Three-bird flights in the Mallard

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Summary

NESTING-PERIOD flights were investigated in an intensive study completed in 1962. In North Kent, three-bird flights performed during the nesting season are not territorial in the Mallard or the Shoveler. Experiments with a live bird and with models demonstrated the absence of territorial aggressiveness on the breeding grounds. Females were always the centre of attacks and in the Mallard paired males showed remarkable passivity which contrasted with vigorous defence of the female in the Shoveler. Two distinct levels of intensity were discovered in the three-bird flights which are considered to be a phase in the indiscriminate pursuit of females characteristic of *Anas* species: comparable behaviour in the Shoveler is described. Three-bird flights coincide with maximum activity in the gonad cycle and with the period of isolation of drakes. Behaviour of paired drakes during Mallard flights indicates a polygamous tendency. It is suggested that the flights are primarily sexual in origin, but that latent gregariousness is also a causal factor. The biological significance is obscure, but possible explanations are given.

Introduction

Widespread discussion of territorialism in Mallard *Anas platyrhynchos* has occurred, especially since Hochbaum postulated a territorial concept in 1944. Dzubin (1955) and Sowls (1955) demonstrated inconsistencies and later Hochbaum (1959) agreed that his interpretation had been too rigid. Conflicting opinions still exist, but it is now widely agreed that Mallard do not hold territory in the sense of a static defended area. During the breeding seasons of 1958 to 1961 inclusive I found no evidence of territorial behaviour in North Kent and in 1962 an attempt was made to discover the significance of what had previously been taken to be primary evidence for territorialism: the " defence flights " of Hochbaum and others, which had first been described as territorial defence by Geyr (1924).

Three-bird flights

Three-bird flights occur in spring at the beginning of the nesting period and have been described under various names. They are quite distinct from aerial courtship display parties which precede them, in which a number of drakes display to a single female, and from attempted rape flights which follow them. The latter are usually characterized by the fact that a number of drakes harass a lone female, attempting to force her down and rape her. (See also Dzubin, 1955 & 1957 and Lebret, 1961). Generally, the sight of a pair flying over nesting or feeding terrain at this season stimulates a loafing drake to rise and pursue them. After a chase of varying length, during which the pair usually move well away, the pursuing drake returns to the spot where it was loafing. These flights were generally called " defence flights ", but " Vertreiben " (Geyr, 1924) and " expulsion flights " (Lebret, 1961) have also been used to describe them. In America the expression " three-bird flights " has been used and this seems more satisfactory because it reflects the present state of knowlege without attempting to pre-judge the nature of the behaviour involved. In the descriptions and discussions which follow the latter terminology is used and the male which initiates the three-bird flight by rising from the ground at a flying pair is referred to as the pursuer.

As far as I can recollect I have never seen a lone drake Mallard attacked in circumstances suggesting territorial defence in fourteen years of visiting the North Kent marshes. Further, all nesting season flights seen from 1958 to 1961 inclusive, totalling approximately 200, were directed at female members of pairs or at lone females.

Most of my observations were made on the Isle of Sheppey, North Kent, which is bordered on its north side by the Thames estuary and divided from the mainland by the Swale channel. On the southern and eastern sides there are some 13,000 acres of fresh grazing marshes, similar in many respects to those at Delta, Manitoba (Hochbaum, personal communication). A few salt marshes of 100 acres or more adjoin the Swale shore and some 5,000 acres of upland arable border the grazing marshes. The wintering and breeding Mallard populations are, as far as I can ascertain, wholly wild and no appreciable farming or breeding of birds has taken place. There are no ornamental waters or similar artificial habitat.

Mallard flights

Because of prolonged cold weather, breeding was late in 1962 and my main observation period corresponded with commencement of first nests. A description of every flight seen in that season was recorded and the primary features of these are summarised in Tables I and II. As in previous years no

Table I: Location, intensity and numbers of three-bird flights of Mallard in north Kent, spring 1962.

