The history of potato-eating by wildfowl in Britain

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Summary

The development of potato-eating and swede turnip-eating by wildfowl is linked to agricultural changes and climatic conditions in Britain. The tradition of taking waste potatoes from harvested fields began in Scotland among Mallard at least a century ago. A few Lancashire Pink-footed Geese acquired the habit about 30 years later, although potato-eating did not become widespread until the 1920's. On the other hand, Scottish Greylag Geese and some Whooper Swans have selected a regular diet of potatoes for only 20-30 years. Turnip-eating has been sporadic in bad weather among Whooper Swans in Aberdeenshire and became traditional after 1947 in the Greylag flocks on the Isle of Bute. The techniques used by the birds in dealing with roots are briefly described.

Land drainage and the shift of arable cultivation, so much a part of agricultural history in Britain, are not wholly inimical to wildfowl. Indeed the ease with which many species have accommodated themselves to new foods is both remarkable and worthy of detailed study in the context of conservation. An undisturbed roost, generally a body of water, remains essential but wildfowl have shown increasing readiness to forage many miles away. Further, the flooding of new reservoirs has enabled the birds to exploit areas in which hitherto they were seldom present.

Agricultural changes

There is little doubt that the first product of agriculture to be utilised by wildfowl was spilled grain from the stubbles of harvested cereal fields. This, and more recently field beans, provided an attractive autumn diet compared with the small seeds of indigenous plants. Likewise, geese must have found that young green shoots of winter cereals were more nutritious than grass, and clover and rye-grass, introduced as sown crops during the 1700's, provided excellent alternatives to rough pastures. Unfortunately, details of the early stages of the association between wildfowl and agriculture are unknown. The more recent addition of potatoes and turnips to the wildfowl diet is, on the other hand, partially documented and the history of their introduction is the subject of this paper.

Potatoes were brought into Britain about 1590, but to begin with there was little incentive to grow them except in Ireland where food and land were notoriously in short supply. They were taken to Scotland towards the end of the 17th Century but, like turnips, became widely cultivated only between 1750 and 1760. As in England, the adoption of potatoes and turnips as field crops was hindered by the current open-field farming which allowed common grazing of all arable land after the grain harvest and before most root crops could be taken in. This hindrance disappeared at the end of the 18th and beginning of the 19th Centuries, when sufficient capital was found to finance the enclosure of old open-fields, and drainage, and cultivation of virgin land (Buxton, 1948). In Scotland potatoes were grown at first in small units mainly by crofters in the highlands and islands. In the more fertile low-lying areas, around the east coast, the good grain crops which could already be produced made potatoes less necessary as a source of human food; however turnips, the great field rivals to potatoes at that time, were extensively grown there for stock food (Symon, 1959). Throughout the 19th Century potato growing increased and there is little difference in the figures for total acreage of 1882

and 1939. There were, however, changes in distribution and these were important ones for wildfowl. The production of new varieties with superior cropping qualities expanded the seed and maincrop potato industries in the Scottish lowlands in the 1890's, and there was a very substantial spread of potato-growing into Lincolnshire, the Isle of Ely and adjacent counties during the Great War. Thereafter, potato growing in the west of Britain declined, but the second World War again raised the acreage. By 1943 and 1944 it was up by over 70% on 1938 and this increased level has been maintained at about 700,000 acres throughout Great Britain.

Improved methods of cultivation have influenced the availability of agricultural food for wildfowl almost as much as changes in distribution of the crops. So long as potato growing was only for consumption in their own homes farmers were content to lift the tubers by hand and then turn pigs on to glean anything that remained. With the development of potato marketing, small fields were consolidated into large ones which needed mechanical harvesting. Larger fields are more likely to attract such wary birds as geese which are now to be found where before there were only ducks. Mechanical potato lifters (the " spinner " type introduced in 1870 and the " elevator " in 1920) produce more wastage than hand digging because some tubers are inevitably damaged and the smaller ones not always extracted. Pigs are now very seldom used to glean the fields, most being fattened under cover and the increased wastage has obviously encouraged wildfowl, often to the farmer's benefit, since ground-keepers harbour disease. Similarly, changes in the method of cultivating swede-turnips have increased the likelihood of visits by geese and swans to the fields. In earlier days they were generally unavailable because it was customary to lift and store most of the swedes in the autumn to meet the requirements of inside stock (and harvesting methods used for roots produce little wastage). Sheep were folded on to the very small areas remaining during late winter and spring. More recently, particularly in Caithness, Aberdeenshire and Bute, swede-turnips have been less and less stored for inside use and are lifted merely as required. Consequently in these areas roots are becoming readily available in the fields throughout the winter (Kear, 1962).

