as regards the life below low-water mark as well as above it.

LIMITING FACTORS IN THE MARINE ENVIRONMENT

(1) The annual range of temperature is between $+4$ deg. C. in February and $+17$ deg. C. in September in the open sea, and between even greater extremes intertidally.

(2) The timing of the tides has a marked effect on the life of the shore; since high water of spring tides in Blakeney Harbour occurs at about 8 a.m. and 8 p.m., the corresponding low tides which expose as much as possible of the shore do so at almost the hottest and the coldest times of the twenty-four hours. As might be expected, some species (e.g. *Echinus esculentus*) are found only offshore in Norfolk waters, while occurring intertidally in places where the high tides are in the middle of the day and night (Wilson, 1937, p. 55).

(3) Although the principal biological indicator is *Sagitta elegans* (*S. setosa* being apparently rare) the plankton of Blakeney Harbour and the adjacent area is poor in number of species for most of the year (probably because of the turbidity of the water and the vagaries of the sea-temperature), although some of these species, such as small calanoid copepods, may occur in huge numbers all the summer. My previous statement, that *S. setosa* is the only species here (Hamond, 1961) is based on misidentifications; a few genuine *setosa* have been taken in the Harbour within the last ten years, but these unfortunately have no date attached. In October, 1961 an immense increase in the number of *Sagitta elegans* taken per ten-minute haul coincided with the height of the Yarmouth

herring fishery; this increase was probably due to a mass of water moving southwards along the east coast (Rae & Rees, 1947) rather than to any increase of the indigenous population.

(4) The main trend of the ocean currents set up by the North Atlantic Drift is anti-clockwise round the North Sea, flowing south along the east coasts of Scotland and England until deflected by the "bump" of Norfolk, which causes the current to split in the neighbourhood of Cromer into two branches. Of these one proceeds east and south-east, the other turning sharply west along the coast as far as the Wash, where it turns north again and then east (approximately in the latitude of Skegness) to rejoin the parent current flowing south-east at that point. Off the North Norfolk coast this westerly flow has superimposed upon it an oscillatory effect, due to the tidal cycle which in Blakeney Deep runs in an ellipse whose long axis is parallel to the coast. If the starting point of a given body of water, at the time of low-water of spring tides on Blakeney Bar, be assumed to lie about halfway between the Bar and the Blakeney Overfalls Buoy (see Fig. 1), then three hours later (at about half flood) it will have reached the turning point at the western end of the ellipse off Wells, and in turning slows down to give about twenty minutes slack water before starting to flow eastwards again, all this taking place while the tide is still flowing hard into such nearby harbours as Blakeney and Wells. The eastern turning point of the ellipse is roughly level with the Pollard, and occurs some three hours after high water in the harbours. While the tidal ellipse is thus about ten miles long from east to west it is only about three miles across at its widest part off Blakeney Bar, this being the distance in a south-south-westerly direction of the position at high water of spring tides of our given body of water from its starting position at the previous low water; moreover, at the next lower water it ends up about one and a half miles W.N.W. of its starting point, this distance representing the overall gain per cycle. At neap tides the shape of the ellipse is very similar but all the distances covered are only about half those given for spring tides. Out near the South Race Buoy the tidal ellipse is much more nearly circular, so that it seems as if the peculiarly elongate form of the tidal ellipse inshore is due to it being "squashed" between the coast on one hand and the offshore water on the other. The strength of this tidal current is seldom appreciated until one sees it swirling past a buoy moored several miles from land, but it needs constant watching as regards navigation, while biologically its effects are threefold:—

(i) Vertical mixing is very thorough owing to the velocity of the tidal currents operating over a wide shallow area, so that there is no chance of any discontinuity layer or thermocline being established, and I have never yet found any temperature difference between the surface and the bottom. A series of bottom readings taken on 5.8.1955 read as follows:—

Blakeney Bar	17.0 deg. C.
One mile north of the Bar	17.0 deg. C.
Two miles north of the Bar	16.2 deg. C.
Four miles north-east of the last position	16.1 deg. C.

which shows that, at about half-ebb of a spring tide, the rise in temperature caused by warm water pouring out of Blakeney Harbour could be detected as far as a mile off the Bar. It is possible, but not confirmed, that such a temperature boundary is established all along the coast in summer, especially in calm hot weather, separating warmer water immediately next the coast from the great body of cooler water further out. This boundary, once established, would be favoured by the shape of the inshore tidal ellipse, but rapidly destroyed by strong winds from a mainly northerly or southerly direction (i.e. at right angles to the coast).

(ii) Since the same water mass will cross a given area of sea-floor several times, in one direction or the other, planktonic larvae have a correspondingly increased chance of successful settlement and metamorphosis if a suitable substratum is present; if all the substrata are unsuitable, however, the larvae take so long to cover a relatively small net distance that it is quite possible that many of them die on the way, although some at least have a remarkable power of delaying metamorphosis (Wilson, 1937, p. 120).

(iii) In the more circular type of tidal ellipse found further offshore the speed of the current, and hence the suspended load of silt and detritus, varies very little over the entire tidal cycle, but inshore (see para. 4) each cycle will include two periods of slack water during which a part of the suspended load drops out (the densest particles first) and is picked up again in reverse order of settling as the tide gathers speed once more, though not before some of it, at any rate, has been used for food by certain bottom-living invertebrates. *Ophiura albida* and *Ampelisca tenuicornis* are the most conspicuous of these, and they should therefore be most abundant in moderate depths near the coast on suitable substrata. The truth of this can be judged from Fig. 2; the almost complete concentration in the Deeps of *O. albida* as against the more diffuse distribution of *A. tenuicornis* may be because the former is confined to relatively soft grounds where it can take advantage of a heavy "rain of food" every slack water, alternating with strong currents that sweep much of it away, while the latter, although having its greatest numbers here, can also live on harder grounds and make do with a less violently fluctuating food supply.

(5) The account by Steers (1960, Chapter IV) shows clearly how unstable the coastline is, consisting as it does of soft and loose materials (shingle, sand and mud) which are constantly being moved along the outside shore by wave action or, within the sheltered confines of the marshes, being caught in the interplay of the binding action of the various plant communities with the scouring

or depositing action of the tides. Moreover the entire coastline is exposed to a comparatively long "fetch" (the distance, at right angles to the coast, across the sea to the coast opposite), and such bays or estuaries as there are have only the most nominal shelter provided by the nearby land (except Wells Quay and Rocks, q.v.) so that virtually the entire shoreline is laid open to the most violent and extensive wave-action, and almost the only persistent intertidal habitats are those of clean sand supporting *Nephthys cirrosa* and haustoriid amphipods, or of large rocks, as at West Runton, which are probably too heavy to be shifted except in the most violent gales. It is interesting to note that from any northward-facing part of the Norfolk coast a line can be drawn to the North Pole without touching land.

DESCRIPTION OF THE GROUNDS, AND OF THEIR FAUNA.

(a) Shore Grounds. These will be dealt with in the order in which they occur from west to east.

Hunstanton. North of the lighthouse runs a long narrow promontory straight out into the sea on the very "corner" of Norfolk; it is locally called "the Scaup" and is about 800 yards long at low water of equinoctial spring tides, but is almost completely covered at low water neaps. The centre is composed of clay into which the unwary walker may suddenly sink up to his knees; its deceptively firm appearance is enhanced by great hillocks of mussels which form the most striking topographical feature of the Scaup. They are in fact *Mytilus edulis*, but the common horse-mussel *Modiolus* is often cast ashore here and is also locally called "Scaup"; the old *Modiolus*-shells are covered with encrusting organisms, mainly the polyzoa *Cryptosula* and *Conopeum*. Both sides of the Scaup (this term meaning now and hereafter the promontory) are composed of bound shingle with black muddy sand an inch or two below the surface; the east side slopes much more gently and is a good deal sandier than the west side, and may have *Ophiura albida* (otherwise found only offshore, see p. 19) creeping about, covered by only an inch of water at low-water springs. On the shore immediately east of the Scaup the sandy gravel at the same level is much cleaner, and the stones are much smaller, than the bound shingle on the Scaup itself; this sandy gravel is woven through and through into a stubbly mat by the thickly massed tubes of *Lanice*, and strangely enough there is almost no associated fauna. At the distal (northern) tip of the Scaup certain offshore species (*Eudendrium ramosum*, *Halecium halecinum* and *Modiolus*) can be found growing in water only ankle-deep, so that they may be partly exposed; with them, the sponge *Halichondria panicea* forms thick felted greenish masses often over a foot across, and *Alcyonium* occurs on dead *Modiolus*-shells. On the sponge are found *Bougainvillia*, *Archidoris*, and *Ophiothrix*

fragilis, the first-named sheltering numbers of tiny pycnogons (*Achelia echinata*, *A. longipes*, *Anoplodactylus pygmaeus*), while the most noticeable burrowing animals are *Venerupis pullastra* and the polychaetes *Nephtys caeca* and *Nereis longissima* which all grow to a large size here. At times great numbers of *Asterias* and *Psammechinus* invade the shore, while the algae and hydroids that are sometimes so abundant harbour many small invertebrates among their branches. Tunicates are noticeably absent.

Under Hunstanton Pier are lumps of concrete which shelter a few animals (*Sagartia elegans*, *Phyllodoce maculata* and *Gammarus*, mostly *G. locusta* but sometimes a few *G. zaddachi*): the sands in front of the Pier have not been investigated.

Brancaster. The shore due north of the Golf Club consists of a flat expanse of clean sand sloping very gently seawards, containing *Nephtys cirrosa* and small *Bathyporeia* spp., and at low-water springs many very large *Tellina tenuis*, *Magelona papillicornis* and *Spiophanes bombyx*, together with a few *Urothoe grimaldii* and occasionally *Nephtys hombergi* and *Scoloplos armiger*. At present I cannot account for the absence of *Urothoe brevicornis*, *Haustorius arenarius* and *Nerinides cantabra*, all of which are found in superficially similar shores at Wells, Stiffkey and Morston. East of this, the shore at low-water springs curves round northwards to form a broad cape on the west side of the channel between Scolt Head Island and the mainland; the sands of this cape contain moderate numbers of *Ensis siliqua* and one or two small *Tellina*, also *Ophiura texturata* and possibly *Portumnus variegatus* (only dead ones seen here). At about mid-tide level are shallow outcrops of the submerged forest, starting approximately four hundred yards north-west of the Golf Club and running westwards for at least a mile, and consisting of about four inches of compacted vegetable remains (peat) overlying a layer of exceedingly tenacious grey clay, from one to two feet thick or even more. Two very similar but not closely related bivalves, *Barnea candida* and *Petricola pholadiformis*, make vertical burrows in the submerged forest; whereas *Petricola* never penetrates below the peat (in which, however, it outnumbers *Barnea* by about three to one), *Barnea* goes right down to eight or ten inches below the base of the peat (i.e. more than a foot below the surface) where it attains its largest size away from competitors and predators. Old burrows of both species may have the dead shells firmly woven into place by the tubes of *Lanice*, usually about five or six in a single burrow, which have invaded the burrow after the occupant's death. A third species of boring bivalve, *Zirfaea crispata*, is much scarcer, while small specimens of *Venerupis pullastra* and large specimens of *Audouinia tentaculata* may also lodge in the old burrows. The most conspicuous large polychaete is *Nereis longissima*, but the surface of peat is honeycombed with *Polydora ciliata*. Round the edges of the outcrops scouring by the tide excavates deep caverns in the clay, while leaving the peat

relatively untouched, so as to form a sort of roof from which hang small algae and tufts of *Bowerbankia*, the latter having other sessile organisms growing on it but not in such abundance as they do under Wells Rocks. The submerged forest corresponds to habitat "a", and the sandy shore to habitat "o" in part, as given by Pantin & al. (1960, p. 237); they sampled the submerged forest about a mile west of the Golf Club, and not in its immediate neighbourhood as described above.

Wells-next-the-Sea. The most recent map of this harbour (Steers, 1960, p. 50) is very clear but on rather a small scale. The sands down by the east side of Wells Bar seem to be more or less barren except for a few *Ensis siliqua*, although higher up, on the south side of the channel opposite where a ridge drawn in red by Steers ends on the north side, there is a stony patch with moderate numbers of *Lanice* where systematic digging would probably reveal a few burrowing animals. The Lifeboat House (not shown on the map) is situated on the little cape which sticks out to the east at the extreme northern end of the seawall running from Wells; south of this cape, between the seawall and the channel, is a roughly triangular sandbank containing the same burrowing fauna as that off Morston Creek (see under Blakeney Harbour) except for *Magelona* but with the addition of *Ophelia rathkei*; *Macoma* and *Scrobicularia* have been found in the hard mud near the foot of the seawall, and are also very abundant across the channel north-east of the Lifeboat House.

Beyond the sandbank, going towards Wells, the channel runs close to the sea wall, which slopes down steeply into it so that its western shore is formed of large irregular boulders. Here at low tide, under rocks and on submerged rotten posts, grow large yellow masses of *Halichondria* (not green as at Hunstanton) and smaller masses of *Ciocalyptra penicillus*, many orange *Metridium* and fewer brown ones (white ones being scarcest), numbers of the peacock worm, *Sabella pavonina*, and tufts of ctenostome polyzoa (*Anguinella palmata* and *Bowerbankia imbricata*) carrying immense numbers of sessile ciliates and a few small hydroids such as *Opercularella lacerata* and *Calycella hispida*. The rocks are covered with *Fucus vesiculosus* (on which *Laomedea* spp. grow thickly) on top and with small red and brown algae round the sides; these small algae shelter myriads of copepods. The Quay has under it an even greater abundance of *Halichondria*, and more and larger *Metridium*, but most other species seem to be scarcer here than under the Rocks. A semi-parasitic copepod (*Ascomyzon* sp.) is very common in *Halichondria*. All round the Quay and Rocks in rotten posts the wood-boring isopod *Limnoria lignorum* is common, accompanied on the surface of the wood by multitudes of the tiny fanworm *Fabricia sabella*, and in its burrows by the ciliate *Folliculinopsis limnoriae*, which lives on the tail of the *Limnoria* itself, and by a very peculiar ostracod (probably *Aspidoconcha*

limnoriae) which creeps about in the burrows and is found nowhere else. Wells offers an interesting comparison with Blakeney Harbour since, besides being much more sheltered, Wells has only very slight brackish influence, as shown in this comparison of the distribution of three common amphipods:—

<i>Species</i>	<i>Wells Quay and Rocks</i>	<i>Blakeney Harbour</i>
<i>Gammarus locusta</i>	Abundant at all times of year.	Extends in summer as far as the lowest reach of Morston Creek and on to the Strond. The dominant non-burrowing amphipod on the sands outside the Point.
<i>G. zaddachi</i>	None at all so far.	Abundant all over the Harbour, never outside the Point (N.B.—The great majority are <i>G. z. zaddachi</i> , some are <i>G. z. salinus</i>).
<i>Melita palmata</i>	Abundant.	Common in Morston Creek, especially near the Quay, and on the Freshes Lays where brackish influence is strong; only twice found outside the Point (among debris near the <i>Hjördis</i>).

According to the Plymouth Marine Fauna (1957) *G. locusta* and *Melita* are truly marine species which can stand small amounts of brackish influence, *Melita* the more so, while *G. zaddachi* is an estuarine species heavily overlapping the other two at the seaward end of its range; another species of *Gammarus* found mainly on sandy shores in the Plymouth area is unfortunately undescribed, so that it cannot be shown if it occurs in Norfolk or not. The population of *Melita* in Morston Quay may well be maintained at an artificially high level by continual recruitment from the Freshes Lays, from which boatloads of mussels are brought up to Morston Quay, there to be washed, sorted and put into sacks to go by road to the markets.

Blakeney Harbour (Page 1). Biologically the Harbour, including the sands outside the Point, is one of the richest and most diverse areas along this stretch of coast, since the sandflats and creeks teem with polychaete worms of various kinds while the deepest part of the Pit regularly yields the pipe-fish *Syngnathus acus*, the armed bullhead *Agonus cataphractus* and the small spider-crab *Macropodia rostratus*, as well as flounders (*Platichthys flesus*) and in summer large shoals of whitebait (young *Clupea* sp.). West of the Point, on the eastern edge of Stiffkey Sands, lies the wreck of the French schooner *Guenowle* which came ashore in 1921; and north of the main sandhills squarely in the middle of what was the main channel until 1960, lies the "Iron Steamship" (the local

name for the wreck of the Norwegian coaster *Hjördis*, which ran aground there in a storm in December, 1914). Although gradually decaying, the *Hjördis* is still the finest natural grotto imaginable, full of sessile invertebrates. Below decks the dominant attached forms are the false coral *Alcyonium digitatum* and the sea-anemone *Metridium senile*, while the hydroids *Tubularia larynx*, *Halecium lankesteri*, and *Plumularia setacea*, the polyzoa *Bugula plumosa* and *Scrupocellaria scruposa*, and the tunicates *Didemnum candidum*, *Sidnyum turbinatum* and *Botrylloides leachi* all carpet the sides, and a few can usually be found of the following:—the hydroids *Bougainvillia ramosa*, *Coryne muscoides*, and *Sarsia eximia*, the sponge *Leucosolenia* (most if not all *L. complicata*), the nemertine worm *Lineus longissimus*, the brittle-star *Ophiothrix fragilis* (often extremely abundant on the inside walls of the wreck), the hermit-crab *Pagurus bernhardus*, the edible crab *Cancer pagurus* and the lobster *Homarus vulgaris*. On the colonies of hydroids and polyzoa are found numerous free-living animals such as the amphipods *Caprella linearis* and *Jassa falcata*, the pycnogonids *Achelia echinata*, *A. longipes* and *Phoxichilidium femoratum*, various marine mites (mostly *Copidognathus* spp.), the polychaetes *Lepidonotus squamatus*, *Autolytus* spp., *Procerastea halleziana*, *Polydora ciliata*, small *Sabella pavonina*, *Pomatoceros triqueter*, a few terebellids, and abundant Protozoa (vorticellids and suctorians). The broken-off base of the mast is riddled with *Chelura* and *Limnoria*. All these species live inside the wreck; outside it, round under the stern and rarely elsewhere, are numerous fig-like colonies of the tunicate *Aplidium proliferum*, belonging to a local variant that constantly has eight instead of six lobes to the branchial siphon, while the outsides of the wreck are covered with a thick felt of green algae (*Enteromorpha* sp.) among which the cottony tufts of the hydroid *Laomedea dichotoma* var. *plana* show as dull white or brown, and which looks invitingly smooth until the collector's hands and knees are tortured by the sharp points of myriads of barnacles just underneath. On top of the decks the amphipod *Jassa falcata* builds its muddy nests in enormous numbers among forests of small red algae, and clumps of mussels hang from the beams. *Guenowle* used to have a similar but less rich fauna in which *Metridium*, *Tubularia*, *Scrupocellaria* and *Bugula* were dominant, but since 1954 there have been extensive changes (probably as part of the aftermath of the 1953 flood) so that Stiffkey Sands has advanced about twenty or thirty yards eastward into the channel, completely surrounding *Guenowle* of which only a little piece now shows. The mouth of the channel down towards the Bar, which in 1945 to 1948 ran about two hundred yards west of the *Hjördis*, has moved east every winter so that, whereas only her stern stuck out into the channel in 1952, since 1954 it has been impossible to board her except from a boat at low tide, a perilous undertaking in any but the calmest weather. In 1960, however, a new channel opened up

about half a mile west of the old Bar and communicated with the old channel about halfway between the two wrecks; this has now deepened to form the main channel, much larger than that going round by way of the *Hjördis*, a few yards east of which (and at present submerged) lies some remains of a double-walled wooden smack, which sometimes contains hydroids and tunicates. The tideline near all these wrecks is an excellent place for animals which have been washed up, but it is not always possible to determine whether they came from the *Hjördis* or the seafloor outside; cork buoys moored in the channel become covered after a time with algae above (harbouring *Jassa* and *Gammarus locusta*) and *Tubularia larynx* below, on which acolids feed.

Heading south-west from the *Hjördis* towards the Far Point, the shore used to be of clean sand that held a high water content even when exposed for a few hours at low-water springs (its own level being slightly above low-water neaps) due to its being very flat and sloping evenly from the edge of the shingle spine of the Point all the way down to low-water mark, so that the water-table was almost parallel to the surface and never very far below it. At high water the shingle, being battered by waves, takes up water like a gigantic sponge, and continues to discharge in the form of small rivulets across the surface of the sand long after the tide has receded. Since 1957 the proportion of shingle has greatly increased (caused possibly by the removal of much of the sand rather than by the addition of more shingle) and the distinctive burrowing fauna of worms (*Nephtys cirrosa*, *Nerinides cantabra*) and haustoriid amphipods has dwindled to a fraction of what it was in its heyday, when the patch containing them covered an area of less than two acres, surrounded on all sides by a vast expanse of apparently identical sand in which they were scarce or absent; they are still common near low tide in the sand lying off Stiffkey and Wells.

The Far Point is connected to the mainland immediately south of it by a wide belt of stones resting on hard clay, of which a part (a tongue-like promontory stemming from the southern shore) is exposed at low-water springs, and is called the Reef, while the other part, the Threshold, is always submerged by the swiftly flowing current emptying the Sin Pool into the lower channel running down past *Guenowle* to the Bar. The Threshold is covered with large brown seaweeds (*Laminaria saccharina* and *Chorda filum*, both restricted to places with fast current flow and limited wave action); *Laminaria*-holdfasts contain a rich assemblage of small invertebrates from which, however, tunicates and shelled molluscs are conspicuously absent. The Sin Pool has not been fished in; at low tide the Pit drains into its north-east corner, and the Stiffkey River (with some addition from the Pit) into its south-east corner; this latter channel, although still the smaller of the

two, has widened and deepened very considerably since 1958 due to the rapid erosion of the hard clay which forms its south side. In between these channels lie the Freshes Lays, a hard stony and muddy patch covered with mussels which are cultivated here; young mussels transplanted here from the Wash often contain the peacrab *Pinnotheres pisum*, which never survives for long, perhaps because of the wide daily variations in salinity and temperature. Medium-sized *Venerupis pullastra* are quite common, and in winter *Aeolidia papillosa*, in spring *Onchidoris fusca*, are plentiful along with their egg-ribbons, though both these sea-slugs have been found spawning here as late as the first week in June. Of the algae, *Laurencia* is abundant in little pools on the lays and gives shelter to myriads of harpacticids and to much larger numbers of the viviparous brittle-star *Amphipholis squamata* than can be found anywhere else, although this is a common species under stones all over the western part of the Harbour. The shelly grit, with plenty of mud in it not far below the surface, which forms a large proportion of the northern half of the lays is an excellent ground for polychaetes, especially *Lanice conchilega* but also *Audouinia tentaculata*, *Notomastus latericeus*, and occasionally *Tharyx marioni* and *Kefersteinia cirrata*, while deeper digging in the thick black mud underlying the lays may give *Nereis virens* and large *Amphitrite johnstoni*. Under stones on the surface can be found *Gammarus zaddachi*, *G. locusta*, *Melita palmata* and rarely other amphipods, the chiton *Lepidochiton cinereus*, and the polychaete *Phyllodoce maculata* which may be especially abundant on the Sin Pool shore of the lays. Almost the only hydroid in winter, and by far the most abundant in summer, is *Laomedea dichotoma* var. *plana*, but *Kirchenpaueria pinnata* is also common here in summer, as is *Laomedea flexuosa* on *Fucus* near the mouth of the Freshes, whereas *Tubularia larynx*, *Campamularia integra*, and *Plumularia setacea* have each occurred once only. *Hydractinia echinata* was once (ca. 1951) not uncommon here on shells of *Buccinum undatum* tenanted by *Pagurus*, but is nowadays most often taken in whelk pots out to sea. At or slightly below low-water springs one or two small colonies of the typically offshore hydroid *Sertularia argentea* may be found; *Clytia johnstoni* grows on it, also on *Ceramium rubrum* and *Ulva lactuca* on the Reef and the lays. Polyzoa include *Conopeum reticulum* and *Electra pilosa* (both very common), *Cryptosula pallasiana* which was plentiful here up to about 1956 but has since died out almost entirely (though still very common at Hunstanton and West Runton), and *Alcyonidium mytili*, amongst others. The endoproct *Pedicellina cernua* is common on algae and on hydroids, whilst its relative *Loxosoma singulare* occurs, sometimes in large numbers, on the polychaete *Notomastus*. The anemone *Sagartia elegans* is most abundant in the Threshold but is also quite common under mussels on the lays; a larger species, *Tealia felina*, is only rarely found here.

On the eastern half of the Strond (the "South Side" of Steers' map), which extends between mid-tide level and high water of neap tides, there were, up to about ten or more years ago, large mudflats covered with wigeon-grass (*Zostera* spp.) which have since been greatly reduced by the phenomenal growth of *Spartina townsendi*. This pestilential plant covers the entire upper part of the shore on the west side of Morston Creek, from which it extends westward on both sides of the *Zostera*, covering Seven Foot Knoll on the one side and the entire frontage of the Meols on the other, the latter as far west as the shingle spit running out to the Freshes Stake. This spit is the most prominent part of the immense tract of shingle covering the whole western half of the Strond; there was formerly much more sand just east of it than there is now, but the flood of 1953, and the altered tidal conditions after it, removed much of this sand and deposited it on the Freshes Lays and elsewhere. In the north-east corner of this shingle area a large shallow artificial pool has been formed during the last three years, due to the building on its north side of a dam, about a foot high, made of planks backed with stones, through whose interstices water drains off continuously from the pool; these interstices support a surprisingly rich fauna for such an exposed habitat, so high up the shore. East of the Strond Pool (in which mussels are kept for fattening) the Strond consists mainly of hard clay, on which the *Spartina* grows directly, or which may be covered with muddy sand; a bank of clean sand has grown up remarkably in the last four years on the edge of the Strond next to the Pit, a little way west of Seven Foot Knoll. The fauna of the Strond is less restricted than it might appear, since most animals must be dug for in muddy sand or searched for under stones or among algae; the commonest species are:—

In the Strond Pool itself; the polychaetes *Pomatoceros*, *Eumida*, *Eulalia viridis* (both the typical variety and the var. *ornata*) and *Phyllodoce maculata*, several copepods, and the amphipods *Gammarus zaddachi* and *G. locusta*.

In the Strond Pool Dam; the sponges *Sycon ciliatum*, *Leucosolenia* sp., and another kind so far unidentified, the saddle-oyster *Anomia ephippium*, the top-shell *Gibbula cineraria*, the brittle-star *Amphipholis* (often numerous), the sea-urchin *Psammechinus* and the starfish *Asterias*.

In bare shingle covered with barnacles; only the isopod *Jaera albifrons*.

In muddy sand; the polychaetes *Arenicola marina* (the lug-worm) and *Scoloplos armiger*, and the bivalves *Cardium edule* (the cockle), *Tellina tenuis* and *Scrobicularia plana*; *Arenicola* and *Cardium* are now both very scarce here, due to excessive digging.

What is left of the *Zostera* grows on mud, over which creep a few *Hydrobia ulvae*. The hydroid *Laomedea dichotoma* var. *plana*

grows on the *Zostera* blades but the colonies, although they may often produce medusae in the summer, are only about 2 cm. high compared to 15 cm. on the lays. The *Spartina* has practically no associated fauna at all.

The eastern boundary of the Strond is formed by Morston Creek, in whose lowest reach the hydroid *Laomedea loveni* (and *L. flexuosa* in summer) forms a thick fur on *Fucus*, while under stones are found more *L. loveni*, *Opercularella lacerata*, and ctenostome polyzoa (mainly *Valkeria uva*). On and under shells in the same place is found *Laomedea gelatinosa*, sometimes in great abundance, while in the spring *Clava multicornis* is found, usually on living *Mytilus* but occasionally on waterlogged wood. *Valkeria*, *Clava*, *Opercularella* and *L. loveni* extend up the creek as far as the site of the now dismantled sheepbridge above Morston Quay, as does *Nereis diversicolor* (which is common even in the pools right on top of the marsh); while *Scoloplos*, *Acanthodoris pilosa*, *Eubranchus pallidus*, *E. exiguus*, and various pycnogonids do not extend above the lowest reach of Morston Creek (whose upper limit is the junction of Morston and Backwater Creeks). In winter the viviparous blenny (*Zoarces*) breeds in Morston Creek and in the Pit, as does *Scoloplos*. Some animals, such as *Carcinus* (the shore crab, locally called "gillie"; "kittiwitch" or "swinny-crab" in other parts of Norfolk), *Littorina littorea*, *Hydrobia ulvae*, and *Scoloplos*, are very widely distributed over the entire Harbour. Mention should also be made of a bank of clean sand, lying immediately north-east of the mouth of Morston Creek (between it and Tibby Head), of which the most westerly part contains all the species formerly found in clean sand south-west of the *Hjördis*, excluding *Portumnus* but including *Magelona* (once); the Harbour east of this has not been investigated except for the accidental discovery, in a part of the sandbank about 150 yards due south of the Watch House at less than two feet below high-water neaps, of a fairly dense population of *Macoma balthica*. On the north side of the Pit at the higher levels the shore is largely of hard clay overlaid by muddy sand to a greater or lesser extent. Where the clay is almost bare (as for instance all along immediately below high-water neaps west of Pinchen's Creek) *Mya arenaria* is present in small numbers, while *Nereis diversicolor* (accompanied in its burrow by *Halicyclops incognitus*) and *Scrobicularia plana* are both very common; *Macoma* is also found here, though sparingly, being large and plentiful in the bed of Pinchen's Creek itself (with a few *Cardium*). West of this area, and therefore south-west of the Point Lifeboat House, a wide area of loose muddy sand barely covered by high-water neaps contains no *Mya*, a few severely overfished *Arenicola*, many *Scoloplos* and a few *Scrobicularia*, *Tellina*, and *Ophelia rathkei*. The shores immediately along the north side of the Pit, lying below half-tide level, have no particular fauna to speak of. Preliminary experiments suggest that the sand microfauna is exceedingly poor.

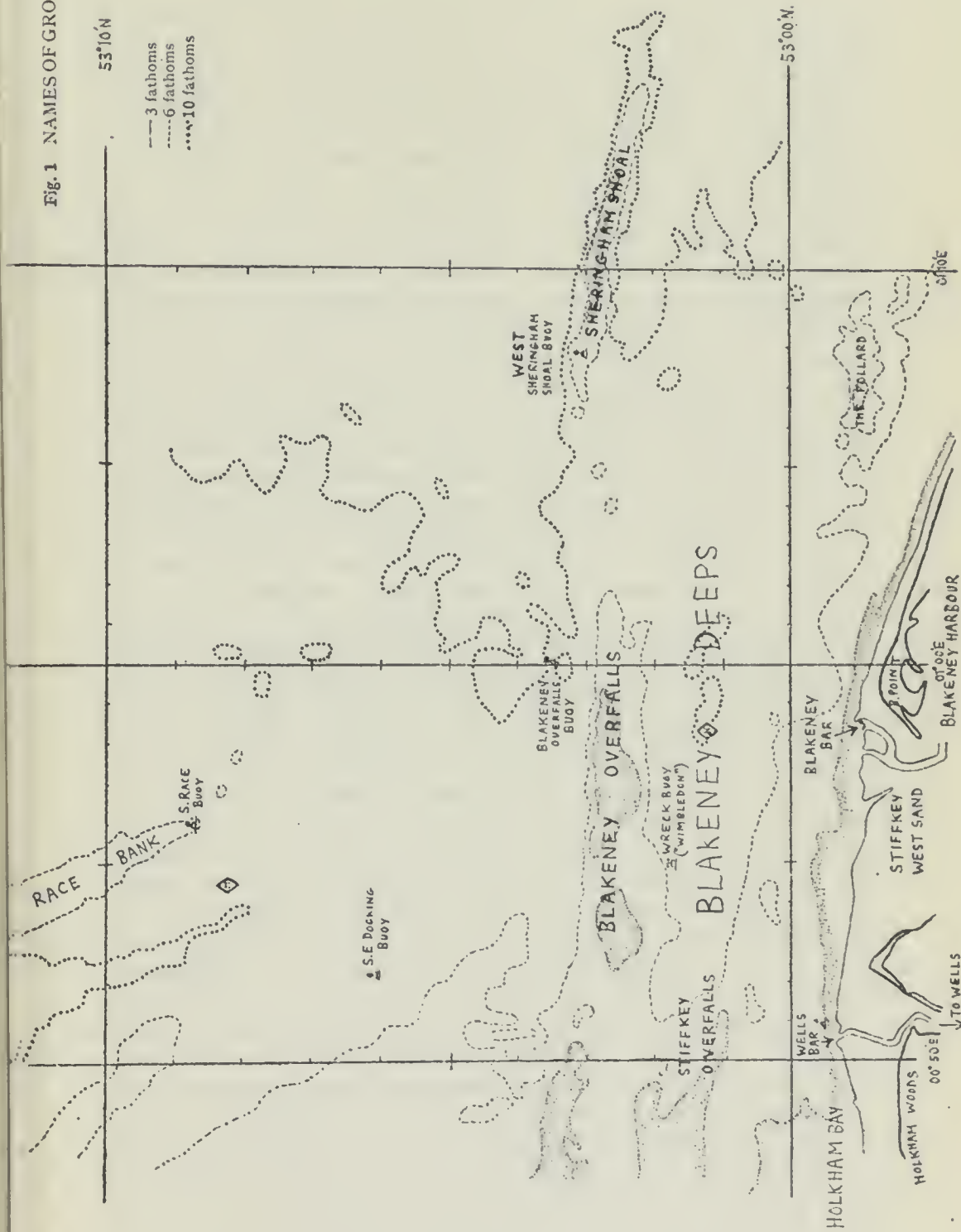
West Runton. This shore is unique in Norfolk, since instead of a low-lying shore of sand and mud there is a belt of rocks and stones resting on a platform of hard chalk, backed by high cliffs and extending below low-water mark. At and below low-water neaps great numbers of *Zirfaea* bore into the chalk to a depth of about a foot; shallow burrows, only three or four inches deep, are made by *Venerupis pullastra* (a small, heavily ridged variety), and thin winding tunnels, following cracks in the chalk, by *Nereis pelagica* and *Perinereis cultrifera*, while the superficial two inches or so of the chalk are riddled through and through by *Polydora ciliata*, much as in the peat of the Forest Bed at Brancaster. The rocks are well covered with *Fucus vesiculosus* and *F. serratus*, while *Carcinus* and *Actinia equina* are abundant under stones and in the little pools, whose sandy floors, especially in the zone of *Fucus vesiculosus*, support a large population of *Bathyporeia* spp. and in which various mysids are trapped by the falling tide. Around the edges of pools in the *Fucus serratus* zone, and in much greater abundance below it, *Corallina officinalis* flourishes and provides shelter to a great variety of small crustacea and worms. In many of these pools (in and below the *Corallina* zone) the hydroids *Coryne muscoides* and *Kirchenpaueria pinnata* are plentiful but rarely grow intermingled, nor does *K. pinnata* ever seem to grow on *Corallina* itself although *Coryne* does so quite often. Near low-water springs the larger boulders usually have a rich fauna underneath including the hydroid *Dynamena pumila*, the polyzoa *Bugula plumosa*, *Schizoporella linearis* and *Cryptosula pallasiana*, the endoproct *Pedicellina*, the nudibranchs *Facelina auriculata*, *Ancula cristata*, *Archidoris pseudoargus* and *Onchidoris aspera* (although nudibranchs are notoriously capricious in their appearance), and the tunicates *Polyclinum*, *Morchellium*, *Sidnyum turbinatum*, *Didemnum candidum*, *Perophora* and *Botrylloides*. Larger and mobile animals hiding under rocks include small edible crabs, the hairy crab *Pilumnus hirtellus*, the squat-lobster *Galathea squamifera*, and the fishes *Onus mustela*, *Cottus bubalis* and *Centronotus gunnellus*. As far as the fauna is concerned, West Runton is most closely paralleled by the inside of the *Hjördis*, but there are also many differences; the frequent poverty of the West Runton fauna is probably due to the lack of shelter from all sides except the south, the distance from similar grounds so that reduction in numbers of any given species is only partly covered by recruitment, and to the other limiting factors mentioned in the Introduction. East Runton is very like it, but has not been investigated in such detail. At Sheringham (west of the Lifeboat House) only the lower shore resembles West Runton; the upper shore is of hard chalk, covered with green algae (*Enteromorpha*) and supporting a sparse fauna, while subtidally there are gullies in the chalk, from which large flints may be brought up covered with red algae, sponges, and encrusting polyzoa.