Location	Flight(s) Against		Intensity of Flights		Date
	Paired ♀♀	Lone ♀♀	Low	High	
SB	70	—	—	70	10th - 29th April: one 13th May
SB	13	—	13	—	10th - 29th April
UB	2	—	2	—	20th April
G	23	—	—	23	9th April - 26th May
G	9	—	9	—	17th April - 13th May
SB	—	4	—	4	10th & 28th April
G	—	2	—	2	9th April
G	—	1	1	—	6th May
totals	117	7	25	99	

G = Fresh grazing marshes; UB = Upland breeding grounds; SB = Salting breeding grounds.

case of a lone drake being attacked was seen. Table I analyses the flights according to date and intensity, whilst Table II shows the reactions of the two or three individuals in the same flights. Behaviour patterns were

Table II: Mallard behaviour during flights

Intensity of flight		Paired ♀ harassed	Reaction of paired ♀	Reaction of paired ♂	Additional display by pursuing ♂
Low	High				
25	—	No	Slight evasive flight in 15	Nil	"Neck pressing" in flight in 7 cases.
—	74	Yes	Evasive flight	"Moved away"	Nil, except one case where it "hung neck", (see text)
—	8	Yes	Repulsion note	"Moved away"	Nil
—	3	Yes	Loud quacking	"Moved away"	Nil
—	5	Yes	Inciting during flight	"Moved away"	Nil
—	7	Lone ♀ harassed	Evasive flight in 6	—	Nil
—	1	Yes	Repulsion note	Remained at side of ♀	Nil
—	1	Yes	Evasive flight	"Moved away"	2 ♂♂ pursuing

observed, some of which have not previously been described. The most important patterns are:—

1. Three-bird flights occur at two levels of intensity. Lower intensity flights occur principally at the beginning of the period, when the pursuing drake merely flies near to the female or perhaps glides past her once or twice before planing back to his loafing spot. Occasionally the pursuer is seen to display during low intensity flights by pressing his head and neck back, usually whilst gliding. High intensity flights are in sharp contrast; here the pursuing drake harries a lone or paired female with extreme vigour, twisting and closely following her as though attempting to seize her tail. Table I shows that of 124 flights observed, 99 (almost 80%) involved high intensity pursuits. Once a pursuing drake was seen to hang its head and neck almost vertically, presenting a contorted appearance which had not previously been seen.
2. In every high intensity flight against a pair, the female was harassed without the paired drake attempting to defend her. On the contrary, the paired drake usually moved away, sometimes as much as forty yards, and allowed his female to be pursued. During the pursuit he trailed behind, flying leisurely. When the pursuing male "dropped away" the paired male rejoined his partner and flew close to her. This behaviour is summarised in Table II by the term "moved away" for the paired drake's reaction.
3. When pursued in a high intensity flight the female, whether paired or not, takes evasive flight which is often quite spectacular. Sometimes the paired female will "incite" (Lorenz, 1951), and not infrequently one hears a female using the "repulsion note" (*loc. cit.*). I was not always close enough to be certain whether inciting and repulsion notes occurred and some such may have gone unrecorded. When subjected to low intensity flights the paired female either fails to react, or takes only slight evasive action. Reactions seen are recorded in Table II.
4. In very few cases can three-bird flights be precisely associated with any particular area on the ground. This is discussed further in Appendix B.
5. In a number of cases lone drakes flew directly over loafing drakes without the latter exhibiting aggressiveness. However, pairs or lone females which flew over the same loafing males either immediately before or afterwards were pursued. A drake which was watched at close quarters for ninety minutes on 15th May, 1961 whilst waiting for its incubating mate at their feeding spot was seen to flatten and remain motionless when a strange drake flew low over him.

To supplement visual analysis of flights, attempts were made to determine the birds' reactions when areas which might have been their territories were entered or crossed by others of the same species. The behaviour of the pursuing drake before and after it took part in a three-bird flight was noted: case histories are given in Appendix A.

Shoveler flights

Shoveler *Anas clypeata* indulge in three-bird flights at the same phase in their annual cycle as Mallard and flights appear to originate in the same manner. There is however, a striking difference in the behaviour of the paired drakes in that the male Shoveler always defends its mate. Cursory observation might lead to the conclusion that the Shoveler holds territory, but many

incidents occur in which the bird that appears to be a territorial defender is found to be pursuing a paired female. Marauding males, which seem to be unmated, are more noticeable in Shoveler than Mallard at the beginning of the nesting period. They apparently result from the substantial excess of males which is found in the population on Sheppey at that time. Three case histories typical of Shoveler behaviour are given in Appendix C: these have been included to illustrate the behaviour of paired drakes.

