

shanks feed far more on the green marsh in the creek bottoms and the creeks were very early packed with ice. Many shore birds however had moved on before the hard weather. The number of Bar-tailed Godwits lessened noticeably early in January and few were left in the area by the end of the month. Oystercatchers, which had been present in very large flocks – well over a thousand strong – moved away at the same time and none was seen after the middle of January. Green Plover and Golden Plover moved away even earlier. None was seen in the area between Christmas and 4th March. From that date on large movements of both species occurred northwards and by mid-

March very large flocks of Green Plover were present on grass-land generally and especially on Cowbit Wash.

There does not appear to be any special significance in the number of gulls found. Throughout the year the bodies of gulls of various species can be seen along the high-water mark, dead from one cause or another. Many of the Guillemots and Razor-bills were oiled and their deaths need not have been associated with the hard weather.

Summing up, it is quite clear that on the north side of the Wash the two species which suffered most severely during the hard weather were the Shelduck and the Redshank.

Some effects of severe weather on wildfowl in Kent in 1962-63

JEFFERY HARRISON and MICHAEL HUDSON

Summary

Large numbers of wildfowl died in Kent early in 1963. Losses were especially heavy among birds on the Thames and Medway estuaries, where the inter-tidal zone was frozen for long periods. Most losses occurred 15th-26th January. Shelduck and Wigeon were severely affected, because their food became inaccessible. Losses were heavier than during the last comparable cold spell, in 1947, which had lower temperatures but more precipitation and in which the inter-tidal zone was frozen only for short periods.

More duck than drake Wigeon were found dead, even though there was an unusual preponderance of drakes in the local population. Dead Shelduck too were mostly females. Only 4 of 16 apparently starved ducks contained no food. There is evidence that the mortality was selective and that it was the weaker birds which were culled.

Numbers of ducks and geese during and after the cold spell are compared with those in other years. Nesting in 1963 was delayed, though less than in the cold spring of 1962. Breeding success was high for Shelduck and Pochard. Mallard did badly on the Thames, probably because of heavy losses of nests due to flooding of the coastal marshes by abnormally high summer tides.

It is suggested that if wildfowl losses in severe winters are to be minimised in future wildfowling should be stopped, if possible, when the inter-tidal zone freezes.

Introduction

The exceptionally severe weather which lasted from 23rd December, 1962 until 5th March, 1963, unfortunately provided ample opportunities for studying the effects of the weather on wildfowl, particularly in north Kent, where large numbers died. This was in curious contrast to south Kent where very few were found dead. The difference is possibly to be accounted for by the absence of any intertidal feeding zones in south Kent, where wildfowl quickly turned to such plants as kale and sprouts.

This winter was the first since 1947 in which conditions were severe enough to follow up some observations made on Wigeon (*Anas penelope* L.) in north Kent by Harrison and McLean (1947). At the end of January, 1947, it became obvious that duck Wigeon were suffering from the

cold spell far more than the drakes. From birds which were shot at that time, it was confirmed that the ducks were relatively thinner than the drakes. Experimental studies in north America suggest that Mallard drakes succumb more quickly to starvation in cold weather than do females (Latham, 1947; Jordan, 1953) but, as is shown below, the observations made on Wigeon and Shelduck (*Tadorna tadorna* (L.)) in 1963 support the findings of 1947.

The cold spell of 1947 differed from the 1963 spell and this was particularly reflected in the icing conditions of the saltings and the inter-tidal zone, which were far more severe and prolonged in 1963 and resulted in a widespread mortality, particularly of Wigeon and Shelduck, which did not occur in 1947.

The majority of our observations were made on the Thames fresh marshes and foreshore in the Cooling – Egypt Bay area and on the south shore of the Medway estuary, covering Greenborough, Milfordhope, Barksore and Chetney Marshes. The Romney Marsh area was visited less often during the cold spell, as for much of the time this was practically impossible. Other notes are included from the Sevenoaks gravel pits.

Comparison of the weather during the winters 1946-47 and 1962-63.

Meteorological data recorded during the two winters at three stations in south-eastern England enable conditions to be compared although, unfortunately, no data are available on the relative snowfalls, or on the number of days of ground frost. Furthermore, precise records of the extent of freezing of the inter-tidal zone do not exist, but the lack of these is to some extent covered by field observations.

In 1947 adverse weather conditions were experienced between 23rd January and 16th March (53 days). In 1962 the cold spell set in on 23rd December and lasted until 3rd March, 1963 (71 days). In 1947 the inter-tidal zone was partly frozen on 31st January and 1st February and wholly frozen from 16th-20th February. In 1963 the inter-tidal zone was partly frozen from 10th-13th January and wholly frozen from 15th-26th January, 1st-3rd February and 23rd-26th February.