(b) Offshore Grounds (Fig. 1)

Off the North Norfolk coast the seafloor has a gentle gradient eastwards from a line of shallow sandbanks which extend from Hunstanton to the Docking Shoal, with one or two small gaps where there is deeper water, and beyond that to the Race Bank and the Dudgeon Shoal lying north-east of the Docking Shoal. On these banks the average depth is less than three fathoms; the innermost banks off Brancaster and Thornham are in half that depth at low-water springs, and of course slightly more at other times. The Race Bank, according to the Wells whelkers, is composed of hard mud as the base material, covered with a superficial layer of sand and shells of very variable and sometimes considerable thickness; this is probably also true for the Blakeney and Stiffkey Overfalls and Sheringham Shoal. The water all round the South Race Buoy on its north-east, south-east and south-east sides is on an average eight fathoms deep for some miles around, and provides the chief whelkgrounds; other grounds are inside the South-east Docking Buoy, further out near the Dudgeon, and north-east of Blakeney Overfalls on grounds north of Sheringham Shoal, on all of which the whelks congregate on patches of stiff clayey mud or on rough ground with a high percentage of silt (A or C₂ grounds, see below). On account of their distance from Wells these grounds are worked only in the summer, the winter fishery being in Blakeney Deeps.

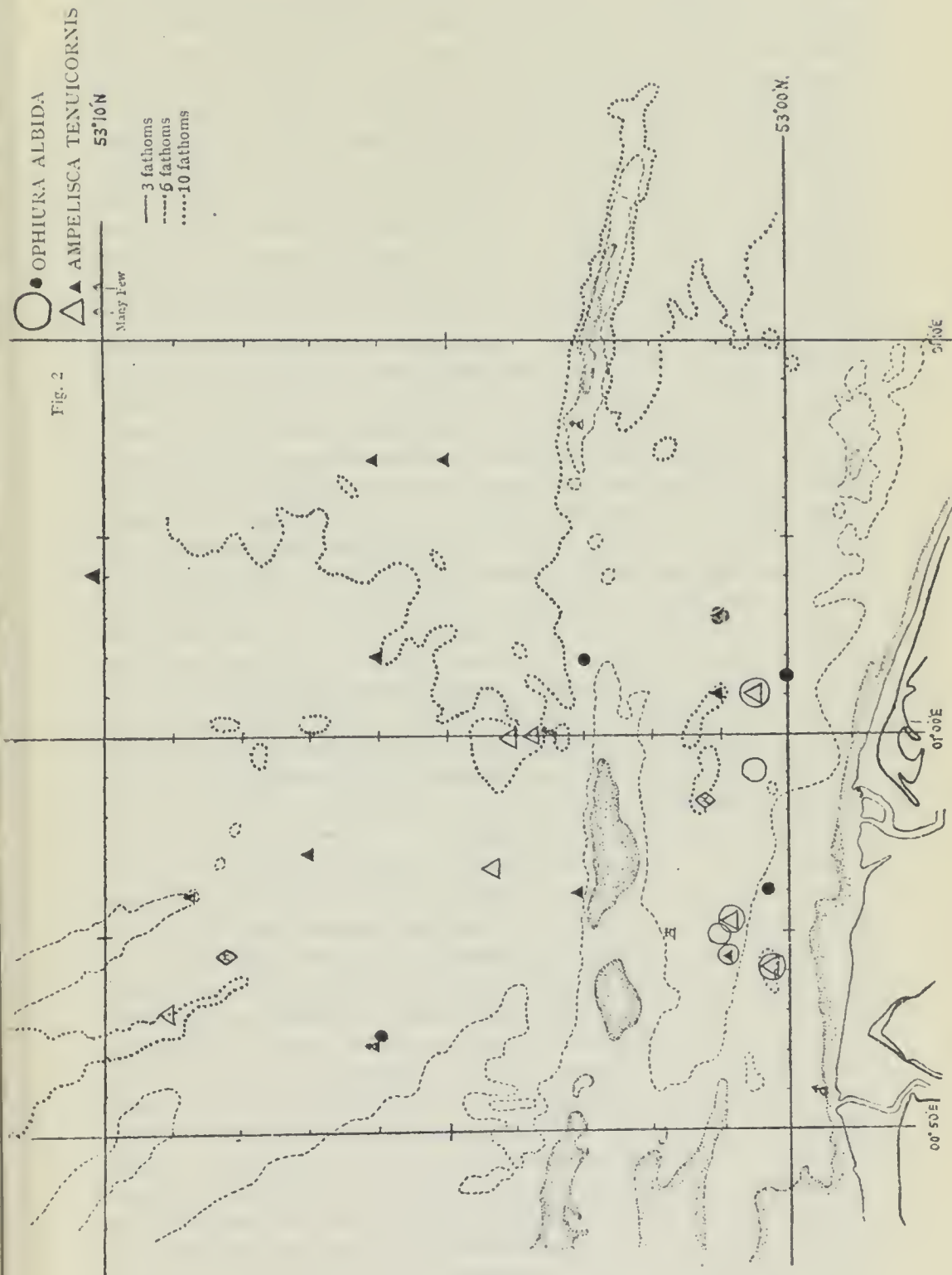
The great majority of the whelks are *Buccinum undatum*, but the "almond whelk" (*Neptunea antiqua*) and the "bullet" (*Colus gracilis*) also occur, *Colus* being much the rarest. The hermit-crab *Pagurus bernhardus* is very abundant in old *Buccinum*-shells and constitutes a major pest, while the spider-crabs *Hyas araneus* and *Hyas coarctatus* are both numerous with many epizoic "lodgers" such as sponges, hydroids and polyzoa; the latter groups also grow in quantity on stones and shells in far greater variety than between tidemarks. Of the molluscs, the gastropods *Ocenebra erinacea*, *Calliostoma zizyphinum*, *Gibbula cineraria* and *Trivia arctica* are all common, while the squid *Loligo forbesi* frequently hangs its spawn on the pots in the summer. The swimming-crab *Portunus holsatus* ("flying gillie", "flying Tom Ted", or "swimmer") is plentiful, up to 40 per cent being infected with *Sacculina carcini* (which in North Norfolk belies its name by never occurring on *Carcinus*; the only other record here is of one on *Macropodia* at D.17); sometimes an infected *Portunus* may bear two parasites. Some other crabs (other spp. of *Portunus*, *Pirimela denticulata*, *Pilumnus*, *Ebalia tumefacta*, and *Macropodia rostratus*) occur from time to time. The dominant echinoderms are *Asterias rubens* and *Psammechinus miliaris*, but there are periodic invasions by droves of *Solaster papposus*; *Henricia sanguinolenta* and *Ophiothrix fragilis* are both fairly common, and *Echinus esculentus* rare. Many

Fig. 1 NAMES OF GROUNDS



other species, especially hydroids and polyzoa, drift along the bottom and become entangled in the whelk gear.

Between Wells Bar and Blakeney Bar the sea bottom slopes gently northwards to a depth of six fathoms about two miles out (the slope being steeper in the eastern portion) over a sandy substratum like that of the shore to the south of it. On their way home from the whelk grounds the Wells fishermen sometimes trawl for shrimps outside Wells Bar while waiting for the flood tide; their catches also contain *Sepiola*, *Portumnus*, *Portunus holsatus*, *Gobius minutus* (much larger and more brightly coloured than in the harbours, and more often attacked by *Lernaeocera minuta*), *Agonus*, *Trachinus vipera*, and little plaice and sand-eels. S.5 (see below) was a very similar haul on sandy ground further west. Off Blakeney Bar, about a mile north or north-east of the *Hjördis*, recent work with a bottom plankton net has yielded a surprising abundance of amphipods, cumaceans, and mysids, which will be dealt with in future papers, and of which certain species seem to be found only here. Some were not previously known from Norfolk, but until similar work has been done elsewhere it is impossible to say whether they are confined to this type of smooth sandy bottom, or even if they are distributed over the whole of it. Off Stiffkey, right in the middle of the stretch we are considering, a little over a mile north of the water's edge at low-water springs there is a mudhole, a six-fathom depression with a markedly silty floor containing great numbers of *Lanice*, *Ophiura albida*, and *Ampelisca temnicornis*, the latter being widely distributed in small numbers elsewhere but exceedingly abundant here and in one or two other places (Fig. 2; see also p. 5). Off the Point, where the sand grades off seawards into the muddier deposits of Blakeney Deep, there is a narrow strip of clean sand in five fathoms with abundant dead water-worn shells of *Ostrea*, many of them honeycombed by *Polydora* and *Cliona* (neither of which, however, are found living here). This ground is exceedingly barren, but has one very interesting inhabitant, the polychaete *Ophelia borealis*; other animals found there (*Tubularia indivisa*, *Pandalus montagui*, *Portunus pusillus*) have probably strayed in casually from the Deep, where they are much more plentiful. In the centre of the Deep the bottom consists of mud mixed with coarse sand, stones, and plenty of dead shells, with hydroids and other sessile creatures growing on them; the most abundant species are *Buccinum undatum*, *Pagurus bernhardus*, *Pandalus montagui*, *Ampelisca temnicornis*, and *Ophiura albida*, although many more are found in smaller numbers. This muddy patch appears to be restricted to an area somewhat south of the deepest part as shown in Fig. 4; the deepest parts themselves, and the grounds immediately east and north-east of them, appear to be barren (it is quite usual to catch masses of dead *Ostrea*-shells with little else save *Psammechinus miliaris*) until one reaches the inner slope of the Overfalls which has at its foot a



very rich fauna, especially well provided with small amphipods and tens of thousands of the harpacticid copepod *Rhynchothalestris rufocincta*, living in a deposit of *Ostrea*-shells mingled with a fair amount of silt; a moderately rich ground, which deserves further investigation, is found just off the eastern end of the Overfalls. In the north-west corner of the Deeps, directly opposite the mudhole off Stiffkey, lies the wreck of the *Wimbleton*, just south of which the bottom is of hard sand in about eight fathoms, while north-east of it, on the steepest part of the inner slope, are masses of dead water-worn shells (mostly *Ostrea*) without *Ophelia borealis*, and not so clean as the ground in which that species occurs. The north side of the Deeps is bounded by the Overfalls, running parallel to the coast from Wells to Blakeney about five miles out and rising to within ten or fifteen feet of the surface, on which small breakers are seen even in quite calm weather if there is a bit of swell. I have never fished on top of the Overfalls, as I have reason to believe that it is littered with wreckage which would endanger the dredge, but the northern slope goes down to nine fathoms all along as far west as off Stiffkey, and to the north-east of the Blakeney Overfalls Buoy there is a wide area of ten or eleven fathoms, the deepest encountered in this survey, which leads away eastwards beyond my radius of action. The deeper part of the northern slope, just west of the Buoy, is specially noticeable for an abundance of "ross" (the local name for the fist-sized lumps of clotted sand which form the tubes of the worm *Sabellaria spinulosa*) which are covered with *Botrylloides* and encrusting polyzoa, and give shelter to the usual teeming array of small invertebrates; west of the "ross" ground is a dense patch of *Flustra foliacea*, which by itself may nearly fill the dredge, and among which *Porcellana longicornis* may be extraordinarily abundant (although this species is also quite common in many other places).

This very general description cannot possibly take into account all the variations on the themes of "stones, sand, and dead shells" which may be encountered, but an empirical classification of the main types of ground is suggested below, based on the fifty-four stations (ten fished by the *Pommerania* and the rest by me) for which there are adequate data; it should be emphasised that off North Norfolk the stones are usually similar lithologically to beach shingle but bluntly angular instead of rounded, the large dead shells at any given station are almost always either all *Ostrea edulis* or a mixture of *Mya truncata* and *Modiolus modiolus* (though many smaller species may be found by careful sorting), and, at any rate nearer the coast, there are no grounds of pure soft mud such as are found in great stretches west of the Isle of Man (Southward, 1957), off Northumberland (personal observations) or, on a smaller scale and in shallower water, the Rame Mud near Plymouth (Plymouth Marine Fauna, 1957, p. 30). It seems, however, as though P.105, situated about seventy-six miles N.N.E.

of Happisburgh, at the extreme southern edge of the Silver Pit, is the nearest ground of this kind to the Norfolk coast; here were found a relatively large number of animals not hitherto found nearer Norfolk (*Virgularia mirabilis*, *Amphiura filiformis*, *Chrystall-o-phrisson nitidulum*, *Ammotrypane aulogaster*, *Owenia fusiformis*, *Amphicteis gunneri*, *Pectinaria auricoma*, *P. belgica*, *Glycera capitata* and *Eugyra arenosa*) all characteristic of mud or muddy sand in rather deep water, with a limited amount of shells and small stones. Twenty-nine other species of bottom-living invertebrates were taken in this same haul, all preferring distinctly harder grounds than those just listed, and all save *Eteone flava* known from our coast, so that it looks very much as if the *Pommerania* pulled her dredge across at least two types of ground, beginning perhaps with soft mud, traversing a substratum resembling E₁, and ending with one resembling B (for the meaning of these symbols, see below). Rather the same sort of thing happened to me in the mudhole off Stiffkey (haul D.14), where the dredge struck bottom in the middle of the hole and travelled up one side out of it, fishing successively on sandy mud, muddy sand with *Lanice*-tubes, and clean sand with a few dead shells; the heterogeneity of the substrata is reflected in the mixture of animals taken (information from Dr. J. B. Buchanan), even though the dredge did not fish for much more than two hundred yards. This uncertainty is largely eliminated by such devices as the Peterson and van Veen grabs, which take a localised "bite" out of the sea floor to a known depth over a known area, providing samples which can be treated on a fairly strict quantitative basis both as regards the proportions of silt, sand, stones, shells, and other inorganic materials (by washing the entire sample through a series of graded sieves and weighing each sieve before and after) and as regards the numbers of the various animals present. There are many variations of this method, which requires a large boat with a power-driven winch and other facilities not available to me.

No record of the substratum is available for a great many of the whelkpot stations, mainly because attention was focused on such things as colonies of hydroids and polyzoa which, in drifting along the bottom, had become entangled in the whelk gear, and on *Pagurus* and *Hyas* which probably walked a long way to get to the pots, bringing with them a host of parasitic, commensal, and epizoic "hangers-on", so that a large proportion of the rubbish from a catch of whelks probably does not originate from the ground on which it was caught. Another facet of this phenomenon is clearly shown by the results of both types of fishing over the muddy grounds near the middle of Blakeney Deep, where at D.1 I dredged some hundreds each of *Ampelisca tenuicornis* and *Ophiura albida* (Fig. 2), one very damaged specimen of a tunicate (probably *Molgula occulta*), two or three *Pagurus* and one *Macropodia*; on this very ground the whelkers take sackfuls of *Buccinum* and

Pagurus, several *Macropodia* and *Galathea squamifera*, and many *Hyas araneus* and *H. coarctatus*, but not in ten years have I seen or heard of *Molgula* in pots, while *Ampelisca* and *Ophiura* are very scarce in them.

One type of substratum which is conspicuously lacking off Norfolk is any kind of hard coherent rock into which organisms can bore; the flint boulders found at East and West Runton are quite impervious, while conversely such substrata as are attacked (hard chalk at West Runton, submerged forest at Brancaster, and moorlog, possibly identical with the submerged forest, at D.18) are all friable and readily eroded, sheltering far fewer animals than they otherwise might.

Taking all these limits into account, it is possible to construct a table of the principal types of substratum, as given below.

CLASSIFICATION OF BOTTOM DEPOSITS (Fig. 3)

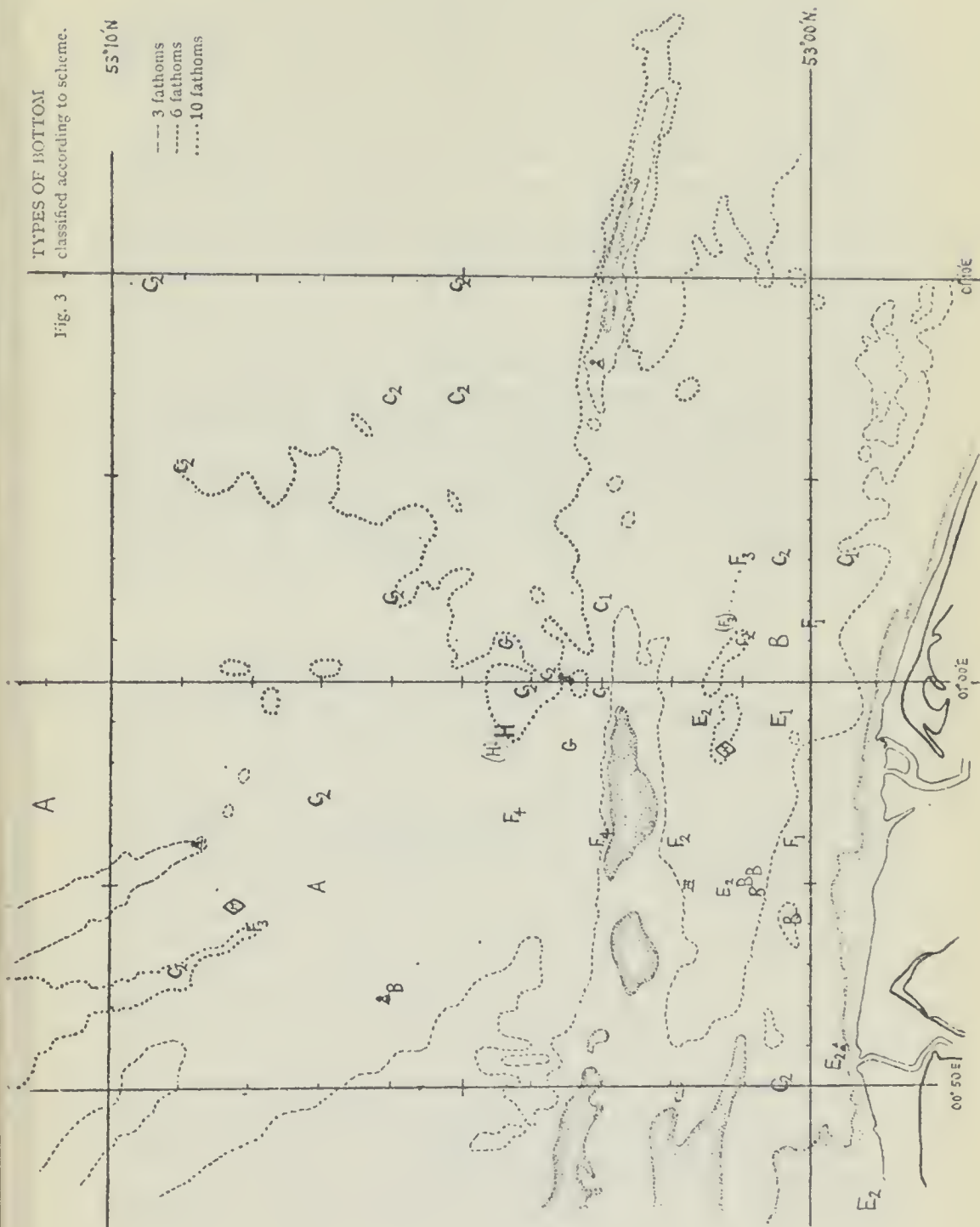
Type	Description
softer than A.	Probably quite a soft mud in part, but accidentally mixed with harder ground in the same haul.
A.	Clayey mud with stones and shells, no <i>Ophiura albida</i> .
B.	Silty sand with some shells and stones, abundant <i>O. albida</i> and <i>A. tenuicornis</i> (common elsewhere, but reaches by far its greatest abundance here, equalling <i>O. albida</i> in numbers).
C ₁	Muddy ground resembling garden earth, with fair or moderate numbers of dead shells of <i>Modiolus</i> and <i>Mya truncata</i> , no <i>O. albida</i> .
C ₂	Slightly muddy sand, less silt than the preceding, but a much higher proportion of dead shells of <i>Modiolus</i> and <i>Mya truncata</i> , rich fauna, no <i>O. albida</i> .
(The letter D is omitted in this context in order to avoid confusion with D standing for dredge hauls in the present series).	
E.	Clean sand with few shells:—
	E ₁ <i>Ophiura albida</i> common.
	E ₂ <i>Ophiura albida</i> absent.
F.	Masses of dead waterworm and eroded <i>Ostrea</i> -shells:—
	F ₁ Very clean sterile ground, apparently barren except for <i>Ophelia borealis</i> .
	F ₂ Slightly dirty, hardly any animals at all, but not as completely sterile as F ₁ .
	F ₃ As for F ₂ , but large numbers of <i>Psammechinus miliaris</i> .
	F ₄ Slightly dirty, quantities of <i>Bugula plumosa</i> growing on the shells, varied and abundant fauna.
G.	Slightly dirty sand, relatively uneroded <i>Ostrea</i> -shells thickly covered by colonies of <i>Sabellaria</i> .

Fig. 3
TYPES OF BOTTOM
classified according to scheme.

55°10'N

--- 3 fathoms
----- 6 fathoms
..... 10 fathoms

53°00'N



H. Small shingle uniformly coated with *Sabellaria*, very little free sand, a moderate amount of silt.

The main variations on these basic patterns are as follows:—

(1) C_2 may sometimes have a high proportion of gravel mixed with it; this does not significantly affect the fauna. At D.18, a mixture of C_2 with moorlog gave what I still consider to be the richest haul I ever had.

(2) Some grounds can best be described as intermediates; this is especially true of the *Pommerania* stations, whose allocation in the list below is based partly on the German authors' own choice of terms when describing a ground and partly on the animals found there vis-à-vis their distribution in my own catches; for instance, P.106 had *Ophelia borealis* along with numerous hydroids and peracaridan crustacea, on a ground of bivalves, sand and small stones, without *Ophiura albida*, and is thus classed as E_2/F_1 .

It must be emphasised that these grades are entirely empirical, and that further work will probably result in the abolition, re-definition or merging of many of them.

List of those Stations whose substratum is adequately known.

D.1	2	3	4	5	6	7	8	9	10	11
B	F_1	B	C_1	C_1	C_2	E_1	G	E_2	G	F_2
D.12	13	14	15		16	17	18			19
F_1	C_2	B	$C_2 + \text{gr.}$		F_3	B	$C_2 + \text{moorlog}$			H
D.20	21	22	23		S.1	2	3	4	5	6
F_4	F_3	C_2	C_2		E_2	B	F_2	F_4	E_2	E_2
P.105	106	107	108	109		111		112	113	114
softer than A	E_2/F_1	C_2	G	E_2		$C_2 + \text{gravel/H}$		E_2	E_1/B	E_2
P.115	W.1	2	3	4	5	6	7	8	9	
E_2	A	A	A	C_1	C_2	C_2	A	C_2	$C_2 + \text{gravel}$	
W.19	26	27	28	29	30					
C_2	C_2	C_2	C_2	C_2	C_2					

Relative frequency of the various types of bottom deposits.

(a) At D and S stations combined:—

Type	C_2	B	E_2	C_1	F_1	F_2	F_3	F_4	G	E_1	H	Total
Frequency	6	5	4	2	2	2	2	2	2	1	1	29

(b) At W stations:—

Type	C_2	A	C_1	Total
Frequency	10	4	1	15

(c) At *Pommerania* stations:—

Type	E ₂	C ₂	G	C + gravel/H	E ₁ /B	E ₂ /F ₁	Softer than A	Total
Frequency	4	1	1	1	1	1	1	10

(d) At all the above stations combined:—

Type	C ₂	E ₂	B	A	C ₁	G	F ₁	F ₂	F ₃	F ₄	E ₁	H
Frequency	17	8	5	4	3	3	2	2	2	2	1	1

Type	C ₂ + gravel/H	E ₁ /B	E ₂ /F ₁	Softer than A	Total
Frequency	1	1	1	1	54

SUMMARY

A brief resumé of the work of previous authors is followed by an account of the limiting factors in the physicochemical environment. The shore grounds are treated in turn, including remarks on some changes which have come about during the last few years; the offshore grounds are also described, and a classification is suggested for the deposits found on them. A chronological list of all the stations worked by the author is given as an appendix.

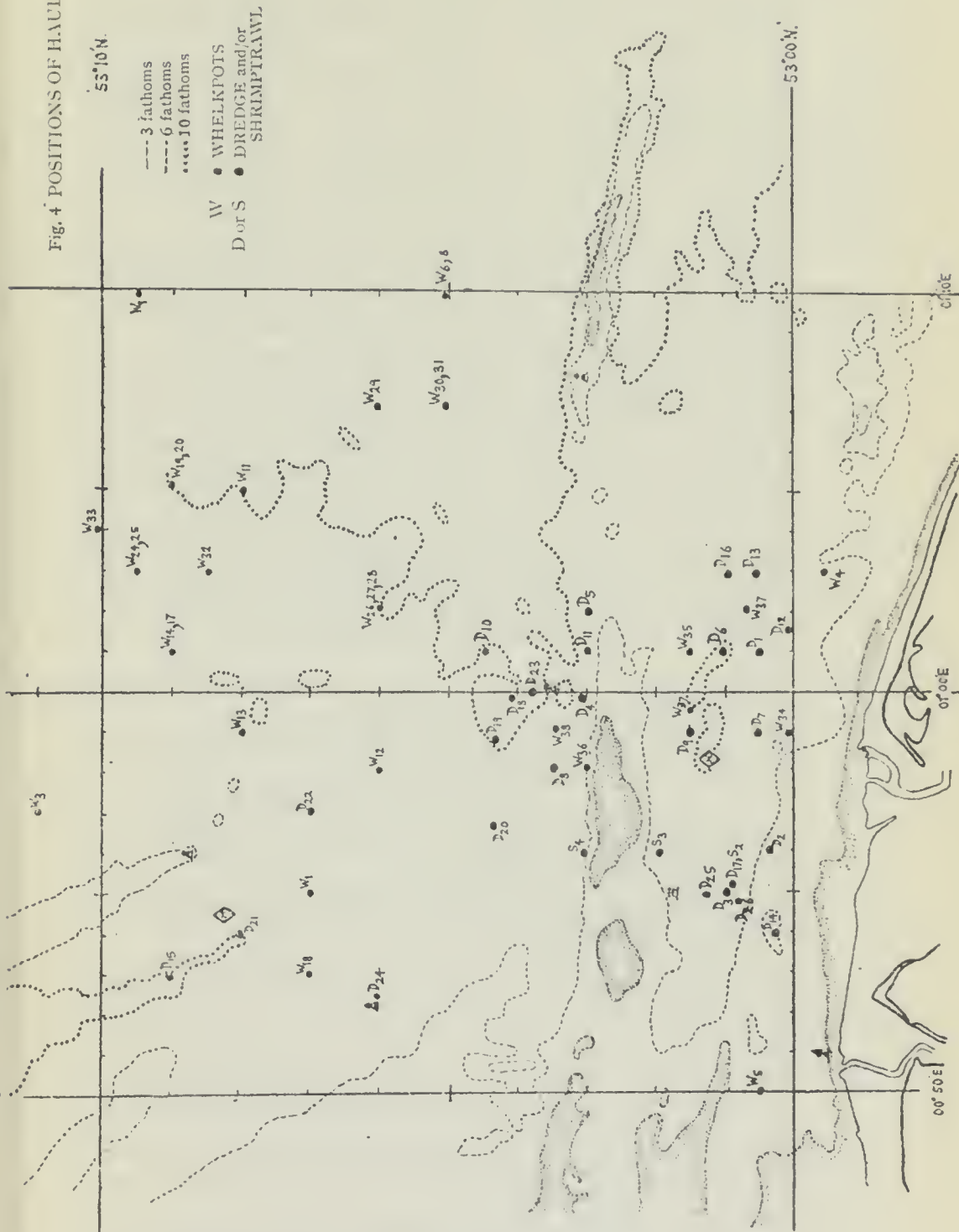
ACKNOWLEDGEMENTS

It gives me very great pleasure to record the help given by the whelk fishermen, especially Messrs. W. E. Cooper, David Cox, and E. C. Jarvis, all of Wells-next-the-Sea, and Mr. Lester Green of Stiffkey, in putting to one side the rubbish from their pots; and by the latter and by Mr. Nat Green (formerly of Stiffkey) in crewing for me on dredging excursions. Mr. E. A. Ellis, F.L.S., and Miss R. M. Barnes have both given valuable help with local records and with arranging access to the library and collections of the Castle Museum, Norwich. Mr. John Fisher, of Dereham, kindly allowed me to examine his large collection of invertebrates from various shores, mostly from East Runton and West Runton. The purely biological side of the work could not have progressed without the generous and skilful help of many famous specialists who were always kind enough to name animals whose identification presented unusual difficulties, while Professor J. E. Smith, F.R.S., and Mr. Ellis both read the typescript and made many valuable suggestions. Most of the dredging and shrimp trawling was financed by a generous grant from the Royal Society, and the charts are reproduced from Admiralty Charts Nos. 106 and 108 by kind permission of Her Majesty's Stationery Office and the Hydrographer of the Navy. To all those mentioned above I owe an immense debt of gratitude for helping me so often and to such good effect.

LIST OF OFFSHORE STATIONS (Fig. 4)

- W.1. 53° 07' N. 00° 55' E., 6.4.1950. Clayey mud bottom, abundant *Buccinum* (40 per cent with *Pagurus*), many *Hyas araneus* and *H. coarctatus* with hydroids and polyzoa on them.
- W.2. 53° 10' N. 01° 18' E., 17.7.1950. Clayey mud, abundant *Buccinum*, few *Pagurus*.
- W.3. 53° 11' N. 00° 57' E., 1.8.1950. Hard clay covered with stones and shells.
- W.4. 52° 59' 30" N. 01° 03' E., 2.1.1951. Muddy, lots of stones and shells, abundant *Pagurus* and *Asterias*, about fifty *H. araneus* and one or two *H. coarctatus*.
- W.5. 53° 00' 30" N. 00° 50' E., same day. Similar to W.4, but sandier.
- W.6. 53° 05' N. 01° 10' E., 16.6.1951. Very shelly and stony ground, masses of hydroids and polyzoa, many *H. araneus* and large *H. coarctatus*.
- W.7. 53° 19' N. 00° 57' E., 22.6.1951. Clayey mud with some shells and stones, many of both species of *Hyas*.
- W.8. 53° 05' N. 01° 10' E., 26.6.1951. As for W.6, but fewer *Hyas*.
- W.9. 53° 09' 30" N. 01° 10' E., 2.7.1951. In places, the bottom had masses of stones and shells with serpulids, polyzoa and tunicates.
- W.10. 53° 12' N. 01° 07' E., 20.8.1951. No bottom record as such; many large *Pagurus*, the mouths of whose shells were encrusted with polyzoa.
- W.11. 53° 08' N. 01° 05' E., 12.9.1951. No bottom record.
- W.12. 53° 06' N. 00° 58' E., 27.9.1951. No bottom record.
- W.13. 53° 08' N. 00° 59' E., 18.3.1952. No bottom record.
- W.14. 53° 09' N. 01° 01' E., 12.6.1952. No bottom record.
- S.1. In Holkham Bay just outside Holkham Gap. Fine clean sand with *Crangon vulgaris*. 12.6.1952.
- W.15. 53° 15' N. 01° 02' E., 2.7.1952. No bottom record.
- W.16. Same place, 11.7.1952. No bottom record.
- W.17. 53° 09' N. 01° 01' E., 25.8.1952. Unusually shelly and stony.
- W.18. 53° 07' N. 00° 53' E., 1.4.1954. No bottom record.
- W.19. 53° 09' N. 01° 05' E., 13.5.1954. Quite a lot of shells.
- W.20. Same place next day, no bottom record.
- W.21. 53° 15' N. 01° 07' E., 27.5.1954. No bottom record.
- W.22. Same place, 23.6.1954. No bottom record.
- D.1. 53° 00' 30" N. 01° 01' E., 16.8.1954. Soft muddy ground with some shells and stones, great numbers of *Ophiura albida* and *Ampelisca tenuicornis*.
- D.2. 53° 00' 20" N. 00° 56' E., 23.5.1955. Sandy, with masses of dead waterworn *Ostrea*-shells, extremely clean and practically lifeless except for one *Ophelia borealis*, and a few other animals which had probably strayed in from the Deepes nearby.
- D.3. 53° 01' N. 00° 55' E., same day. Sand much dirtier, shells as in D.2 but fewer, many *Ophiura albida* and *Pandalus*, but no *Crangon*.
- D.4. 53° 03' N. 01° 00' E., same day. Dirty (silty) ground, dredge full of dead shells (mainly *Mya truncata* and *Modiolus*), no *Ophiura* but fair numbers of polychaetes and crustacea.
- D.5. 53° 03' N. 01° 02' E., 6.6.1955. Rather muddy, dredge full of *Mya*- and *Modiolus*-shells, lumps of "ross", hydroids, and a few small stones; many small invertebrates.
- D.6. 53° 01' N. 01° 01' E., 23.6.1955. Sand with a little mud, a few small stones and shell-fragments, many large dead *Modiolus*-shells, lots of *Halecium halecinum* and *H. beani*, about fifty each of *Psammechinus* and *Pandalus*.
- D.7. 53° 00' 30" N. 00° 59' E., same day. Sand with a few shells, abundant *O. albida* and many tufts of *Vesicularia*.

