A SURVEY OF THE ROOKS IN THE MIDLANDS.

BY
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INTRODUCTION.

THE Rook (*Corvus f. frugilegus*) is an essential part of the English country-side. Its large size, its characteristic cawings and its habit of appearing in flocks all the year round compel attention. Although an arboreal species, so far as nesting is concerned, it is essentially a bird of agricultural land. When feeding, it almost invariably frequents farm lands at all times of the year, and, as its diet is mixed, its economic position has been much disputed from time immemorial. Ultimately the food question will determine its economic position, but until something exact is known of its distribution and numbers no correct interpretation of its feeding-habits can be made. It is not only necessary to know the kind of food eaten but also the total quantity. There are the further problems of the extent of its feeding area, the possible influence of migration, and the question of its adaptability to other foods, should its numbers unduly increase, or if other species consume its normal food.

It will be seen that underlying all these problems is the question of numbers. For this reason a survey was made. A repetition of the census is being made with a view to finding what alterations, if any, have taken place.

Nottinghamshire, Leicestershire and Rutland were surveyed in 1928, Derbyshire and Lindsey in 1929, and Kesteven and Holland in 1930. A repetition of the census was commenced in 1932 with the first three counties.

THE SURVEY AREA.

The area surveyed, 5,305 square miles, would appear to be sufficiently large to eliminate local inaccuracies. Any peculiarities in their distribution, or any special features which influenced them in their choice of sites for nesting, would be more likely to be found over such a large area. The survey includes the whole of five geographical or seven administrative counties, namely, Nottinghamshire, Leicestershire, Rutland, Derbyshire and Lincolnshire (three divisions). As a unit, in their topographical features they are representative of a considerable portion of the country. There is a seaboard on the east of about 100 miles; there are the marshes and fens,

the chalk wolds, extensive tracts of woodlands and heathlands ; rivers, such as the Trent, Welland and Witham, with innumerable tributaries, and on the north-west there are the mountains of Derbyshire rising to over 2,000 feet and consisting of wild moorland and crags.

The geological formations run approximately north to south, so that by travelling from Derbyshire on the west to the Lincolnshire coast on the east, one passes from the carboniferous mountain limestone to the chalk. The chalk is bordered by alluvial deposits. Charnwood Forest in Leicestershire is one of the most ancient mountain groups in England, with peaks of slaty rock, hornstone and granite rising to over 900 feet. The annual rainfall varies from under 25 inches for most of Lincolnshire to over 50 inches over a large part of Derbyshire.

Summer and Winter Flocks.

In the nesting season Rooks collect in groups and build their nests, rarely in large woods, more or less close together, forming the familiar rookeries. These flocks remain together until the young are fledged and until they can feed themselves. By the autumn the rookeries are deserted and any particular flock may join with a number of other flocks in the district, and adjourn to some large wood for roosting at night. There are many exceptions. In some rookeries the birds will roost in trees alongside their nests all through the winter. The large roosts to which united flocks go during the winter are termed Rook roosts, major rookeries or winter rookeries.

From August to December, with an optimum in October, their aerial manœuvres are at their best and most charming to watch. During August the young become independent of their parents and all appear to start a period of physical training in preparation for the nesting season to come. Small groups of birds will indulge during the early afternoon in furious races or in wonderful wheeling and diving " stunts ". A single bird will fly to a great height and descend looping the loop like a tumbler pigeon, only to be followed by another bird doing the same thing. Others will fly to great heights, apparently trying to outdo all rivals.

A colony from one rookery will fly to meet a colony from a neighbouring rookery and with much cawing they will circle round and round. Then one colony still circling will rise to a great height, only to descend again and after further circling the two will separate and fly away. The old name

for such a gathering was a "wedding of crows" and it is possible that a certain interchange of birds, especially young ones, does take place at these gatherings.

It is during this non-nesting period that Rooks may range far for food. The usual custom is that each rookery returns to the area surrounding its nesting-site for its food. They sometimes remain on those sites until it is quite dark. Very bad weather, especially fog, may temporarily prevent this, causing a certain congestion near the Rook roost.

In some cases the birds of a rookery fail to appear on their territory for about a month to six weeks in August and September.

It is during these autumn months also, that the birds may often be seen perched in dense numbers on single trees, sometimes resting after their exertions in flight, and sometimes towards late afternoon, preparatory to their departure for the winter roost.

NESTING-HABITS.

The Rook is single-brooded and nests in March and April, the young being fledged in May and early June. In the following spring these young birds, about 10 months old, do not breed but congregate with the parent birds in the rookery. The following season they mature and breed.

It is difficult to state exactly when nest-building really commences. Often in the early morning during the months of November and December the birds visit their nests and are seen pulling sticks out. Possibly they are tidying up, or possibly they are loosening them so that the winds may destroy them altogether, or possibly it is just a slight return of the nesting stimulus and, like young birds, their methods are only crude and their intentions neither serious nor sustained.

More serious are their efforts in February and in some cases, although rarely, nests are completed in this month and eggs laid. By the middle of March nest-building is in full swing and late nests are built during April. Often late nests are built through disturbance from an earlier one. In one case noted a group of apparently disappointed birds from a large rookery formed a new colony half a mile away, commencing operations on May 7th.