Discussion

Females, whether with their mates or not, are always the centre of attacks during these flights. This suggests that three-bird flights are attacks of sexual rather than territorial origin. These flights occur at the beginning of the breeding season and correspond with building of nests and egg laying. They are thus coincident with the breaking up of flocks and the spacing of pairs over the breeding range. This does not necessarily preclude gregariousness and one section of the population studied showed some gregariousness of pairs throughout the laying period for a number of years; similar behaviour has been noted by Gollop (1954) and others. The significant point is that three-bird flights do not occur amongst the flocks, but are restricted to pairs and males which have split away from them.

I have witnessed only one case in which a male initiated a three-bird flight whilst his own female was with him. Often a female will scarcely have settled on her nest, after parting company with her mate, before the latter begins three-bird flights. Flights appear to be caused by males who for one reason or another are alone. Isolations may be temporary and of short duration, *e.g.* when a male is waiting for a laying female. Alternatively, they may be longer isolations in the incubation period, during which many of the drakes become semi-gregarious. Mallard drakes appear to have one of the shortest periods of isolation amongst *Anas* species. Johnsgard (1960) estimated that " 50% paired after December " and pairing does not necessarily involve leaving a flock. Consequently, when isolation occurs it may be for the first time in nine months or more. If a first nest is successful, at least as far as the incubation stage, it may then be as little as two or three weeks before the drake begins to seek the company of other males again, albeit for short periods only at that stage. The gregarious tendency must be strong and throughout the period under consideration the sight of flying birds remains a powerful stimulus to lone males. The strength of the stimulus is sufficient to cause numerous errors and I have seen Mallard drakes repeatedly take off after Shoveler and Wigeon *Anas penelope* females, only to turn back before reaching them. Similar behaviour has been recorded by Hochbaum (1944) and Lebret (1961). These considerations suggest that one factor in the motivation of three-bird flights is latent gregariousness in the pursuing male.

During low intensity three-bird flights the pursuing males display to females instead of attacking them. Comparison with the results reported by Johnsgard (1960) suggests that such flights may be a transitional phase between the pairing display and the three-bird flight periods. High intensity three-bird flights also appear to be a display form and no physical contact or apparent result has been witnessed. The manner in which the pursuing drakes end the encounter is in my opinion definitely symbolic. Weidmann (1956) stresses the importance of inciting in pair formation, but its (apparently ineffective) use during three-bird flights has yet to be elucidated. During these flights the

paired drake ignores his mate's constant inciting, but as soon as they land he responds to it.

Another unexplained phenomenon which coincides with commencement of three-bird flights is a period in which females, usually paired birds, quack loudly and frequently on the nesting grounds, particularly in the early morning. This has been called the " period of persistent quacking ". Quacking is a common feature of the winter flocks but is uncommon once egg laying commences. Following the " period of persistent quacking " it will not be heard again at all frequently until the moult is finished and birds re-assemble in autumn flocks. There is a clear advantage in breeding females remaining silent during the whole period of pursuit flights, since calling would attract males and might threaten breeding success. For this reason the burst of quacking is puzzling. It occurs at the beginning of the laying period and appears to emanate from birds which have not commenced laying. It should not be confused with the " decrescendo quacking " (Lorenz, 1951).

It is apparent that there is a high sexual element in the motivation of three-bird flights and I believe this to be the most important single factor. Males remain sterile until approximately mid-February and activity in the gonad cycle reaches a maximum about March or April in south-east England (Höhn, 1947). The coincidence with commencement of three-bird flights is striking. Increase in the testes weight after mid-February corresponds with increasing intensity of pursuits and with weakening of pair bonds. Drakes wander farther and farther from the original loafing spots and tend to associate with other drakes. In April 1962, when many clutches were nearly complete, drakes joined together in groups of three or four whilst waiting for their females during dawn nest visit periods. These parties would fly slowly about the salt marsh apparently looking for females; if one was seen or could be " put up " the group harassed her in concert. This further suggests that males are not attached to territories, but rather are held near to their females by the pair-bond. Similar behaviour was observed on upland nesting grounds during pre-incubation nest visits. Most upland nests are in wheat and barley fields, where loafing pools and waters are non-existent. In the early stages of laying, males remain in the fields quite close to the females (see Appendix B, Flight B), but later they adjourn to adjacent pasture where parties of waiting males feed and loaf together without friction. Observed behaviour and the comparatively early desertion of incubating females indicate that the pair-bond in Mallard is weak by comparison with other *Anas* species, *e.g.* Shoveler and Pintail *A. acuta.* As pair bonds weaken and finally break, a pattern of gradually increasing intensity can be discerned in the aerial pursuits of females. The beginnings of these pursuits are seen in pairing displays (Johnsgard, 1961) and subsequently they find expression in low intensity three-bird flights; the latter quickly develop into the high intensity pursuits. As more and more pairs break up, another type of flight develops in which groups of males chase any lone female and these lead eventually to rape flights and attempted rape flights. In all these flights the harrying of the female is similar in form but varies markedly in intensity from a simple display to the violence of a rape flight.