Fig. 4. POSITIONS OF HAULS



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- W.23. 53° 14' N. 00° 57' E., 7.7.1955. A few species found on the deck of the whelkboat when it docked.
- D.8. 53° 03' 30" N. 00° 58' E., 20.7.1955. Slightly dirty sand with abundant fist-sized lumps of "ross" (in many cases covered with *Botrylloides*), and masses of *Flustra* in which great numbers of *Porcellana* were hiding.
- D.9. 53° 01' 30" N. 00° 59' E., same day. Sand and shells, masses of *Vesicularia* and nearly as much of *Hydrallmania*, moderate numbers of *Crangon*.
- D.10. 53° 04' 30" N. 01° 01' E., 5.8.1955. Masses of "ross" covered with small colonies of *Botrylloides*, *Bicellariella*, and *Bugula avicularia*.
- D.11. 53° 03' N. 01° 01' E., same day. Sand with clean dead shells, quantities of *Vesicularia* and several large *Pandalus*.
- D.12. 53° 00' N. 01° 01' 30" E., 25.8.1955. A dredgeful of dead and eroded waterworn *Ostrea*-shells, two more *Ophelia borealis*, otherwise even more lifeless than D.2, and very much like it.
- D.13. 53° 00' 30" N. 01° 03' E., same day. Masses of old shells with hydroids, several fist-sized stones and many smaller ones.
- D.14. 53° 00' 15" N. 00° 54' E., 1.9.1955. Mudhole (roughly three parts of soft non-clayey mud to one part of sand) full of *Lanice*-tubes matted together, with hundreds of *Ophiura albida* and about fifty each of *Ampelisca*, *Eumida*, *Harmothoe impar* and *Psammechinus*. Dr. J. B. Buchanan has kindly pointed out that the dredge must have fished over two types of ground, a muddy deposit with *Ophiura* and *Ampelisca*, and a sandy deposit with the other species, as their principal inhabitants respectively.
- D.15. 53° 09' N. 00° 53' E., 20.9.1955. Dredge absolutely crammed with small stones and dead shells of *Modiolus*, *Mya truncata* and other species, all smothered with *Serpula*, a few *Sabellaria* and *Pomatoceros*; plenty of hydroids and bushes of *Flustra* and *Vesicularia*. Myriads of worms and crustacea in this very rich haul.
- W.24. 53° 09' 30" N. 01° 03" E., 10.7.1956. A few spp. among catch when boat docked.
- W.25. Same place, 24.7.1956. Some *Hyas* (species not stated) brought home covered with epizoid hydroids and polychaetes, among which other invertebrates were sheltering.
- W.26. 53° 06' N. 01° 02' E., 26.7.1956. A large clump of living *Nemertesia antennina* brought home, with *Scrupocellaria reptans* and small *Flustra* all over its basal mat, and many polychaetes and amphipods living in and around it.
- W.27. Same place, 3.8.1956. A large living *Modiolus*, with some small ones and several *Microcosmus* all round it in a cluster, covered with tufts of *Bicellariella*.
- W.28. Same place, 7.8.1956. One old valve each of *Modiolus* and *Ostrea*, a few other shells and some stones, all coated with other organisms, brought home.
- W.29. 53° 06' N. 01° 07' E., 23.8.1956. Various tunicates and branching polychaetes brought home.
- W.30. 53° 05' N. 01° 07' E., 3.9.1956. A large tuft of *N. antennina*, a live *Modiolus*, and a cluster of *Microcosmus*, brought home, with a rich associated fauna.
- W.31. 53° 05' N. 01° 07' E., 17.9.1956. Numerous *Hyas araneus* (covered with *Halichondria panicea*, out of which crept about a hundred *Jassa pusilla*) brought home.
- D.16. 53° 01' N. 01° 03' E., 17.7.1957. Slightly dirty ground, lots of large dead waterworn *Ostrea*-shells, thirty-three *Psammechinus* but hardly anything else. (Further hauls that day, respectively $\frac{1}{2}$, 1, $1\frac{1}{2}$ and 2 miles west of D.16, brought up the same type of catch with apparently no animals at all).

- W.32. 53° 08' 30" N. 01° 03' E., 2.8.1957. Well over a hundred *Pagurus* in shells of *Buccinum* brought home, the hermits removed, checked for parasites and discarded, and the shells crushed in seawater and strained off through a plankton net, the larger animals being picked out by hand.
- W.33. 53° 10' N. 01° 04' E., 4.8.1957. Seventy-five *Pagurus* in *Buccinum*-shells, treated as for W.32.
- D.17 and S.2. 53° 00' 53" N. 00° 55' 06" E., 12.8.1957. Muddy ground, of a consistency similar to garden soil, matted with tubes of *Ampelisca* shared by *Corophium bonelli* (both species being present in hundreds), and dredge also full of *Mya truncata*-shells, hundreds of *Ophiura albida* and small *Scoloplos*, at least ninety *Eumida*, many *Psammechinus* and many *Audouinia*. The haul with the shrimp-trawl, which was carried out immediately after that with the dredge, resulted in a solid mass of *Asterias* weighing about sixty to eighty pounds, with very few other animals.
- D.18. 53° 04' N. 01° 00' E., 2.9.1957. Bottom material like coarse garden earth with many dead shells of *Modiolus* and a few of *Mya truncata*, and some black friable waterlogged wood (? moorlog, or possibly another outcrop of the submerged forest found on the shore at Brancaster) full of *Hiatella*; dredge full of large *Nemertea antennina* and *Flustra*, at least 200 each of *Cressa* and *Porcellana*, 130 *Golfingia*, and an immense variety of other organisms; probably the richest haul I have ever had.
- S.3. 53° 02' N. 00° 56' E., 15.8.1958. Rather infertile ground, mostly dead *Ostrea*-shells.
- S.4. 53° 03' N. 00° 56' E., same day. Lots of large dead *Ostrea*-shells with abundant *Bugula plumosa* and many worms and amphipods.
- D.19. 53° 04' 18" N. 00° 58' 36" E., 1.9.1958. Dredge full of small shingle coated with *Sabellaria*, rather meagre fauna, haul discarded (as was a similar haul immediately afterwards, about $\frac{1}{4}$ mile N.W. of D.19).
- D.20. 53° 04' 20" N. 00° 56' 40" E., same day. Rough ground, dredge full of dead *Ostrea*-shells, many large bunches of *Hydrallmania* and *Vesicularia*, general facies very like that of S.4 but fewer hydroids, polyzoa and molluscs apart from *Ostrea*, moderate numbers of polychaetes and swarms of small crustacea including several hundred *Photis reinhardi*.
- S.5. 52° 59' 30" N. 00° 36' E., 7.9.1958. Moderately clean sand with abundant large *Crangon*, many large and small *Gobius minutus*, fifteen *Ophiura texturata*, and a few other things.
- D.21. 53° 08' N. 00° 54' E., 17.8.1959. Rather barren ground resembling D.16 in that about half the haul was solid *Psammechinus*, the other half dead *Ostrea*-shells; haul later discarded.
- D.22. 53° 07' N. 00° 57' E., same day. Masses of dead shells (*Modiolus* and *Mya truncata*), the former covered with balanids outside and polyzoa inside, as well as *Ascidella* and *Actinothoe* on both sides; at least 100 *Porcellana*, numerous *Pholoe*, and at least 50 each of *Harmothoe impar*, *Cressa* (52 counted), *Leptocheirus pectinatus*, and *Galathea intermedia*, as well as a great variety of other worms and crustacea, and of small molluscs.
- D.23. 53° 03' 45" N. 01° 00' E., 20.8.1959. General facies of haul very like D.22 but somewhat siltier, including 126 *Pholoe*, 47 *Golfingia*, 49 *Cressa*, 93 *Photis*, 54 *Leptocheirus*, 32 *Molgula manhattanensis*, and a great many other worms, crustacea and tunicates in smaller numbers, as well as many small molluscs rather as in D.22.
- W.34. 53° 00' N. 00° 59' E., 31.12.1959. Washings from 165 *Buccinum*, left overnight in seawater with magnesium sulphate, yielded a few copepods and other things. No bottom record.

- W.35. 53° 01' 30" N. 01° 01' E., 8.2.1960. A few *Pagurus* in *Buccinum*-shells, a few *Hyas* (both spp.) and other whelkpot rubbish, brought home; no bottom record.
- W.36. 53° 03' N. 00° 58' E., 16.10.1960. Seventeen *Pilumnus hirtellus* brought home, no bottom record.
- S.6. Just outside Wells Bar, same day. Clean sand with abundant *Crangon vulgaris* and a few other animals.
- W.37. Mainly around 53° 00' 40" N. 01° 02' E. and 53° 01' 30" N. 00° 59' 30" E., 16.11.1960. A series of hauls whose combined results were brought home, consisting of 196 *Hyas araneus*, no *H. coarctatus* at all, and various other animals. No bottom record.
- W.38. 53° 03' 30" N. 00° 59' E., 22.3.1961. Pots left three or four days due to gales, many lost but about 25 recovered which contained 35 *Psammechinus* and several stones with *Hydrallmania* and other animals. No bottom record.
- D.24. 53° 05' 50" N. 00° 52' 30" E., 6.8.1962. Haul right against the south-east Docking Buoy, mainly of shingle, some dead *Modiolus*-shells and about 50 *Psammechinus*; discarded except for a few species.
- D.25. 53° 01' N. 00° 55' E., same day. Clean sand with one live *Spisula solida* and a few other things.
- D.26. 53° 00' 45" N. 00° 55' E., same day. Like D.24 but with many smaller dead bivalve shells as well as dead *Modiolus*-shells, and with plenty of animals.

LEGENDS TO FIGURES 1 to 4

- Fig. 1. Chart showing the area worked over by the author, with the main geographical features indicated.
- Fig. 2. Chart showing the distribution and abundance of the brittle-star *Ophiura albida* and the amphipod crustacean *Ampelisca tenuicornis*. Large open symbols denote plenty, small black symbols few, of either species; the circles indicate *O. albida*, the triangles *A. tenuicornis*.
- Fig. 3. Chart showing the various types of bottom offshore, classified according to the scheme on p. 22.
- Fig. 4. Chart showing whelkpot, dredge and shrimp-trawl stations sampled by the author; some of the most outlying stations are beyond the area shown.

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SOME EFFECTS OF SELECTIVE FEEDING BY THE COYPU (*Myocastor coypus*) ON THE VEGETATION OF BROADLAND

BY E. A. ELLIS

The coypu spread throughout the Broads District in the 1940's and by 1960 its numbers had become so great that extensive damage was being done to wild vegetation, lowland crops, grazing land and the banks of rivers and marsh ditches. Trapping carried out on a grand scale in 1961 and 1962 greatly reduced the coypu population and the very severe winter of 1963 was responsible for a further drastic reduction; control should therefore be much easier in the future and it now seems unlikely that the animals will ever again become abundant in this area. In view of this it seems worth while recording changes in the pattern of Broadland vegetation brought about by coypus in their heyday.

The more obvious changes were those involving the destruction of particular plants in the mass. Broads were denuded of water lilies, bulrushes, beds of reed-mace and reeds fringing the shores; great quantities of cowbane were eaten in Surlingham and Ranworth broads; hundreds of acres of saw-sedge were laid low; the great water dock was attacked everywhere; in fens, beds of fen rush and meadowsweet were removed through the gnawing of rhizomes in winter, leaving extensive muddy and peaty "lows" exposed. In the broads, the area of open water was much increased; but in the marshes, plants of kinds avoided by coypus were quick to fill gaps and became more abundant than formerly; for instance, one saw huge beds of purple loosestrife flourishing temporarily in freshly cleared "lows" and stinging nettles replaced great hairy willow-herb destroyed by coypus on river banks. In some fens, creeping bent-grass spread to form turf as the result of close grazing and the elimination of taller plants.

The following species were found to be damaged by coypus.

Acorus calamus. Generally avoided and became more frequent in the Yare and Waveney where other rond-plants were reduced; but in two instances rhizomes were gnawed in winter and one large patch of leaves was seen freshly bitten off in summer, possibly by young animals.

Agropyron repens. Rhizomes dug out in winter; leaves grazed.

Agrostis stolonifera. Grazed and spreading to form turf replacing *Filipendula ulmaria*, etc. in fens.

Agrostis tenuis. Grazed.

Alnus glutinosa. Barked occasionally in winter.

Angelica sylvestris. Roots dug out in winter.

Apium nodiflorum. Slight damage seen twice.

Azolla filiculoides. Skimmed from water.

Baldellia ranunculoides. Grazed.

Berula erecta. Stems and rootstocks eaten.

Caltha palustris. Leaves eaten in spring.

Calystegia sepium. Rhizomes dug out in winter.

Carex acutiformis, *appropinquata*, *disticha*, *nigra*, *otrubae*, *paniculata*, *remota*, *riparia*, *rostrata*. Rhizomes bitten, mainly in winter; leaves grazed, mainly in spring.

Catabrosa aquatica. Whole plants eaten in summer.

Centaurea nemoralis. Rootstocks dug out.

Cicuta virosa. Rhizomes eaten in winter; one of the first plants to be attacked regularly by coypus on the Broads.

Cirsium arvense, *palustre*, *vulgare*. Rootstocks dug out.

Cladium mariscus. Rhizomes and young shoots gnawed extensively, mainly in winter. Damage widespread, but plants showing signs of slow recovery now.

Crataegus monogyna. Barked to a small extent in winter.

Dactylis glomerata. Dug out in winter; grazed.

Eleocharis palustris. Rhizomes dug out; stems grazed.

Elodea canadensis. Whole plants eaten.

Epilobium hirsutum. Rootstocks dug out extensively in autumn and winter.

Eriophorum angustifolium. Rhizomes dug out in winter; grazed.

Eupatorium cannabinum. Dug out occasionally in winter, but mostly avoided.

Festuca arundinacea, *pratensis*, *rubra*. Grazed.

Filipendula ulmaria. Rootstocks eaten in winter; plants seldom molested in summer.

Glyceria maxima. Rhizomes, shoots and young leaves attacked at all seasons. The plants are very resilient, however, and retain a footing except where grazing pressure is greatest along the margins of waterways. *Glyceria* has replaced *Phragmites* in parts of Yare Valley broads because of its greater powers of resistance.

Hedera helix. Barked extensively in severe winters. (Coypus were found dead shortly after they had eaten many leaves of *Hedera canariensis* at Brundall in February 1959).

Hippuris vulgaris. Eaten occasionally in water.

Holcus lanatus. Grazed.

Hydrocharis morsus-ranae. Whole plants destroyed; eaten freely.

Impatiens capensis. Generally avoided, but a few plants were found to have been attacked at Surlingham in 1962, in summer.

Iris pseudacorus. Rhizomes gnawed occasionally in winter; young leaves grazed by young coypus in spring, but not to any great extent. This species became much more abundant as other vegetation was cleared from the wetter marshes by coypus; but in 1961 great quantities of its leaves were cut off by foraging parties of these animals in the early part of the summer. This sudden attack had no precedent and suggested a change of behaviour on the part of the coypu.

Juncus acutiflorus, effusus, gerardi, inflexus, subnodulosus. Rhizomes dug out in winter; some grazing.

Lemna gibba, minor, polyrhiza, trisulca. Skimmed from water.

Lolium perenne. Grazed.

Menyanthes trifoliata. Rhizomes eaten in winter.

Myriophyllum spicatum, verticillatum. Whole plants eaten.

Nuphar lutea. Rhizomes and young leaves bitten.

Nymphaea alba. Rhizomes and young leaves attacked.

Phalaris arundinacea. Rhizomes dug out in winter.

Phragmites communis. Rhizomes eaten extensively in winter; young shoots cut off in spring; leaves pulled down and eaten in summer. Many reed-beds were exterminated by coypus, especially round the edges of broads and rivers.

Poa trivialis. Grazed.

Potamogeton lucens, pectinatus. Rhizomes and leaves eaten freely.

Potentilla palustris. Dug out in winter.

Ribes sylvestris. Twigs cut and used in nest-building.

Rorippa nasturtium-aquaticum. Whole plants eaten in autumn.

Rubus caesius, fruticosus. Rootstocks gnawed in winter.

Rumex conglomeratus, crispus, hydrolapathum. Rootstocks of all these docks are dug out in winter, wherever they can be found.

Salix alba, cinerea, purpurea, triandra, viminalis. Barked in severe winters. The roots also are gnawed after excavation; this often kills the trees which also become blown over easily. Seedlings of *S. cinerea* are commonly grazed in summer.

Scirpus lacustris, tabernaemontani, maritimus. Rhizomes and young shoots eaten.

Sium latifolium. Rootstocks and young shoots eaten.

Sonchus palustris. Young shoots cut off in spring.

Sparganium ramosum. Rhizomes and young shoots eaten.

Stachys palustris. Fleshy underground shoots dug out in winter.

Stratiotes aloides. Turions (winter buds) eaten.

Typha angustifolia, *latifolia*. Rhizomes dug out extensively in winter. Re-colonisation of cleared mud by seedlings often takes place, so that new beds of reed-mace may appear and flourish for a season; but while coypus abounded they usually discovered the seedlings and destroyed them.

The following plants were found to be either ignored or avoided by coypus, in areas where the animals were numerous.

Bidens cernua, *B. tripartita*, *Callitriche stagnalis*, *Cardamine amara*, *C. pratensis*, all orchids, *Equisetum fluviatile*, *E. palustre*, *Frangula alnus*, *Fraxinus excelsior*, *Galeopsis tetrahit*, *Galium palustre*, *G. uliginosum*, *Humulus lupulus*, *Hydrocotyle vulgaris*, *Lathyrus palustris*, *L. pratensis*, *Lotus uliginosus*, *Lychnis flos-cuculi*, *Lysimachia nummularia*, *L. vulgaris*, *Lythrum salicaria* (trial gnawing seen discontinued), *Mentha aquatica*, *Myosotis scorpioides*, *M. cespitosa*, *Myrica gale*, *Oenanthe fistulosa*, *Peucedanum palustre*, *Polygonum amphibium*, *P. hydropiper*, *P. persicaria*, *Ranunculus* (all species), *Rhamnus catharticus*, *Ribes nigrum*, *Scrophularia aquatica*, *Scutellaria galericulata*, *Solanum dulcamara*, *Thalictrum flavum*, *Urtica dioica*, *Valeriana dioica*, *V. officinalis*, *Veronica beccabunga*, *V. catenata*, *Viburnum opulus*, *Vicia cracca*.

No ferns were seen damaged by coypus at any time, except that winter burrows were made under large stools of *Osmunda regalis* in some places.

These notes are based upon regular observations made at Surlingham, Wheatfen and Rockland Broads over the last twenty years, and on supplementary observations made from time to time in the broads and marshes of the rivers Bure, Ant, Thurne and Waveney.

NOTES ON THE MOTHS OF HICKLING BROAD

BY T. U. PEATE

INTRODUCTION

These notes are made on some of the more interesting species of Lepidoptera seen at Hickling Broad in August, 1958-9-60, and late June, 1960.

Most collecting at Hickling was done by means of a mercury-vapour discharge lamp, in a Robinson light-trap. This was usually sited at Hickling Staithe, but was also run in the middle of a reed-bed in Heigham Sound. Electric light at Whiteslea Lodge also attracted moths, and dusk work and car headlights have also produced specimens.

Over 100 species have been recorded by me, of which mention is made of thirty-two below. Throughout emphasis is on marsh species.

Papilio machaon, the Swallowtail butterfly, was very scarce in 1960, in contrast to its abundance in 1958 and 1959.

SPECIES OF INTEREST

The family Sphingidae, the Hawk moths, is represented at Hickling by the Poplar, Privet, Eyed and Elephant Hawks, all of which are common. The Poplar, which is seen from June until the end of August is the most abundant. Larvae of the Elephant can frequently be found on willow-herb.

Most of the common Prominents occur at Hickling. The only one worth special mention is the Maple Prominent, *Lophopteryx capucina*. One specimen of this chalkland species was taken in August, 1960 at Hickling Staithe. The caterpillar probably feeds on the Field Maple, and the insect is known to be increasing its range. Another species first taken in 1960 was the Chocolate Tip, *Clostera curtula*. In contrast to the previous species, *C. curtula* is becoming generally rather scarce and is at best local in Norfolk. Two specimens were seen.

There is a strong colony of both the Pebble Hook tip, *Drepana falcataria*, and the Oak Hook tip, *D. binaria*, at Hickling. Neither are Broadland insects and their presence is worth noting.

The Water Ermine, *Spilosoma urticae* is always confined to marshy land, and one specimen was taken in late June at Heigham Sounds. It probably abounds earlier in that month.

The Round-Winged Muslin, *Comacta senex*, swarms at Hickling, and I have even taken it flying over the middle of the Broad. The Dingy Footman, *Eilema griseola*, is represented by both its typical, pale grey form, and also the straw-coloured *var. flava*. The rare Dotted Footman, *Pelosia muscerda*, occurs in small numbers: I have never seen more than ten specimens in one season.

The Powdered Dagger (*Simyra albovenosa*), purely a marshland insect, does well at Hickling and can be found in June and again in August. The larva, a reed feeder, prefers the drier edge of reed-beds to the wetter parts.

A single specimen of the Stout Dart, *Spaelotis ravidus* was taken in 1958: it appears to be the first record for Broadland (Bretherton, *Ent. Gazette*, Vol. 8, No. 1). The moth is very easily overlooked.

The Dog's Tooth, *Hadena suasa* is usually associated with the coast, and single specimens have been taken at Sea Palling and Hickling, both in 1959.

The Crescent-striped, *Apamea oblonga* has occurred twice—once in 1958 and again in 1960. It is associated with grasses near brackish water. The Crescent, *Celaena teltcostigma* occurs every year in large numbers, and is extremely variable. Variations taken include *var. fibrosa*, Hubn.

The Wainscots are particularly confined to marshland. Nearly all species are reed or sedge feeders, most of them feeding inside stems. The rarest Wainscots, Fenn's (*Arenostola brevilinea*) and the Fen (*A. phragmitidis*) are both common at Hickling. Other Wainscots worth noting are *Nonagria sparganii*, *N. typhae*, *N. geminipuncta*, *N. dissoluta*, *Coenobia rufa*, *Chilodes maritima*, *Leucania straminea*, *L. pudorina* and *Rhizedra lutosa*, all to be found in August except *L. pudorina*, which is a June insect.

The attractive Gold Spot, *Plusia festucae*, is quite common in late August at Hickling and there is considerable variation in size.

An interesting marsh moth, the Silver Hook, *Eustrotia uncula*, has been taken once only, in 1958. This insect is virtually limited to Fenland. I suspect that it might prove to be fairly common in this locality if some collecting were done in July.

The Geometridae are not very remarkable. Of particular note is the capture in 1958 of *var. approximans* of the Canary-shouldered Thorn, *Deuteronomos alniaria*; this form had never previously been taken in the British Isles.

Finally a very good local moth, the Reed Leopard, *Phragmatocia castaneae* flies very commonly at Hickling in June. It is supposed to have been introduced at Ranworth in the nineteenth century from original Cambridgeshire stock; if so, it has taken to Broadland very well.

A MASS DISPERSAL OF SPIDERS

BY ERIC DUFFEY

Aerial dispersal movements by spiders are frequently mentioned in zoological literature and any keen observer can see evidence of this phenomenon in the countryside, particularly during the autumn and winter months. Bristowe (1929, 1939) and Duffey (1956) review the subject in some detail and the latter has measured certain micro-climatic factors associated with this behaviour. However, although the identity of aeronautic spiders has been recorded in many cases, little is known about the proximate factors which initiate dispersal behaviour and of the climatic conditions necessary to ensure its success.

On October 31st, 1960, during visits to two areas in West Norfolk, active dispersal movements were recorded of Linyphiid spiders emerging from ground vegetation. The first locality, Cranberry Rough, a wet fen near Great Hockham, had been partially flooded for some weeks and only very small areas such as the banks of dykes and scattered sedge tussocks were free from standing water. During the late morning spiders were found in some numbers on the old flowering heads of *Peucedanum palustre*, on bushes, reeds, and the tops of grass and rush stems. Although silk from these aeronauts was abundant everywhere it was not particularly conspicuous and only obvious by inspection of the vegetation. Some twenty-three species (including immature specimens) were taken among 348 individual spiders. The most abundant species was *Porrhomma pygmaeum*, 158 specimens forming 45.4 per cent of the total. Only four other species reached double figures: *Bathyphantes gracilis*, 20; *Erigone atra*, 16; *Gongylidiellum murcidum*, 14; and *G. vivum*, 10. *G. murcidum* is a very rare fen species in this country and is recorded by Locket and Millidge (1953) only for Wicken Fen in Cambridgeshire and the New Forest, Hants; it has also been taken by the author in Redgrave Fen, Suffolk in June, 1960. The full species list is as follows (new county records (Bristowe 1939) marked with an asterisk):—

* <i>Porrhomma pygmaeum</i>	71♂, 87♀
<i>Bathyphantes gracilis</i>	8♂, 14♀
<i>Erigone atra</i>	8♂, 8♀
* <i>Gongylidiellum murcidum</i>	2♂, 12♀
* <i>Gongylidiellum vivum</i>	4♂, 6♀
<i>Linyphia clathrata</i>	1♂, 4 im.♂
<i>Gnathonarium dentatum</i>	2♂, 2♀
* <i>Hillhousia misera</i>	3♂, 1♀
<i>Savignia frontata</i>	2♂, 1♀
<i>Centromerus sylvaticus</i>	2♂
<i>Wideria nodosa</i>	2♀
<i>Pachygnatha degeeri</i>	1♂, 1♀
<i>Bathyphantes approximatus</i>	1♀

<i>Lophomma punctatum</i>	1 ♂
<i>Oedothorax fuscus</i>	1 ♂
<i>Araneus cucurbitinus</i>	1 juv.
<i>A. (cornutus)</i>	1 juv.
<i>Philodromus (aureolus)</i>	1 im. ♀
<i>Lycosa (amentata)</i>	3 im. ♀
<i>Hypomma (bituberculatum)</i>	1 im. ♂, 2 im. ♀
<i>Pirata (piraticus)</i>	20 juvs.
<i>Theridion</i> sp.	1 im. ♂, 1 im. ♀
<i>Tetragnatha</i> sp.	1 juv.

Unidentifiable juvenile Linyphiids 71

N.B.—Nomenclature as in Loeket, G. H. and Millidge, A. F., 1951–53. *British Spiders*, Vols. 1–2, Roy. Society.

Later in the day between 1530 hours and 1600 hours G.M.T., near Little Cressingham, Norfolk, a white coating like a severe hoar frost was seen covering the ground vegetation and scattered bushes in a small (three to four acres) saucer-shaped enclave to a stream valley. The white coating proved to be an extensive mat of silk produced by immense numbers of aeronautic spiders. It was quite a remarkable sight and visible from a considerable distance. The boundaries of the silk mat were quite sharply defined and coincided with the lower parts of the rising ground around the valley enclave. Nearly the whole of the floor of the enclave consisted of flooded fen dominated by a coarse *Carex* species, whose leaves emerged from the standing water, which was at least a foot deep. The isolated groups of willows occurring in the fen were also covered by the silk mat.

Flood water prevented access to the area and collecting was only possible around the fringes of the silk mat. By this time the sun was low on the horizon and the air temperature falling rapidly, with mist collecting in the valley and other low-lying areas. Air-borne dispersal does not take place under conditions of cooling ground temperatures and none of the spiders was seen to float away. Although very numerous on silk-covered bushes and tall herbaceous vegetation, the spiders were not particularly active and if disturbed dropped on a strand of silk and remained motionless. Aeronauts are normally extremely active at the height of the movement but most of these spiders were clustered together under the silk-sheet or else on twigs or grass stems. Some were completely inactive and scarcely moved when transferred from the plant to collecting bottle. Sprays of foliage on bushes were wrapped in a silk sheet rather like a nylon bag but in many cases individual leaves and twigs were covered with silk. Many spiders were found huddled together between the silk sheet and the leaf surface. It seemed quite clear that the necessary conditions for successful aerial dispersal were over and that in response to falling temperatures the spiders were becoming inactive after retiring to places of shelter.

There seems to be two possible explanations for this remarkable phenomenon:—

- (i) The flood water may have recently extended to this enclave in the stream valley and forced spiders to leave the ground vegetation by mass emigration. This seems unlikely, however, because flooding had been widespread in many areas for several days and dispersal activity was not seen elsewhere in the stream valley. In addition, at Cranberry Rough, the first site visited, moderate dispersal activity was taking place, but it was known that this area had been flooded for several weeks. Nevertheless, there is some evidence that under certain conditions flooding of ground vegetation may cause spiders to climb to the upper parts of the plant stems and leaves. J. A. L. Cooke (in litt.) has described how an exceptionally high spring tide in mid-April, 1961, reaching up the River Stour by Flatford Mill Field Centre, Essex, flooding the grassy sea wall, caused large numbers of spiders and insects to crawl up the grass stems. In fifteen minutes he was able to collect 260 spiders. This must be a rather exceptional occurrence, however, as the two most abundant species, *Hypomma bituberculata* and *Praestigia duffeyi*, have on other occasions demonstrated their ability to withstand submergence, the former by fresh water and the latter by sea water. A number of species common on the upper reaches of saltmarshes are able to withstand regular submergence, and collections of spiders have been made (Duffey, unpublished) from *Puccinellia* tussocks, dug up on a North Norfolk saltmarsh, when they were completely covered with sea water.
- (ii) The small silk-covered depression was surrounded on all sides except the north by high land, and it is possible that it formed some sort of aerial trap during the afternoon. If cold air collected on the floor of the valley, causing a temperature inversion, airborne spiders drifting across would tend to sink in the absence of upward-moving air currents. The presence of flood water would help to create these conditions by preventing the sun from warming the ground surface. Large numbers of aeronautic spiders collecting in a relatively small area would move about actively, producing abundant silk as trail lines in an effort to become airborne again, resulting in the formation of the silk sheet over the vegetation. More localised formation of silk sheets is a relatively common phenomenon and when broken up by a fresh wind the loose pieces form the well-known floating gossamer.

October 31st was preceded by a cold night but as far as is known without widespread ground frost. In the morning it was dull and mild with very little breeze until about midday, when the sun came out for the first time. Sunshine was never strong, however, during the afternoon and for most of the time there was a good deal of cloud about. By 1600 hours G.M.T. the sky was largely clear and the air temperature was falling rapidly.

During twenty to twenty-five minutes' collecting by two people, 559 spiders were taken, of which 463 (82.8 per cent) were *Porrhomma pygmaeum*, which was also the commonest species at Cranberry Rough. The next commonest was *Trachynella nudipalpis*, of which fourteen adults were taken. The species list is as follows:—

* <i>Porrhomma pygmaeum</i>	188♂, 275♀
* <i>Trachynella nudipalpis</i>	3♂, 11♀
<i>Lepthyphantes tenuis</i>	2♂, 4♀ (1 im.♀)
<i>Centromerus sylvaticus</i>	2♂, 1♀
* <i>Araeoncus humilis</i>	1♂, 1♀
<i>Centromerus expertus</i>	1♂
* <i>Gongylidiellum vivum</i>	1♀
<i>Savignia frontata</i>	1♀
<i>Lycosa (pullata)</i>	1 im.♂
<i>Linyphia</i> sp.	11 im.
Unidentifiable juvenile Linyphiids	55

Two main explanations for aerial dispersal activity by spiders have been given. Several authors suggest that it is mainly a response to unfavourable physical changes in the environment which cause the population to emigrate. Nielsen (1932) states that October is the main month in the year for mass migrations in Denmark and says that a warm sunny morning after a cold night causes the ground to become wet and the resultant high humidity is disliked by spiders, which migrate. Bristowe (1939) has suggested that a rapid rise in temperature on a sunny day after a cold night causes discomfort to spiders, which have become conditioned to the cold, and they are stimulated to move away. Kajak (1959) made a study of spider dispersal from what she calls "artificial" and "natural" meadows in Poland. The difference between these two habitats is not defined in the English summary, apart from the comment "The artificial meadows when compared to the natural meadows showed a deficiency of green turf". Kajak found that during her sampling period, August to November (eight collections by sweep-net), there was a much more marked dispersal from the artificial meadows than from the natural. She concludes that "it is possible to presume that the dispersals prove to be a flight of winter-active forms from poor turf territories unsuitable for active endurance of the period of cold".

All the above explanations of dispersal activity are based on the assumption that certain habitats become unfavourable for spiders due to micro-climatic changes and that this induces a mass migration. Conversely, it must also be assumed that if conditions in the habitat never become unfavourable, then dispersal never takes place. There is no experimental evidence to support this point of view and the following observations of aeronautic spiders and their behaviour suggests that some other explanation must be sought.