Non-breeding immature birds are a bit of a nuisance at times to their elders. They appear to receive a partial nesting stimulus or they are influenced by the nest-building

of the others to emulate their example. The nests they attempt may be awkwardly placed and badly constructed, so that they may fall on top of an occupied nest. These young birds also are apt to consider that sticks can be used from other nearby nests.

The number of these non-breeding birds varies in different rookeries. A well-shot rookery has few. The proportion appears to be highest in the small experimental rookeries which have only existed a year or so, or which move their sites a short distance annually.

Census of Adult Nesting Birds.

For the purpose of this census the rookeries were located and the nests counted. By doubling the number of nests the number of mature nesting birds is obtained.

Various factors tend to complicate the counts. Odd nests may have survived the winter and not be occupied. Nests may be built from January to May. Odd pairs may build two nests, probably always due to some accident causing desertion of the one first built. Young birds may build experimental nests.

Sometimes there are compound nests, the whole mass being about 6 feet across and over 3 feet deep. One such at Saunby had eight pairs nesting in the mass, but there may be only a single pair.

On the whole, April is the best month for counting the nests. The dates of building vary from year to year. In two old-established rookeries building began on January 25th in 1930, on February 16th in 1931, and on February 6th in 1933. One new rookery began building on May 7th in 1928. Late counts are apt to be inaccurate through the partial nests built by younger birds.

The Rookeries.

Although everyone has a rough idea what is meant by a rookery, it is impossible to define it accurately. There may be a solitary nest; there may be a few nests here and there in trees with gaps between and straggling along for a mile; there may be several compact groups in a village; or there may be the well-recognized clump of trees, almost all of which have some nests in them.

A suitable nesting-site is essential for all birds. In the case of the Rook there must be sufficient sites for the colony.

In this survey all the nests are in trees and none are less than 10 feet from the ground. In many cases one tree is sufficient. Generally a clump of trees or a small plantation is preferred. Sometimes the rookery may be on the edge of a large wood, but in no case has one been found in the middle of such a wood. Any kind of tree is suitable, deciduous or evergreen. Once they are established on a site they may cling to it, no matter whether branches die or the whole trees die. Although elm, ash, oak, beech and horse-chestnut are most frequently used, it is only because they are the dominant trees in the neighbourhood. Scots pine is the principal evergreen, but nests are found in holly and holme oak. Larch is frequently used. One small rookery existed in a high hawthorn hedge in Nottinghamshire, but it is now extinct. No rookery is found in fruit trees in these counties, but one was recorded in the first issue of *The Countryside* (1905) on Thorney Fen in a fruit orchard. This still exists.

The relative exposure of the site appears to be quite immaterial. Often the rookery is on a bleak hill-top, where the swaying of the trees would appear to break the eggs or throw them all out. On the other hand some rookeries are in most sheltered dells. Altitude in itself is not a limiting factor in choosing a site for a rookery. There is an altitudinal limit for tree growth, and on the highest peaks of Derbyshire there are no trees, but it is highly probable they would nest in the heather if there was suitable food to be had. Actually there is only suitable food on these moors about June, when there is an abundance of caterpillars of the antler moth (*Charæas graminis*) on the rough herbage. Almost all the rookeries between Hartington and Chapel-en-le-Frith on the carboniferous limestone plateau are between 1,000 feet and 1,200 feet above sea-level, the highest at nearly 1,400 feet. Their foraging range is as little as possible, especially during the critical months, March to August. At this time the parent birds are far too busy making endless journeys to the nest with food to travel any but the shortest possible distances.

Generally speaking, the feeding range of one rookery extends to meet those of the neighbouring rookeries, with considerable overlapping at such vague boundaries.

This does not obtain when the rookeries are several miles distant, as in parts of Derbyshire, nor do the Rooks of Nottinghamshire range over the centre of the county, where there are no rookeries.

NOTTINGHAMSHIRE (1928).

Area : 843 square miles, or 536,678 acres.
Area under crops and grass : 418,663 acres.
Ratio, arable to grass = 1 : 1.
Number of rookeries : 182.
Number of nests : 6,501.
Average size of rookery : 35.7 nests.
Number of nesting birds : 13,002.
One rookery to 4.6 square miles.
One bird to 32.2 acres of agricultural land.

The county is largely lowland in character, only a little land in the west rises to over 600 feet above sea-level, and nearly half of it is below 100 feet. About 5 per cent. consists of woodlands. Oaks, silver birches and pines predominate in the centre of the county, but these are replaced by elm and ash along the Trent valley and in the south.

The distribution of Rooks in this county is remarkable. The whole of the centre, roughly 200 square miles, has no rookeries. Jackdaws are the prevalent birds of the Crow family in this area. This is largely on the Bunter Sandstone formation, but extends partly over the Keuper Marl. It is a dry, streamless area, with light sandy soils. There is a great concentration of Rooks along the Soar valley from Loughborough to Long Eaton, and then along the Trent valley through Nottingham and Newark to Dunham Bridge. Along these stretches there is a good proportion of rich grassland. From Dunham Bridge northwards the rookeries are on the Lincolnshire side of the Trent. Rookeries are also found along the valleys of the Rivers Poulter, Ryton and Idle in the north, the Erewash and Leen valleys in the west, and in the Vale of Belvoir (Rivers Devon and Smite) on the south-eastern boundary.