Arable cultivation replacing the grassland meant, of course, increased disturbance of feeding wildfowl. On the other hand, the speeding-up of work by mechanisation later reduced the number of men employed and restricted the disturbance to short periods of the year. Wildfowl can also forage at night, particularly by moonlight.

Climatic factors

Short term climatic extremes force birds suddenly to change their feeding regime in order to survive. Deep floods or a long spell of frost and snow may cause a temporary shortage of food and make new exploration essential. Hungry birds are often prepared to consume unusual items and this is particularly true of juveniles. For the first year of life, a young bird is continually coming across novel foods and it will of necessity be more adventurous in its choices than an adult which has already established a seasonal tradition in its diet. The immature individuals may occasionally reveal new sources of food, their actions are observed by the other birds and local enhancement occurs. If the food is nutritious enough and readily available the flock may " remember " to return next season without the pressure of

hard weather. The memory is, however, most likely to function when there are other pressures related to food shortage acting upon the population, such as those resulting from an increase in numbers or a decrease in the area of available habitat.

It appears that severe winters (characterised by a mean temperature below 34°F., and therefore marked by a predominance of snow rather than rain and a good deal of frost) tend to occur in irregular groups. Using this criterion Manley (1952) found a number of severe months between 1808-20, 1826-30, 1837-55, 1878-97, and 1940 onward. The trends are apparent both in English and Scottish records and are supported by those in Holland, Denmark, Norway and Sweden, countries which share a large part of their wildfowl populations with us. Very cold or snowy winters in the British Isles as a whole occurred in 1814, 1828, 1838, 1879, 1881, 1886, 1917, 1940, 1947, 1956 and now in 1963. However, as an inspection of many early books of ornithology and wildfowling indicates, certain parts of the country have suffered in other years so that, except in recent instances, it is often impossible to pinpoint the connection between any one bad winter and the start of a particular feeding habit.

Potato-eating

The first wildfowl to take potato as a staple item of diet in Britain were the ducks. Of these, the Mallard is the only species which feeds on potato regularly and in any quantity. The habit started and spread during the 19th Century and two factors in particular may have led to its development. The first was a succession of severe winters, and the second was the potato-blight, unknown in Europe until 1845, but a disease that continued to cause irregular failure of the crop for decades. Many early reports indicate that diseased and rotten potatoes were taken by the ducks and, indeed, there must often have been a considerable acreage available. The blighted tubers were seldom gathered but remained exposed upon the surface of the fields or lightly covered with earth in rank, decomposing heaps. The blight was most serious in wet, low-lying soils with a Mallard population probably already at hand. A shortage of other food would quickly bring about the discovery of this new and much appreciated supply. The first actual record of this type of feeding came from Scotland, where St. John (1863) found in Moray that Mallard already preferred the diseased tubers to corn. English authors (e.g. Shand, 1905) spoke of duck consuming decaying potatoes with enjoyment, thereby apparently rendering their flesh unpalatable! However, A Son of the Marshes (1895) suggested that their weakness for this rotting vegetable (he called the blight a luxury for ducks) could be taken advantage of, presumably by using potatoes as bait.

Regular flights inland to the harvested fields seem to have appeared first in Scotland and Ireland. St. John (1901) noted in his Scottish diary for 15th January, 1847, " I see that the Mallard duck feeds now very much in the last year's potato fields." Gray (1871) wrote of 40 to 50 Mallard visiting potato pits in Ayrshire, and Saxby (1874) of birds wandering over potato fields in Shetland. Florence (1912) found pieces of potato in a Mallard taken in Morayshire in November, 1909 and Ussher & Warren (1900) wrote of flights from the Irish coast to the stubbles and potatoes in autumn. A few English writers of the early 1900's mention the tuber as among the foods taken by the Mallard but

it was not generally recognised as part of the annual feeding cycle until the 1920's. Undoubtedly the habit spread rapidly during the Great War which increased the availability of harvested potato fields in eastern England. An increase after the war in the popularity of wildfowling produced reports that Mallard could be shot on old potato plough (e.g. Paton & Pike, 1929; Scott, 1935) or "fed" into ponds and marshes by scattering potatoes. The tubers were being used as bait in duck decoys in Norfolk, Lincolnshire and also in the Berkeley Old Decoy, Gloucestershire. They are, in fact, still regularly employed at Borough Fen Decoy. Potato-eating is now firmly established in certain Mallard populations throughout the country. The severe winter of 1947 provided at least one instance of another duck species taking rotten tubers. Gregory (1947) found that the pulpy potatoes in an unharvested field in Kent attracted good numbers of Pintail, as well as Mallard, and several stomachs of the former contained potato. Pitman (1947) makes several references to Wigeon feeding on potatoes (always apparently in company with Mallard) and R. E. M. Pilcher (personal communication) has noted this habit in both Wigeon and Teal.