- (a) Many species of spiders occurring frequently in collections of aeronauts normally live in the "litter" layer, i.e. close to the ground. This zone of the ground vegetation is nearly always moist with a saturated or near-saturated atmosphere most of the time in the atlantic climate in this country. It is unlikely therefore that high humidity is of any significance in stimulating dispersal.
- (b) The litter layer in ground vegetation warms up very slowly in relation to leaf surface temperatures. Measurements, for example, in late March, 1952 (in *Brachypodium pinnatum* grassland) registered only a 4° C. rise from 0500 hours to 1200 hours G.M.T., in contrast to a 19° C. rise on the vegetation surface. This small temperature fluctuation in the litter is unlikely to make the environment so unfavourable as to induce mass dispersal. In addition spiders moving vertically up the vegetation would have to pass through a zone of higher temperatures before dispersal became possible.
- (c) Collections of aeronauts nearly always show one species to be of overwhelming abundance in relation to the others taken. If the main factor causing dispersal was an unfavourable environment acting equally on all litter spiders, one would expect a wider representation of species and numbers in the recorded cases of mass emigration.
- (d) Dispersal takes place at all times of the year, including the summer months, when the environment is not subjected to conditions likely to make it unfavourable.
- (e) Mass dispersals such as that at Little Cressingham are recorded during the autumn, winter and spring, and consist very largely of small Linyphiid spiders with very poor representation of other families. This is the time of the year when many common Linyphiids reach maturity and are numerically most abundant in the ground vegetation. Duffey (1956) showed that the population density of the twelve most common Linyphiids in limestone turf near Oxford (mature specimens only) reached a peak in October.

- (f) Dispersal by air takes place among tree populations as well as from the ground. Duffey (1956) records an active dispersal of an arboreal species *Theridion pallens*, which took place at the same time as the arrival of warmer weather in late April.

A good deal of work has been carried out on mass migration and dispersal in insects, and although this concerns winged arthropods, it is reasonable to assume in the absence of evidence to the contrary that this behaviour is brought about by the same biological requirements in both insects and spiders. Johnson (1960) discusses the causes of mass migration and dispersal in insects and comments: "Current lack of food or space is often said to cause migration, but I postulate that to make the original exodus is the normal individual action of many new flight-mature insects, irrespective of the size of the population, the immediate food supply or space. Shortages of food or space may cause insects to move: such shortages often coincide with a mass exodus, but they are not necessarily cause and effect. Exodus flights are, no doubt, made also by individuals from the smallest possible populations but pass unnoticed. I see migration as an evolved adaptation rather than as a current reaction to adversity".

The view expressed in the last sentence of this statement is substantially the same conclusion arrived at by Duffey (1956) after a study of aerial dispersal from a known population of spiders in limestone grassland near Oxford. In this work a detailed study of nine aeronautic spiders was made in which the population density was measured by examining samples of turf: seasonal peaks in ground activity, which usually coincide with mating behaviour were recorded by the use of pitfall traps, and aerial dispersal movements measured by the use of grease-banded canes. It was concluded that aerial dispersal is an established part of the breeding cycle, taking place at different times according to the species concerned and associated in some way with breeding activity, and possibly in some cases with population density.

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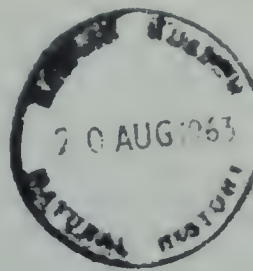
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THE NORFOLK BIRD AND MAMMAL REPORT

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Edited by

MICHAEL J. SEAGO

Assisted by

R. A. RICHARDSON, G. R. SOUTH, J. F. W. BRUHN

AND J. T. FENTON

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Volume 20 Part 2

Norfolk Bird Report

1962



INTRODUCTION

THE Council of the Norfolk Naturalists' Trust, in co-operation with the Norfolk & Norwich Naturalists' Society, is pleased to present to members the annual report on the birds of Norfolk.

It is hoped that the altered layout with its increased narrative will be appreciated. New sections have been written to cover Breydon Water, the Breck, Wash and Fens. Newcomers and visitors to the county will thus be able to see at a glance which birds to expect at these localities. In addition, it is anticipated that by this new presentation the amount of editorial work may be shared and this should result in earlier publication.

The classified notes have been shortened. The intention is to restrict this section to unusual and rare birds (including commoner birds seen at unusual times of the year and in unusual localities), to species whose distribution is known to be changing and to special summaries. As in previous Reports, the summaries for the Reserves are largely restricted to breeding birds.

We welcome the establishment of Holme Bird Observatory and are pleased to include an account of their activities. In previous Reports many records for this fascinating part of the coast have been supplied by Cambridge Bird Club.

The Year: During January in East Norfolk in addition to 450 whitefronts and 32 pink-feet highlights included 52 bean-geese, 2 lesser white-fronts and a red-breasted goose. The only previous county record of a red-breast is one said to have been shot at Halvergate in 1805. Other notable winter records include a white stork found dead at Whitlingham, 400 eiders and up to 15 long-tailed ducks together on the Wash, a gathering of 115 red-breasted mergansers at Snettisham, 34 goosanders at Narford, 110 Bewick's swans at Welney, white-tailed eagle at Scolt, great snipe at Thetford and great grey shrikes at eighteen localities.

Between the end of February and mid-March remarkable numbers of dead fulmars were washed-up on beaches from Aberdeen to Kent and almost 200 were reported in Norfolk. During the same period numbers of shags appeared inland and one remained in the centre of Norwich for six weeks whilst a flight of 14 descended into a Castle Acre lime pit.

Spring-time surprises were a little egret at Stiffkey, a drake ring-necked duck in the Stanford Battle area which was an addition to the county list, honey buzzard over Salthouse Heath, ospreys at Breydon, Blakeney and Selbrigg, Kentish plovers at Breydon and Cley, Temminck's stint and white-winged black tern at Cley, broad-billed sandpiper at Breydon, 100 black terns at Hickling, Alpine swifts at Blakeney and Cley, hoopoe at Thompson, firecrests

at Holkham, Holme and Wolferton in April and woodchat-shrike at Sheringham.

The nesting season continued until well into autumn with young house martins still in the nest at Holt October 15th and at Blakeney and Sea Palling on 20th. Swallows at Blakeney were feeding nestlings up to October 4th. A song thrush at Surlingham still had eggs late in October.

658 pairs of Sandwich terns and 1,740 pairs of common terns nested on the coast; but many were unsuccessful. 360 pairs of herons nested compared with 430 the previous year. Collared doves continued to spread and in addition to 24 pairs in Yarmouth and Gorleston, others nested at King's Lynn, in the Breck at Little Cressingham and on the Fen borders at Downham Market. No breeding black redstarts were reported. In Broadland, at least 100 pairs of bearded tits bred, but no harriers nested. Little ringed plovers bred at two gravel pits and were present at two others. Common sandpipers reared three young at Gt. Witchingham; there are only two previous breeding records for the county. Fulmars had a rather disappointing season and at the end of August there were only 15 young on ledges between Cromer and Sheringham compared with 25 young in the previous three years. Three pairs of stonechats bred.

August-September wader highlights included dotterel at Cley, 50 black-tailed godwits and 100 greenshank at North Wootton, 3 Temminck's stints and 2 pectoral sandpipers at Wisbech S.F., another pectoral sandpiper at Cley and also a red-necked phalarope there. September 18th was good for sea-watching at Cley and in addition to Leach's petrel and sooty shearwater, all four skuas were identified including over 50 Arctic, 35 great, 2 pomarine and a long-tailed skua. A Mediterranean black-headed gull headed west at Cley August 11th.

One of the most noteworthy autumn arrivals was a yellow-browed warbler on Blakeney Point September 21st to 23rd. The same month single aquatic and icterine warblers, together with 5 barred warblers and 5 red-breasted flycatchers appeared along the north coast. Other September surprises were 100 Manx shearwaters off Cley during a northerly gale, a crane at Cley and Blakeney and 5 ortolan buntings.

In addition to light-vessel casualties, the following dead birds were found along a four mile stretch of shore at Winterton October 13th: single little grebe, wood-pigeon, razorbill, song-thrush, cross-bill and goldcrest, 3 guillemots, 17 fieldfares, 57 redwing, 5 black-birds, 3 robins, 2 meadow-pipits and 4 chaffinches.

Notable records towards the end of the year were a spoonbill at Terrington (later found dead carrying a Dutch ring), rough-legged buzzards at Cley and Hunstanton, grey phalarope at Cley, Sabine's gull at Scolt, an influx of waxwings in late November,

another irruption of crossbills, 100 bullfinches at Weybourne and over 60 collared doves in a garden at East Runton.

During October and November light-vessels off the Norfolk coast had almost nightly visits from hundreds and sometimes thousands of starlings. Many came to grief striking the lantern glass. Among the Inner Dowsing casualties on October 29th were four birds which had been marked in Finland, Norway and Holland.

Arctic conditions set in at Christmas and for ten long weeks bitterly cold easterly winds, accompanied by snow and exceptionally severe frosts caused many casualties. Wrens were very badly hit and a record of between 50 and 60 preparing to roost in a tree at Smallburgh December 30th is particularly interesting. Details will appear in the 1963 Report. 243 full species were recorded in the county during the year.

Unusual nest sites reported included a blackbird's over a down-water pipe in Upper Goat Lane in the centre of Norwich. The nest, a foot or so above the head of passers-by, held no less than four broods of young. Another blackbird, at Framingham Earl, raised three broods in the same nest in a laurel, possibly because the hen was unable to find enough mud for the construction of new nests. There were several instances of blackbirds retaining old nests in 1947 and 1959 both of which were dry and sunny years. In 1961 in two instances house-martins stole freshly mixed cement from building sites for nest making, in lieu of mud. At Caister, song-thrushes built a nest where the top of an old tram standard had rusted away. On two occasions cock blackbirds were reported feeding young cuckoos, whilst another observer witnessed a robin feeding a young song-thrush. At Ormesby, robins nested in the open mouth of a 28 pound pike fixed to a tree.

Varieties reported included an all-white house sparrow reared at Blakeney and melanistic cock pheasants at Edgefield, Plumstead, Hempstead and Baconsthorpe. In the Cranworth area one cock pheasant was almost pure buff with a few markings on the rump, another was buff with a black collar and yet another had buff wings and pale blue cap and rump. An Edgefield blackbird had large white wing patches and an all-white swallow appeared at Holme. Three white-headed blackbirds were seen in Norwich early in the year and another appeared at Rockland St. Mary. At Tottington West Mere an almost entirely white lapwing with greyish breast band appeared for the third year in succession. At Rush Hills, Hickling, on June 15th a most attractive ringed plover was observed, silver-buff replacing brown upperparts, tail and upper wing surface. The underparts were normal.

Road casualties over a five-mile stretch of the A47 between Yarmouth and the "Stracey Arms" totalled 50 birds, as follows: 3 rooks, 6 black-headed gulls, 2 herons, 12 moorhens, single barn owl, wood-pigeon, lapwing, song-thrush, goldfinch, fieldfare, sedge warbler,

house-martin, and hedge-sparrow, 7 house-sparrows, 7 skylarks, 2 blackbirds and 2 reed buntings. The road was covered twice weekly throughout the year (RHH).

Toxic Chemicals: Special attention is drawn to the Third Report of the joint committee of the B.T.O. and R.S.P.B. "Deaths of birds and mammals from toxic chemicals Sept. 1961–August 1962" and to "Toxic chemicals and birds of prey" (*British Birds*, Vol. 56, pp. 124–139). Chemical analysis of a heron found dead in August at Caister Castle revealed the following wide range of poisons: mercury, dieldrin, aldrin, heptachlor, epoxide and benzene hexachloride.

Acknowledgments: We are indebted to R. A. Richardson for the cover drawing of red-breasted and white-fronted geese and for other illustrations; also to H. A. Hems for photographs, to Cley and Holme Bird Observatories; to the Cambridge Bird Club (particularly G. M. S. Easy), to the Gt. Yarmouth Naturalists Society for light-vessel notes, to the Trinity House Depot at Yarmouth; to D. R. Andrews, E. T. Daniels and E. A. Ellis for valuable assistance and to all other contributors.

Recording: Records for the 1963 Report should be sent by the end of **January** to Michael J. Seago, 33 Acacia Road, Thorpe, Norwich, Nor 71T (telephone Norwich 34351). Entering records involves many hours of work and contributors are requested to submit notes in Checklist order (giving serial numbers based on the 1952 B.O.U. Checklist) rather than in diary form. It would also be helpful if separate sheets are used for distinct areas (e.g. the Breck, Fens and Wash). In order to minimise the work involved, records will not normally be acknowledged. The names of all contributors will be included in the Report. It is requested that records of rarities should be reported to the Editor without delay and attention is drawn to the excellent *British Birds* editorial on sight records of unusual birds (Vol. 55, p. 557).

Recent Publications: Attention may be drawn to the following papers affecting Norfolk: "Radar films of migration over Eastern England" (*British Birds*, Vol. 55, pp. 388–414); "The distribution of the sooty shearwater around the British Isles" (*British Birds*, Vol. 56, pp. 197–203); "Nightjar enquiry 1958" (*Bird Study*, Vol. 9, pp. 104–115); "Recoveries of ringed great black-backed gulls" (*Bird Study*, Vol. 9, pp. 192–197); "The past and present status of the red-backed shrike in Gt. Britain" (*Bird Study*, Vol. 9, pp. 198–216); "The whooper swan in Gt. Britain" (*Bird Study*, Vol. 9, pp. 217–241) and "The British population of the Mute Swan" (*Bird Study*, Vol. 10, pp. 10–28).



Male Kestrel at nest in a Norfolk Church

Of all our rich and varied heritage of wild nature few creatures have suffered more savage persecution than the magnificent birds of prey.

To the ever-present menace of shot-gun, gin-trap, strychnine and egg-collector's blowpipe can now be added the insidious effects of agricultural poisons. Insects, birds and small mammals under the influence of toxic chemicals make easy victims for hawks and owls which, in their turn, suffer sterility or a lingering death.

Travellers returning from Speyside relate with amusement tales of signs directing tourists to the Ospreys. How long will it be before the familiar yellow pointers show us the way "To The Kestrels"?

All breeding records of hawks and owls are particularly welcome at this critical period.



Scroby Sands

(ROBIN H. HARRISON)

Despite the failure of two nesting seasons in succession due to high tides and gales, the first Sandwich and common terns began arriving during the first days of May.

It was not until June 11th that a landing was possible and on this occasion 150 common terns' nests and 52 Sandwich terns' nests were counted. These figures are well below the average for previous seasons. A second visit was made July 8th when it was found that most of the clutches of eggs seen on the previous visit had been washed away by recent heavy seas. Some young survived,

however, and twelve young common terns and four young Sandwich terns were ringed. Many of the common terns were found to have fresh clutches and there was a new colony of 62 Sandwich terns' nests. Twenty dead common tern chicks were found.

Unsuitable weather prevented any further landing until July 28th by which time the opportunity had been lost for ringing any number of terns. One young common tern which could almost fly was marked, together with nine smaller ones. Three juvenile Sandwich terns were also ringed and some common terns' nests still held eggs. In spite of adverse weather, the terns had enjoyed a reasonably good nesting season and a proportion of the young had reached the free flying stage.



Breydon Water

At the beginning of the year 250 white-fronted geese had reached Halvergate marshes. 350 were present by Jan. 6th with a peak of 450 on 13th. Numbers had declined to 200 by Feb. 3rd and the last record was of 150 on March 4th. Associating with the white-fronts was a most exciting rarity: a red-breasted goose. It was observed on many dates between Jan. 2nd and 28th. Up to 30 pink-footed geese spent Jan. and Feb. on the lower Bure and Halvergate marshes. These, too, were not seen after March 4th. Also noteworthy was an adult lesser white-fronted goose identified with the pink-feet on Jan. 20th and 27th.

Winter wildfowl counts included 86 mute swans at the beginning of the year; just over 500 shield-duck during the Jan. cold spell and 480 on Feb. 18th; 84 pintail in Jan., 71 in Feb. and 65 on March 3rd; between 600 and 750 wigeon during Jan. and 450 till mid-March. Also small numbers of shoveler, scaup, pochard and goldeneye. Particularly interesting were 3 smew and 13 Bewick's swans Feb. 18th. Other notable visitors at this season included 2 black-tailed godwits Jan. 27th; 50 snow buntings at Halvergate next day and 200 on Breydon marshes Feb. 11th; a maximum of 13 hooded crows Feb. 24th and up to 40 twites till March 3rd. Small parties of Lapland buntings wintered at Halvergate, along the lower Bure and on marshes adjoining the estuary. They were again present from early November. Short-eared owls were widespread and once 12 were in view at one time. A day time roost at Halvergate held up to 18 of these birds during Feb.

In spring garganey appeared April 8th with an avocet on 11th and again on 18th when the first whimbrel arrived. A peregrine was stooping at a wood pigeon on 22nd. Peak numbers of waders passed through at the end of April and during early May. Bar-tailed godwits were unusually abundant and wader highlights included Kentish plover and broad-billed sandpiper. A table of selected waders appears on page 53.

Other interesting May records included red-breasted mergansers on 2nd and 5th; 8 black terns on 3rd and singly on 4th;

a marsh-harrier on 9th; 6 Sandwich terns on 24th and 2 wigeon lingering till the 26th.

Among breeding birds, the number of lapwings was up to average and redshank showed a slight increase and again outnumbered the lapwing. Three pairs of oystercatchers bred on the marshes; one nest was only 20 yards from Acle New Road. A fourth pair of oystercatchers bred successfully in a sugar-beet field at Runham. The first young sheld-duck appeared May 19th with a maximum of 111 young towards the end of June. Up to 3 pintail stayed until early June but there was no proof of nesting. A short-eared owl's nest containing 4 young was found at Halvergate. Kestrels have declined: one pair reared young in a derelict drainage mill. Barn owls hatched 3 young in a cattle shed close to Breydon, but these were later found dead due to human interference. Non-breeding summer residents included 2 cormorants.

An osprey heading south June 9th and 2 avocets on 16th were the most exciting summer records. Also of great interest were at least 3 wagtails resembling the blue-headed race on June 2nd and 16th and July 1st.

The majority of the adult sheld-duck departed for the North Sea coast of Germany between July 10th and 12th with further departures on 16th. None remained by Aug. 11th. Northern waders quickly took their place. The first whimbrel returned July 7th with peaks of 38 on July 18th and 52 on Aug. 4th when 15 black-tailed godwits and a red curlew-sandpiper passed through. A little ringed plover was seen July 14th and 3 red curlew-sandpipers arrived on 30th. Ten common sandpipers followed Aug. 18th with spotted redshank and curlew-sandpiper. During the autumn greenshanks were rather scarce, no party exceeding 6. In contrast, redshank numbers were high with 400 to 500 throughout Aug. Curlew, too, appeared in unusual numbers with 250 on Aug. 22nd increasing to 450 by 29th. Nine ruffs were noted on 26th.

August's most distinguished arrivals were 3 spoonbills on 15th. A single immature had been seen July 28th. Two collared doves on the saltings in late Aug. were a new species for Breydon. Spotted redshank appeared on several occasions until Nov. 10th with a maximum of 9 on Oct. 14th. The last greenshank was noted Nov. 4th.

Other interesting autumn records included wigeon from Sept. 10th; over 2,000 greater black-backed gulls, 120 golden plover and jack snipe on 22nd; 3 little stints on 29th; 2 purple sandpipers and 30 grey plovers Oct. 6th; twites from the 9th; a late ruff on 12th; another immature spoonbill from 12th to 18th; hooded crows from 18th; 4 Bewick's swans on 27th and the first

adult sheld-duck returned on 28th. Six brent geese and a drake goosander appeared Nov. 10th with a red-throated diver on 24th.

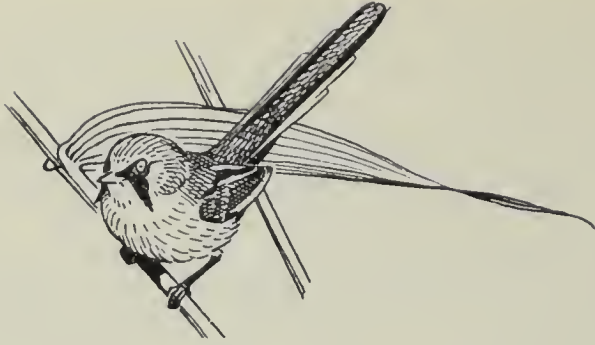
Twelve Bewick's swans and a goosander were seen Dec. 1st when 29 pink-feet also arrived and were followed by 7 white-fronts on 5th when a bittern was watched on the Lumps. Over 80 snow buntings were recorded on the 8th.

Hundreds of lapwings departed with the onset of the cold spell but over 5,000 dunlin had reached Breydon by the end of the year, together with 2,500 knot. For many it was their last journey. Arctic conditions prevailed for weeks to come and there were many casualties. Noteworthy arrivals Dec. 26th were 7 bean geese and 5 or more smew. At Halvergate, white-fronted geese totalled 148 by the 29th. At this time 6 scaup, 26 shoveler, 71 pintail, 30 pochard, 600 wigeon, 589 sheld-duck, over 200 coot and a red-throated diver sought shelter on Breydon. The following day 3 smew (including an adult drake) were on the lower Bure and a drake goosander was recorded on 31st.

At the end of the year every dyke and flood pool was sealed and the Bure covered in ice as far down-river as Three Mile House. Breydon mudflats froze between tides and on occasions only a narrow strip of mud edging the main channel remained ice-free.

BREYDON WATER WADER TABLE

	APRIL										MAY									
	24	26	28	29	30	1	2	3	4	5	9	10	12	13	14	19	20	26	28	
aged Plover	—	—	—	—	40	—	—	—	—	—	—	—	126	100	—	112	167	103	—	
tish Plover	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	
7 Plover	—	—	1	1	4	4	4	6	12	6	1	1	—	7	—	1	3	—	—	
istone	—	—	—	—	—	—	—	—	3	13	—	6	4	5	—	2	—	8	3	
mbrel	1	1	5	—	3	3	6	4	10	11	6	21	11	7	6	1	—	—	—	
k-tailed Godwit ..	—	6	—	—	—	—	—	—	1	—	3	1	—	5	4	—	—	—	—	
tailed Godwit ..	2	5	111	156	161	138	105	46	51	55	7	10	12	—	3	2	1	1	1	
mon Sandpiper ..	—	—	—	—	—	2	1	1	—	—	—	2	1	—	—	—	—	1	7	
ted Redshank ..	1	1	1	1	—	—	1	—	1	—	1	—	—	1	—	—	—	1	—	
nshank	1	—	—	—	3	4	5	2	1	1	1	2	1	3	—	—	—	—	1	
t	—	—	10	—	—	5	4	—	2	1	—	7	81	23	—	2	—	6	—	
lin	3000	2000	1000	2500	—	1000	1000	—	1000	—	—	1000	1000	—	—	760	700	600	—	
ew-Sandpiper ..	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	
lerling	—	—	24	7	—	7	31	11	—	1	—	—	24	11	5	—	—	2	1	
d-billed Sandpiper ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	
et	1	1	1	1	1	1	—	—	—	—	—	—	—	—	—	8	—	—	—	



Cley and Salthouse

As a result of the cold spring, only a small number of the early hatched ducks survived, although numbers of sheld-duck and mallard were maintained. The first pair of garganey arrived March 22nd with a second drake on 25th. Three pairs bred and eight flying young were observed from July 11th. A maximum of 18 garganey was recorded August 28th. Twenty pairs of gadwall were present in May and ten nests were found. Five pairs of teal and 18-20 pairs of shoveler bred. Only small broods of sheld-duck were noted, although a nest containing 18 eggs was found June 4th.

About 20 pairs of little terns nested on the northern boundary, but common terns failed to rear any young on Arnold's marsh. Two pairs of common terns bred successfully on Round Pond marsh. Ringed plovers and oystercatchers, redshank and lapwing all bred as usual. Three pairs of stone-curlew nested in Cley Hall farm area.

A pair of black-tailed godwits appeared on Fourteen Acre marsh March 15th. They stayed until mid-May and although the male was once observed in song flight there was no attempt at breeding. Three others arrived March 30th.

A pair of bitterns almost certainly bred at Salthouse, but the two males at Cley probably had no mates as booming continued until mid-June. One bittern was watched booming twice on the open marsh. Three pairs of herons nested in The Hangs.

Bearded tits had a moderately good breeding season and well over 30 pairs bred at Cley and Salthouse. A nest with eight eggs was found May 28th. Three early broods of bearded tits were lost to weasels and seven weasels were trapped in just over a week towards the end of April. Six feral grey-lag geese were on the marsh; one pair bred but reared no young.

By the end of the year over 2,000 coypus had been destroyed by the Warden at Cley and Salthouse. They first appeared here in 1959. The total had increased to 2,643 by April 1963.



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H. A. Hems

The Nightjar is most numerous in Breckland and in parts of north Norfolk. Due to military activities, however, very few young have been reared in recent years at either Kelling or Salthouse Heaths. Holt Lowes and Edgefield Heath remain attractive with others breeding between Sheringham and Cromer, but the birds frequently occupy new sites as cover becomes too thick. Late Nightjars were recorded at Buxton 2nd October 1959 and 4th October 1961.



H. A. Hems

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The first Collared Doves to reach Britain were identified at Overstrand in July 1956. They have since spread in a remarkable manner and by 1961 had bred in 18 counties and occurred in a further 18. The two main Norfolk strongholds are the coastline between East Runton and Overstrand and the Yarmouth district. Others breed in the Brock at Little Cressingham and on the Fen border at Downham Market. As many as 64 came to feed daily in an East Runton garden towards the end of the year.



Blakeney Point

(The National Trust)

WARDEN: W. EALES

It was a disappointing breeding season for the tern colony as a result of poor weather. Conditions were, however, slightly better than in 1961 and many second brood chicks of little tern and common tern survived. 300 common tern chicks were ringed and at least 50 clutches of little terns' eggs hatched successfully.

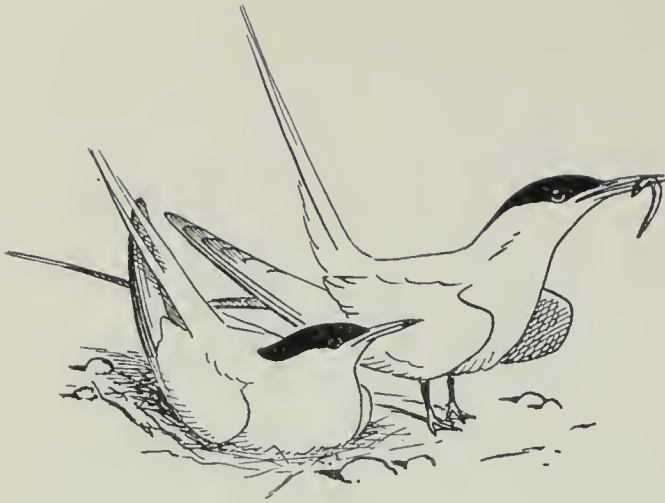
The main ternery suffered heavily and on 24th June a north-westerly gale brought clouds of sand which covered hundreds of nests and chicks of terns, oystercatchers and ringed plovers. Many chicks although quite advanced were buried, including the Arctic tern chicks. Oystercatchers fared very badly with the high tides and gales—several pairs had three attempts at nesting before hatching their eggs through nesting on Far Point which was covered frequently by exceptional tides.

Ringed plovers were more successful, second clutches hatching well. Many first attempts were robbed by black-headed gulls. Redshank had a good season. Two pairs of reed buntings nested, but one pair lost their chicks through a late frost. Skylarks, meadow pipits and linnets all nested in numbers.

Roseate terns appeared from time to time but none nested. A hedgehog and rats caused a certain amount of trouble in the ternery. Stoats were also troublesome and two were shot in the marshes.

The following is a summary of nests:

Sheld-Duck	..	..	35	Common Tern	..	..	980
Red-legged Partridge	..	..	3	Arctic Tern	..	..	2
Partridge	..	..	1	Little Tern	..	..	75
Oystercatcher	..	..	60	Sandwich Tern	..	..	1
Ringed Plover	..	..	114	Black-headed Gull	..	..	4
Redshank	..	..	60	Swallow	..	..	2
Hedge-sparrow	..	..	1				



Scolt Head Island

(The Nature Conservancy)

WARDEN: R. CHESTNEY

Bad weather at the end of June and the beginning of July was again responsible for considerable losses amongst the terns, particularly amongst common terns and over 400 chicks of this species were lost between June 25th and July 9th. North-westerly gales accompanied by rain and high tides resulted in many chicks dying as they hatched. Of the 600 pairs of common terns that attempted to nest many lost all their young and did not attempt to lay again and only just over a hundred young reached the flying stage. Sandwich terns, however, fared much better than in 1961 and established three breeding areas. Of the first group 300 to 320 chicks flew from a total of some 300 nests, from the second group of 170 nests 80 to 90 chicks flew and from the third group of 125 nests again 80 to 90 chicks flew.

Little terns fared badly and the startling decrease as a breeding bird continued. Although up to 40 pairs were present in early May no more than six nests were found and these were covered by high seas on June 24th. Three young little terns were flying on July 17th, however. This total compares badly with the pre-war figures when over 200 nests were found in 1937. The decline of the little tern on Scolt Head has been steady since the end of the war, although 100 nests were counted in 1951.

One pair of Arctic terns reared a single chick and were joined by a second pair on July 25th. Roseate terns did not breed although one or two were observed. Oystercatchers were responsible for the

destruction of 30 or 40 common terns' nests and breeding short-eared owls took chicks although they tended to turn their attention more to the black-headed gulls on Plover Marsh. Less than 20 young gulls reached the flying stage. Black-headed gulls were believed to have broken and eaten numbers of Sandwich tern eggs, but the highest mortality for this species was in the second colony where human disturbance contributed to the loss of 65 chicks.

Following new arrivals on July 20th, the flock of adult Sandwich terns totalled over 3,000 in addition to 500 flying young. Numbers remained high until early August. Twenty-one species nested on the Island and of these only the Canada goose was unsuccessful. Gadwall bred for the first time and seven eggs hatched. Records for the whole of the Island appear below:

	<i>Number of nests</i>		<i>Number of nests</i>
Mallard	15	Redshank	80
Gadwall	1	Black-headed Gull	125-150
Sheld-Duck	96	Common Tern	600
Canada goose	3	Arctic Tern	1
Red-legged Partridge	4	Little Tern	6
Partridge	5	Sandwich Tern	595
Oystercatcher	70-80	Short-eared Owl	1
Lapwing	1	Hedge Sparrow	1
Ringed Plover	150		

SCOLT HEAD ISLAND DUCK TABLE

(Monthly maxima)

	Mallard 400	Teal —	Wigeon 1,400	Shoveler 2	Golden-eye 40	Scoter 150	Eider —	Sheld-Duck 500
.	350	—	250	—	36	200	14	280
ch ..	40	—	—	—	36	500	12	150
il ..	—	—	—	14	11	1,500	7	70
..	—	—	—	—	2	600	70	—
..	—	—	—	—	—	600	24	—
..	—	—	—	—	—	40	24	5
..	—	27	27	—	—	1	33	—
..	150	80	250	—	5	7	62	2
..	200	700	700	—	8	80	60	150
..	400	250	1,200	3	26	—	70	250

SCOLT HEAD ISLAND SELECTED WADER TABLE
(Monthly maxima)

	Oyster-catcher	Grey Plover	Golden Plover	Turnstone	Curlew	Whimbrel	Bar-tailed Godwit	Spotted Redshank	Knot	Dunlin	Sanderling
Jan. . .	900	30	25	80	700	—	30	—	2,000	250	15
Feb. . .	250	11	—	100	600	—	250	1	500	200	20
March . .	180	30	24	80	400	—	90	1	700	150	7
April . .	100	12	—	—	200	5	5	1	15	90	50
May . .	100	8	—	30	200	25	8	1	100	170	90
June . .	—	3	—	15	250	1	3	—	1	15	—
July . .	—	—	—	40	700	5	5	—	18	120	22
Aug. . .	100	70	30	100	1,000	65	28	3	40	200	32
Sept. . .	250	65	—	100	1,000	4	80	1	45	100	50
Oct. . .	400	20	3	200	1,000	—	30	—	80	350	60
Nov. . .	500	30	—	200	600	—	60	—	600	400	40
Dec. . .	400	35	18	—	500	—	30	1	1,000	400	40

Cley Bird Observatory

WARDEN: R. A. RICHARDSON

During 1962 the Observatory again supplied information to many visiting bird-watchers and kept careful notes of migratory movements throughout the year. For several reasons ringing showed a sharp decline, only 290 birds of 34 species being marked, 251 being trapped and 39 as nestlings. Red-throated diver and mealy redpoll were, however, new to the Cley ringing list. A selection of recoveries notified during the year follows the Ringing Progress table.

With the acquisition at mid-summer of a portable tape recorder we are steadily building up a collection of local bird voices and other sounds, notable among them being a series of wader calls, the display calls of the nightjar and the song of the bearded tit, probably a unique recording.

We are, as always, grateful to all who have helped the Observatory in various ways during the year. Details of hotel and cottage accommodation in the Cley district may be had by sending a stamped envelope to the Hon. Secretary, The Green Farmhouse, Cley, Holt, Norfolk.

The Year's Migration at Cley

*Compiled from the diaries of the Observatory
and N.N.T. Wardens*

January: The year opened with a long-tailed duck and scaup and they were joined by another long-tail, red-breasted merganser and eider on 2nd. On 9th there was a fall of 1,000 greenfinches on the Point. The same day 8 white-fronted geese were seen. 9 corn buntings flew east on 27th on the same day that there were 10 shore-larks on the Hood. The following day the shore-larks had increased to 20 and a glaucous gull arrived on the Point.

February: 2 mealy redpolls were seen on 2nd. A ruff was following the plough on 17th. On 20th there was a merlin on the Heath and 10 mealy redpolls on West Bank, 3 of which were ringed. 2 smew came on 26th.

March: On 2nd a glaucous gull appeared and there were 3 the following day with a red-necked grebe and a shag. 30 Bewick's swans appeared on 5th. The first stone-curlews arrived at Hall Farm on 6th with a barnacle goose on 10th. A waxwing was noted at Blakeney on 15th, but the highlight was the arrival of a pair of black-tailed godwits which remained until 24th. On the 17th 23 gadwall were counted; also 5 stonechats. Garganey arrived on 22nd. On 24th 5 whooper swans and 2 Bewick's were recorded, together with a Scandinavian rock pipit. On 27th lesser black-backed gulls passed through and the first 3 Sandwich terns arrived next day. On the 30th 3 black-tailed godwits and a ruff were on the marsh.