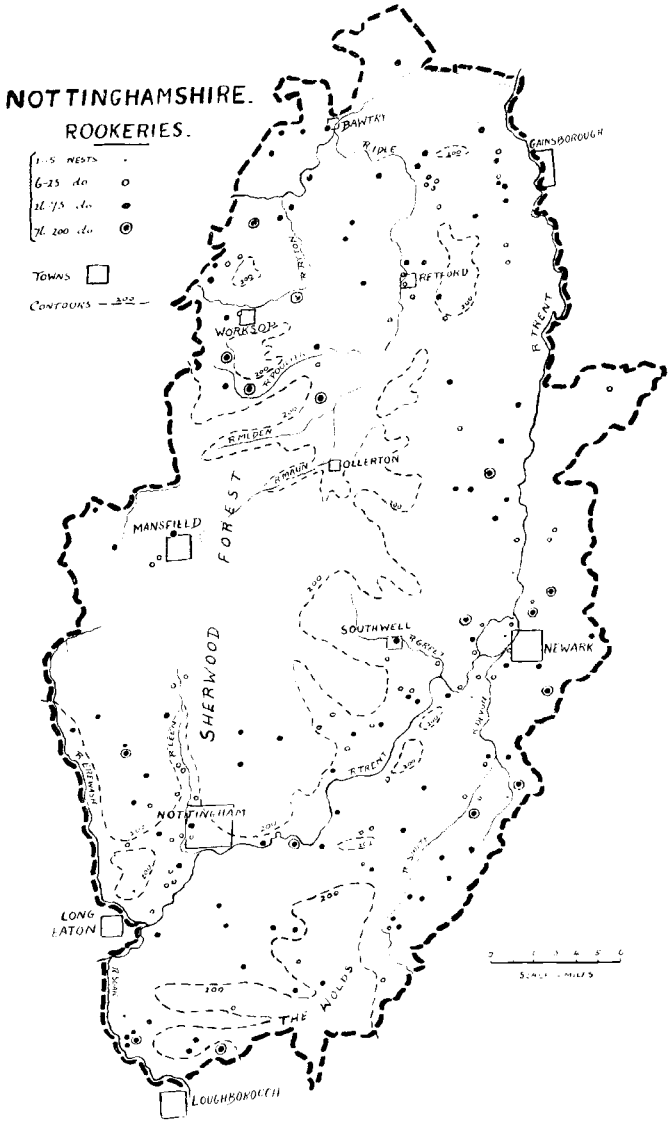
There are rookeries in the vicinity of the more populous centres, Nottingham, Newark, Gainsborough, Retford, Worksop and Mansfield.

There are very few rookeries at an altitude of over 200 feet above sea-level.

THE ROOKERIES CLASSIFIED ACCORDING TO SIZE.

Number of Nests.	*Number of Rookeries.*
1–5	12
6–25	68
26–75	88
76–200	14

The largest rookeries are at Sutton Bonington on the River Soar in the south, and at Averham about three miles N.W. of Newark.


NOTTINGHAMSHIRE.
ROOKERIES.
1-5 NESTS
6-25 do
26-75 do
76-200 do
TOWNS
CONTOURS
BAWTRY
RIDLE
GAINSBOROUGH
RETFORD
WORKSOP
TRENT
MANSFIELD
FOREST
OLLERTON
SOUTHWELL
NEWARK
SHERWOOD
NOTTINGHAM
LONG EATON
THE WOLDS
LOUGHBOROUGH
SCALE MILES

LEICESTERSHIRE (1928).

Area : 800 square miles or 530,642 acres.
Area under crops and grass : 453,758 acres.
Ratio, arable to grass = 1 : 5.
Number of rookeries : 230.
Number of nests : 9,381.
Average size of a rookery : 40.8 nests.
Number of nesting birds : 18,762.
One rookery to 3.5 square miles.
One bird to 24.1 acres of agricultural land.

The eastern half of the county is quite different from the western half. The eastern half is almost entirely the Lias geological formation covered with boulder clay. The latter forms the soil and thus determines the agricultural practice. It is wholly agricultural land and is especially devoted to grazing. There are no waste lands such as heaths, bogs or moors.

The western half contains more mixed farms and contains stone quarries and coal mines, and a remarkable area of about 50 square miles known as Charnwood Forest, with rocky peaks rising to 900 feet, containing an admixture of woods, heaths, steep bracken-covered slopes and extensive reservoirs, the whole interspersed with cultivated fields. On this half of the county there is no drift and the soils are derived from the underlying rocks, such as Keuper Marl and the coal measures.

There are no very large woods in the county but a great number of small plantations and coverts. The dominant trees are ash and elm.

The river valleys all have their rookeries, the Soar runs south to north through the centre of the county, the Wreak runs E.N.E. from Syston near Leicester, the Avon and Welland from the southern boundary, and the Sence is in the west. Again, there are rookeries around the populous centres—Leicester, Loughborough, Hinckley and Melton Mowbray. At Ashby-de-la-Zouch the Rooks apparently want to settle, but for some reason they do not succeed. They build nests and then desert the rookeries.

Charnwood Forest has few Rooks.

Rookeries are more frequent on the eastern half where grassland is abundant, especially in the area between Melton Mowbray, Leicester and Market Harborough.

THE ROOKERIES CLASSIFIED ACCORDING TO SIZE.

Number of Nests.	*Number of Rookeries.*
1–5	11
6–25	84
26–75	106
76–200	27
over 200	2

The rookeries, consisting of over 200 nests, were at Husbands Bosworth, since considerably diminished, and at Croxton Abbey. There are several large groups around Stapleford.