The inclusion of potato in the diet of the Pink-footed Goose probably occurred as a result of their long established habit of grazing winter wheat. From the middle of the 19th Century, wheat was usually following potatoes in rotation. Whether blighted potatoes were ever taken is not known, but the first tubers eaten would certainly have been partly decayed, having been on the field from harvest until the wheat sprouted. Presumably the geese learnt to fly to the harvested fields earlier and earlier in the autumn until they arrived before the wheat was up, to eat nothing but waste potatoes. Some reports (e.g. Haigh, 1935) stressed that the tubers were soft and even now it is frequently assumed that the goose cannot take anything too solid. However, examinaion of stomach contents of birds shot during the last five years show that hard tubers are cut or bitten into pieces; indeed the lack of rotten potato in many stomachs suggests a preference for undecayed food. A degree of frost, while not immediately softening the potato, may increase its sweetness and palatibility. There is little evidence that unharvested tubers are dug up and eaten; normally wildfowl arrive too late in the autumn to attack unharvested fields.

The earliest report of potato-eating referred to the Pink-footed Geese of the Ribble estuary in Lancashire (Howard, quoted by Mitchell, 1892). The birds flew inland, especially under a light moon to feed on cultivated grasses, clover, young wheat, rotten potatoes and grain. The habit did not spread to other localities rapidly, probably due to differences in the distribution of the geese, on the one hand, and potatoes and/or winter-sown wheat on the other. When potatoes were first cultivated extensively on the Lincolnshire wolds in 1918 and 1919, Pinkfeet (J. H. Davey, pers. comm.) turned to them at once, suggesting perhaps some prior acquaintance with the food, although in that area grass, grain and winter wheat had hitherto been their main diet. Dawson (1931) wrote that before Christmas, 1924, large numbers of Pinkfeet came regularly at dawn from the Humber to a twelve acre potato field on the Yorkshire wolds. Potatoes were first grown on a large scale in the Holbeach area of Lincolnshire in the 1890's and at Wainfleet in the 1920's (R. E. M. Pilcher, pers. comm.), but here the geese did not appear until 1927 and 1932 respectively and by this time potato-eating was traditional in the flocks. The

Norfolk birds visiting Wells and Yarmouth prior to 1939, never flew to potato fields, the agricultural practice then being mainly centred around grass, and now, although there are plenty of potatoes, the geese no longer come: presumably they have joined or are represented by the Lincolnshire birds. In Scotland, Pinkfeet were found to be eating potatoes regularly in the 1920's. This change in habit was related to a change in their distribution which brought roosting flocks into Perthshire. The provision of stretches of water for reservoirs and curling ponds (e.g. Dupplin Loch and Carsebreck) had made this influx possible. J. Berry (personal communication) states that during the 1920's potatoes became a regular diet of Pinkfeet in north-east Fife.

Figure 1 shows the modern distribution of potato-growing in Britain as a whole, and Figure 2 in Scotland on a rather larger scale. Nowadays potatoes are a most important Pinkfoot food once the stubbles are cleared: only the Solway geese and the few that spend the early winter on the Severn do not take them regularly. Areas where potatoes are not grown are, in fact, often evacuated by Pinkfeet as soon as the spilled grain has been taken.

Potato-eating in the Greylag Goose has only recently become an established tradition (or, at least, has only recently been recognised as such). This is perhaps surprising since the bird is an opportunist and generally more adaptable than the Pinkfoot in its choice of both food and feeding habitat. It was also often seen feeding with Pinkfeet in Scotland and might have been expected to acquire the habit from them: in fact in February, 1935, McLean (1954) shot three Greylags with a number of Pinkfeet on an old potato field near Flanders Moss in Perthshire. Dalgety (1937) and Blockley (undated, but about 1937) say that the Greylag is not partial to potatoes as is the Pinkfoot and Pitman (1947) states that in his experience, mostly gained pre-war, the habit of eating potatoes is only found in the Pink-footed Goose. Undoubtedly, potatoes were taken at times, particularly in bad weather, and Alpheraky (1905) lists potato, turnips and garden vegetables as presumably occasional foods of the continental Greylag. However, the widespread utilisation of tubers does not appear to have occurred until the second World War. Probably today fewer Greylag, in proportion to the total population, take potato than do Pinkfeet. This is due to the former being less concentrated in potato-growing areas and not to any avoidance of potatoes if they are available. There has, incidentally, been a recent report of potato-eating by breeding Greylag in Iceland.