April: The Sandwich terns had increased to 8 by 4th, although 200 were counted on 5th last year. On the 5th the first blackcap was at High Kelling. Male ring ousels arrived on 7th and a black redstart was on the Point. A single shore-lark, 25 brent geese and a male Lapland bunting were also recorded.

On 8th there were 7 black-tailed godwits on the marsh, the first swallow passed through with 3 snow buntings and a white wagtail. The 12th brought the first sand martin and next day the Sandwich terns increased to 60 and a black-tailed godwit was recorded. The first cuckoo and willow warbler came on 14th. 2 snow buntings and a black redstart were on the beach on 18th. The first sedge warblers arrived on 19th which also saw the first little terns and turtle dove. The first common tern appeared on 20th and also house-martin, whitethroat, swifts and 2 black-tailed godwits. The first nightingale and grasshopper warbler were heard on 21st. 4 black-tailed godwits were seen on 22nd and easterly wind on 23rd brought in 2 black terns, lesser whitethroat and a black redstart on the Point. 3 mergansers were seen on 24th and the following

day there was an influx of yellow wagtails. 27 bar-tailed godwits were recorded on 29th (17 red) and the first reed warblers appeared.

The great grey shrike which arrived on the Heath 26th November 1961 was present the whole month.

May: A red-backed shrike arrived on 1st. Next day a peregrine was seen, with marsh and Montagu's harriers on 3rd. 2 hooded crows, 5 black terns, 3 marsh harriers and 2 merlins were all seen on 4th. Over 20 black terns came next day and for the third day there was a heavy passage of swifts and hirundines. The 6th was the last day the great grey shrike was on the Heath; 6 black terns passed through and 4 black-tailed godwits appeared. A Temminck's stint and a wood sandpiper joined the waders on 8th with 3 little stints next day and the first 2 spotted flycatchers.

On 10th 7 more little stints arrived. An immature glaucous gull was moving west and 30 turtle doves went the same way on 16th, when a nightingale was on Blakeney Point. Next day 5 ruffs were noted. A red-necked phalarope visited the area on 20th and a honey-buzzard was on the Heath. Curlew-sandpiper, wood sandpiper and reeve were new on 21st. Next day wood sandpipers were singing in display flight. 2 spotted redshank in summer plumage were watched on 24th and 10 gannets moved east.

More waders came on 25th including over 100 turnstones, little stint and Kentish plover. Another little stint came on 27th and was joined by a curlew-sandpiper on 28th.

June: Usually a quiet month June had some surprises beginning with a little ringed plover on 4th. A pair of roseate terns were on the Point on 5th and a little stint at Cley on 7th. Waders on 10th included 3 wood sandpipers, 7 ruffs and black-tailed godwit and this day marked the beginning of a light westward passage of adult lapwings seen on most days of the month. A visit by a fieldfare on 13th was followed next day by an Alpine swift at the Hood. A white-winged black tern was new on 18th; also a spotted redshank.

Another Alpine swift was observed on 24th.

July: Turnstone and spotted redshank arrived on 16th. 16 whimbrel passed through on 17th on the same day that a black-tailed godwit and green sandpiper arrived. The first Arctic skuas of the autumn were chasing a wood-pigeon on 19th. 2 red curlew-sandpipers were seen on 22nd and on 25th the first westbound juvenile lapwings were watched. The 27th produced 2 wood sandpipers. 3 red curlew-sandpipers appeared on 29th with 3 little stints next day. The first autumn grey plovers reached Cley on 31st with 20 bar-tails, 4 green sandpipers, 2 little stints, 2 curlew-sandpipers and sanderling.

August: The biggest wader movements of the year took place, beginning with 16 curlew-sandpipers, 8 black-tailed and 8 bar-tailed godwits on 1st with 2 little ringed plovers on 2nd. 9 red

curlew-sandpipers were watched on 3rd and 14 on 4th; other waders included juvenile spotted redshank, 4 greenshank, little stint and 3 ruffs. 12 crossbills appeared.

12 wood sandpipers arrived on 8th and 10 greenshank next day. Passage was in full swing on 10th when a Temminck's stint appeared in the continuous stream. An immature spoonbill was observed and a sea watch produced an adult long-tailed skua. The 11th saw an increase in the assembling Sandwich terns (500 counted). On the same day a collared dove was moving east, a juvenile little gull was over the reed-beds and an adult Mediterranean gull passed west. A red-necked phalarope stayed from 12th until 18th. Skua movements were added to by a pomarine skua also on 12th.

Another 10 greenshank were seen on 13th. 5 spotted redshank appeared on 15th and they were present to the end of the month. A black tern passed through on the same day and another on 16th when 25 ruffs were noted. On 18th 12 ruffs and 2 little ringed plovers were seen with a heavy westerly movement of common and Sandwich terns. On 19th 2 Manx shearwaters, 4 black terns and a marsh harrier were noted. Next day, 3 little stints appeared, as did 3 pied flycatchers and a collared dove headed west. A peak of 15 greenshank appeared on 21st and 2 juvenile little gulls on 22nd. The following day saw the arrival of an osprey and 6 wood sandpipers. Another little gull came on 24th with 24 common sandpipers next day. Bar-tailed godwits began increasing on 27th when 5 spotted redshank and a buzzard was seen. On 28th birds of prey featured 7 kestrels on the Heath, marsh and Montagu's harrier. On 29th a purple sandpiper, 4 little gulls, 2 great skuas and several Arctic skuas and gannets were seen.

September: The osprey stayed in the area until the 6th. A pectoral sandpiper remained until 17th. A pomarine skua flew over the shore-line and 10 whinchats and 10 pied flycatchers were on the Point all on 1st. New arrivals on 3rd included black-tailed godwit, red-necked grebe and barred warbler, the latter staying until the 7th. Another purple sandpiper came on 4th. Stormy weather on 6th produced 3 pomarine skuas, a little ringed plover and a blue-throat which came into Cley marsh. On 7th 60 or more skuas, including 2 great skuas and 2 immature little gulls joined the westerly parade.

The first Lapland bunting came on 8th when 75 turnstones passed west. This day also produced 3 spotted redshank, 3 great skuas, a crane and another little gull. Westerly movements on 9th included 80 bar-tailed godwits and a roseate tern. A spotted crake came in on 10th. Next day a crane was seen from the Point flying east. Westerly force 5 winds on 12th produced 100 Manx shearwaters and a red-breasted flycatcher; also a wryneck. A dotterel

was new on 13th, also 3 snow buntings. An aquatic warbler was at Walsey Hills on 14th.

On 15th the first rock pipit came in and there were pied flycatchers on the Point. Next day a great northern diver was observed with a red-necked grebe on 17th. The 18th was good for sea watching with numerous skuas including 35 great skuas, 2 red-necked grebes, gannets, 2 little gulls, 2 sooty shearwaters and a Leach's petrel. There were 2 ring ouzels, a red-breasted flycatcher and 2 barred warblers on the Point on 20th. A dull day on 21st found a yellow-browed warbler at the Long Hills and the first merlin and 3 or 4 shags were recorded.

The first winter shore-lark arrived on 22nd; also 3 Lapland buntings and 20 twites at Morston. On 25th an ortolan bunting was seen. The following day brought in 50 redstarts and 40 pied flycatchers. A juvenile little gull and 6 Lapland buntings were new on 27th and on 28th another ortolan was recorded. On 30th 2 little gulls and 5 black terns passed through.

October: The 1st saw a late swift, while Blakeney Point had numerous goldcrests on 7th and for the next five days. The 7th saw the arrival of redwing and the departure of redstarts and pied flycatchers. A ring ouzel was seen and a blackcap followed on 8th with more redstarts and pied flycatchers, brambling and a late wood sandpiper. The 10th brought a siskin and a red-breasted flycatcher. A ring ouzel and a male hen harrier were new on 13th. A great grey shrike arrived on the Point on 14th and what was probably the same bird moved to the Heath a week later where it stayed until at least Dec. 12th. Hooded crows began coming in on 15th and another late wood sandpiper was seen on 17th. A female hen harrier came next day. Fieldfares and redwing were still arriving on 19th when there was an influx of Lapland buntings and 10-12 shore-larks were seen on 20th, with an oiled red-necked grebe which stayed until 31st.

20 or more little auks passed on 25th while many hundreds of kittiwakes and a few Arctic skuas passed east. A great skua appeared on 29th and next day 15 westbound Bewick's swans, hen harrier, spotted crake and goosander were seen.

November: A rough-legged buzzard arrived on 1st. 4 little auks and a long-tailed duck came in on 10th. Birds of prey featured on 18th when a rough-legged buzzard, hen harrier, sparrowhawk and kestrel were seen. Other interesting birds were Iceland gull and 2 woodcock. On 23rd a grey phalarope was noted and a water pipit reached Snipe's marsh, while merlin and long-tailed duck came in on 25th. A spotted redshank was present on the last day of the month.

December: The rough-legged buzzard and hen harrier were present during the early part also a glaucous gull and a grey phalarope. 3 goosanders and 12 shore-larks were noted on 17th with 21 white-fronted geese on 25th, 19 Bewick's on 26th while the 30th produced a late cornerake.

[illegible]

Species Total: 1962-34; Since 1949-154

Holme Bird Observatory

DIRECTOR: P. R. CLARKE

Holme Observatory was established early in September and although its work has not yet run a full year an excellent First Report has been issued. Provided enough friends rally to its support in this first critical year there is good reason to expect that this Observatory will become a valuable research centre. 247 birds of 39 species were ringed, including bearded tit, ring ouzel, black redstart, barred warbler, firecrest, mealy redpoll and crossbill. Other highlights of the first four months included marsh harrier, great grey shrike, bluethroat, Bewick's swan, chiffchaffs on Nov. 12th, a large thrush influx Oct. 11th and a spectacular weather movement Dec. 29th.

Details of the Observatory may be obtained from The Director, Holme Bird Observatory, The Firs, Holme-next-Sea, King's Lynn. A summary of the most interesting observations appears below: **September:** A small influx of migrants between 1st and 3rd included 4 pied flycatchers and 8 whinchats. A Manx shearwater appeared on 8th; also 2 collared doves (probably from nearby nesting sites), and a white swallow. Next day 2 marsh harriers travelled westward and a black tern was noted. The first snow bunting arrived on 10th. Over 50 grey plover were on the shore on 13th. Next day's arrivals included 4 pied flycatchers, lesser whitethroats, robins and tree creeper. On 15th, flocks of lapwings (up to 60 in each) moved west all morning. Fantastic flocks of knot numbering many thousands, along the shore. 10 wigeon arrived on 18th with the first 2 rock pipits next day. Highlight of the 20th was a barred warbler which was eventually ringed. In addition there were pied flycatchers, redstarts, garden warblers and a Manx shearwater. On 22nd 2 crossbills arrived; also a great spotted woodpecker, 12 blue tits, pied flycatcher, redstart, whitethroat, robin, yellow wagtail and 25 snow buntings. The barred warbler (an immature) was still present on 23rd and the crossbills left the following morning heading S.W.

An influx on 26th included song thrushes, blackbirds, redstarts, robins, blackcap, spotted and pied flycatchers and a barred warbler which was still present next day. A swift and 6 redstarts were new on 29th. Up to 4 greenshank present daily.

October: A late swift appeared on 1st, with curlew sandpiper and sand martin next day. A whimbrel was new on 3rd and arrivals on 4th were 8 song thrushes, 4 blackbirds, 6 redstarts, robin, garden warbler, pied flycatcher, 8 bramblings, 4 crossbills and 2 water-rails. New arrivals on 5th included crossbill, 3 Sandwich terns and jack snipe. A party of 6 bearded tits arrived from an easterly direction on 6th, dropping down from a good height into the reeds. 15 mistle thrushes came in. Next day there were 7 bearded tits, blackcap

and reed warbler. The 9th was interesting with 2 crossbills south, a ring ouzel, spotted flycatcher, wood sandpiper, 2 greenshank, 8 bearded tits, Lapland bunting, twites and 2 yellow wagtails. On 10th there were a dozen bearded tits in reeds.

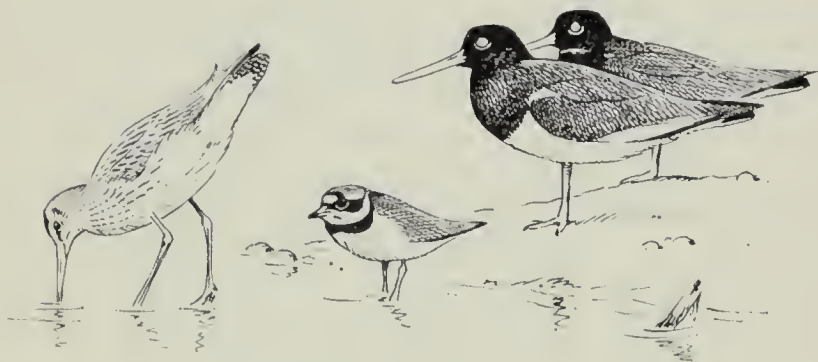
Two ring ouzels were present in early morning on 11th with a large influx of thrushes during the afternoon. The firs and surrounding dunes held 500 song thrushes, 550 redwings, 300 blackbirds, 50 fieldfares, 3 ring ouzels, 4 redstarts, 30 robins, 60 goldcrests, 20 chaffinches and 2 crossbills. One ring ouzel was present on 12th with late spotted flycatcher, 2 blackcaps, 60 goldcrests, a great grey shrike, 2 great spotted woodpeckers (which proved to be of the Northern race when netted) and 2 Lapland buntings.

The 13th brought another ring ouzel, a great spotted woodpecker, great grey shrike, 24 snow buntings, 4 bearded tits, 5 sheld-duck, 4 greenshank, a sparrowhawk and 100 goldcrests. Another spotted flycatcher was noted on 14th, together with 2 hooded crows, 70 eiders on the sea and 60 grey plovers. New on the 15th were 20 bramblings and a red male crossbill. The 3 remaining resident house martins departed on 16th when the list included spotted flycatcher, 2 crossbills, green sandpiper and 10 bearded tits. 2 Lapland buntings were new on 19th with great grey shrike and a greenshank on 20th. On 22nd 2 crossbills flew out to sea, calling and great grey shrike and ring ouzel were recorded. A black redstart appeared and when nearly dusk climbed to a great height, circling all the time, and eventually made off to W.S.W. Arctic, long-tailed and 2 pomarine skuas all headed west on 26th. A firecrest discovered on 27th was soon ringed. A great grey shrike remained until the end of the month and a merlin travelled to the east. Blackcap and bluethroat were recorded on 29th, when siskins, 2 merlins and 7 brent geese put in an appearance. Next day 28 Bewick's swans headed west at dusk and a late blackcap was noted. On 31st a further 10 Bewick's swans passed westward.

November: Flocks of starlings came in from N.N.W. all day on 2nd. Mostly 20-30 in each flock, but some up to 60. 8 bearded tits, 2 Lapland buntings and a greenshank were also seen. On 3rd 29 redpolls travelled east and other arrivals included 6 shore-larks and flocks of starlings moving along the coast to the west on a broad front with others in from the north. A great grey shrike was recorded on several dates between 3rd and 27th.

There was an influx of thrushes from north on 9th with 40 blackbirds, 100 fieldfares and 40 goldcrests. Golden-eye, scaup and tufted duck appeared on the Broadwater on 11th. Next day 2 chiffchaffs were in the buckthorn bushes and one was caught and ringed. A woodcock appeared on 18th when an oiled and exhausted great northern diver was found. New on the 19th was a great skua and 2 woodcock probing mole hills on the lawn. 4 Lapland buntings were recorded on 20th, with 75 snow buntings two days later.

December: A black redstart appeared on 1st and was later caught at roost. Short-eared owl was new on 5th. 50 fieldfares were stripping the sea buckthorn berries on 16th. On 19th 100 wood pigeons moved west and on 22nd, 30 Bewick's swans passed to the west at dusk. 12 Bewick's were resting on the ice on Broadwater next day and 7 more appeared on 24th. A mealy redpoll arrived on 27th. The 29th featured an all day passage of redwings, fieldfares, greenfinches and starlings. Birds arrived from S.W. and S.S.W. Redwing were passing at the rate of 40 per hour and fieldfares about 25 per hour. The fieldfares built up for a short while at the sea buckthorn bushes with over 200 present at one time. On 30th 10 Bewick's swans put in an appearance. There was very little continuance of yesterday's movements and birds were seeking the shelter of the house in a biting east wind and driving snowstorms.



The Wash

The Wash scene remains much the same from year to year, and apart from the holiday season, this must be one of the least disturbed areas of the East Coast. A full account of the birds of the area is included in the *Cambridge Bird Club Report* for 1962.

In August, a long-tailed skua was seen at Hunstanton on 7th, the same day as 3 great skuas and a little gull were seen there. Common/Arctic terns peaked at 1,400 on Aug. 3rd and there were 1,200 Sandwich terns Sept. 16th. Throughout the period Aug. 4th to Oct. 29th Arctic skuas were in evidence with a maximum of 45 on Sept. 12th. A marsh-harrier appeared at Holme at the end of Aug. Aug. 22nd was a good day for waders at North Wootton with 3 curlew-sandpipers, 50 black-tailed godwits, a wood sandpiper, at least 8 spotted redshank and a remarkable total of 100 greenshank. Sept. 12th produced a record of 55 Manx shearwaters flying past Hunstanton. A late black tern appeared at Snettisham Oct. 7th and a great grey shrike at Dersingham on Oct. 14th. At

Dersingham July 8th to Oct. 22nd up to 25 crossbills were seen. Also on 22nd, 350 bramblings arrived at Hunstanton.

Towards the end of Oct. parties of 3 and 8 little gulls were reported from Hunstanton and Holme and on Oct. 26th and Nov. 18th hundreds of kittiwakes were flying into the Wash past Holme. 5 great skuas were off Hunstanton Oct. 26th. A Leach's petrel was seen there Nov. 18th. Other Nov. records include a late wheatear on 10th, a hen harrier in the Terrington and Snettisham areas from 17th to 24th and a rough-legged buzzard at Hunstanton on 11th and 22nd. On the 17th a spoonbill was watched for several minutes on Terrington marsh. A spoonbill, almost certainly the same bird, was found dead at the same place Dec. 16th. It had been ringed as young at Callantsoog in Holland the previous June.

Single firecrests were seen at Wolferton and at Holme April 20th with another at Holme Oct. 27th. During May a male blue-headed wagtail was recorded at Holme on 6th and on 26th one observer was fortunate to see 90 gannets off Hunstanton. An injured red-breasted merganser spent the summer at Snettisham pits. A puffin was off Hunstanton March 4th and another puffin and a black guillemot were found dead at Holme on the 25th. Interesting breeding records include sheld-duck nesting on salt marshes among black-headed gulls. Ten pairs of common terns summered on Wolferton saltings.

All three species of diver were recorded. A great northern, picked up at Holme in Nov. later died a victim of the oil menace. A black-throated diver was also found oiled at the same time. This was a notable month for sea birds for 12 red-throated divers were counted on 7th. On the same day great crested grebes reached a maximum of 50. They were recorded in every month of the year. Up to 6 slavonian, 4 black-necked and 2 red-necked grebes were all seen in Nov. and cormorant numbers reached between 30 and 40 on 11th. Up to 7 shags were noted in all the winter months as well as in May and July. Up to 5 short-eared owls and 15 hooded crows were recorded.

Wigeon and teal were watched flying in the Wash past Holme from mid-Sept. and a few pintail with them on two occasions. Of the sea duck, scoter were up to strength with a maximum of 2,000 off Hunstanton Jan. 26th. 400 eiders, recorded Jan. 6th, and 115 red-breasted mergansers, on Feb. 28th are unusual totals. Between Holme and Hunstanton there were frequently 35-70 eiders between Jan. and April with 300 on Jan. 13th, 150 on Feb. 4th and they were present again from Nov. with 105 on Dec. 18th. Up to 68 scaup, 48 golden-eye, 15 long-tailed ducks, 30-40 velvet scoters and 800 sheld-duck were recorded. A drake smew headed south off Hunstanton Feb. 11th and the same day 450 pink-footed geese were at Wolferton.

The Norfolk section of the Wash does not usually hold large numbers of brent geese and those recorded only exceeded 130 on Mar. 18th when 300 were counted at Wolferton. A whooper swan appeared Jan. 27th; 5 Bewick's swans spent most of Nov. at Snettisham where 8-10 drake goosanders were noted on 19th. On Nov. 22nd 25 Bewick's swans were seen at Hunstanton and 30 passed over Snettisham on 25th.

Altogether 26 species of wader were recorded. The total of knot reached over 40,000 in Oct. Other autumn wader totals included up to 4,500 oystercatchers, 4,000 dunlin, 850 grey plover, 7,000-10,000 curlew, 2,000 sanderling, 1,000 bar-tailed godwits and 220 turnstones. A woodcock was circling Hunstanton lighthouse Nov. 7th. The purple sandpiper, so typical of rocky shores, was noted on several occasions with 9 at Heacham Jan. 28th and 12 at Hunstanton Mar. 29th. Whimbrel were frequently moving west or south-west in parties up to 50 strong Aug. 18th to 30th and 3 ruffs were seen among the holiday crowds on Hunstanton cliffs Sept. 16th.

A few wheatears, redstarts, white wagtails and turtle doves and single grasshopper and garden warblers were noted in spring. Snow buntings remained at Snettisham until April 8th (50 there earlier in the year). The number of summer migrants recorded on the return passage was much smaller than usual. No more than 8 whinchats, 12 pied flycatchers, 5 redstarts and 3 garden warblers were seen.

Oct. 7th, however, was a day when considerable movement of small birds was noted. 1,900 skylarks, 340 meadow pipits, 250 rock pipits and 1,200 chaffinches were seen flying into the Wash within a couple of hours. Also on this day the first fieldfares, redwings, twite, siskins, bramblings and Lapland buntings were noted along the east side of the Wash.



Hickling

(The Norfolk Naturalists Trust)

WARDENS: E. PIGGIN assisted by G. E. BISHOP

As in 1961 bearded tits had a very successful breeding season despite prolonged cold spells. At least 70 pairs are estimated to have nested at Hickling, Whiteslea and Heigham Sounds. Over

40 nests were found, the first on April 13th. Several parties remained in the area at the close of the year.

Bitterns were reduced in number and there were only five booming on the Reserve; they commenced February 24th. Nests were not looked for, but parent birds were undoubtedly feeding young at Swimcoots, Perrin's Rand and Wet Spurlings later in the season.

For the third year in succession, no marsh-harriers nested although a pair appeared during the spring. The cock stayed throughout the summer and odd ones remained until the end of the year. Montagu's harrier was reported only once, on May 20th when a cock passed over Whiteslea.

Five pairs of common terns bred on the two wader grounds. Fourteen pairs of great crested grebes nested on the Broad and Sounds, but carrion crows took a number of their eggs. Other breeding birds included seven pairs of herons, 2 pairs of Canada geese and 2 pairs of feral grey-lag geese. Later in the year, 25 grey-lags and 50 Canadas collected at Hickling. Garganey arrived March 29th and 4 pairs stayed on Rush Hills, but there was no evidence of successful breeding. Nesting shoveler suffered greatly from a fox: five ducks were killed and their eggs destroyed. Lapwing, redshank and snipe all bred as usual on the Whiteslea marshes. Barn owls nested at The Lodge, but failed to rear young.

Wigeon remained until May 7th at which time Rush Hills held a variety of passage waders including ruffs and reeves, black-tailed godwits, spotted redshank and greenshank, together with black terns. Up to 300 mute swans spent the summer at Hickling.

Horsey

(MR. JOHN BUXTON)

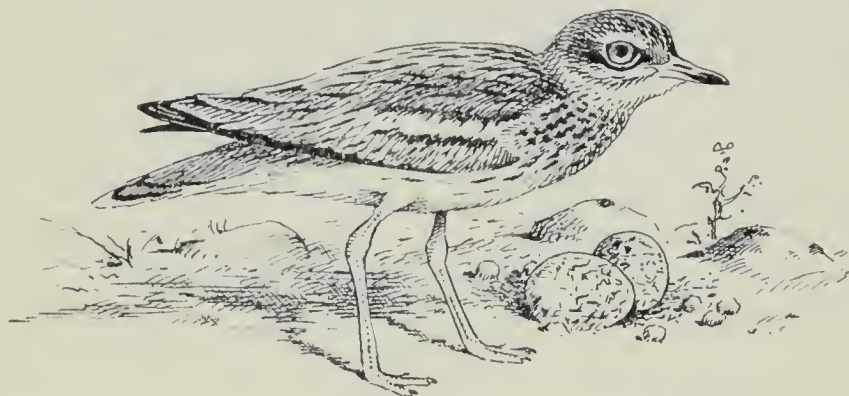
KEEPER: G. CREES

Bearded tits had a fair breeding season and thirty pairs were estimated nesting round Horsey Mere. A total of fifteen nests was found; the first April 27th and the last July 16th. As in 1961 eruptive behaviour was recorded during September when parties between five and twelve strong were watched leaving the Mere and heading south or west. Only a small colony remained at the end of the year.

Although marsh-harriers in ones and twos were observed each month it is disappointing to record that none nested. Four marsh-harriers appeared May 18th, but there was no sign of pairing. No Montagu's harriers appeared.



Bitterns nested successfully. There were five booming males at Horsey with two more to the south at Starch Grass. Three families of water-rails were observed during the summer. A stonechat's nest with five eggs was found June 22nd. Two short-eared owls remained until April 1st, but neither they nor oystercatchers bred.



Breckland

Records were received from some twenty-six observers and the meres were again the main attraction both to the watchers as well as the birds. Comparatively few records were submitted from other areas.

Unusual records include a drake ring-necked duck on waters in the Stanford area from April 1st to 22nd. It is an addition to the county list and the third British record of this North American duck. A great snipe near Thetford Jan. 1st; 2 common scoters at Stanford April 17th; a ring ouzel near Fowl Mere April 22nd; a hoopoe at Thompson May 10th; single bitterns at Diddlington and Stanford and a bearded tit at Foulton all Nov. 4th. Other interesting records were a kittiwake at Thompson Feb. 16th; two or three

shags which spent late Feb. and early March by the river bridge at Thetford; an injured red-throated diver at Watton Green Nov. 14th and a cock Montagu's harrier which was most regrettably shot near Thetford in early July. A summary of recent willow tit records appears in the Classified List.

Other reports of predatory species in the area were single buzzards at Tottington in Feb., Wretham Heath in Sept. and at Gooderstone in Oct.; one pair of sparrow-hawks which may have bred at Langford and another at Fowl Mere Dec. 2nd; a pair of long-eared owls at Merton; up to 3 hen harriers at Gooderstone and several pairs of breeding Kestrels, three of which occupied old cottages in the Battle Area.

Passage waders were scarce at the meres. A few common and green sandpipers, one wood sandpiper at Lang Mere July 21st, 4 greenshank, two bar-tailed godwits and single ruff and jack snipe being all that were reported. A black tern appeared at Lang Mere May 2nd.

Of the breeding waders, curlew totalled some 12 to 15 pairs in the Stanford-Tottington-Wretham area and at least 5 young were seen. Another pair appeared on Bridgham Heath. Stone-curlew, first noted April 8th, were recorded as breeding at six localities and a flock of 15 was at Thompson in September; they were last noted Oct. 15th. Woodcock bred at Wayland Wood, Merton, Thompson, Tottington, Stanford, Sturston, Croxton and St. Helen's Well. Ringed plover were noted at Lang Mere, Gooderstone, Bawsey, Cockley Cley, Weeting and North Pickenham. Lapwing, snipe and redshank were also recorded.

Of the more typical Breckland species, wheatears showed a marked decrease; 7 pairs were present at Weeting Heath May 16th. Stonechats made a welcome return and a pair bred at Brettenham Heath. The only whinchats mentioned were 3 to 6 summering near Frog Hill and 12 at Crosswater Staunch along Little Ouse July 23rd. Redstarts bred at Merton, Tottington, Stanford, Little Cressingham, West Tofts, Two Mile Bottom, Santon, Thompson and St. Helen's Well. Only a few nightjars were reported. Woodlarks were seen at West Tofts, Lang Mere, Fowl Mere, St. Helen's Well, Mouse Hall, Grime's Graves, Stanford Water, Foulden, Santon, Weeting and Frog Hill. Crossbills were observed at a number of locations, including 50 at St. Helen's Well July 8th and 25 at Gooderstone Sept. 27th, but only one nest (at Santon Warren) was reported. Four pairs of herons nested at Thompson and five pairs at Didlington.

Other summer records included a total of 41 adult great crested grebes on eight lakes; a total of 17 broods of tufted ducks at 8 sites and 5 broods of pochard at 2 sites. Grasshopper warblers appeared at Didlington, Foulden Common and Gooderstone and red-backed shrikes at six sites. Wrynecks were seen at Two

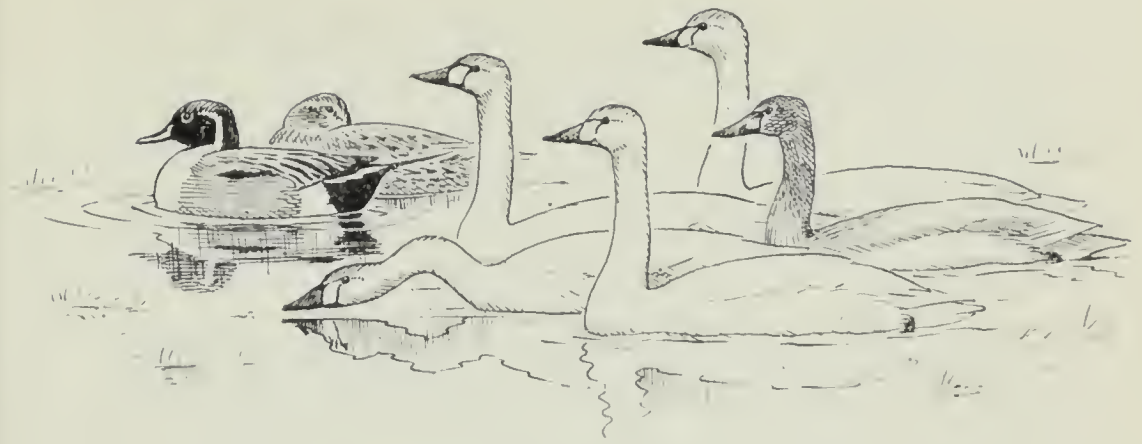
Mile Bottom and St. Helen's Well. Two or perhaps 3 pairs of collared doves bred successfully at Little Cressingham with an autumn peak of 18 birds; 7 remained there until the end of the year. These are the first Breck breeding records for this newcomer. One or two collared doves appeared at Mundford at the end of Nov. Redpolls bred at Thompson and Lang Mere and were seen at many other places at various times. Six pairs of Canada geese nested at West Mere, one of them 10 feet up in an oak. A whooper swan remained at Wayland Wood, Watton, till May 5th. Grey wagtails were seen at Didlington in April and Nov., Buckenham Tofts and Narborough in summer and at Stanford and Bodney in autumn. Hawfinches appeared at Marham in Jan., and at Thompson and Lynford in April.

Winter records were almost entirely confined to wildfowl led by 26 goosanders at Narborough in Jan., 34 at Narford during Jan./Feb., up to 14 at Stanford in Feb./March with up to 5 there in April and 7 at Thompson Feb. 25th. Up to 10 whooper swans visited Thompson in Jan. (13 again in Dec.) and up to 26 Bewick's swans at Stanford and 15 at Thompson in Feb./March and 23 at Thompson in Dec. when up to 9 at Stanford where 4 on Oct. 28th.

Other wildfowl totals included 350 mallard at Narford Feb. 11th; 150 pochard at Fowl Mere Feb. 4th and 150 teal at Foulden Nov. 4th. Gadwall counts included 70 at Lang Mere Sept. 22nd; 91 at Fowl Mere Oct. 21st; 140 at Stanford Jan. 7th and 143 there Sept. 16th; 50 at Shadwell June 11th; 66 at Didlington March 4th and 70 there Nov. 4th. Shoveler peaks were 72 at Bodney Jan. 7th and 60 at Stanford towards the end of the year when 70 at Mickle Mere. 47 tufted ducks at Shadwell Feb. 18th; 42 wigeon at Little Cressingham Dec. 23rd; and 13 pintail at Little Cressingham Jan. 7th. Sheld-Duck were seen occasionally at Stanford and odd golden-eye appeared at Narborough, Mickle Mere, Lang Mere and Fowl Mere.

Other winter records received included great grey shrikes (singly at Stanford and at Two Mile Bottom in Feb. at Tottington Feb. 22nd to March 25th and at St. Helen's Well Nov. 3rd). Siskins appeared here and there as usual with the largest number (60) at St. Helen's Well during March and April and one was at Santon Warren July 1st. Bramblings were scarce, apart from 80 at Shadwell Dec. 2nd. Hooded crows were not seen anywhere. A late house martin caught at Lynford Point in Nov., was kept successfully until the following spring.

A request for golden pheasant records brought in reports of up to 60 in a single flock at West Tofts, 20 at Black Rabbit Warren, 22 between Merton and Tottington, up to 19 between East Wretham and Hockham, three border locations near Santon Downham and others at Kilverstone and Knettishall Heath. Only two actual breeding records emerged from all this: broods of two and seven at Merton, both reported by a gamekeeper.



Fenland

Fenland Washes

Wildfowl counts on the Ouse Washes included 1,000 mallard Jan. 20th and 1,500-1,800 teal at the end of Jan., with 1,400 through Feb. and 1,200 on March 4th. The first garganey was noted March 24th. At the end of Jan. 5,500 wigeon were estimated increasing to 6,600 Feb. 10th; 1,500-2,000 remained till March 18th. 1,400 pintail were present Jan. 28th with over 1,000 in Feb. declining to 500 by March 4th and to 200 by 11th. Over 75 shovellers were estimated Feb. 3rd increasing to 175 a week later. Up to 7 goosanders were seen between Jan. 1st and Feb. 18th with 5 smew Jan. 28th.

Up to 12 white-fronted geese were at Welney Feb. 8th-March 11th with 250 pink-feet Jan. 20th. 6-8 whooper swans appeared between Hilgay and Welney Jan. 1st-March 11th. Four whoopers reappeared Dec. 8th. Bewick's swans were present on the Ouse Washes up to April 20th and from Dec. 3rd. Counts at Welney included 99, Jan. 28th and 110 on 30th, 35 on Feb. 8th and 56 on March 4th.