One of the most remarkable aspects of three-bird flights in Mallard is the passivity of the paired drakes. The latter deliberately move away from their partners during the flights, allowing the pursuing male " free access " to the female. Table II shows that in 82% of the high intensity flights,

corresponding to 73% of all flights, paired drakes deliberately " moved away ". These results are at variance with those of Lebret (1961), who says of the pursuing drake " In many such cases he is not only assaulting the female and a short clash of the two drakes may precede. After the drake of the assaulted pair has been driven away, the victor may turn to the female and chase her some distance, her mate following immediately." I have never seen anything resembling this in three-bird flights of Mallard in Kent. It is possible that since Lebret's birds were " very tame " and in part artificially fed, they may have been living at a density considerably greater than that found in wild populations. Out of several hundred Mallard flights in Saskatchewan Dzubin (1955) recorded only six which " showed friction between the drakes ". He also says (p. 291) " most of my observations of the territorial pursuits in the Mallard have been inconclusive since I could not follow many of the pursuits to completion ". In those cases where the paired drake did not " move away " in the present study, his role was nevertheless completely passive.

Dissimilarity between the paired drakes' behaviour in Mallard and Shoveler flights has already been noted. In the Shoveler the paired drake attacks the pursuer and attempts to force him away by constantly interposing himself between his mate and the pursuer or by actually buffeting the latter. The concept of " mated-female distance " (an area surrounding the female from which the drake excludes other males: Conder, 1949) certainly applies in Shoveler, but I am doubtful whether they hold territory in the sense of a defended area. The biological significance of the pursuers' actions is not apparent; possibly such behaviour could ensure that all females are " fast-paired " and stimulated to breeding condition. In the Shoveler the paired drakes' behaviour has an obvious survival value, but in Mallard the opposite appears to apply. I suggest that the paired drakes' reaction in these flights is a measure of the strength of the pair-bond. In Mallard the completely passive reaction suggests a polygamous tendency which is also suggested by the comparatively large number of ' trios ' which exist throughout the breeding season. Like Lebret (1961), I am unable to produce proof as yet, but I have had the strongest possible circumstantial evidence that in some of the trios with two females, both were laying.

It appears likely that three-bird flights are caused by simultaneous drives of sexual and gregarious origin in the drakes. At the beginning of the period, the former, which is dominant, is increasing and the latter decreasing in intensity. The maximum effect seems to occur just before drakes re-flock. Thereafter the sexual drive regresses as gregariousness increases and I agree with Lebret (1961) that the urge to harry females has largely died out when drakes congregate for the moult.

My conclusions on territory accord with those of Munro (1943) that " no behavior that might be interpreted as territory defence has been observed ". Some incidents might have been so interpreted if the whole sequence of events had not been clearly observed or the case history had not been known.

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Appendix A

Mallard case studies

Case A

A pair studied during their laying period in April 1962 was recognisable because of unusual " pricking " of the male's left wing. They visited the nest site every morning and stayed from approximately 04:00 hrs. to 08:30 hrs. (All times are G.M.T.) While the female was at the nest the male went to a small pool about 100 yards away. From the pool this drake initiated many three-bird flights and also pursued lone females ; always returning to the same spot and apparently holding territory at the pool. However, the following anomalies were discovered :—

(i) Only one of the pairs pursued looked as though they were going to pass over or near the loafing place or the nest site. All other birds pursued were well away from this vicinity and flying away from it. Frequently the pursuer would fly 80 yards or more to catch up with the bird attacked.