Potato-eating in the Mute Swan has nowhere become traditional although this omnivorous bird takes the tuber occasionally and there is one particularly early record for Ireland (Thompson, 1851). The Whooper Swan, which shows a stronger tendency to feed inland in small flocks, is now found regularly on potato fields in autumn in Perthshire and Angus. The associated habit of feeding on winter wheat is of longer standing (although it also applies only to very small numbers and to certain localities). The influx of swans into the Tay and Forth faunal areas (Boyd & Eltringham, 1962) during the last 50 years has relevance here, since these are the main potato-growing districts in Scotland. Potatoes have probably been taken sporadically from young wheat fields for the whole of this time, but only since the severe winters of the 1940's has the habit been noticeably regular. Baxter & Rintoul (1953) wrote of two Whooper Swans feeding on potatoes from a rubbish dump at Nigg, in Ross and Cromarty, and in 1961 potato-eating was recorded in Aberdeenshire. There is

Figure 1. Distribution of maincrop potatoes in Britain. One dot equals 1,000 acres of potatoes. After Hessayon & Fenemore (1961).

Figure 2. Distribution of potatoes in Scotland in 1955. From O'Dell & Walton (1962).

evidence (J. W. Campbell, personal communication) that in addition to clearing ground of waste potatoes, Whoopers also remove a lot of grass rhizomes, including those of couch grass.

Turnip-eating

It must be emphasised that, although swede turnip-eating by geese is harmful to agricultural interests, it occurs exceptionally and only in those areas of Scotland where roots are left in the field all winter. The habit undoubtedly started because the birds were attracted to the green tops during weather that made their normal feeding grounds unavailable. Other green brassica crops are seldom taken; kale and brussels sprouts are in small fields, often close to human habitation, and sugar and fodder beet are usually harvested before the birds arrive.

Ducks may acquire a temporary liking for brassicas, but do not take field roots, although one decoy has apparently been successfully baited with chopped turnips (Whitaker, 1918). During the very cold weather of 1947, both Mallard and Wigeon were seen on small fields of kale and brussels sprouts and this behaviour was repeated in 1963. In many cases, it was the depth of snow that allowed the ducks to reach the normally inaccessible kale leaves.

Greylags and Canada Geese take kale, etc., occasionally. Unlike the Pinkfoot, which normally moves away in adverse weather, the Greylag prefers to remain and resort temporarily to unusual foods. According to some writers of the last century, other geese have taken turnips and rape kale regularly; for instance, Folkard (1875) referred to the habit in Bean Geese and Borrer (1891) in Whitefronts. Possibly these observations were made during a series of hard winters, certainly nowadays neither species takes these crops consistently, although reports indicate that Whitefronts were taking kale in early 1963. Johns (1918) also wrote of Greylags appearing in turnip fields but the habit has become a regular one rather more recently than that. The winter of 1947 produced a number of unusual complaints from farmers, mainly referring to the activities of Greylags. Most cases of birds feeding on swede turnips occurred during that winter. The green tops, frosted roots and finally the sound turnips were eaten in Bute, Aberdeenshire and Wigtownshire, and in a few other places in Scotland Greylags were seen feeding on roots put out for cattle. The birds seldom continued to take swedes once their normal feeding grounds were free of snow. However, since 1947, the Bute geese have taken sound roots in increasing numbers and invade the crop as the weather deteriorates each winter. In 1963 there have been further cases of swede turnip eating in Wigtownshire, Dumfriesshire and Aberdeenshire in addition to Bute. Undoubtedly the habit will spread further if winters continue to be cold and the agricultural practice of leaving swedes on the fields until the spring becomes general. Figure 3 shows the modern distribution of 200,000 acres of turnips and swedes in Scotland. It is obvious that potentially these roots provide a source of food in all areas where there are wild geese.

Rogerson & Tunnicliffe (1947) have seen Canada Geese in Suffolk following a farm cart through the fields and eating mangolds intended for cows, in much the same way as Greylags do occasionally in Scotland. This is still, however, very unusual.