At Stradsett lake on the Fenland border 3 goosanders and 8 great crested grebes were seen April 1st. A single grebe appeared on Welney gravel pit. Six broods of tufted ducks were raised at Runcion Holme G.P. and another pair bred at Hilgay.

Other interesting birds included bittern at Welney Jan. 7th and 14th; 2 long-tailed ducks at Hilgay New Cut Nov. 11th; rough-legged buzzard over the Washes Dec. 23rd; and marsh harrier there Aug. 4th; little ringed plover at Lynn Beet factory June 9th and wood sandpipers there Aug. 7th and 26th; small number of ruffs on the Washes between Jan. and March 24th and 1-2 black terns there May 6th and 13th. Whinchats were thought to have bred. Twites stayed at Welney till March 17th. Three early willow warblers arrived at Wissington B.F. March 24th.

A shag was run over and killed at West Walton March 3rd. The following day another shag, injured, was found at the same place and released April 1st. A razorbill caught in a drain at Marshland St. James May 14th was released on the Nene four days later. Collared doves have reached Fenland and 10 were seen at Stow Bardolph Fen around farm buildings Dec. 23rd. A magpie was perched on a pig's back at Terrington St. Clement.

Wisbech Sewage Farm

26 species of waders were recorded here during the year. 4 grey plover appeared Nov. 24th, up to 3 turnstones in late Aug., 2 black-tailed and 2 bar-tailed godwits April 28th and up to 6 green sandpipers. A single wood sandpiper was noted May 1st with 9 on July 15th and up to 12 during Aug. Snipe peaked at 250 at the end of Oct. Jack snipe stayed until April 25th and one had returned Sept. 15th. Spotted redshank are one of the attractions here and ones and twos appeared in spring between April 25th and May 6th. They were again present from June 19th until Nov. 4th with counts of 20 on Aug. 19th and 29th, 30 on Sept. 2nd and 45 on Oct. 12th. Greenshank maximum was 22 on Aug. 29th. An autumn highlight was a pectoral sandpiper, Sept. 8th-16th with 2 on 10th.

Up to 6 little stints were recorded July 29th-Nov. 4th. A Temminck's stint stayed Sept. 1st-3rd with 3 on 8th. Dunlin peaked at 350 on Nov. 24th; up to 4 curlew-sandpipers were noted Aug. 3rd-Sept. 10th. Ruffs and reeves appeared in numbers with up to 100 Aug. 22nd-29th and a little ringed plover was reported July 15th. A black tern was noted May 5th, 9 on July 25th and several in Aug. including 21 on 15th. Other interesting visitors included a spoonbill July 22nd, and up to 50 twites in March. An early swallow appeared March 7th. Wildfowl records included 40 pintail March 19th and 1-2 Bewick's swans up to April 6th. Over 100 sheld-duck were reared.

Selected 1962 Light-Vessel Notes

Compiled by R. A. RICHARDSON

Little Grebe: Dudgeon, two, Oct. 11th.

Manx Shearwater: Newarp, one on deck, Oct. 7th.

Sheld-Duck: Corton, several west, Oct. 20th, were probably returning moult migrants.

Water-Rail: Haisboro', two, Sept. 28th and one, Nov. 9th.

Moorhen: Haisboro', two, Sept. 29th and one next day (see "Recoveries"). Newarp, one, Nov. 2nd.

Coot: Lynn Well, one, Oct. 24th. Haisboro', single Oct. 10th and Nov. 29th.

Lapwing: Lynn Well, a few west, Jan. 13th/15th and 28th. Inner Dowsing, Dudgeon, Haisboro', Corton and Newarp all record westward movements between Sept. 26th and Nov. 24th.

Collared Dove: Newarp, an exhausted bird, Sept. 15th.

Owls: Four stations reported owls as follows: Inner Dowsing, a "tawny" landed in the sea, Sept. 16th; a "short-eared" was reported Oct. 11th and a "long-eared" next day and on Nov. 5th. Dudgeon had a "long-eared" Oct. 11th. Haisboro' reported a "tawny" Oct. 27th, an "owl" Nov. 5th and a "small owl" on 7th while Cross Sands reported a "bara" Nov. 6th.

Woodpeckers: Seven stations reported a total of nine woodpeckers between Oct. 11th-14th. It is reasonable to assume all were Greater Spotted of Scandinavian origin, those with scarlet caps being immatures in their first autumn plumage.

Skylark: Lynn Well, Dudgeon, Haisboro' and Newarp reported the usual autumn arrivals of larks between Sept. 26th and Nov. 9th.

Fieldfare: Five stations had a moderate passage between Sept. 22nd and Nov. 30th.

Song-Thrush: Haisboro' and Newarp reported small numbers Oct. 4th, 8th and 11th.

Redwing: Haisboro', Corton and Newarp had redwings Oct. 4th-Nov. 6th.

Blackbird: Autumn passage as usual at most stations between Sept. 24th and Nov. 25th with peak arrival of Continental birds Nov. 5th.

Goldcrest: Five stations had goldcrests between Oct. 8th and 13th.

Meadow-Pipit: Inner Dowsing and Newarp reported a moderate passage Sept. 24th and 26th and Oct. 4th and 11th.

Waxwing: Inner Dowsing, one, Oct. 12th.

Great Grey Shrike: Haisboro', one, Oct. 12th.

Starling: All stations had the customary nocturnal visitations of Continental immigrants between mid-Sept. and mid-Dec. with the peak night on Nov. 5th.

Goldfinch: Inner Dowsing, a few Oct. 20th and also at Corton on 12th.

Bullfinch: Cross Sands, several of both sexes Oct. 11th, possibly of the Northern race arriving as they did with waxwing, woodpeckers, great grey shrike and crossbills. These mid-October movements from northern Europe coincide exactly with arrivals on the Norfolk coast.

Crossbill: Haisboro', single females Oct. 8th and 11th and a male on 13th. Newarp, two, Oct. 11th.

Chaffinch: Five vessels reported arrivals throughout Oct.

The following were also recorded in 1962: Merlin, Grey Plover, Golden Plover, Turnstone, Snipe, Woodcock, Knot, Wren, Wheatear, Stonechat, Redstart, Nightingale, Robin, Pied Flycatcher, Hedge-sparrow, Greenfinch and Siskin.

Classified Notes

The Wash and Fen records have been largely selected from the files of the Cambridge Bird Club. Important records from Wisbech Sewage Farm, part of which is on the Lincolnshire side of the county boundary, have also been included. Fuller details may be found in the *Cambridge Bird Club Report* for 1962.

The number preceding the name of each bird refers to the *B.O.U. Check-list of the Birds of Great Britain and Ireland* (1952) where the scientific name may be found. All records refer to 1962, unless otherwise stated. Where no initials appear after a record, details have been supplied by many observers. No detailed descriptions are given of rarities accepted by the Rare Birds Committee of *British Birds*.

6 Red-necked Grebe: North: Cley, singly March 3rd and Sept. 3rd and 16th; 2, Sept. 18th with an oiled bird for 10 days from Oct. 20th. Wells, 2, March 2nd. Blakeney, singly, Sept. 12th and Oct. 29th (HH). Wash: Hunstanton, singly Nov. 11th and 18th (CBC).

7 Slavonian Grebe: North: Singles at Scolt, Feb. 11th (RC) and at Blakeney, Oct. 29th (HH), 4 in Brancaster Bay, Nov. 10th (HR) and 1-6 at Holme from Nov. 10th onwards (CBC). Wash: Hunstanton, 1-3 till March 18th and from Sept. 21st (CBC).

8 Black-necked Grebe: North: Ones and twos in winter at Holme, Scolt, Wells and Salthouse. Wash: Hunstanton/Heacham, 1-4 in winter (CBC).

12 Leach's Petrel: North: Singly at Cley, Sept. 18th (co) and at Holme Nov. 18th (CBC).

16 Manx Shearwater: North: 1-2 end June and first week July at Cley with main autumn passage mid Aug. to mid Sept. and 100 during northerly gale off Cley Sept. 12th. Wash: Hunstanton, flock of 55 heading north Sept. 12th (CBC).

21 Sooty Shearwater: North: 2 at Cley, Sept. 18th. Singles at West Runton on 20th and Cromer, Oct. 19th (DVB). One dead, East Runton, Sept. 21st (PT).

26 Fulmar Petrel: North: Recorded Weybourne to Happisburgh. Not very successful breeding season and at end of Aug. only 15 young on ledges between Cromer and Sheringham compared with 25 young in previous three years. First one returned to Cromer Nov. 19th with 2 at Beeston on 21st. On Dec. 1st, 30 at Cromer, 22 at East Runton and 17 at Beeston. All left with the severe weather later in the month (PT).

East: Gorleston, one circling the Parish Church Sept. 6th (PRA). Wash: Hunstanton records include 10, May 26th (CBC).

Between the end of Feb. and mid March unprecedented numbers of dead fulmers were washed-up on beaches from Aberdeen

to Kent. Almost 200 wrecked birds were reported in Norfolk including 2 at Winterton, 17 between Trimmingham and Mundesley, 30-40 West Runton gap to Overstrand, 32 Salthouse beach road to Weybourne, 39 Blakeney Point to Salthouse, 2 at Wells, 7 at Holkham, 18 at Scolt including 3 blue phase, 37 at Holme and 2 at Snettisham.

27 Gannet: North/East coasts: Usual autumn passage with maxima of 60 off Cley and 80 off Blakeney, Sept. 18th. Wash: 90 off Hunstanton, May 26th (CBC).

29 Shag: Exceptional numbers appeared in southern England from late Feb. and throughout March. Many were recorded inland. Inland records include one, exhausted, at Gt. Ellingham Feb. 24th and 2-3 on the Little Ouse near Thetford at end Feb. At Castle Acre 14 descended into a lime pit March 10th and 7 were caught and released at Lynn; the others flew off but one died through striking an elevator. One appeared in centre of Norwich on Wensum March 17th-May 1st. 3 remained on Yare at Postwick April 9th-19th. In the Fens, one killed West Walton March 3rd and another, injured, there next day (CNA, HPC).

No coastal concentrations reported, but between Feb. 18th-April 22nd up to 7 at Snettisham, 2 at Heacham, 12 at Hunstanton, 2 at Wells, 7 at Cley, 2 at Sheringham and one at Yarmouth.

30 Heron: Details of heronries as follows:

Borders of Wash: Snettisham, 8 nests. *Fens:* Islington, 61 and Denver Sluice, 34 (AEV). *Breck:* Thompson Water, 4 (AWK); Didlington, 5 (AEV). *Mid-Norfolk:* Kimberley Park, 17 (PRB) and Keswick, one (*per* EAE). *Broads area:* Gen. McHardy's Wood, 3; Whiteslea, one; Heigham Sounds wood, 3 (EP); America wood Earsham, 8 (JWM); Fishley Carr, Aele, 6 (RJ); Upton, 10 (HH); Wickhampton, 35 (ETD, MJS); Buckenham, 41; Mautby, 26 and Ranworth, 39 (MJS); Ranworth marshes (Horning Hall), 11 (RB); Heron Carr, Barton Broad, 10 (DS); Belaugh Broad, 7 (RECD); Wheatfen, one (EAE) and Salthouse Little Broad, one (*per* RB). *North:* Melton Constable, 9 (RPB-O); Holkham Park (Obelisk Wood), 9; Gunton Park (The Grove), 6 (*per* MJS); Wiveton Hall, one (RGB) and Cley (The Hangs), 3 (WFB).

Total: 360 nests at 27 sites. None nested at Runham or Martham Ferry.

32 Little Egret: North: Stiffkey, one, June 15th (PRC, JTRS). First county record since 1955.

40 White Stork: An unpublished 1961 record: One at Whitlingham, Dec. 23rd (TC) was found dead there approx. 2nd Feb. 1962. It had been caught alive (presumably in poor health) at Skaerback, Jutland, Denmark in 1960 and then given to a Danish ringer who kept it in a barn over the 1960-61 winter. It flew strongly on being

released on April 16th 1961 (when it was ringed) and was not seen again there. Not considered an "escape" by Danes. The fourth county record since 1929.

42 Spoonbill: East: Breydon, singles on July 28th and Oct. 12th–27th with 3 on Aug. 15th (PRA, HD, RHH). Lessingham and Eccles, 2 during first three weeks of July (*per* RWC and EAE). Broad: Hickling, singles Aug. 17th–24th and Sept. 21st (EP). North: Cley, singles July 29th and Aug. 10th. Wash: Terrington marsh, one on Nov. 17th and one, almost certainly the same, found dead at same place Dec. 16th had been ringed in Holland (CNA, HPC). Fens: Wisbech S.F. one, July 22nd (CBC).

47 Garganey: First, Cley, March 22nd. Breeding season records from Cley (maximum 6 in May with 18 Aug. 28th), Meadow Dyke Horsey (pair), Hickling (4 pairs), Surlingham Broad (drake), Stracey Arms (pair) and Cantley (drake).

Ring-necked Duck (*Aythya collaris*): Breck: A drake visited several waters in Stanford Battle area, April 1st–22nd (CAEK *et al.*). First county and third British record.

56 Tufted Duck: Breeding records only are given. Fens: 6 broods Runceton Holme (DW) and one brood, Hilgay (CBC). Breck (total of 17 broods): two broods, Tottington West Mere; one, Ring Mere; 2, Cockley Cley; 2, Shadwell; 3, Stanford; 2, Fowl Mere; 3, Buckingham Tofts and 2, Thompson (GJ, AWK, CAEK, CRK, AEV).

57 Pochard: Breeding records only are given. Breck: 3 broods at Stanford and 2 ducks with 4 juveniles at Shadwell June 11th (AWK).

61 Long-tailed Duck: East: Yarmouth Harbour, 2, Dec. 8th (RHH); one off Horsey, March 4th (CBH). North: Brancaster to Weybourne, 1–3 up to March 9th and from Nov. 10th. Holme, maxima include 10, Feb. 10th and Dec. 16th and 6, April 21st (CBC).

Wash: Hunstanton to Snettisham, recorded up to April 12th and from Nov. 11th with 15, Jan. 26th (CBC). Fens: Hilgay New Cut, 2, Nov. 11th (CBC).

62 Velvet Scoter: East: Gorleston, 80 south April 15th and 12 on 20th (PRA). North: No party exceeded 18. Wash: Hunstanton–Snettisham, maximum of 30–40 during March and up to 20 in Dec. (CBC).

64 Common Scoter: East: Gorleston, 7–800, April 17th (PRA). Wash: Hunstanton, maximum of 2,000, Jan. 26th (CBC). Inland: a drake on Waveney at Burgh St. Peter, March 7th (RWC).

67 Eider-Duck: East: Yarmouth Harbour, 1–5, Nov. 10th–Dec. 30th. North: Scolt Head (*see table*) maximum 60–70 in May and Dec. (RC); Holme, 70, Oct. 14th (HO); Brancaster, 70, Oct. 12th (ALB); Titchwell, 70, Sept. 24th (GL); Wells, maxima of 20, March

15th and 28, Nov. 16th (HH) and at Cley recorded in nearly every month with 10 in Jan. and 8 throughout Aug./Sept. Wash (Holme-Heacham): Frequently 35-70, Jan. to April, with 400 on Jan. 6th, 300 on 13th, 150 on Feb. 4th and from Nov. with maximum of 105 on Dec. 18th. Snettisham, 15, Nov. 11th is the only record (CBC).

69 Red-breasted Merganser: Inland: 4 (3 drakes), Seamere, May 2nd (CG). North coast: No party exceeded 9. Wash: Snettisham, duck minus wing spent the year on gravel pits where maxima of 50 on Feb. 25th and 115 on 28th (CBC).

70 Goosander: More records than usual and notes received from: Broads (Rockland and Horsey), Breydon, Yare at Cantley, North coast (Cley, Wells, Holkham lake and Holme), Breck (Narford, Stanford, Thompson, Tottington and Narborough G.P.) and also inland on Wensum at Guist, at Seamere and Blickling. Wash (Snettisham) and Fens (Wigenhall relief channel, Stradsett and Ouse Washes).

Maxima include 8-10 drakes at Snettisham, Nov. 19th (CBC), 34, Narford, Feb. 11th (CAEK); 26, Narborough G.P., Jan. 28th (DW); 14, Stanford, Feb. 4th and 7 at Thompson on 25th (CNA, HPC). A drake on Yare at Rockland Fleet July 23rd was in partial eclipse at the flightless stage of moulting (EAE).

71 Smew: East: Breydon, 3, Feb. 18th (RHH); at least 5 Dec. 26th and singly on 31st (PRA). Lower Bure near Yarmouth, 3, Dec. 30th (RHH). Haddiscoe, one, Feb. 28th (RWC). North: Scolt, 5, Jan. 7th (RC); Cley, 2, Feb. 26th; Wells, 2, March 2nd (HH). Fens: Ouse Washes, 5, Jan. 28th (CBC). Inland: Cawston lakes, one, Jan. 21st (NL).

73 Sheld-Duck: Moults migration records only are given. East: Breydon, main departure July 10th-14th with smaller movement on 16th (PRA). North: Scolt easterly departure in evenings: 33 on July 8th, 14 on 16th, 40 on 17th and 30-40 on 18th (RC). Cley, 100 west Sept. 1st with 22 west on 8th.

76 White-fronted Goose: East: Breydon area, 250 Jan. 2nd increasing to 350 on 6th and to maximum of 450 on 13th. Reduction to 120 by Feb. 23rd and last noted March 4th. First birds returned Dec. 5th and 148 by 29th. Fens: Welney, up to 12, Feb. 8th-March 11th (CBC).

77 Lesser White-fronted Goose: East: Yare valley, 2 adults with bean-geese Jan. 13th (MJS) and one adult on Feb. 4th (CJC, GMSE, AEV). An adult with pink-feet on lower Bure marshes Jan. 20th (RHH) and 27th (PRA). Another adult in Yare valley with bean-geese Dec. 31st (PRA).

78 Bean-Goose (*A.a. arvensis*): East: Yare valley, up to 52 Jan. 1st-Feb. 22nd. 7 reached Burgh Castle Dec. 26th with 28 at usual haunt on 27th and 48 by end of year. The Yare valley is the only

locality in England to receive regular visits from bean-geese. 2 were shot in Jan. and one wounded bird remained at Wheatfen Broad where 20 spent at least one night roosting on a grazing meadow (EAE).

Pink-footed Goose (*A.a. brachyrhynchus*): East: Breydon area, up to 32 mainly on Bure marshes till March 4th and 29 from Dec. 1st (PRA, RHH). North: Morston, 35 greater part of Jan. (WE). Wash: Snettisham, 50, Jan. 28th and North Wootton, 250, Feb. 14th (CBC). Fens: Welney, 250, Jan. 20th (CBC).

80 Brent Goose: North: Blakeney, maximum of 2,000 in Jan. (HH), 60 first week of Nov. and nearly 3,000 by Dec. 22nd (WE). Brancaster, 400 through Jan. to March, with 500 on Feb. 7th, 4 remained April 12th, 3 on 21st and one on May 7th. 18-20 per cent of wintering flock considered young birds; first in autumn (5) Oct. 16th, 300 by end Nov., 400 by Dec. 6th and 500 by 31st (RC). Wells, 1,250 in Jan., 600 in early March and 4, April 14th (HH), 65 returned Dec. 7th (ALB) and 80 by 15th (HR).

Wash: Holme-Snettisham, 70-130 frequently up to March 18th and from Nov. 8th; Wolferton, 300, March 18th (CBC). East: Yarmouth, parties totalling 50 north off-shore, Nov. 10th (PRA).

81 Barnacle Goose: North: Cley, one, March 10th-19th. Scolt, one, Jan. 13th and 16th (RC).

83 Red-breasted Goose: East: Halvergate, one with white-fronts, Jan. 2nd-28th (PRA *et al*). The only previous county record is one said to have been shot at Halvergate in 1805.

85 Whooper-Swan: Small numbers reported on North coast (Cley and Blakeney), Broads area (Horsey, Hickling, Reedham), Breck (Lang Mere, Ring Mere, Tottington West Mere, Watton, Stanford. Fowl Mere and Thompson), Wash (Snettisham to Holme) and Fens (Ouse Washes).

86 Bewick's Swan: East: Records include 13 at Norton near Reedham Feb. 4th (AEV), 13 at Breydon on 18th (RHH) and 12 there Dec. 1st, 15 west at Buckenham on 31st (PRA). Broads: Horsey, 11, Jan. 7th (HR) and 23, March 31st (GC). North: 9 records at Cley with maxima of 30, March 5th and 30-35 west Dec. 22nd. 6 records at Holme with maximum of 30 west Dec. 22nd.

Wash: Hunstanton, 25 and Snettisham 30, both on Nov. 25th (CBC). Fens: Ouse Washes, maximum of 110 at Welney Jan. 30th (CBC). Breck: Recorded up to March 10th and from Oct. 28th at Stanford and Thompson with maximum of 26.

91 Buzzard: North: Singly at Kelling, July 10th and at Cley, Aug. 27th. Breck: Singly at Tottington, Feb. 25th (HPC) and at Gooderstone, Oct. 11th-18th (CRK).

92 Rough-legged Buzzard: North: Cley, Nov. 1st-Dec. 12th. Wash: Hunstanton, Nov. 11th and 22nd (CBC). Fens: Ouse Washes, Dec. 23rd (CBC). All singles.

93 Sparrow-Hawk: Recorded from 11 localities, but successful breeding proved at only two sites.

97 White-tailed Eagle: North: Scolt, one reported to RC Jan. 7th was seen by him Feb. 7th-25th. Blakeney Point, one, Dec. 6th was filmed by WE.

98 Honey-Buzzard: North: Salthouse Heath, one, May 20th (CO).

99 Marsh-Harrier: None bred although at least 4 in Hickling/Horsey area during spring when another pair by River Ant. Many coastal records of 1-3 birds April 11th to Sept. 21st between Holme and Cley with one at Breydon May 9th (MJS).

100 Hen-Harrier: Recorded from Broads (Horsey and Hickling), lower Bure marshes, North (Scolt, Morston to Salthouse and Selbrigg), Breck (Gooderstone), Wash (Sandringham, Snettisham and Terrington). Usually 1-2 birds, but 3 at Gooderstone (CRK).

102 Montagu's Harrier: None bred, although a pair appeared in Yare valley May 20th (EAE). None was seen at Horsey and only one cock (May 20th-GER) at Hickling. Breck: A cock shot near Thetford early July (*per* HFA). North: Singly at Cley May 3rd and Aug. 28th and at Holkham Sept. 8th (HH).

103 Osprey: East: Breydon: June 9th (PRA) and Hardley flood through July till Aug. 3rd (*per* RWC). North: Blakeney harbour April 29th (HH), Selbrigg Pond, June 2nd/3rd (*per* RAR) and Sept. 29th (*per* RPB-O), south off Overstrand, July 28th (PG), daily between Stiffkey and Kelling, Aug. 23rd-Sept. 9th and at Holkham. Sept. 12th. All singles.

104 Hobby: North: Singly at Blakeney, April 25th (CO) and May 6th (HH).

105 Peregrine Falcon: Coastal records from Scolt, Cley and Breydon on 4 dates. One over Norwich, April 15th (RAFC).

107 Merlin: North: Recorded at Scolt, Morston, Blakeney and Cley. East: Recorded at Horsey, Acle Bridge and Halvergate.

117 Quail: North: Blakeney, calling, June 13th/14th (HH).

[**Bobwhite** (*Colinus virginianus*): Some numbers of these North American quail have been released in the county and birds appeared in 1962 at Holkham, Taverham, Hainford, Somerton and near Wymondham. Others were released at Rackheath in 1961 (*per* EAE)].

119 Crane: North: Cley, one south-east Sept. 8th (RAR *et al*) and Blakeney, one east on 11th (GB).

121 Spotted Crake: North: Cley, one, Sept. 10th–18th with 2 on 14th.

125 Corncrake: North: Burnham Market, one found dead beneath overhead wires, May 17th was shown to MJs. At Cley a winter occurrence Dec. 30th was the only record: chestnut wings were seen well.

131 Oystercatcher: Breeding records: North: 60 nests at Blakeney Point and 22 pairs on south side of harbour; 4 pairs at Stiffkey; 8 pairs at Wells; 4 pairs at Burnham Overy and 70–80 nests at Scolt. East: 3 nests on Breydon marshes and one nest in sugar-beet at Runham.

135 Little Ringed Plover: West: Birds present during summer at four localities and breeding proved at two: *Site A* (Fen border where bred 1960/61), one pair present and nest with 4 eggs July 17th; all hatched. Birds gone by Aug. 14th. *Site B* (where bred 1961), a pair present from April 8th and clutch of 4 eggs found May 16th had hatched by June 4th. Last seen Aug. 14th.

North/East coasts: Passage records from Burnham Overy, Cley (including 2, Aug. 2nd and 2 more on 18th), Scolt, Breydon and Cantley (one, Aug. 5th).

136 Kentish Plover: East: Breydon, a male, May 12th (PRA, FEP, POR). North: Cley, a male, May 25th/26th.

142 Dotterel: North: Blakeney, a juvenile, Sept. 13th.

146 Great Snipe: Breck: Thetford, one by the Little Ouse between first and second stanches, Jan. 1st (AJD).

147 Jack Snipe: East: Hardley, a very late bird May 27th (PRA).

148 Woodcock: Unusual numbers reported in Jan. with 50–60 observed during a shoot at Brancaster Hall on 6th (RC) and 30 counted in 15 minutes at Mautby on 13th (FEDD-B).

150 Curlew: Breck: 12–15 pairs summered in Stanford, Tottington and Wretham area. No nests found, but at least 5 young seen (GJ, WJ).

151 Whimbrel: Late birds in Oct. include singles at Holme on 3rd (HO) and Blakeney on 20th (HH).

154 Black-tailed Godwit: Recorded at usual localities March to Sept. with maxima of 15 at Breydon Aug. 4th (PRA) and 11 Blakeney–Stiffkey Aug. 20th–Sept. 7th (HH). A winter record at Breydon where 2, Jan. 27th (PRA, RHH). At Cley, a pair from March 15th to mid-May, the male once observed in tentative song flight; 3 others arrived March 30th. Wash: 50 at North Wootton, Aug. 22nd and a late bird at Snettisham, Nov. 4th (CBC).

157 Wood-Sandpiper: Usual passage records May 8th–Oct. 17th when a late one at Cley. Also singly at Cley June 10th/12th and at Hickling on 15th (MJs).

159 Common Sandpiper: A pair nested and reared three young at Gt. Witchingham (S. F. Simmons *per* EAE). The birds took up residence in May beside a pond enlarged from a war-time rocket crater. The family departed in early July. Riviere's *Birds of Norfolk* (1930) gives only two breeding records, at Hickling in 1897 and Coltishall in 1912.

162 Spotted Redshank: In addition to records from usual localities, 3 at Hickling May 3rd–6th and June 24th (EP) and singly at Cantley Aug. 5th (GRS) and at Wells Nov. 2nd (HH).

165 Greenshank: Wash: Remarkable total of 100 at North Wootton, Aug. 22nd (CBC). Recorded up to Oct. 10th at Cley, 14th at Holme and 20th at Blakeney.

170 Purple Sandpiper: East: Yarmouth harbour, 1–2, Sept. 8th and Nov. 11th (PRA); Breydon, 2, Oct. 6th (RWC). North (Scolt, Burnham Overy, Wells and Cley): 1–2 in Jan., Feb., April, Sept., Nov. and Dec. with 7 at Scolt, May 2nd. Wash (Hunstanton–Heacham): up to 10–12 till March 29th and 2–5 from Nov. 7th (CBC).

173 Temminck's Stint: North: Cley, one, May 8th/9th. Fens: Wisbech S.F. one, Sept. 1st–3rd and 3 on 8th (CBC).

176 Pectoral Sandpiper: North: Cley, one, Sept. 1st–17th (WFB *et al*), its call was tape recorded by RAR. Fens: Wisbech S.F. one, Sept. 8th–16th and 2 on 10th (CBC). 21 pectoral sandpipers have been identified in Norfolk since the 1948 invasion when 3 appeared at Cley/Salthouse and the species was photographed for the first time.

Western Sandpiper/Semipalmated Sandpiper: A small streaked sandpiper at Cley Aug. 12th (RAR, DLC *et al*) is considered by British Birds Rarities Committee—on the evidence at present available—as either Western or semipalmated sandpiper. Single individuals of “Peep” Sandpipers are very difficult to identify. A semipalmated sandpiper identified at Cley in July 1953 was the first British and second European record (*British Birds*, XLVII, p. 131). The bird recorded at Romney March, Kent, in 1907 was among the “Hastings Rarities” and is now unacceptable (*B.B.* Vol. 55, p. 358).

183 Broad-billed Sandpiper: East: Breydon, one, May 26th (PRA, FEP). The ninth county record.

184 Ruff: Broads: Hickling maxima of 12, July 18th and 15, Aug. 10th (EP).

185 Avocet: East: Breydon, one April 11th–May 1st with 8 on May 19th (PRA) and 2 on June 16th. None recorded elsewhere.

187 Grey Phalarope: North: Cley, one, Nov. 23rd–Dec. 2nd.

188 Red-necked Phalarope: North: Cley, singly May 19th and Aug. 12th–18th. Latter bird with only one leg.

193 Arctic Skua: North/East coasts: Autumn passage July 1st–Oct. 29th with one Nov. 18th. Cley Sept. peaks include 31 on 5th, 60 on 7th and over 50 on 18th. Also a sick bird at Cley Feb. 18th (co) and singles off Salthouse (uu) and Scolt both on May 29th (rc). Wash: Hunstanton–Heacham, recorded Aug. 4th–Oct. 29th with maximum of 45, Sept. 12th; Snettisham, 2, July 15th and Sept. 12th (cbc).

194 Great Skua: North (Scolt—Salthouse): Autumn passage from end Aug. to Oct. 29th, with one off Holme, Nov. 19th (ho). Maximum 35 moving west off Cley, Sept. 18th. Wash: Hunstanton, 3, Aug. 7th; 5, Oct. 26th and 2, Nov. 10th (cbc).

195 Pomarine Skua: North: Cley, 1–2 on eight dates Aug. 12th–Oct. 5th with 3 on Sept. 6th. Holme, 2, Oct. 26th (ho). It is remarkable that since *Birds of Norfolk* (1930) this skua was only recorded on two occasions prior to 1953 since when it has been reported annually.

196 Long-tailed Skua: North: Cley, Aug. 2nd and 10th and Sept. 18th/19th. Scolt, June 11th and Aug. 14th (rc). Holme, Oct. 26th (ho). Wash: Hunstanton, Aug. 7th (cbc). All singles. Since *Birds of Norfolk* this skua was only recorded on three occasions prior to 1953 since when it has been reported annually with the exception of 1955.

202 Glaucous Gull: North (Scolt–Sheringham): Records of 1–2 birds up to May 16th and from Oct. 31st.

203 Iceland Gull: North: Cley, an adult Nov. 18th, 19th and 22nd. Cromer, an immature, Nov. 20th (pr).

205 Mediterranean Black-headed Gull: North: Cley, an adult west Aug. 11th (rar). This once rare gull has appeared annually in Norfolk since 1952 inclusive with the exception of 1958/59.

207 Little Gull: North: Cley, an immature east May 16th. In autumn recorded there on 14 days from early Aug. till mid-Oct., usually immature singly or in twos, but 4 juveniles together Aug. 29th and single adults Aug. 3rd and Sept. 8th (co). Blakeney, singles May 29th, Aug. 28th–Sept. 12th and Oct. 27th–Nov. 9th; Wells, one, Dec. 21st (hh). Scolt, singles April 22nd and May 12th (rc). Holme, 8, Oct. 22nd (cbc).

East: Yarmouth, singles Feb. 22nd, Aug. 18th and 22nd (pra). Broads: Hickling, one, Aug. 29th (mjs). Wash: Hunstanton, one, Aug. 7th and 3, Oct. 30th; Snettisham, 2, Sept. 8th (cbc).

208 Black-headed Gull: Numbers of *pairs* at breeding localities: North: Scolt, 125–150; Burnham Overy, 11; Stiffkey, 18; Morston–Blakeney saltings, 37 (hh); Blakeney Point, 4 (we) and North drain marshes Cley, 65. Broads: Alderfen, over 300 (agh). Inland: Scoulton Mere, 200 (wsb). Other localities not counted.

Heavy westward evening passage at Cley daily during third week Aug. when counts included 3,050 on 21st, 4,340 on 22nd and 2,590 on 24th.

209 Sabine's Gull: North: Scolt, a first winter bird, Nov. 6th (RC).

211 Kittiwake: North/East coasts: Summer counts include up to 30 at Scolt from June till early Aug. (RC) and 200 at Scroby end July (RHH). Winter movements: North: Holme, 1,000 entering Wash, Feb. 14th (CBC). Cley, hundreds east at sea, Oct. 25th and same day at Cromer 1,390 east in 45 minutes at midday and 277 in 15 minutes at sunset (DVB). Holme, 1,700, Oct. 26th (CBC). Cley, 200 east, Nov. 18th. Inland, one dying at Surlingham, Feb. 16th (EAE).

212 Black Tern: Spring passage began April 20th at Hickling and 23rd at Cley. Maximum at Cley over 20 May 5th with 8 on June 2nd; at Horsey, 7 on May 22nd (GC); at Breydon, 8 on May 3rd (MJS). Only Hickling produced any numbers with 6 May 3rd, 25 on 9th, 100 on 23rd and 50 on 24th (GEB).

Autumn passage July 15th–Oct. 7th. No party exceeded 5 apart from 21 in Fens at Wisbech S.F. Aug. 15th (CBC).

213 White-winged Black Tern: North: Cley, one, June 18th (JTRS, RAR *et al*).

217 Common Tern: Number of *pairs* at breeding localities: Wash: Wolferton saltings, 10. North: Holme, 2; Scolt, 600 and Blakeney Point, 980. East: Scroby, 150. Broad: Ranworth, 16; Hickling 5 and Ormesby, 6 (EGS). Very late (Common/Arctic) Nov. records at Cley on 6th and Hunstanton on 8th.