RUTLAND (1928).

Area : 152 square miles or 97,087 acres.
Area under crops and grass : 88,189 acres.
Ratio, arable to grass = 1 : 2.
Number of rookeries : 49.
Number of nests : 2,340.
Average size of a rookery : 47.7 nests.
Number of nesting birds : 4,680.
One rookery to 3.1 square miles.
One bird to 18.8 acres of agricultural land.

This small county is almost wholly in the basin of the River Welland. The surface is undulating. Low hills run in ridges east and west separated by narrow valleys.

It is well wooded and the soils are generally rich and well cultivated. Oak, beech, ash and horse-chestnut are the dominant trees.

It is rich in Rooks and the rookeries are fairly evenly distributed. There is plenty of good grassland. It is remarkable how the rookeries are found on the " red lands " (Northampton sands) of the county. These are under arable crops. The same soils in the south of Leicestershire, as at Nevill Holt, also are rich in Rooks.

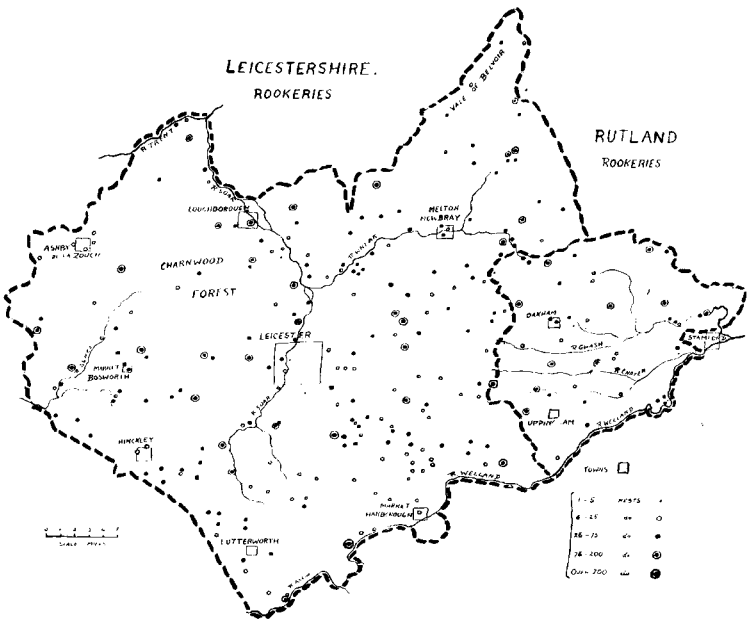
THE ROOKERIES CLASSIFIED ACCORDING TO SIZE.

Number of Nests.	*Number of Rookeries.*
1–5	9
6–25	9
26–75	24
76–200	7

The largest rookeries are at Wardley Wood to the west of Uppingham, and near Stocken Hall on the north-eastern border of the county.

DERBYSHIRE (1929).

Area : 1,009 square miles or 643,333 acres.
Area under crops and grass : 450,733 acres.
Ratio, arable to grass = 1 : 6.
Number of rookeries : 240.
Number of nests, 10,620.
Average size of a rookery : 44.2 nests.
Number of nesting birds : 21,240.
One rookery to 4.2 square miles.
One bird to 21.2 acres of agricultural land


LEICESTERSHIRE.
ROOKERIES
RUTLAND
ROOKERIES
VALE of BELVOIR
LOUGHBOROUGH
MELTON MOWBRAY
ASHBY de la ZOUCH
CHARNWOOD
FOREST
LEICESTER
MARKET BOSWORTH
HINCKLEY
OAKHAM
STAMFORD
UPPING HAM
TOWNS
MARKET HARBOROUGH
LUTTERWORTH

The uplands occupy the north and west half of the county. Most of this area is over 1,000 feet above sea-level and rises to over 2,000 feet. It consists of mountain limestone and millstone grit formations. The rainfall is from 40 to 60 inches annually. The mountain limestone, which forms the greater part of the area, consists of smoothly rounded hills with deep narrow gorges. The hill pastures, with scanty herbage, extend to the summits. Fields are divided by stone walls and trees are few and dwarfed. The millstone grit area presents a marked contrast with its wild moorlands and sharp escarpments. Beech, sycamore, elm and horse-chestnut are the principal trees.

The eastern portion, approximately one-quarter of the total area, consists of low hills on the coal measures between 300 feet and 600 feet high, devoted to mixed farming on somewhat indifferent soils.

The southern portion, approximately another quarter of the area, is chiefly on the Keuper Marl formation. This is the arable district and the soils are very productive. The meadows on the banks of the Dove and Trent and the lower reaches of the Derwent provide rich pasturage. Woods in this county are not extensive. The whole county is predominantly grassland, although much of this is hill pasture.