The Whooper is the only swan that takes sound swede turnips from fields in winter. Very few birds are involved and the practice has been observed only in Aberdeenshire where a few swans also eat loose turnips in the stock fields. The habit has been sporadic over the years and originated earlier than 1947. It is related to weather conditions and the availability of other types of food, occurring during most winters but never on an extensive scale (H. Robertson, pers. comm.).

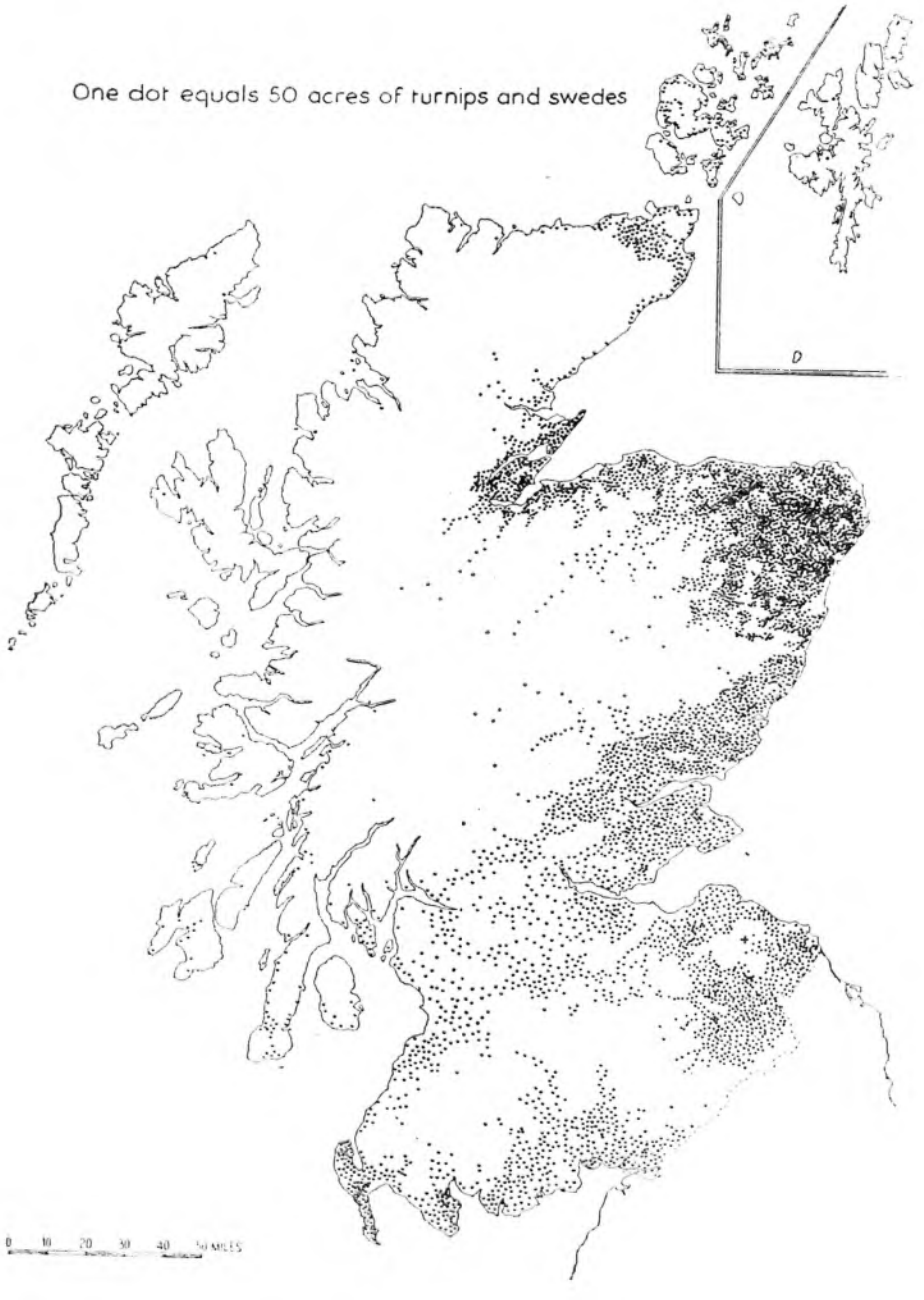

Figure 3. Distribution of turnips and swedes in Scotland in 1955. From O'Dell & Walton (1962).