218 Arctic Tern: North (Scolt–Blakeney Point): Total of at least 6 pairs bred.

219 Roseate Tern: North: None bred, but 1–2 between Blakeney Point and Scolt, May 15th–Sept. 9th.

222 Little Tern: Breeding records of *pairs* include: North: Scolt, 6; Burnham Overy, 4; Wells, one; Stiffkey, 2; Blakeney Point, 75 and 6 on south side of harbour; Cley–Salthouse, 20. East: Winterton–Horsey, 31 (PRA) and Caister, one (*per* EBG).

223 Sandwich Tern: Apart from a single nest at Blakeney Point, bred only at Scolt (595 nests) and Scroby (62 nests). At Cley, spring peak of 250, April 28th; autumn influxes included 100 on July 22nd, 500 on Aug. 11th, 390 on 27th and 300 on Sept. 5th with many moving west at sea on 7th.

226 Little Auk: North: Cley, up to 20 recorded Oct. 25th. Inland: Norwich, one found dying in Ipswich Road, Feb. 14th (CH) now in Castle Museum collection.

229 Black Guillemot: North: Holme, one dead, March 25th (CBC).

230 Puffin: East: Singles dead at Hemsby, April 16th (JMT) and Yarmouth, Oct. 1st (PRA). North: Cley, singles Feb. 18th and March 4th; Scolt, 5, Oct. 18th (RC) and Holme, one dead, March 25th (CBC).

235 Turtle Dove: Larger gatherings only are given: Southburgh, 60, June 7th (ALB); Seamere, 150 feeding on kale, July 27th later increasing to 300 (CG).

Collared Dove (*Streptopelia decaocto*): Breeding season localities include King's Lynn (2 pairs), Hunstanton, Wells, Salthouse Heath, Blakeney, Cley, West Runton to Overstrand (11-12 pairs) and Yarmouth/Gorleston district, also inland at Seamere, Swaffham, East Harling, Little Cressingham and Downham Market.

In Yarmouth/Gorleston district a survey in May/June produced 24 pairs occupying 11 sites including 4-5 pairs nesting in St. George's Park; largest group was 45 at Watney's Maltings Oct. 19th (PRA, RHH); at Southtown an all white one (except for typical black neck marking and buffish primaries-PRA) was observed. Autumn counts at Broom Hill, East Runton, include 51, Oct. 30th; 55, Nov. 22nd and 64, Dec. 29th (Mrs. G. R. Culley). In Breck, at Little Cressingham, 2-3 pairs nested with autumn peak of 18 and at least 7 wintered (1962-3 winter), a pair was also present 1960/61 (GJ). At Mundford, 2 appeared Nov. 25th. On Fen borders, several pairs bred at Downham Market (RPB-O) with 10 at Stow Bardolph Fen Dec. 23rd (CNA, HPC). At King's Lynn up to 8 wintered (DAL).

246 Little Owl: In many parts of the county now seldom seen, marked decrease. Some idea of their former abundance (when they were caught in large numbers in gin traps placed in rabbit holes) may be gained from EAE's record of 30 hung on one keeper's fence in Lothingland in 1926.

248 Long-eared Owl: Described in *Birds of Norfolk* (1930) as "fairly abundant in all districts where there are fir-woods and also within the area of the Broads", not a single *confirmed* nesting record has been received for 1962. Breeding was, however, suspected at usual site on Salthouse Heath and a pair was seen in the Breck at Merton in spring (WJ). A migrant flew from a cliff cave at West Runton, Nov. 10th (PT).

249 Short-eared Owl: East: Halvergate, up to 18 in a diurnal roost through Feb.; one pair bred successfully here (RHH). North: Scolt, one pair bred rearing 2 young; Blakeney, pair stayed till June 6th, display observed but breeding not proved (HH). Scarcer than usual in winter and no party exceeded 7 in number. Fens: Ouse Washes, few up to March 24th (CBC).

255 Swift: An early arrival commencing April 20th at Gorleston and Cley, 21st at Sheringham and 25th at Thompson. Oct. 5th is a late date (CO).

256 Alpine Swift: North: Blakeney Point, one, June 14th (JTRS) and Cley, one on 24th (BRB). Ten previous county records.

258 Kingfisher: In the autumn of 1957 EAE recorded the county distribution and many pairs were then in residence along the Bure and its upper tributaries, the Ant and its Broads, the Wensum, Yare, Tas and Chet, the middle reaches of the Waveney and several scattered pools and streams in the south-west.

Severe frosts at the beginning of 1962 and 1963 have caused a severe reduction. In the summer of 1962 kingfishers were absent from Surlingham and were very scarce along the lower reaches of the Yare and Waveney and on the Broads. *Summer* records were however received from Burgh Castle, Postwick, Norton, Marlingford, the Wensum and its tributaries (main stronghold), the Tudd, Sparham, Lyng, Elsing, Lenwade, Mermaid Lake in Bure valley, Belaugh, Corpusty, Gooderstone, Hardley, Gt. Hockham, Holme, Castle Acre and Cranworth. 5 were together by Six-mile pump, river Bure, Dec. 23rd (RHH) shortly before the river became covered in ice.

261 Hoopoe: Breck: Thompson, one, May 10th (AWK). No other records.

263 Greater Spotted Woodpecker: Seven Norfolk light-vessels reported a total of 9 woodpeckers Oct. 11th–14th and it is reasonable to assume all were greater spotted of Scandinavian origin. North: Holme, one, Sept. 22nd; 2 (netted and proved Northern), Oct. 12th and singles on 13th and 22nd (HO). Wash: Hunstanton, one, N.N.W. over Wash, Oct. 22nd (CBC).

265 Wryneck: Breck: Pair at Two Mile Bottom and St. Helen's Well, for several days in June with one on 16th. North: Singly at Sheringham, May 19th; Blakeney Point, Sept. 2nd and a Cley garden on 12th.

271 Wood-Lark: Apart from 11 Breck localities only recorded as follows: Central: Horsford (where a pair bred–NL); North: Near Holt, one, March 3rd (CO) and Wash: Wolferton, 2 pairs bred (CBC).

273 Shore-Lark: North coast: Recorded at usual localities between Holme and Cley up to April 11th (maximum 20 at Cley, Feb. 28th), with an early bird at Cley Sept. 22nd and others from Oct. 2nd (maxima 6 at Holme, Nov. 3rd (HO), 40 at Blakeney, Oct. 29th (HH) and 12 at Cley on 20th). Wash: Hunstanton, 3 on Jan. 21st and one south, Oct. 27th; Snettisham, 1–2, Oct. 25th–27th (CBC). East: Winterton, one, Oct. 13th (RCM).

274 Swallow: November records from Blakeney on 5th and 11th (HH) and West Runton on 7th (RAFC).

276 House-Martin: Six November records with latest at Holt on 11th (PJW) and Blakeney on 15th (HH). 2 very late birds at Blakeney Dec. 17th.

277 Sand-Martin: 4 late birds at Horsey, Oct. 23rd (GC).

281 Hooded Crow: North/East coasts: Again scarce and no party exceeded 15. Last spring date May 8th though a late bird at Cley June 10th. No Breck or Central Norfolk records. Wash (Hunstanton-North Wootton): up to 10 together. Fens (Wisbech S.F. and Welney), ones and twos (CBC).

293 Willow Tit: *Birds of Norfolk* gives only 4 occurrences for the county. During the following two decades a number of breeding records were obtained, the first in 1934. At South Wootton 4 small breeding colonies each of 4-5 pairs remained until 1946. Willow tit localities from 1949 inclusive (*breeding and breeding season sites in italics*) are given below:

North: Beacon Hill Sheringham, Felbrigg, Cley Park, *Salthouse Heath, Hempstead*, Holkham, near Glandford Mill, Hanworth, Cromer, *Kelling*, Cley and North Walsham. Broads area: *Wheatfen, Rollesby, Hoveton, Catfield, Ranworth, Upton*, Calthorpe and Hassingham. Breck: *Beechamwell, Thompson, Fowl Mere, Santon, Gooderstone, Mickie Mere*, Narford, West Acre, *Foulden, Gt. Hockham, Stow Bedon, Cranwich, Weeting, Mundford, Lynford, West Tofts*, Croxton, *Stanford, Shadwell, Thetford golf course*, Didlington, *Grime's Graves* and St. Helen's Well. Fen/Wash borders: Gayton, Sandringham, *Snettisham*, Stow Bardolph, Middleton, Runcton Holme, Wimbotsham, Wallington Hall and *Shouldham*. Fens: *Denver Sluice heronry* (1957). Central: Gressenhall, Cawston, Mousehold Heath, *Cranworth* and *Reymerston*. South: No records (and few observers). *Summary by MJS and AEV.*

295 Bearded Tit: Broads area: Breeding records from Hickling/Heigham Sounds/Horsey area (100 pairs estimated) and Waveney valley (at least 15 present). Wintering birds remained at Surlingham and Wheatfen Broads till early spring. One female at Surlingham March 23rd carried a red ring on left leg and had almost certainly been ringed at Walberswick, Suffolk, in 1960. Other Yare valley records include birds at Cantley Jan. 6th; at Buckenham, Jan. 28th, Feb. 18th and March 4th; 2-6 at Hardley Oct. 13th-16th and 30 at Wheatfen Dec. 31st. 7-8 appeared at Rollesby Broad Nov. 4th and 4-5 at Haddiscoe on 6th. 2 remained in osiers at Worstead through Dec. (CA).

North: Cley, 30 breeding pairs. Holme Broadwater, 6 arrived Oct. 6th and up to 12 till Nov. 11th (HO); Wells, 2 in reedy dyke Oct. 6th (when arrived Holme-HR). Breck: Foulden Common, one, Nov. 4th (CAEK).

302 Fieldfare: Very late spring birds at North Walsham (6) May 13th (CA), at Horsey (2) on 30th (GC) and at Cley (one) June 13th (DVB). Early autumn return at Holkham (2) Sept. 22nd and at Cranworth on 23rd (ALB).

304 Redwing: Four early birds at Holkham Sept. 22nd.

307 Ring Ouzel: North (Holme-West Runton): Small spring passage March 19th–May 5th with maximum of 16 at Holkham April 21st. In autumn recorded on 8 dates Sept. 20th–Nov. 9th but no party exceeded 3. Wash: Heacham, one, Oct. 14th (CBC). East: Yarmouth, one, May 3rd (PRA) and Breck: Fowl Mere, one, April 22nd (CG).

311 Wheatear: Single Nov. birds at Salthouse and Holme on 8th, at Holme and Sheringham on 10th and at Cromer on 23rd (CBC, CO, HO, PT).

317 Stonechat: Single pairs bred at Horsey (GC), Brinton Common (RPB-O) and in Breck at Brettenham Heath (GJ). Pairs also present during summer at Winterton (GRS), Happisburgh (PAGR) and at a second Horsey site (RJ). Again many autumn/winter coastal records of 1–5 birds at many localities between Heacham and Haddiscoe.

320 Redstart: *Breeding records* only are given. Wash: 3 pairs at West Newton, 2–3 pairs, Sandringham–Dersingham and one pair, North Wootton. Breck: See page 71.

322 Nightingale: North: Blakeney Point, one, May 16th. *Birds of Norfolk* gives only one record for coastline one being taken on Cley beach in 1899.

324 Bluethroat: North: Singles on Cley marsh Sept. 6th (WFB), at Blakeney on 18th/19th and 22nd/23rd (HH), at Burnham Overy on 18th (RPB-O) and at Holme, Oct. 29th (HO).

338 Aquatic Warbler: North: Cley, one, Sept. 14th (BB, SD, ND, JJ).

340 Icterine Warbler: North, Holkham, one, Sept. 5th (ICTN).

344 Barred Warbler: North: Cley, one Sept. 3rd–7th; Blakeney Point, 2, on 20th one remaining till 24th (CO); Holme, one trapped on 20th stayed till 23rd and another present on 26th/27th (HO).

354 Willow-Warbler: North: Cley, a late bird still singing, Oct. 11th.

357 Wood-Warbler: North: Continues to decrease and only singles recorded at Hempstead and Kelling with a pair at Glandford (HH).

360 Yellow-browed Warbler: North: Blakeney Point, one, Sept. 21st–23rd (MJR, GL *et al*). The tenth county record and the first since 1928.

365 Firecrest: North: Holkham, April 14th/15th (CNA, HPC) and Holme on 20th (CNA, HPC, CBC) and another ringed on Oct. 27th (HO). Wash: Wolferton, April 20th (CBC). All single birds.

368 Pied Flycatcher: North: 6 spring records May 5th–29th at Holme, Blakeney and Cley. Autumn passage Holme–Cley Aug. 20th–Oct. 8th with peak of 100 at Holkham Sept. 1st. East: Yarmouth, Sept. 5th–Oct. 6th with maximum of 26 (PRA, RCM).

370 Red-breasted Flycatcher: North: Blakeney Point, singly, Sept. 12th, 20th–22nd and Oct. 10th/11th. Holkham, 2, Sept. 20th (RECC, MPT, ARH, MGB) and Blakeney, one, 23rd–25th (HH).

379 Water-Pipit (*A.s. spinoletta*): North: Cley, one Nov. 24th till end of year (RAR).

381 Grey Wagtail: *Breeding season* records from Narborough, Gressenhall, Buckenham Tofts, Corpusty and Hockering. Usual winter records.

382 Blue-headed Wagtail (*M. f. flava*): North: Holme, a male May 6th (CBC). East: Breydon, one, June 2nd (PRA) and 1–2 males on 16th and July 1st (RCM).

383 Waxwing: Thorpe-next-Norwich, one, Jan. 13th; Gorleston/Yarmouth, 6, end of Feb.; Sheringham, one, March 16th and Gorleston, 2, April 16th. Short-lived irruption Nov. 9th–23rd when parties up to 12 at Blakeney, Claxton, Blofield, Holt, Sheringham, West Runton and Kettlestone and 50–60 at Wheatfen on 17th (EAE).

384 Great Grey Shrike: Singles at 18 localities as follows: North: Salthouse Heath, wintering till May 6th and from Oct. 20th till end of year. Blakeney Point, Oct. 14th. Blakeney, Oct. 11th and 16th and Dec. 31st (CO, HH). Holme, Oct. 12th–Nov. 27th (possibly 3 different birds–HO). East Beckham, Nov. 20th (RFL–now in Norwich Castle Museum). Burnham Deepdale, Sept. 27th and Butcher's beach Scolt, Oct. 22nd (RC). Holkham, Oct. 14th (CNA, HPC). Gun Hill Burnham Overy, Oct. 21st (AEV).

East: Haddiscoe, Jan. 5th–March 8th (singing March 5th–RWC). Horsey, Jan. 30th (GC). Winterton, Nov. 1st (RAFC). Central: Horsford, Dec. 20th (RPB-O). Breck: Two Mile Bottom, Feb. 17th (CWB). Stanford, Feb. 10th/11th. Tottington, Feb. 22nd–March 25th (CNA, HPC, PJG). St. Helen's Well, Nov. 3rd (CBC). Wash: Dersingham, March 4th and Oct. 14th (CBC).

386 Woodchat-Shrike: North: Sheringham, one, June 17th (JTRS).

388 Red-backed Shrike: Breeding season distribution: North coast: Total of 12 pairs at 8 localities. Breck: Recorded at 3 sites. East: Successful breeding at 2 sites. Central: 3 pairs bred at 2 sites.

391 Hawfinch: Recorded at 12 localities: North: Blakeney, Wiveton, Weybourne, West Runton and Holkham. Central: Norwich (Newmarket Road) and Cranworth. East: Gorleston and Winterton. Breck: Thompson and Lynford. West: Marham.

394 Siskin: Numerous records of small parties. Largest 30 at Guist, Nov. 22nd (JF) and 60 at St. Helen's Well March-April with 3 pairs still present May 6th (CBC).

396 Twite: North/East coasts: Records from usual localities with maximum of 150 at Holme, Oct. 21st. Fens: Wisbech S.F. up to 50 till April 22nd; Welney, up to 13 till March 17th (CBC).

397 Redpoll: Birds showing the characteristics of the Continental race, *C.f. flammea*, as follows: North: Cley, 10 throughout Feb. and 2 on March 25th; Holme, 2, Feb. 24th; one, March 11th and 5 on 18th (CNA, HPC) also one caught and ringed Dec. 27th (HO); Holkham, one, April 20th (CNA, HPC); Weybourne, 4, April 23rd (CAEK). Central: Mousehold Heath, one, March 24th (MJS).

A continued increase in breeding lesser redpolls in birch-heath and forestry land.

401 Bullfinch: Again a marked increase in the breeding population. In North Norfolk at the end of the year flock of 100 at Weybourne and 30 at Holt (RPB-O).

404 Crossbill: An autumn irruption was first noted Aug. 4th when 12 passed westward at Cley. Between then and end of Nov. parties up to 24 in number reported at Hellesdon, Taverham, Norwich, Thorpe, Ludham, Guist, Cranworth, Holme, Brancaster, Holkham, Wells, West Runton, East Runton, Cromer, Winterton (a male dead on beach Oct. 13th), Caister, Yarmouth and Gorleston.

In the Breck, recorded at many localities including 50 at St. Helen's Well July 8th. Close to the Wash at Dersingham up to 25, July 8th-Oct. 22nd; and at West Newton up to 40, July 1st-15th (CBC).

Light-vessels: Singles on Haisboro', Oct. 8th, 11th and 13th, 2 on Newarp on 11th.

408 Brambling: Late birds at Salthouse Heath till April 23rd. Holme-Hunstanton, maximum of 350, Oct. 22nd (CBC).

416 Ortolan Bunting: North: Singly at Blakeney, Sept. 15th (HH) and at Cley on 25th and 28th. Holkham, 2, Sept. 18th (RPB-O).

422 Lapland Bunting: North coast: Small parties up to March 6th with a male at Morston April 7th. Autumn arrivals from Sept. 8th. East: Halvergate/lower Bure/Breydon marshes, up to 25 till March 3rd and up to 22 from Nov. 5th till end of year. Winterton, one arrived on beach, Sept. 23rd (MJS). Wash: Hunstanton, singles Oct. 7th and Nov. 7th; Snettisham, one, Oct. 27th (CBC).

423 Snow Bunting: North/East coasts: Recorded up to April 18th and from Sept. 10th. Counts include 200 at Cley, Jan. 3rd; 400 at Stiffkey on 18th; 200 Breydon marshes, Feb. 11th; 100 at Yarmouth North Denes, Sept. 27th; 250-300 at Cley by end of Nov. and 400

on stubble at Blakeney, Dec. 31st. Wash: Snettisham, up to 50 till April 8th; Hunstanton golf course, 100, Nov. 18th. Away from coast, 3 at Buckenham Dec. 31st (PRA).

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The following, not mentioned in the Classified Notes, were also recorded in 1962 (*breeding species in italics*): Black-throated Diver, Great Northern Diver, Red-throated Diver, *Great Crested Grebe*, *Little Grebe*, Cormorant, *Bittern*, Mallard, Teal, Gadwall, Wigeon, Pintail, *Shoveler*, Scaup, Golden-eye, Grey-lag Goose, *Canada Goose*, *Mute Swan*, Kestrel, *Red-legged Partridge*, *Partridge*, Pheasant, *Water-Rail*, Moorhen, Coot, *Lapwing*, *Ringed Plover*, Grey Plover, Golden Plover, Turnstone, *Snipe*, Bar-tailed Godwit, Green Sandpiper, *Redshank*, Knot, Little Stint, Dunlin, Curlew-Sandpiper, Sanderling, *Stone-Curlew*, Greater Black-backed Gull, Lesser Black-backed Gull, Herring Gull, Common Gull, Razorbill, Guillemot, *Stock Dove*, *Wood-Pigeon*, Cuckoo, Barn-Owl, Tawny Owl, Nightjar, *Green Woodpecker*, *Lesser Spotted Woodpecker*, Skylark, Carrion-Crow, Rook, Jackdaw, Magpie, Jay, Great Tit, Blue Tit, Coal-Tit, Marsh-Tit, Long-tailed Tit, Nuthatch, Tree-Creeper, Wren, Mistle Thrush, Song-Thrush, Blackbird, Whinchat, Black Redstart, Robin, Grasshopper-Warbler, Reed-Warbler, Sedge-Warbler, Blackcap, Garden Warbler, Whitethroat, Lesser Whitethroat, Chiffchaff, Goldcrest, Spotted Flycatcher, Hedge-Sparrow, Meadow Pipit, Tree-Pipit, Pied Wagtail, White Wagtail, Starling, Greenfinch, Goldfinch, Linnet, Chaffinch, Yellowhammer, Corn-Bunting, Reed-Bunting, House-Sparrow and Tree-Sparrow.

Selected Ringing Recoveries

(Notified in 1962)

	<i>Ringed</i>	<i>Recovered</i>
Shag Heron	Farne Is. 29.6.61 (as young). Denver. 7.5.61.	Blakeney Point. 8.4.62. Le Croisic, Loire, France. 28.1.62.
White Stork	Skaerbaek, Jutland, Denmark. 16.4.61.	Whitlingham S.F. Feb. 1962.
Spoonbill	Callantsoog, Noord Holland. 12.6.62. (as young).	Terrington Marsh. 16.12.62.
Mallard	How Hill. 26.1.55.	Velkua (Turku & Pori), Finland. 10.9.61.
Mallard	How Hill. 26.1.55.	Oriniemi, Polvijarvi (Kuopio), Finland. 12.10.62.
Mallard	How Hill. 10.2.56.	Kirovsk (Murmansk), U.S.S.R. 17.9.61.
Mallard	How Hill. 18.2.56.	Korsnas (Vaasa), Finland. 1.8.61.
Mallard	How Hill. 28.2.56.	Island of Sando, Nauvo (Turku & Pori), Finland. 22.8.62.
Mallard	How Hill. 18.2.60.	Vaskijarvi, Somero (Uusimaa), Finland. 20.8.62.
Mallard	How Hill. 18.2.60.	Khaapsalu, Estonian S.S.R. Oct. 1961.
Mallard	Kristinestad, Finland. 10.7.59.	Welney. Dec. 1959.
Mallard	Ostermalma (Sodermanland), Sweden and transported to Vasby (Uppland). 15.6.59.	Middle Drove. 15.1.60.
Teal	Le Sambuc, France. 7.3.60.	Brancaster. Dec. 1960.
Moorhen	Texel, Holland. 27.9.62.	Haisboro' light vessel. 30.9.62.
Coot	St. Ouen, Jersey, Channel Is. 25.12.55.	Hickling Broad. 10.1.59.
Oystercatcher	Scolt Head. 10.7.61 (as young).	Porthcawl, Glam. 1.6.62.
Lapwing	Gooderstone. 11.6.56 (as young).	St. Hilaire des Loges (Vendee), France. 3.1.62.
Lapwing	Gooderstone. 3.6.62 (as young).	Ribadeo (Lugo), Spain. 9.12.62.
Golden Plover	Thornham. 1.11.59.	Brekken (Sor-Trondelag), Nor- way. 24.5.61.
Snipe	<i>The first recovery of a British-ringed golden plover in Norway.</i> Cley. 11.9.59	Oost-Flevoland, IJsselmeer, Holland. 6.10.62.
Curlew	Tjock, Finland. 4.6.59.	Morston. Jan. 1960.
Redshank	Scolt Head. 25.5.60 (as young).	Hamworthy, Dorset. 3.1.62.
Dunlin	Terrington. 18.8.59.	Rumma (Harju), Estonian S.S.R. 10.8.61.
Dunlin	Terrington. 18.8.59.	Near Holbaek (Sjaelland), Den- mark. 20.8.61.
Dunlin	Terrington. 9.8.60.	Ringkobingfjord (Jutland), Denmark. Aug. 1961.
Dunlin	Ottenby, Sweden. 6.7.61.	Terrington. 25.8.61.
Ruff	Wisbech S.F. 4.9.58.	Livorno, Italy. 22.3.60.
Ruff	Wisbech S.F. 5.9.60.	Kozhva, Komi, U.S.S.R. 14.7.61.
Great Black-backed Gull	Lake Orrevann, Stavanger, Nor- way. 20.6.60 (as young).	Breydon. 20.1.62.
Great Black-backed Gull	Great Ainov Islands, Barents Sea, U.S.S.R. (as young). 20.6.61.	Winfarthing. 29.1.62.

Great Black-backed Gull	Hovden (Sogn og Fjordane), Norway. 4.7.55 (as young).	Near Norwich. 20.3.60.
Great Black-backed Gull	Klepp (Rogaland), Norway. 7.6.59 (as young).	Thornham. 5.3.61.
Great Black-backed Gull	Rott (Rogaland), Norway. 24.6.59 (as young).	Caistor. 1.1.60.
Lesser Black-backed Gull	Near Lancaster (as young).	Breydon. 15.8.62.
Black-headed Gull	Raade (Ostfold), South Norway. 3.6.61 (as young).	Thompson Water. 10.3.62.
Black-headed Gull	Hauho, S.W. Finland. 29.6.61 (as young).	Norwich. 2.1.62.
Black-headed Gull	Helsinki, Finland. 11.6.61 (as young).	Toft Monks. 9.4.62.
Black-headed Gull	Selso, Roskilde Fjord, Denmark. 25.6.59.	Thorpe, Norwich. 18.3.62 and later released at Cromer.
Black-headed Gull	Puhtu, Estonian S.S.R. 14.6.61 (as young).	Breydon. Sept. 1961.
Black-headed Gull	Alderfen Broad. 23.6.56 (as young).	Cantley gullery. Early June 1962.
Kittiwake	Farne Islands. 1.7.61 (as young).	Blakeney Point. 20.5.62.
Kittiwake	Farne Islands. 19.7.58.	Brancaster. 20.5.61.
Common Tern	Scroby Sands 31.7.55 (as young).	Scroby Sands. 28.7.62.
Sandwich Tern	Scolt Head. 21.6.62 (as young).	Near St. Louis, Senegal. 17.1.63.
Sandwich Tern	Stiffkey. 28.6.59 (as young).	Found alive but oiled, Cape Town, South Africa. 26.4.62.
Green Woodpecker	Minsmere. 27.7.60 (as young).	Near Norwich. 20.2.61.
Swallow	Benacre, Suffolk. 27.8.61.	Hardingham. 8.7.62 (caught and released where breeding).
Sand-Martin	Bawsey. 6.8.61.	Las Cabezas (Sevilla), Spain. 3.9.61.
Rook	Spurn Point. 8.11.61.	Swaffham. 7.12.61.
Blue Tit	Cley. 5.11.57.	Re-trapped there. 4.3.62.
Coal Tit	Aylsham. 22.6.61.	Drayton, nr. Norwich. 12.2.62.
Song-Thrush	Cley. 14.10.59.	Sanlúcar la Mayor (Seville), Spain. 2.2.62.
Redwing	Thorpe, Norwich. 31.12.59.	Guimaraes (Minho), Portugal. 30.11.61.
Blackbird	Near Turku, Finland. 24.5.61 (as young).	Rollsby. Nov. 1961.
Blackbird	Nunspeet (Gelderland), Holland. 16.6.59 (as young).	Thorpe, Norwich. 29.2.62.
Blackbird	Gooderstone. 17.11.59.	Near Dorpen (Niedersachsen), Germany. 2.12.62.
Robin	Fair Isle. 4.4.60.	Gorleston-on-Sea. 13.3.61.
Sedge-Warbler	Cley. 6.5.59.	Returned to breed there 1960, 1961 and 1962.
Whitethroat	Cape St. Vincent, South Portugal. 1.10.61.	Saxthorpe. 14.7.62.
Hedge-Sparrow	Gibraltar Point, Lincs. 12.9.61.	Holme. 22.9.61.
Red-backed Shrike	Middleton. 24.7.61 (as young).	Benacre, Suffolk. 1.9.61.
Starling	Ribatschi, Kaliningrad, U.S.S.R. 26.6.61 (as young).	Ludham. Feb. 1962.
Starling (4 birds)	Pori, S.W. coast of Finland. 28.5.61.	} Inner Dowsing light-vessel. 29.10.62.
	Hol (Buskerud), Norway. 15.4.62.	
	Castricum, Holland. 15.11.61.	
	Kennemerduinen, Holland. 31.10.62.	

Starling	Ribatschi (formerly Rossitten), Kaliningrad, U.S.S.R. 7.7.61 (as young).	Rockland St. Mary. 8.1.62.
Greenfinch	Solihull, Warwicks. 7.2.62.	Feltwell. 23.4.62.
Goldfinch	Brancaster. 2.9.61.	Lier (Antwerpen), Belgium. 28.10.61.
Bullfinch	Sandwich Bay, Kent. 29.10.61.	Flitcham, Castle Rising. 19.4.62

Contributors

P. R. ALLARD
 R. W. ALLARD
 D. R. ANDREWS
 C. N. ARNOLD
 VICE-ADMIRAL J. ASHLEY-WALLER
 H. F. ASHTON
 R. P. BAGNALL-OAKELEY
 J. BAILEY
 P. R. BANHAM
 W. S. BARBER
 MRS. K. BARNHAM
 MISS R. M. BARNES
 L. BATTRICK
 G. E. BISHOP
 W. F. BISHOP
 M. R. BOARDMAN
 M. G. BOUSTELL
 B. BROUGHTON
 C. W. BROWN
 J. F. W. BRUHN
 A. L. BULL
 G. BULLARD
 P. S. BURNS
 A. & R. BURROWS
 D. V. BUTT
 D. A. J. BUNTON
 R. G. BUNTON
 C. J. CADBURY
 CAMBRIDGE BIRD CLUB
 R. A. D. CAMERON
 R. H. G. CANT
 A. H. CATOR
 B. CAVE
 R. CHESTNEY
 D. CHIVERS
 D. CHUGSTON
 P. R. CLARKE
 CLEY OBSERVATORY
 R. W. COLEMAN
 R. E. COLLINS
 T. COLMAN
 MISS B. A. CONFY
 R. A. F. CONY
 H. P. CRAWLEY
 G. CREES
 A. L. CRESSWELL
 MRS. G. R. CULLFY
 J. CUTHBERT
 E. T. DANIELS
 A. H. DAUKES
 H. DAVIES
 A. J. DAVISON

P. DAY
 MISS S. DAY
 S. DOBSON
 F. E. D. DRAKE-BRISCOE
 R. E. C. DUNBAR
 A. DYMOND
 N. DYMOND
 W. EALES
 G. M. S. EASY
 E. A. ELLIS
 F. FARROW
 L. FENN
 J. T. FENTON
 MISS E. FORSTER
 J. FORSTER
 W. J. GARNETT
 R. GAZE
 P. J. GEORGE
 N. GERBER
 T. GLADWIN
 M. GOODMAN
 C. GOSLING
 MISS E. B. GREEN
 S. GREENWOOD
 MISS P. GURNEY
 C. HAINEs
 A. R. HALL
 H. N. HAMPTON
 C. B. HARMER
 D. G. HARRISON
 R. H. HARRISON
 P. J. HAYMAN
 A. & D. HEWITT
 HOLME OBSERVATORY
 P. HOLMES
 C. W. HOLT
 A. G. HURRELL
 G. JESSOP
 R. JONES
 W. JONES
 J. JOHNSON
 P. N. KEARNEY
 A. W. KERRIDGE
 I. F. KEYMER
 P. D. KIRBY
 C. A. E. KIRTLAND
 C. R. KNIGHTS
 F. J. LAMBERT
 N. LANGHAM
 GEN. SIR G. LATHBURY
 J. M. LAST

MISS D. A. LEAKE
 R. C. MANSFIELD
 O. R. MARKS
 MISS D. M. MAXEY
 MISS V. MAYNARD
 R. MAYO
 MISS E. McEWEN
 G. J. McKILLOP
 MAJOR J. W. MEADE
 MRS. M. MEIKLEJOHN
 D. F. MUSSON
 I. C. T. NISBET
 G. B. PAGE
 MRS. R. PALMER
 N. PAUL
 E. PIGGIN
 F. E. PITTS
 MISS S. C. PUDDY
 D. M. PUTMAN
 H. RAMSAY
 G. RAYNER
 P. A. G. READ
 R. A. RICHARDSON
 MISS M. R. RICHES
 S. RISHMAN
 P. O. ROBINSON
 M. J. ROGERS
 R. RYALL
 COL. D. SCOTT
 R. SCOTT
 R. R. SCOTT
 M. J. SLAGO
 J. T. R. SHARROCK
 A. P. SIMES
 E. G. SKOYLES
 M. E. SMITH
 M. S. J. SNOXELL
 G. R. SOUTH
 MISS D. STEINTHAL
 J. TAVERNER
 MISS J. M. TAYLOR
 M. P. TAYLOR
 P. THOMPSON
 A. E. VINE
 D. I. M. WALLACE
 G. WANT
 R. WARREN
 F. WATERS
 P. J. WILLIAMS
 R. WILSON
 D. WRIGHT

Norfolk Mammal Report

1962

INTRODUCTION

We are pleased to present to members the ninth report on Norfolk mammals. Many of our contributors take a great deal of trouble to provide the detail which adds considerably to the value of their observations. They become so much more significant if an accurate record is made at the time, and includes information relating to the time of year, weather and habitat. Frequently these have significant bearing on the observations of others, and they assist considerably in the assessment of changes in population or the short or long term effects of weather conditions and pest control. With the assistance of more than one hundred observers well dispersed over the whole county we are able to give a satisfactory impression of the status of most of our mammals, but we still lack adequate records of the smaller ones such as the mice, voles and bats. A few of our members are now taking up work on live-trapping, however, and the regular work of the bat-watching group will doubtless widen our knowledge in the next few years.

During the year all the known occupied badger setts in the county have been visited in connection with the National Badger Survey, but a number of unconfirmed records and occasional observations suggest that some additional setts remain to be discovered. A short interim report is given as a supplement at the end of the Classified Notes.

After what seemed to be a disastrous decline in numbers in 1960, foxes appear to be making a remarkable recovery, and the outward movement from the centre of the county has continued into many areas where foxes have not been seen within living memory. This might be associated in some places with the parallel increase in rabbits, which despite Rabbit Clearance Societies have once again become established. In other areas the number of carcasses of coypus left by pest control employees may have been responsible. The number of observations of otters has increased, and this could well mean that this species has also had a good year. As forecast a few years ago, records of sightings of deer are also increasing. Deer benefit from the protection of new forest plantings, and as these forests age, shading out the available food in the herb layer, it is likely that they will become more frequent wanderers.