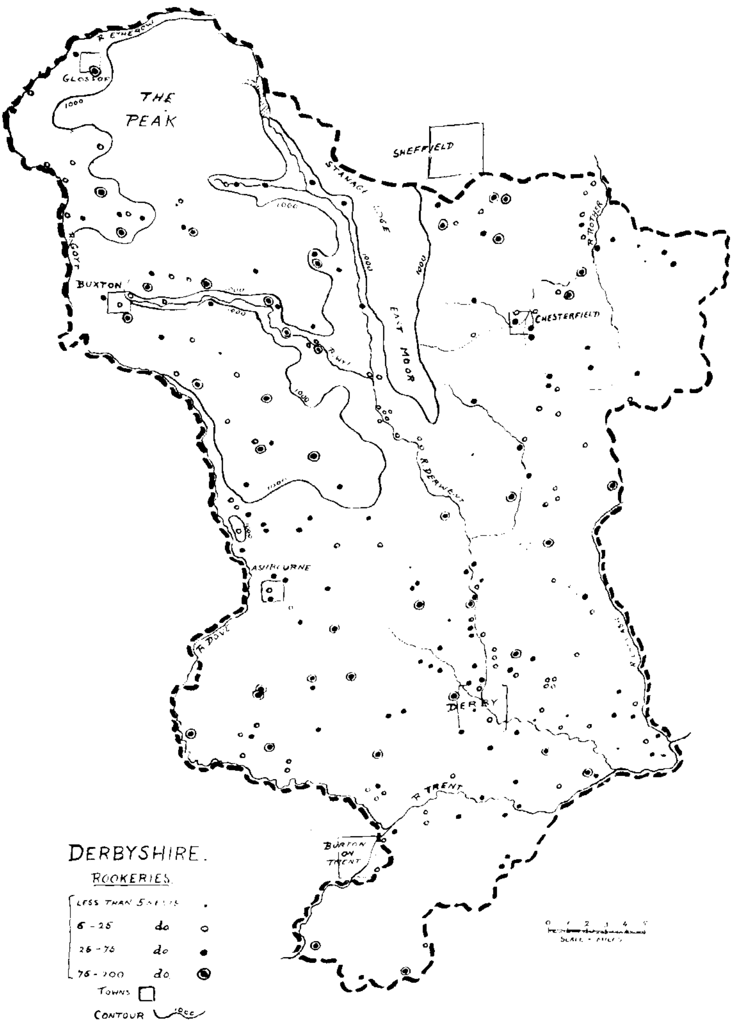
There are rookeries along the chief river valleys: the Trent from Burton-on-Trent to Long Eaton; the Derwent from Sawley to Derby and north-west, with its tributaries, Wye and Hope; the Dove on the western border and the Drone and Rother to the north-east. There are plenty of rookeries on the Derbyshire coalfield from Derby, through Chesterfield to Sheffield. Over the carboniferous limestone plateau north and west of Derby, Rooks are fairly evenly scattered, but nowhere numerous. This area is largely hill pasture.

There are two large areas on which Rooks are absent. Both of these are mountainous and are almost treeless expanses of grouse moors.

One is approximately 100 square miles in extent around the Peak in the north. The other is east of a line from Matlock to Hathersage and northwards to the Yorkshire boundary. The area is about 50 square miles.

Generally the dry dales, those without a stream, have Jackdaws, whereas those dales with good streams have Rooks.

As this county includes the highest land surveyed, it is interesting to summarize the data for the portion over 1,000 feet above sea-level.


GLOSSOP
THE PEAK
SHEFFIELD
STANAGE EDGE
EAST MOOR
BUXTON
CHESTERFIELD
R. DERWENT
ASHBOURNE
R. DOVE
DERBY
R. TRENT
BURTON ON TRENT
DERBYSHIRE.
ROOKERIES.
6 - 25 do
26 - 75 do
75 - 200 do
TOWNS
CONTOUR

Area above 1,000 feet : 260 square miles.
Number of rookeries : 30.
Number of nests : 1,662.
Average size of a rookery : 55.5 nests.
Number of nesting birds : 3,324.
One rookery to 8.7 square miles.
One bird to 50 acres.

As about 150 square miles of this is treeless grouse moors, the concentration of Rooks on the remainder is exactly equal to the average for the whole county.

THE ROOKERIES CLASSIFIED ACCORDING TO SIZE.

Number of Nests.	*Number of Rookeries.*
1–5	9
6–25	94
26–75	96
76–200	41

The largest rookeries are at Catton Hall in the extreme south-west ; High Needham about 7 miles S.E. of Buxton, at an altitude of about 1,100 feet ; Brookhill Hall on the eastern border ; Milford about 7 miles north of Derby. These have between 175 and 195 nests each.

LINCOLNSHIRE.

The county is bounded on the east by the sea from the Humber to the Wash, a distance of about 100 miles. The coastline consists of either low sand dunes or artificial banks. Most of the county is below 100 feet above sea-level. There are two long lines of hills. The Cliff or Heath, of Lincolnshire (lower oolitic) limestone, passes almost due north and south throughout the whole length of the county from Winteringham through Lincoln and Grantham. The height varies from 200 to 400 feet, with a very abrupt slope on the western side.

The second range of hills, the Wolds, extends from Barton-on-Humber for about 50 miles in a south-westerly direction to Spilsby, with an average width of about eight miles. They consist of rolling downs with bleak tops, which are intersected by deep valleys, often very pretty and well wooded.