Techniques used in dealing with roots and tubers

Differences between the species in the techniques used in taking potatoes or turnips are based on differences in the structure of their bills and on their normal feeding regime. The simplest way for any anatid to tackle a root is to nibble at it with the sharp edges of the nails on the ends of the mandible and maxilla. This is the only method employed by ducks and Mute Swans, which differ from the other wildfowl discussed here in that they seldom graze and, when they do, use only the nails to hold and cut the grass. The Whooper Swan and most geese graze sideways, shearing herbage with the lateral lamellae.

A number of duck species in addition to the Mallard appear to have bills strong enough and nails sharp enough to deal with roots, but apparently few actually try. The pieces nibbled off are never larger than the inner mould of the maxilla tip, less than 18 mm. across in the case of the Mallard and 30 mm. in the Mute Swan. Of course, larger pieces can be taken by Mallard, potatoes 20 mm. across and 27 mm. long are found in their gullets, but these are not bitten before being swallowed. The scoop-like marks left by Mallard or Mute Swans on potatoes can be readily seen and are recognisable by the absence of any tooth marks made with the lamellae.

Geese and Whooper Swans also break the skin of a turnip or potato with the maxillary and mandibular nails. The subsequent action has been described as gouging. The semi-circular cuts made by the mandible can be seen around the edge of a partly eaten root as well as the rows of tooth-marks which are made as the sliver of flesh is nipped off with the combined action of tongue and lateral lamellae along one side (see figure in Kear, 1962).

Discussion

Much of the extension and improvement in British agriculture over the last 300 years has been directly beneficial to several wildfowl species. As discussed elsewhere (Kear, 1963), migratory birds take mainly harvest wastage or graze grass and dormant cereals that recover completely. They can therefore be easily accommodated, often to agriculture's mutual advantage. Where there are direct conflicts with farming interests, it is possible that these can be overcome by a change in harvesting methods.

The benefits have been greatest to those species that are already amenable to change by virtue of their unspecialised bills, omnivorous diets and adaptable habits. Indeed two of them, the Mallard and the Greylag Goose, have paid the price of extreme adaptability and long ago became integrated with farming as domesticated animals. Of all the ducks, the Mallard stands out as the most versatile in its behaviour. It has profited the most by changes in cultivation and particularly by the introduction of the potato; the shooting man has in his turn taken advantage of these accessible farmland population. Among the geese, two indigenous and one introduced species can be described as adaptable, but they show important innate and traditional behaviour differences. The Greylag is less wary than its relatives, easier to kill and more difficult to frighten. It is less fastidious than the Pinkfoot in its selection of food and feeding habitat and tends to flight shorter distances from roost to feeding ground, often on to poorer farmland. Once the wintering flocks have arrived they tend to be rather sedentary. The Pinkfeet have been admirably suited by improvements in agriculture; they select only good farmland and are true nomads, moving out altogether if snow covers their usual feeding places. They

tend to be more strictly traditional (or predictable) than the Greylag and in travelling much greater distances (up to 30 miles) from the roost to feed, often pass over land that would seem excellent. In the case of the Wigeon which does much the same thing, Lebret (1959) suggested that a strong flighting urge induces the birds to search for new feeding grounds which may later be opened up. Pinkfeet do, in fact, fly shorter distances to feed at night and in foggy weather probably use feeding grounds reconnoitred during daylight.

The White-fronted Geese have neither the strongly omnivorous behaviour of the Greylag nor the ranging habits that have contributed to the success of the Pinkfeet. Both sub-species of Whitefront that winter in Britain are relatively independent of agriculture. Although pasture grass and, much less often, spilled grain and winter wheat are taken, potatoes and roots have never been exploited. This independence is even more marked in the Barnacle and Brent whose small bills are suited only to their particular food and feeding niche.

The feral Canada Goose is present in this country in small numbers and remains throughout the year. This fact, together with its adaptability, may make it a nuisance on some crops during the summer. The same might be said of the Mute Swan, but fortunately the majority of these birds show a natural disinclination to feed ashore, in fact, Britain appears to be the only country where the phenomenon has recently been observed. The Whooper Swan has always fed more on farmland than does the Mute, and like geese will fly some distance from water to feeding grounds. The habit is recorded in the early literature for both Britain and continental Europe, but the bird undoubtedly prefers an aquatic habitat if sufficient food is available.

The position at present would seem to be that several species of wildfowl are able to take care of themselves in this changing age and need little help from the conservationist other than the provision of secure roosts and a reasonable control of shooting pressure. At the same time their impact on farming is generally immaterial and such local trouble as arises from time to time can be handled relatively easily.

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