The inclement weather of 1962, with its very late spring, wet summer and early frosts in November, will probably have more telling effect in 1963. The record of road casualties during the course of the year appears to be significant in giving an annual

assessment of the status of eight or nine mammals. The differences in various parts of the county over approximately the same lengths of road make interesting contrasts and comparisons. It would be of value if those sending in these statistics would analyse them to show the number of each species found in each quarter of the year.

We thank all who have contributed observations and are also indebted to H. A. Hems, R. P. Bagnall-Oakeley and R. Jones for their excellent photographs. Records for the 1963 report should be sent *by the end of January* to F. J. Taylor Page, "Fairmile", 98, Newmarket Road, Norwich, NOR 27D. *Tel.*: 53365.

Classified Notes

INSECTIVORA

Hedgehog (*Erinaceus europaeus*)

Over most of the county the general decline in population which seemed to have set in towards the end of 1961 appears to have continued in 1962. Many reported fewer casualties on the road and only occasional records of live specimens. From Watton northwards to Holt there appears to have been a higher road mortality during October, although this appears to have included an entire family of five half-grown animals noted in one 100-yard stretch of the Holt-Dereham road (RPB-O). Last year's report contained an error relating to the mortality on the Holt-Norwich road. It should have read one per 12 miles per week and not 12 per mile per week. The possible increase in the latter part of the year was also noted between Langham and Stalham (BFTD), Hickling (EP), Norwich (RMB) and Garboldisham (RM).

Adults were late out of hibernation owing to the prolonged wet spring. Young hedgehogs were observed on the move at North Walsham (1WC), Garboldisham (RM) and Snoring (RPB-O) in mid-December. Increases in the fox population may already be making a noticeable difference to the population of hedgehogs.

Common Shrew (*Sorex araneus*)

Relatively few records came in for any of the shrew species. The weather conditions were probably unfavourable, but there is no evidence other than the scarcity of reports that their status is declining. Common shrew was less frequently seen and is believed scarce at Keswick (EMB), Shipdham (ALB), Gt. Moulton (HR), Ingworth (SS), Corpusty (JL) and N. Norfolk (RPB-O). An increase was noted at Watton (JD) and it was commonly taken as food by cats at Dereham (KD) and Witton (FRW). It is interesting to find it occurring within the City of Norwich on the railway embankment at Brian Road (ETD). Several were reported as road casualties (HFA). An unusual variety with greyish head, neck and hind quarters and with a dark middle was seen at Taverham (MCS) and an entirely black one was found dead at Costessey (HFA).

Pigmy Shrew (*Sorex minutus*)

The only area in the county which appears to have a fair population is the Wensum valley (ws). Only Ingworth (ss), Holme (HBO) and Keswick (EMB) had single reports of sightings.

Water Shrew (*Neomys fodiens bicolor*)

Observations have come from Hickling (EP), Trowse (CNS), the Wensum valley (ws) and from the River Glaven between Hempstead and Selbrigg ponds, where one was watched at close range for ten minutes (RPB-O).

Mole (*Talpa europaea*)

Again there seems to be considerable variation in the estimates of the number of moles in different parts of the county. Reports of increasing populations came in mainly from the south-west and north, but probably this was an impression created by the fact that burrowing was almost continuous in these areas from April to December, particularly in low-lying damp land. This was the pattern of activity at Attlebridge and Morton (MCS), Calthorpe (BFTD), Watton (GJ), Merton (RG) and North Walsham (IWC). Decreases were apparent at Seamere (CG), Little Dunham (FPB), Gt. Moulton (HR), Binham (RS) and Wymondham (DM), often associated with control by the Ministry of Agriculture or the use of poison sprays.

A mottled orange coloured variety was taken at Lakenham Old Hall in February (NCM), a creamy golden one at Docking in early May (GT), a pale cream one at Salthouse in September (RPB-O) and a light buff coloured one at Swanton Novers in mid-December (NCM).

Moles were among road casualties at Old Catton and Beetley, near Watton and near Attlebridge. One was observed swimming strongly in Bayfield Lake over an open stretch of water 50 yards wide (RP B-O).

CHIROPTERA

An increased number of records this year may reflect not only that the number of our observers has increased but also that the status of bats is improving everywhere in the county, for reports of them are more widespread than ever before. The Bat Unit led by John Woolston and Miss Ruth Barnes has continued to do most valuable work. Attempts to study the homing abilities of Pipistrelle bats (*Pipistrellus pipistrellus*) were carried out with specimens taken from the roost at Worsted church, but inclement weather made success unlikely. On September 6th, 29 specimens were released at East Wretham (FJTP). On September 12th, 11 were released at Horstead (RMB, WJW).

Pipistrelles have been recorded at 23 places in the county this year. This includes roosts at nine churches. In spite of complete disinfestation of bats at Brinton and Swannington churches by fumigation, roosts have been re-occupied (RPB-O, MES). Few North Norfolk churches appear to be without a bat population. The earliest flight record was on April 22nd (MES), and the species was observed on the wing until the very end of the year. Two were seen on December 29th when the temperature was only just above freezing point.

The Bat Unit also investigated the bat species at Norwich corporation rubbish-tip at Harford. At least thirty Noctules (*Nyctalus noctula*) were observed flying low to catch crickets (*Acheta domesticus*) August 2nd; on 22nd, only six were counted. On September 17th unsuccessful attempts were made to net 5 Noctules flying above the River Wensum at Attlebridge (RMB, SCP, MES, WJW). Larger numbers had been noted in the preceding weeks (MES). Occasional records come from Wymondham (BO) and Garboldisham (RM).

Two Whiskered Bats (*Myotis mystacinus*) were disturbed in a pile of wood containing several hollow logs at Brinton, where previously they had been found in the roof of the Hall (RPB-O). Natterer's Bat (*Myotis nattereri*) has been observed in flight over the lakes and ponds in the Holt area, and at Old Costessey gravel pits in late September (RPB-O). During the cold weather late in the year, Daubenton's Bat (*Myotis daubentonii*) occupied the old chalk workings at Eaton in fair numbers (CNS).

The first recorded Norfolk specimen of the Serotine Bat (*Eptesicus serotinus*) was found dead in an unused room at Ellingham Hall, near Bungay, October 14th. The possible immigration of this species from known roosts near Lowestoft has been hoped for and expected, but so far no known Norfolk roost has been discovered.

Several records of Long-eared Bat (*Plecotus auritus*) have come in. One specimen, infested with red mites, was found at Morton (MES) and released at Attlebridge, September 8th. A male was taken at Brisley, June 5th (DM) and another was found dead at Corpusty (JL). Others were seen at Langley (WKL).

A Barbastelle Bat (*Barbastella barbastellus*) was taken at Calthorpe Broad, Ingham, August 9th (MCH) and another at Gt. Witchingham, September 26th (CNS).

LAGOMORPHA

Rabbit (*Oryctolagus cuniculus*)

Despite the efforts of Rabbit Clearance Societies and continued sporadic outbreaks of myxomatosis, the population in many areas is now higher than at any time since 1954. Rabbits continue to

live rough above ground in thick scrub or stubble, taking to burrows late in the year (QEG). At that time, myxomatosis is more common, apparently because the rabbit flea, infected with the virus, lies quiescent as a pupa until disturbed in the burrows. It has been suggested that gassing tends to suppress the disease by killing the flea (HB). Many rabbits are now immune to myxomatosis, and recover, even if they develop the disease temporarily (BO). Increase of rabbits is undoubtedly assisting the increase of foxes. Where the disease has appeared for the first time, as at Breydon, the effects are disastrous. It affected rabbits here in autumn 1961 and continued to do so until spring 1962, wiping out the entire population that had existed there in large numbers for over seventy years (RHH).

Records of black rabbits are made occasionally. Several were seen at Weeting Heath (RHM, IHG) and one at Morton (MES). Increasing numbers are found dead on the road as traffic casualties (GJ, HFA). The probable proportion of rabbits to hares is brought out by the estate records of control at Elveden, viz. Hares 3,754. Rabbits 5,031. The latter figure is significant, since rabbits also died from myxomatosis in considerable numbers (VAH).

Hare (*Lepus europaeus occidentalis*)

In many places the hare population has shown a sharp decline this year, in comparison to the very large increase which had taken place between 1954 and 1958. Nevertheless appreciable numbers still exist in some areas. Very reduced numbers are now taken in game bags everywhere (RS, CG, WKL, FRW). Road casualties are also far fewer (GJ). An unusual increase, however, occurred at Cley (WFB), and locally numbers have tended to build up at Swardestone (ETD) and in the Holkham-Wells area (ALB).

RODENTIA

Bank Vole (*Clethrionomys glareolus*)

We continue to lack adequate records of our small mammals. They are probably common in many places, but few people ever see them save as dead specimens caught in a break-neck trap. Live trapping with a Longworth trap is a most interesting occupation and could yield valuable information, both with regard to the species and its status. For example, 15 bank voles were caught in an apple store at Watton in mid-November (GJ); and in the same month at Wheatfen a female in breeding condition was taken (EAE). They abound in the garden at the latter place, and although mainly nocturnal they are seen during the day when they come out to gnaw fallen fruit. They are reported as moderately common at West Runton (HAH), on the fringes of woods at Gressenhall (SCP) and in the Holt and Melton Constable areas (RPB-O).



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H. A. Hems

is possible that there is a decrease in the population of small mammals. Fewer records of Long-tailed Field Mice suggest this.



Copyright

R. Jones

During the year Foxes have become widespread. This one appeared at Horsey where Foxes have not been seen within living memory.

Some of the finest wild Red Deer in Great Britain are to be found in Thetford Chase. This one was photographed during the summer.

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R. P. Bagnall-Oakeley



Field Vole (*Microtus agrestis*)

Numbers are said to vary from very common—Keswick (EMB), Corpusty (JL) and Watton (JD)—to occasional—Hickling (EP), Attlebridge (MES), Cranworth (ALB), Bawburgh (HFA) and Upton (HFA).

Once again at Breydon the considerable numbers attracted short-eared owls in winter and early spring. Ten to a dozen owls were seen hunting at one time and their pellets contained almost exclusively the remains of these voles (RHH). About 12 field voles were taken on the playing fields of the Norwich School (ETD). One kept as a pet ate oats, apple, peanuts, lettuce and cheese. It fed briefly at regular intervals and drank frequently, retiring for rest between periods of activity. It rapidly became tame.

When disturbed by the trimming of lakeside banks at Brinton, field voles took to the water and proved themselves excellent at swimming and diving (RPB-O).

Water Vole (*Arvicola amphibius amphibius*)

Water voles are fairly common in our Norfolk rivers, lakes and broads, though they are infrequently seen. They have been observed regularly in the upper and middle Glaven valley (RPB-O), in the River Blackwater (ALB) and in the upper Bure valley (JL). They are common in Hickling Broad (EP) and in the shallow lakes and ponds near Holt (RPB-O). One was also seen in a roadside pool at Langmere (ETD).

A single black specimen was twice seen in the moat at Caister Castle (DAJB). This particular variety may have become less common, perhaps temporarily, in the Glaven valley where the proportion is estimated to be one to 5 of the normal brown colour (RPB-O).

Long-tailed Field Mouse (*Apodemus sylvaticus*)

The sparsity of records this year might suggest that the long-tailed field mouse has become rare, though it is probably very common in fields, woodlands and hedgerows. The latter habitat provides shelter and food more particularly in winter when rose hips and hawthorn berries are still available. They move there in the late summer and road casualties occur at this time (HFA). In Norwich, field mice were found on a railway embankment (ETD), on the City of Norwich School playing field (CXS) and the basement of the keep of Norwich Castle Museum (RMB). They appear to be regular inhabitants of the Castle Gardens, where they feed on picnic scraps left by visitors.

Harvest Mouse (*Micromys minutus*)

Reports came in from seven different places. The species is said to be common at Happisburgh (DMM) and Ingworth (SS). 100 were killed when a corn stack was threshed at Gt. Moulton (HR).

House Mouse (*Mus musculus*)

There seems to be a general opinion that house mice are much scarcer than a few years ago. Continued control over many years seems to have been effective. In Norwich, however, mice subject to control by poison have recently developed a strain immune to two of the main control preparations (ATP, EDP). It would appear that House Mouse is now more likely to be common away from houses.

Black Rat (*Rattus rattus*)

The species is now likely to be extinct in the county. A report of a single specimen at Acle is almost certainly a mistaken identity. It was probably a black water vole.

Brown Rat (*Rattus norvegicus*)

The considerable increase in the rat population in late 1961 carried over into April of 1962, and proved one of the most serious control problems for many years. In at least two places, Sheringham and Happisburgh, nests that were examined contained extraordinarily large litters. At the former, the rat catcher reported a nest containing 15 young (RPB-O) and at the latter, one in the middle of a wheat field that had been cut about ten days, contained 16 (NMM). Very large numbers have been killed by poison, however, and at the end of the year numbers once again appeared to be under control. An attack on mating frogs, similar to one on toads reported in previous years, was observed at Blofield (DT).

Along the marsh walls at Breydon, brown rats, attracted by the rubbish tip on the south side, have steadily increased, and they have done much damage to ground nesting birds (RHH).

Among road casualties rats easily take first place. Nearly 300 were counted dead on one stretch of road near Watton (GJ). The number killed goes up in the latter part of the year when rats move from the fields to farm buildings.

An albino male was taken at Branthill Farm, Holkham, November 10th (DHM), and a white female with purplish eyes was trapped at Booton Hall, December 10th (TS). Both skins are in the Norwich Castle Museum.

Red Squirrel (*Sciurus vulgaris leucurus*)

Only in a few places does the status of red squirrel appear to have improved noticeably. At Garboldisham red squirrels were reported to be more numerous than for the past nine years (RM) and at Salle Park they returned after several years' absence (KH). Bawdswell Hall also had a slight increase (QEG) and at Castle Acre ring-barking of Scots Pine up to a height of twenty feet occurred for the first time during very dry weather (HWB). The Breck population stays fairly high, and a fair number of road casualties

is always recorded from the Watton area (GJ). In Swaffham Forest, some were found dying or dead with no sign of damage except scouring (JM). Near Thetford a heron was observed pecking the fur off the back of a dead squirrel which it may have caught in its nest (ws). A distinct decrease is said to have occurred in North Norfolk.

A large company of about twenty was watched at Horsford, all active in one large oak (RPB-O). A similar "gathering" was observed near East Harling several years ago (FJTP), but the significance of this communal activity does not appear to be known.

Coypu (*Myocastor coypus*)

The official campaign against coypu began in September 1962. Already the total kill was approaching 100,000 (RVE) in areas covered by the East Suffolk and Norfolk River Board, and with the help of Rabbit Clearance Societies. Doubtless many kills went unrecorded. The campaign commences on the fringes of coypu infestation in East Anglia, and it is intended to work steadily inwards towards the Broads area over the next two or three years. In some of the outlying pockets in Norfolk and Suffolk well over 1,000 were killed between September and December. It remains to be seen if the clearance has been complete. Even where control has not been officially exerted, reports have come in that the populations have been greatly reduced. Hickling, for example, claims that it has only a tenth of the numbers it had in 1961 (EP). At Seamere, though much damage was done to the reed beds during the summer, only odd specimens were present by the end of the year (CG). Reductions were also very noticeable at Horsey (AB). At Cley the two thousandth coypu shot over a period of three years over 500 acres was taken in the last days of 1962 (WFB).

At Surlingham, after severe frost in December, a considerable number of fresh skeletons of young beasts were cleaned up by carrion crows and rats. The remains were widespread among the reed-beds (EAE). Where disturbance was slight, considerable populations have built up. In the vast network of old pits and ditches around Thompson Water (RG), the reed beds and marshes at Holkham (RPB-O), the Breck meres (PB), the Yare marshes (WKL) and in some parts of the Broads, numbers are quite high. Cleared areas of reed in the Yare valley left open mud which became colonised by plants such as marsh sow thistle, milk parsley and tussock sedge. Many trees and bushes were blown over in the marshes after coypus had gnawed through their roots during hard weather after Christmas (EAE).

CARNIVORA

Fox (*Vulpes vulpes*)

Foxes have increased and become widespread. Hitherto it was unusual to have reports of foxes from elsewhere than the

hunting country of central and west Norfolk, but the trend shown last year has continued rapidly, and fresh areas have been colonised where the fox has never been seen before in living memory. A litter of five was dug out at Horsey, for example (AB). It was thought that the dog fox and the vixen had been useful locally in coypu control. Another new record was at Gt. Moulton, where instead of coypus the foxes found food in a turkey farm (HR). At Bawdeswell more foxes were in the neighbourhood than at any time in the past fifty years (QEG). Increases were reported also from Seamere (CG), Hickling (EP), Stanford Battle Area (GJ), Shipdham (ALB), North Elmham (DM), Potter Heigham (TJT), and North Norfolk in the woods around Swanton Novers, Thursford and Stody (RPB-O). In the area covered by the West Norfolk Fox Hunt, numbers appear to have been normal, although litters during the year were larger and all foxes killed were in excellent condition. One shot at Brundall weighed 16½ lb. (HFA) and two other dog foxes from Cockley Cley weighed 14½ and 15½ lb. respectively (HFA).

Badger (*Meles meles*)

A short interim account of the work done for the National Badger Survey is given at the end of this report. During the year unconfirmed evidence from Cromer, South Walsham (MJS), North-repps (FG), North Walsham (LJH) and North Burlingham (BRR) suggest that a few setts remain to be discovered. In North Norfolk, holes in Weybourne woods had signs of badger occupation, and a cottage nearby was visited on several nights for food. Sightings in car headlights late at night at Thursford and Wood Norton suggest that this area would repay a close search (RPB-O).

Otter (*Lutra lutra*)

Of the larger Norfolk mammals, the otter appears to be scarcer than would be expected. Perhaps it is given less attention by our observers than it deserves. It is admittedly a difficult animal about which to obtain information, but a recent book *Watch for the Otter* by Elaine Hurrell, published by Country Life should give encouragement, and certainly provide advice.

The most likely places for otter watchers are in the Thornham and Holme area (CNA, HPC, HBO), Scolt Head (RC), Stanford Water and Thompson Water (GJ), Hickling Broad (EP) and in the Wensum valley (PW). Single reports were made of individuals at St. Benets and North Elmham (KD), Acle (MJW), Itteringham and Brinton (RPB-O). One was shot at Sea Palling (CG) and another found dead at West Caister (WJW). Tracks were seen beside the River Mermaid at Bolwick Hall (MW) and along the marsh dykes at Holkham (RPB-O). Spraints are frequently left under Acle Bridge (DT). One or more regularly travels up and down the River Glaven between Edgefield and Thornage, and along the tributary between Thornage and Gunthorpe (RPB-O).

Stoat (*Mustela erminea stabilis*)

The decline in the stoat population seems to be slowing down, and within the next year or so it is likely the numbers will again be restored, particularly if the rabbit population continues to increase. Already stoats are making a return in the Breck areas (ETD, FJTP, DM), but in most places in the county they are scarce or virtually non-existent. Single observations were made at Yaxham (MES), Scoulton (ALB), Calthorpe (BTT) and Thorpe Hilly Plantation, Norwich (PA). Survivors appear to kill and feed on small birds, or birds killed on the roads. Two stoats were themselves road casualties at Watton (GJ), one at Caister (DAJB) and one at Gt. Witchingham (PW). A stoat's nest at Surlingham contained the remains of a moorhen, a blackbird and two freshly killed eels (EAE). One in ermine was shot at Fakenham, February 21st, and another was also seen late in the same month on the river in the same area (EDP). A partially white specimen was reported from Weston Longville, April 17th (RPB-O).

Weasel (*Mustela nivalis*)

Throughout the county there is general agreement that numbers continue to increase, and the species is probably more common than is realised. Increasingly weasels are found dead on the roads, particularly during the summer when they hunt the verge and banks for ground-nesting birds. A family of seven was watched hunting together at Langham in August (RPB-O). In the Watton area the road casualty list included fourteen weasels (GJ). A minor infestation was dealt with at Cley (WFB). At Valley House, Holt, a specimen with a completely white pelage and dark eyes was shot during the cold weather in February (NCM). Although it is generally thought that weasels do not turn white in winter, several instances of white or partially white animals have been reported in recent years (vide 1961 Report). An almost white one was killed at Kelling in 1956. As long ago as 1903, one from Morningthorpe near Long Stratton was presented to the Norwich Castle Museum (NCM, EDP).

Mink (*Mustela vison*)

Although feral mink have become a new pest problem in some counties, none was caught in Norfolk during 1962.

Feral Domestic Cat (*Felis domesticus*)

New records have come in from Whitwell (AH1), Wramplingham (PA), Bilney (DM) and Taverham (FED-B). They have increased considerably at Horsford (FED-B).

Seals

Yarmouth Naturalists' Society continues to keep records of the Common Seal (*Phoca vitulina*) on Scroby Sands. During a first visit on June 18th only about 60 adults were counted. About

half were resting on the N.E. corner and the remainder were swimming offshore. Owing to adverse weather no further visit was made until July 8th. This first week in July was, as in previous years, the peak pupping period. Despite the bad weather 30 pups with age range between a few days and a few hours were found. A few were dead or extremely weak. On July 28th approximately 100 adults and 20 pups were estimated to be ashore (RHH).

Small numbers of Common Seals were also seen at Scolt Head Island (RC). Fewer were found dead there this year. Elsewhere strandings have been less frequent. The principal breeding grounds are, however, the sandbanks in the Wash, where numbers are estimated at between 2,000 and 4,000. Constant complaints are made that they do damage to coastal fisheries, but an analysis of stomach contents has shown that a large proportion of their food consists of shore crabs and fish of uneconomic value (EDP).

The abnormally high tides and strong winds prevented any close study of the Grey Atlantic Seal (*Halichoerus grypus*) this year (RHH). 18 were seen resting on the N.W. corner of Scroby Sands on July 28th. A small party of naturalists visited the Sands on December 4th during the breeding season. 10 pups were counted (RMB, EAE, PGT, WJW). The severe weather later in the week doubtless had a serious effect on their survival. A very young one was washed ashore at Yarmouth on the 12th (EDP). No recoveries of ringed specimens were reported.

ARTIODACTYLA

Red Deer (*Cervus elaphus*)

A very notable increase in observations of red deer well away from Breckland forests occurred. There now seems to be much more movement to and from outlying estates, and red deer have been seen as far afield as Carbrooke (FJTP), Seamere (CG), Beighton (BRK), Hockham and Wretham (ALB), Merton (RG) and Loddon (WKL), but even more surprisingly in the coastland area from Sea Palling (CG) to Horsey (AB) between September and November. One, possibly an escape from Melton Constable park, lived for some months on a small area of marshy land at Guist (JL). Another, one of a small herd in Swaffham Forest, was killed by a van on the Downham Market road, September 28th (EDP). The identification of the carcass may have been incorrect, as a fallow deer was shot on the forest edge late in the year (DW).

Several poor 2-3 year olds with poor heads have been shot in Thetford Chase (DW). This area is now known to contain some of the finest wild red deer in Great Britain. An account of the shooting of a 15 pointer weighing 33 stone 7 lb. clean was given in *The Field*, January 3rd, 1963.

Fallow Deer (*Dama dama*)

Apart from those at Swaffham already mentioned, fallow deer occur in small but increasing numbers at Horsford (FED-B). Several were shot owing to the damage caused to sugar beet on nearby farms. It is possible that a number of wandering red deer reported may have been incorrectly identified.

Roe Deer (*Capreolus capreolus*)

Roe are also tending to wander more widely, particularly in a northerly direction. Roe damage was found in the region of Drymere pit about $2\frac{1}{2}$ miles from Swaffham, and unconfirmed reports have come from woods near Billingford and Elmham (DM). Roe may also be present in Horsford Woods (BRR, FJTP).

In an attempt to improve the heads of Thetford deer, feeding with mineral salt licks is being tried. During the hard winter one kid died of yew poisoning. This is unusual in deer (DW). Control has accounted for 73 buck and 52 does (FC).

Muntjac Deer (*Muntiacus reevesi*)

This small Asiatic species has once again made several appearances at widely different places. A female appeared in a garden at Diss in mid-May (KMW). Another was seen at West Tofts in Thetford Chase (DW), and others unconfirmed though probable were on the Barnham R.A.F. site near Thetford (WS), Didlington, Lynford and Roudham (FC) and Pensthorpe, near Fakenham (CG).

CETACEA

Common Porpoise (*Phocaena phocaena*)

Reports of strandings came from Holme, March 4th (CNA, HPC), an almost fully grown female at Cromer, April 21st (DT) and a 10 ft. specimen at Sea Palling (no date) (CG). This last was badly damaged, perhaps by a ship's propeller. Several were close inshore at Burnham Overy in late August (RPB-O).

White-beaked Dolphin (*Lagenorhynchus albirostris*)

A fully grown adult was stranded at Holme (CNA, HPC). One, about 7 ft. long, passed within a few yards of bathers at Holkham in early September (RPB-O).

Lesser Rorqual (*Balaenoptera acutorostrata*)

Two uncertain identifications were made: at King's Lynn, February 6th and at North Wootton Marsh, February 4th. Both were about 30 ft. long (BM).

Bottle-nose Whale (*Hyperoodon ampullatus*)

Two individuals each about 17 ft. long were washed ashore at Holkham, July 10th. This species has not been recorded since 1951 (BM).

Norfolk Badger Records

The National Badger Survey organised by the Mammal Society of the British Isles was launched in 1962. Its aim is to record and map the distribution of badger setts in Britain. Information is being collected relating to the history of the population in each county, the changes that take place annually, the factors that govern the existence of badgers in any area, the density of the population and seasonal movements. The position of each sett is being mapped, and as much scientific data collected as possible. This is probably the first nation-wide survey ever made of any mammal in Great Britain.

Norfolk is a county with very few setts. It is one in which the soil conditions and the hand of man have told heavily against the badger. Despite this we have records of its existence since the seventeenth and eighteenth century, mainly from the N.E. There are reports in *Transactions* I, V and VI, and in the *Zoologist* in the nineteenth century, of badgers seen or killed at Brundall, Intwood, Swaffham, Hickling, Irstead, Melton Constable, Salle, Wretham, Holkham and Fornsett. At the time when foxhunting was on the decline in the mid-nineteenth century, and foxes were seldom found, badgers were introduced to make earths for the foxes which were imported first from Leicestershire and later from Canada. A further introduction was made by Ranji Singh at Blo Norton Hall in the early part of the nineteenth century.

However, when H. J. Howard wrote his report for the British Association in 1935 he was able to account for but one known occupied sett, at Kelling. Uncertain and unconfirmed records between that time and 1950 suggested that this information was incomplete, for they came in from Drayton, Aldeby, North Elmham, Bodham, Weybourne, Hemblington, Tasburgh, Stoke Holy Cross and Didlington. Broadly, the earlier information was concentrated on a belt of land some seven miles wide extending from Holkham to North Walsham, and a belt of similar width extending from Kimberley on the S.W. side of Norwich, to Tasburgh on the S., to South Walsham on the E. No known occupied setts appear to exist in either area to-day, though it is very probable that undiscovered ones exist. Fairly frequent trapping, shooting and sighting suggest this. It is very unfortunate that the relative harmlessness of the badger is so little understood.

Since 1954 the badger "country" has become limited to known setts in the centre of the county, where the animals have found protection on private property, and where the owners observe a discrete silence about their presence. Even here, in hunting country, any sett dug outside these protected spots appears to be unsafe. One very extensive one was gassed when terriers, which had been turned in after a fox, were themselves killed by the

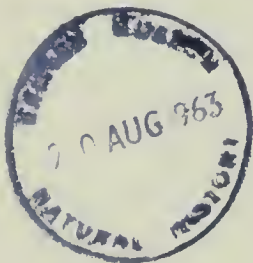
badger occupants. An outlying sett known since 1940 in the banks of a disused drainage channel at Wiggenhall St. Germans, W. of King's Lynn, was destroyed during the construction of the new flood channel in that area. The badgers that escaped may have been responsible for the development of a large occupied sett on Forestry Commission land a few miles away.

At the present time the county can claim but five setts known to be in active use, compared with 100 in Essex and 250 in Leicestershire. Much remains to be done to extend our knowledge, to determine if other setts exist and to discover whether areas previously used still provide the right conditions and protection. Everything possible should be done to encourage badgers in the county and to prevent their slaughter by irresponsible shooting. I should be very glad indeed to have the names of any members who would be prepared to visit sites and provide the detailed information required by the Survey.

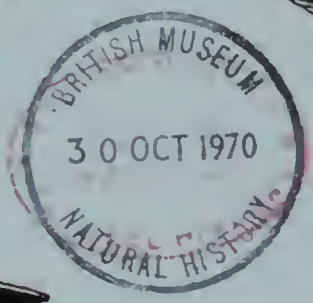
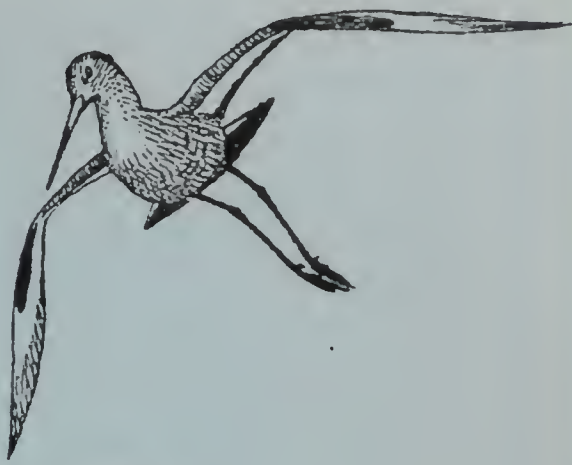
F. J. T. P.

Contributors

- P. ALDOUS
 C. N. ARNOLD
 H. F. ASHTON
 D. ASKEW
 H. W. BACK
 P. R. BANHAN
 R. P. BAGNALL-OAKELEY
 F. P. BARCLAY
 T. H. BARCLAY
 Miss R. M. BARNES
 H. W. BIRKBECK
 W. F. BISHOP
 BRITISH MUSEUM (NATURAL HISTORY)
 A. L. BULL
 Miss E. M. BUTTERY
 Maj. A. BUXTON
 D. J. BUXTON
 R. H. BUXTON
 Lt.-Col. H. J. CATOR
 L. G. CHAPMAN
 R. CHESTNEY
 CITY OF NORWICH SCHOOL
 D. CORBETT
 Miss I. W. CORFE
 H. P. CRAWLEY
 G. CREES
 E. T. DANIELS
 R. A. DAVIS
 DISINFESTATION LTD.
 J. DORLING
 Lt.-Col. F. E. DRAKE-BRISCOE
 B. F. T. DUCKER
 K. DURRANT
 E. A. ELLIS
 "EASTERN DAILY PRESS"
 R. VAUGHAN EVANS
 FORESTRY COMMISSION (EASTERN CONSERVANCY)
 I. P. HARRIS-GODFREY
 C. GOSLING
 L. H. GOSLING
 F. GRAY
 GREAT YARMOUTH NATURALISTS' SOCIETY
 GRESHAM'S SCHOOL N.H.S.
 R. DE GREY
 Miss C. GURNEY
 Q. E. GURNEY
 Miss K. HALL
 L. J. HARDY
 M. G. HARDY
 R. H. HARRISON
 J. STEEL HARVEY
 H. A. HEMS
 A. HOBSON
 HOLNE BIRD OBSERVATORY
 P. J. L. TURNER
 E. G. HURST
 A. H. IVINS
 G. JESSUP
 J. LAST
 W. K. LEIGHTON
 R. H. MALT
 G. MANN
 J. MARSHALL
 N. M. MARSHALL
 W. A. MASON
 D. H. MAUFE
 Miss D. M. MAXEY
 Miss J. F. MAYHEW
 R. MCCURDY
 MINISTRY OF AGR. FISH. & FOOD
 E. MORSE
 NATURE CONSERVANCY
 N. R. NEWSON
 C. A. NORRIS
 NORWICH CASTLE MUSEUM
 NORWICH TRAINING COLLEGE
 Miss B. OAKES
 B. OLLETT
 F. J. TAYLOR PAGE
 P. R. PAGE
 A. PALMER
 A. T. PATON
 E. PIGGIN
 Miss S. C. PUDDY
 Mrs. B. R. RAE
 H. RILEY
 T. SAYER
 R. SCOTT
 M. J. SEAGO
 G. SERVICE
 DR. S. SHEPHEARD
 J. SHORTEN
 Miss W. SIMPSON
 S. SINCLAIR
 C. SMITH
 M. E. SMITH
 W. SOUTHGATE
 Miss W. SPINKS
 THE MISSES D. E. AND D. F. STEARN
 R. A. STEBBINGS
 D. TAYLOR
 Miss J. M. TAYLOR
 B. T. THAINE
 W. CHENEVIX TRENCH
 P. G. TRETT
 Miss G. TUCK
 T. J. TURNER
 Mrs. M. WATHEN
 Mrs. K. M. WATT
 P. WAYRE
 D. WENHAM
 B. WILSON
 W. J. WOOLSTON
 Rev. A. R. B. WYLAM
 Mrs. F. R. WYLAM



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*The *NORFOLK NATURALISTS TRUST*, the first of its kind in Great Britain, was founded in 1926 for the purpose of acquiring by purchase or gift, those properties in Norfolk and on the Suffolk border, requiring protection as nature reserves, and to hold these in perpetuity. Amongst the properties now administered are Hickling, Barton, Ranworth and Surlingham Broads, Cley Marshes, and parts of Breckland. A full list of Trust properties appears on page 192.

Details of membership may be obtained from the Secretary, 4 The Close, Norwich, NOR 16P (*Telephone: 25540*).

*The *NORFOLK & NORWICH NATURALISTS SOCIETY* was founded in 1869. Monthly meetings are held between October and April and between May and September excursions are arranged to areas of natural history interest on the coast, Broads, heaths and woodlands. The Society publication *Transactions of the Norfolk & Norwich Naturalists' Society*, containing papers and notes relating mainly to the natural history of Norfolk, is supplied free to members. Normally, two parts of *Transactions* are published annually, one of these being the *Norfolk Bird & Mammal Report*.

Details may be obtained from the General Secretary, Chalet 72 Wymondham College (*Telephone: Wymondham 3285*).