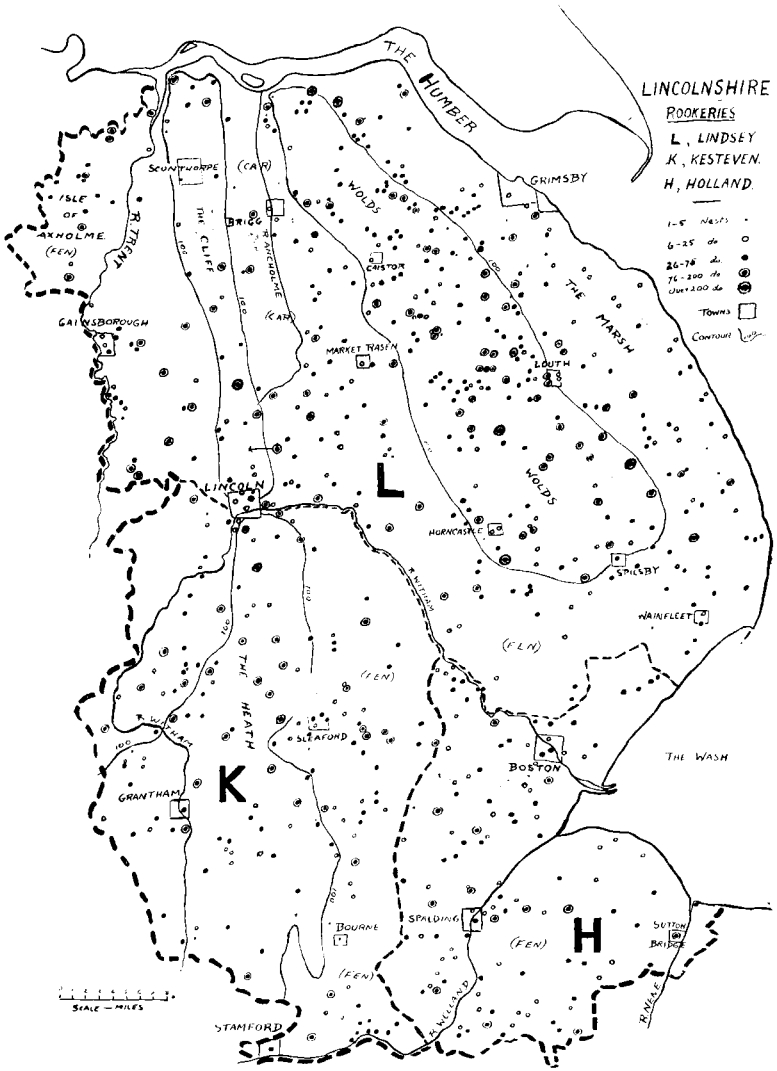
Fen covers most of the area south and east of Lincoln. The Isle of Axholme in the north-west and the Carr lands along the River Ancholme in the north are somewhat similar.

The Marsh is a tract of land between the Wolds and sea. It contains some rich grazing land.

Woodlands are locally large, e.g., around Brocklesby and Grimsthorpe. Oak, beech, birch, pines and ash are the dominant trees.

LINCOLNSHIRE (PARTS OF LINDSEY) (1929).

Area : 1,357 square miles or 968,374 acres.
Area under crops and grass : 845,137 acres.


LINCOLNSHIRE
RODKERIES
L, LINDSEY
K, KESTEVEN.
H, HOLLAND.
1-5 Nests
6-25 do
26-75 do
76-200 do
Over 200 do
Towns
Contours
THE HUMBER
SCUNTHORPE
(CAR)
GRIMSBY
ISLE OF AXHOLME (FEN)
R. TRENT
THE CLIFF
BRIGG
R. ANCHOLME
(CAR)
WOLDS
CASTOR
THE MARSH
GAINSBOROUGH
MARKET RASEN
LOUTH
LINCOLN
L
WOLDS
HORNCASTLE
SPILSBY
R. WITHAM
WAINFLEET
(FEN)
THE HEATH
(FEN)
SLEAFORD
K
BOSTON
THE WASH
GRANTHAM
Bourne
SPALDING
(FEN)
H
SUTTON BRIDGE
R. WELLAND
R. NENE
STAMFORD
SCALE — MILES

Ratio, arable to grass = 3 : 2.
Number of rookeries : 442.
Number of nests : 22,447.
Average size of a rookery : 50.8 nests.
Number of nesting birds : 44,894.
One rookery to 3.0 square miles.
One bird to 18.8 acres of agricultural land.

There are three main rivers, the Trent, Witham and Ancholme. There are many rookeries along the Trent from Dunham Bridge to the Humber, except on a stretch of low-lying arable land from Stockwith to Keadby Bridge. On this area the Rooks move to the higher ground on a ridge from Haxey to Crowle, where the chief villages are. Rookeries are not found to any extent near the Rivers Witham and Ancholme, where grass is scarce. The rich grassland area known as the Marsh, along the coast, has a large number of rookeries. The outstanding feature of this county is the extraordinary number on the chalk Wolds. This is without streams of any size and is almost entirely arable land. Rookeries are abundant on the middle oolite formation, extending almost due north from Bardney to Brigg. A row of rookeries is found along the crest of the cliff running north from Lincoln to Winteringham. The sandy heathlands from Scotton to Scunthorpe have few Rooks.

THE ROOKERIES CLASSIFIED ACCORDING TO SIZE.

Number of Nests.	*Number of Rookeries.*
1–5	20
6–25	120
26–75	216
76–200	79
over 200	7

The largest rookeries are at Barton-on-Humber and Barrow-on-Humber in the north ; South Thoresby, seven miles north of Spilsby ; Boothby Hall, five miles E.N.E. of Spilsby ; Scrivelsby Hall, near Horncastle ; Fillingham Castle, eight miles N. of Lincoln ; and Stenigot, six miles S.W. of Louth. There are many large colonies around Brocklesby Park.