(ii) The nest was near the outer edge of the salt marsh and about 30 yards from the estuary shore. On five occasions three-bird flights took place wholly over the estuary and involved pursuits of three or four hundred yards over water. Once the pursuing drake landed on the water beside the pair 200 yards out in the estuary after a flight lasting three minutes. The three birds floated near to one another without further antagonism.

(iii) In an experiment on 13th April 1962, a tethered adult drake Mallard was placed in full view, on the usual loafing spot of the paired drake. The captive was placed in position just after 04:00 hrs. at which time the pair was already on the pool, although they had not visited the nest. After initial disturbance the pair returned twice, at 04:25 hrs. and 05:07 hrs., dipping and setting their wings as though to land. Each time they veered away at the last moment, apparently disturbed by the strange male on their loafing water. At 06:20 hrs., the pair circled again and this time almost landed beside two drakes who had meanwhile walked to the end of the loafing pool nearest the nest, but they fluttered on a further 60 yards. At 06:30 hrs., after the drakes had moved away, the pair walked quietly to the pool. They had shown no aggressiveness towards the two drakes and they now appeared not to notice the captive drake, which was only 25 yards from them. At 06:45 hrs. the pair " jumped up ", circled the nest area and landed between the nest and the loafing water. The female went straight to the nest and the drake to the loafing spot, again, the latter ignored the captive drake. The female laid her fourth egg that morning.

Case B

Because of the possibility that birds might be alarmed by the occasional flapping of a captive male it was decided to use a wildfowler's drake decoy in further tests.

Another pair was located on 16th April 1962: their nesting area was similar to that in Case A. Another Mallard was laying 30 yards away and a Shoveler 40 yards away. The pair in Case B flew into the nest area at times up to 55 minutes after first light, always arriving from the same direction. As in the other pairs studied, while the female was at the nest, the male took part in three-bird flights, always planing back to a loafing pool about 20 yards from the nest.

At 04:55 hrs. on 18th April this pair was already in the area, but the female had not yet laid. They flew out into adjacent *Spartina* beds when disturbed and the decoy was then placed on the pool in the position from which the drake had risen. At 05:30 hrs. the pair circled the area and flew over the loafing pool, veering away on seeing the decoy on the water. They circled again in exactly the same manner ten minutes later. At 06:30 hrs. the pair sneaked back to the nest area, fluttering low over the *Spartina* beds. The drake did not return to the loafing pool, but remained in the *Spartina* while the female went to the nest and laid her eighth egg.

Two other laying pairs were tested with the decoy and in both reactions were similar to those above. The pair spacing tendency, by which nesting pairs passively re-adjust their positions, was thus common to all pairs. A further illustration of the same tendency is noted in Case C below.

Case C

At times outside the nest visit period, pairs were found spaced over the fresh grazing marshes, often beside ditches and fleets. Table I shows that the minority of three-bird flights were seen over the grazing marshes and this was considered to result from the fact that there were comparatively few lone male Mallards on the marsh at this phase of that season.

On 19th April 1962 two pairs were observed from a car approximately 60 yards apart on a small ditch. The car disturbed the nearer pair which swam slowly away towards the farther pair who were standing on the bank. The female of the second pair began to extend her neck as the first pair approached and then walked slowly away, her mate following; as she did so she incited against the approaching drake, but her mate did not respond. The first drake became increasingly interested in the other female as he neared her, straightening his neck until it was fully erect, looking in her direction and swimming towards her, but she continued to incite. Ultimately the first pair occupied the position the second pair had been in and the latter settled to sleep approximately 30 yards away.

Appendix B

Mallard flights unrelated to possible territory

Many incidents were recorded which were seemingly unconnected with any particular area on the ground or which were entirely contrary to territorial behaviour. Three typical cases are given below:—

Flight A

On 25th April 1962 a typical high intensity flight, in which the pursuing male harassed the female of a pair for about 30 seconds was seen over Borough Market railway junction near London Bridge. This is a wholly built-up area and the nearest water is the River Thames some 200 yards away. This flight also typifies those seen to take place wholly over water, e.g. over the Thames in the City of London and the Thames estuary and Swale channel around Sheppey.