LINCOLNSHIRE (PARTS OF KESTEVEN) (1930).

Area : 726 square miles or 464,669 acres.
Area under crops and grass : 408,627 acres.
Ratio, arable to grass = 3 : 2.
Number of rookeries : 160.
Number of nests : 8,432.
Average size of a rookery : 52.7 nests.
Number of nesting birds : 16,864.
One rookery to 4.5 square miles.
One bird to 24.2 acres of agricultural land.

The Rooks do not cling to the river bank of the Witham in the north, although there are many along the Welland valley

along the extreme southern boundary. There are large numbers of Rooks on the ridge of hills, here known as the Heath, running south from Lincoln to Grantham. There are large numbers on the middle oolite formation. This passes north and south from Washingborough, through Sleaford, to near Market Deeping. There is a strip of fenland about three miles wide flanking this formation on the east and forming the county boundary. On this there are practically no rookeries.

THE ROOKERIES CLASSIFIED ACCORDING TO SIZE.

Number of Nests.	*Number of Rookeries.*
1–5	10
6–25	42
26–75	75
76–200	31
over 200	2

The largest rookeries are at Beaufee Manor, six miles S. of Lincoln; South Rauceby Hall to the west of Sleaford; Lord Bristol's plantation near Cranwell, about six miles N.W. of Sleaford; and Willoughby Hall, about six miles N.E. of Grantham.

LINCOLNSHIRE (PARTS OF HOLLAND) (1930).

Area: 418 square miles or 267,801 acres.
Area under crops and grass: 238,389 acres.
Ratio, arable to grass = 4 : 1.
Number of rookeries: 118.
Number of nests: 4,412.
Average size of a rookery: 37.4 nests.
Number of nesting birds: 8,824.
One rookery to 3.5 square miles.
One bird to 27 acres of agricultural land.

The county is entirely fenland, intersected by dykes of different sizes. The rookeries on the whole are small but widely scattered. Arable land, intensively cultivated, predominates. Grass paddocks and clumps of trees are chiefly found in the villages and homesteads on the main roads. It is along these main highways that most of the rookeries are found, e.g., the road from Wainfleet, through Boston and Spalding to Market Deeping; the road from Bourne through Spalding and Holbeach to King's Lynn; the road from Sleaford to Boston; the road from Grantham to Spalding and the road from Spalding to Crowland. On the distant fields along the dykes trees and grass are scarce and Rooks do not build. The wide salt marshes of the Wash would seem, at first sight, to be good feeding grounds for the birds. This is true for the non-nesting months, but the fluctuations of the tides make them far too uncertain during the nesting season when the young birds have to be fed all day long.

The land reaches at its highest point a height of 20 feet above sea-level.

THE ROOKERIES CLASSIFIED ACCORDING TO SIZE.

Number of Nests.	*Number of Rookeries.*
1–5	4
6–25	47
26–75	54
76–200	13

The largest rookeries are at Moulton, four miles E. of Spalding; Donington, ten miles S.W. of Boston; Quadring Eau, seven miles N. of Spalding; on Great Postland Fen (in two lots), eight miles S. of Spalding; and Holbeach (in three lots), about eight miles E. of Spalding. At Frampton, near Boston, there is a large scattered rookery.

SUMMARY OF THE SURVEY DATA.

Total area: 5,305 square miles or 3,511,119 acres.
Area under arable crops and grass: 2,959,538 acres.
Number of rookeries: 1,421.
Number of nests: 64,133.
Average size of a rookery: 45 nests.
Number of nesting birds: 128,266.
One rookery to every 3.7 square miles.
One bird to every 23 acres of arable land.

THE ESTABLISHMENT OF A ROOKERY.

A rookery may be considered to be established on a certain area of land or territory which extends around the nesting site. This area is claimed for the colony as a feeding ground from all other Rooks. No rigid boundaries exist. There is much poaching from surrounding rookeries where they are not far apart. Rooks do not necessarily forage evenly over the area, very often they are attracted by certain fields and prefer them to all others.

In choosing these areas it must be remembered that they are selected in mid-winter, but the factor which determines the success or otherwise of the venture is the supply of insect and other animal food from the end of March to early August. The young are fed all this time. If this animal food fails no farm crops can take its place, and the rookery is a failure and no young are reared.

PERMANENT AND TEMPORARY ROOKERIES.

Once a rookery has been formed it often remains for a very long period. The largest rookeries are mostly of this type, but very often small, even tiny rookeries, are equally long-established ones. In *Scribner's Magazine* of 1893 is an engraving by Alfred Parsons, showing Ashbourne Church with the small rookery close by it. The picture gives an equally true view of it at the present time. It is well known that many rookeries have been in existence for a long time. The birds often cling tenaciously to an old-established site, even

when through food shortage their numbers are reduced. They will also cling to the old trees even when branches and, later, whole trees die. This is seen at Fillingham Castle (Lindsey), Loddington (Leicestershire), etc. Complete felling of the trees necessitates their removal, as at Melton Mowbray. Human interference in various ways can disperse them. It is far more difficult to persuade them to occupy sites on which we should like them. Colonies sometimes desert the rookery during the nesting-season, after eggs are laid, for no apparent reason, as at Lambley (Nottinghamshire) and at Ashby-de-la-Zouch (Leicestershire). There is always the possibility that these may be due to human, unauthorized disturbance.