Flight B

On 12th April 1962 at an upland breeding ground pairs were seen visiting nests in a wheatfield, arriving between 04:30 hrs. and 05:00 hrs. At 05:10 hrs. a female who had been under observation for forty minutes left her nest and rejoined her mate who was standing nearby. They began to walk slowly through the wheat, feeding off the ground. After a minute or two the drake from a nest 40 yards away, whose female was still laying, noticed the feeding duck. He walked quickly towards her, running the last 10 yards notwithstanding the fact that she was only 10 yards from her own nest. She raised her head when she saw the intruder coming, gave a flight intention movement and "jumped up", she was closely followed by the pursuer and a typical high intensity three-bird flight followed. As usual, her mate trailed along behind. After the flight the pursuer dropped back to the spot where he was first seen, but the first pair left the area.

Flight C

On 17th April 1962 birds were watched on a feeding ground in fresh grazing marshes. A male was seen to rise at a pair, the female of which incited against him repeatedly during the flight without invoking any response from her mate. They circled the marsh two or three times and then all landed together. The female incited against the pursuer in a most agitated fashion and her drake then ran at him twice with head lowered. No further intrusions were attempted even though all three were now standing on the spot from which the pursuer had risen.

Appendix C

Shoveler case studies

Case A

On 10th April 1962 in an area of fresh grazing marshes which had been a nesting ground in previous years a Shoveler drake was seen harrying the female of a pair in a typical high intensity three-bird flight. Afterwards, the pursuing drake planed back and landed on a freshwater fleet. Immediately, another male who had been standing on the bank walked quickly into the water, swam through a screen of reeds and began vigorous head pumping at the male which had just landed. The latter backed away from the displaying drake who continued head pumping for another minute before advancing further. The original pursuer retreated again and then simply " hung about ". Previously a female had been glimpsed in the reeds and similar incidents of this type suggested that the displaying male was in fact defending its mate. On " walking the birds up " the original pursuer flew off alone, whilst the female from the reed bed flew off with the drake which had been displaying. The first drake had therefore been a marauder rather than a territorial defender.

Case B

An incident seen on 9th April 1962 further illustrates the behaviour of marauding drakes and the maintenance of " mated-female distance ". Two pairs were standing some 50 yards apart near a freshwater fleet. Single, apparently marauding males, were continually flighting in the area and one stood staring at one pair from about fifteen yards distance. Occasionally the paired male nearest the single male would rise to pursue flying males which came too close, but it made no objection to the other pair and the odd male which stood nearby. After about twenty minutes the single male suddenly flew straight at the pair it had been watching and landed between the male and female, practically touching the latter. All three exploded into the air and after vigorous aerobatics the paired drake drove the intruder away. None of the birds returned, the pair and marauder moving off in different directions.

Case C

Another instance of pair-bond defence was observed on 12th April 1962 at 05:50 hrs. when a drake was noted head pumping at another which was swimming towards it on a freshwater fleet. Close observation revealed that the swimming bird was making towards a paired female partly hidden in a reed bed. As the intruder approached, the head pumping of the paired drake became more violent until, when the intruder was two feet distant, he flew at him, rushing over the water calling and stabbing at him. In spite of a further attack from the paired drake the intruder flew at the female, forcing her to take off. The paired male flew after them and not only succeeded in getting between the intruder and his own female, but he forced the intruder away by stabbing at him in flight and then pursuing him over the water surface.

Wild ducks and swans at the New Grounds

M. A. Ogilvie

In the *Ninth Annual Report* (1958) there appeared a survey of the status of ducks on the River Severn at the New Grounds and in the Wildfowl Trust's enclosures based on counts made between 1947-1957.

The object of this present survey is to bring the picture up to date, in fact to the end of the 1962-3 winter. Counting in the winter has been slightly more regular in recent years than in the past, thanks to changes in the behaviour of the wild geese, which have made it possible to count ducks with less disturbance to geese than used to be the case. Monthly counts between September and March have been made both in the Decoy and adjacent pens, an area of 40 acres, and on the River Severn half-a-mile away between Frampton Pill in the north-east and Purton Breakwater and the Royal Drift in the south-west, at low tide an expanse of mud two and a half miles by one mile, bordered by a strip of high saltmarsh some hundreds of yards wide. During the last four years frequent counts have also been made during the summer giving valuable information on the departure and arrival dates of wintering species and confirming unpublished records on summering birds made in the early 1950's.