From established rookeries single pairs or small parties of Rooks appear to have the pioneering spirit, and, whether from choice or necessity, they break away from the colony and take up another site. Sometimes the experiment is a failure and they return the following year. Sometimes the site is ill-chosen, and while maintaining their entity, they move to still another site, and so on from year to year until satisfaction is obtained. One such attempt may be cited. In 1928 a pair of birds came from the large Sutton Bonington rookery and built a nest near Kegworth station. Four young birds came with them, possibly their own offspring. After watching the adults for a few days, two of the young birds began to build another nest. About a week later the remaining two started. While the old birds were brooding the second nest was completed, except for a lining, but the third was barely half made. The young birds soon tired of nest-building when the old ones had finished theirs. In 1929 three nests were completed and two experimental nests were half finished by four young birds, which had probably been reared the year before. In 1930 seven nests were nearly finished when the colony deserted and were not seen again. They did not return in 1931, but a new colony of the same size started at Normanton-on-Soar on the other side of Sutton Bonington. It is probable that these are the same birds. In 1932 there were thirteen completed nests and seven non-breeding birds.

In the spring of 1932 it was found that of the 182 rookeries of Nottinghamshire in 1928, 29 had disappeared and 27 new sites had been occupied. In Leicestershire, of the 230 rookeries in 1928, 31 had been lost and 36 gained. In Rutland during the same interval 8 had been lost and 5 gained. Of the whole 461 rookeries in the three counties, 68 had been lost and 68 gained. This represents a change of 15 per cent. in sites. This figure does not represent the whole change in

four years, but is probably more nearly an annual change. Very many rookeries in these counties were noted in the intervening years which only existed a year and therefore do not appear in either survey.

Foraging Range of Rooks.

The area around a rookery may be said to be the feeding-ground of those Rooks for the whole year with the possible exception of about a month around August, when sometimes they are uncertain in their movements. This is the period of uncertainty between the nesting-season and the winter flock-mixing season—a kind of summer holiday. Any consideration of harm or good done therefore may be assigned to the local Rooks and to those alone, with the possible exceptions of farms along the sea-coast in the line of migration and areas near winter Rook roosts during inclement weather. During the autumn months, the period of extravagant flights, small parties of Rooks may stray far from their normal feeding grounds, but their effects would not seem to be very great.

Possible Competition with other Birds.

Except for the general fact that every living creature competes with every other living creature, it is difficult to find direct evidence of the competition of the Rook with other species.

The grouse moors of Derbyshire could not support a colony of Rooks. They only attempt to go on these moors when the young can fly and they can therefore extend the feeding range in their search for grubs.

The occupation of the dry dales in Derbyshire by Jackdaws appears to be complementary rather than competitive. They do not seem to be suitable for Rooks. On the poorer lands of the Leicester wolds, Magpies and Carrion-Crows displace Rooks, but the land does not seem to be good enough for the Rooks. The Black-headed Gull nests extensively in Lincolnshire, forming a very extensive colony at Scawby and smaller ones at Scotton and Laughton.

If there were no Gulls it is very unlikely that more Rooks would nest in these areas, certainly they would not in the immediate vicinity of the gulleries. The replacement of Rooks by Jackdaws in central Nottinghamshire is peculiar, but not too extraordinary. The land is poor and the soil too dry to produce good grassland. Sites have been occupied by Rooks in this area which are not now occupied. During recent years collieries have been opened and new towns are appearing, otherwise it was sparsely peopled by human beings.

It is probable that when these develop Rooks may establish themselves in the area.

NUMBERS THROUGHOUT THE YEAR.

The census refers to the nesting birds. To this must be added the non-nesting immature birds. The total applies to January, February and March.

From March to the middle of May the total population may be trebled owing to the hatching and rearing of the young. On an average four young are reared from each nest, or for each pair. Then a wholesale slaughter begins in some rookeries and in a short time the numbers are reduced to the January totals. This is not, however, true for all. There is nevertheless a gradual fall in numbers, until by the end of August we have only the same number of birds as in January, and this continues until the end of the year.

FACTORS WHICH INFLUENCE THEIR DISTRIBUTION.

The Rook is a bird of the farm. Good land has plenty of Rooks and poor land has few Rooks, but the number of Rooks is no measure of the fertility of the soil. Heathlands, woodlands, moors and marshes are avoided by Rooks. Well-watered valleys are more frequented by them than are drier uplands and plains.

The proximity of rookeries to the rivers and large streams appears to be due to the greater abundance of good land, especially good grassland in these localities. Rivers, as such, do not appeal to Rooks, but they may influence local husbandry and thus indirectly render suitable what would otherwise be an unfavourable locality. In Nottinghamshire and Rutland 60 per cent. of the Rook population is far removed from rivers. Over large areas of Leicestershire and Lindsey Rooks are far removed from streams of any size.

Grassland appears to be essential for their welfare in most localities. They seem to like a grass paddock alongside their rookery.

Their fondness for nesting around human dwellings is probably due to this appeal for good grass, as well as the necessary clump of trees.

A grass field, especially well-tended good grass, can apparently be relied upon for a supply of insect food, during the critical nesting-period far more than an arable field. It is animal food more than anything else that they must have if they are to continue to exist.

Once a rookery has become well established in a site the birds seem loath to leave it although changes may have taken place around them rendering it an unsuitable site, and making life burdensome to them.