Thus the severe weather lasted longer in 1963 and the inter-tidal zone was frozen more often, the longest spell being from 15th January to 26th January, which proved to be the most lethal period. However, there was a greater range of temperature during the cold spell of 1947, coupled with a much greater total precipitation, which may have brought some amelioration of the effect of low air temperatures. The cold spell of 1963 was characterised by more consistently low temperatures even though the minima were not as low as in 1947.

These facts appear to explain the larger number of birds found dead during the severe weather of 1963. The long periods during which the inter-tidal zone was frozen resulted in much hardship for Shelduck which, as Olney (1964) has shown, have no alternative feeding grounds. Continuous low temperatures following snowfalls produced a covering of hard frozen snow over the feeding grounds of Wigeon on the reclaimed grazing marsh at High Halstow, Thames Estuary, for long periods. The congregation of Wigeon on the south facing slopes of the sea wall bore witness to the difficulty of feeding elsewhere. On the

wall the Wigeon were able to benefit from the more pronounced thaw produced by the weak winter sun.

Mortality data

Wildfowl did not start dying in any numbers in north Kent until 23rd January, 1963, when the inter-tidal zone had been continuously frozen for nine days. During the last week of January a large number of birds obviously reached the end of their resistance and died. Of the total casualties, about 80% occurred during this week. Table I records the numbers of wildfowl found dead on the Thames and Medway estuaries and differentiates the sexes where known.

Table I. Numbers of wildfowl found dead on the estuaries of the Thames and Medway, early 1963.

species	total found dead	sex-ratio		
		♂♂	♀♀	not sexed
Wigeon	110	45	57	8
Shelduck	106	8	43	55
Mallard	36	15	19	2
Mute Swan	9			
Tufted Duck	5			
Teal	4	2		2
Pintail	3		1	2
Scaup	3			
White-fronted Goose	3			
Common Scoter	2			
Shoveler	1		1	
Light-bellied Brent Goose	1			

Two facts emerge. First that Wigeon and Shelduck suffered more severely than the other species listed, a fact which can be correlated with their more restricted and susceptible food requirements. Wigeon feed largely on *Enteromorpha* or grass; the former was frozen and the latter snow-covered. Shelduck feed exclusively on the inter-tidal zone which was frozen.

Mallard (*Anas platyrhynchos* L.) and Pintail (*Anas acuta* L.), being more omnivorous, suffered less. The smaller numbers of Teal (*Anas crecca* L.) and Shoveler (*Anas clypeata* L.) are to be accounted for by the fact that many had migrated elsewhere soon after the onset of cold. This seems characteristic of Teal, for they did the same in 1947 in Kent. Even as far south as the Camargue, Teal are reported by Impekovén (1964) to have emigrated in 1963, but not in 1956, when the cold spell on the Camargue did not start until much later, at which time the Teal were physiologically ready to migrate northwards and therefore remained on the

Camargue during the cold, suffering heavy losses.

Secondly, it is apparent that ducks suffered more severely than drakes, as first noticed in 1947. The figures for Wigeon are even more impressive when linked with sex ratio counts made during the period. Under the extreme conditions, it was not possible to differentiate the sexes of Shelduck in the field, but in the case of Wigeon, this was done with considerable accuracy. Counts of 10 different groups totalling 999 birds showed 646 to be males, a higher percentage of drakes than usual in north Kent, where it is rare for one sex to preponderate to any marked extent (Gillham & Homes, 1950). This was first noticed by us both on 8th February when of 700 Wigeon, we estimated that drakes exceeded ducks in a ratio of 60:40. Confirmation of this came from Mr. William Buck, who told us that of 67 caught for ringing on 3rd February, 43 were drakes.

Although parties of Wigeon actually on migration are virtually impossible to differentiate in areas where large numbers are already present, as in north Kent, it is noteworthy that a party of 9 migrating Wigeon seen on the Kent Sand and Ballast Water Reserve at Sevenoaks on 7th March included 8 ducks.

The highest proportion of drakes was recorded on 17th February, the two counts being made, one by each of us independently on the Medway and the Thames, the Medway count being considered an accurate sample of an exceptional concentration of 3,000 Wigeon, which was present on the south shore. In each case the proportion of drakes was 75%. By early April this had fallen to 55%.

When these figures are considered in conjunction with the mortality sex ratios, it will be seen that the ducks suffered even more severely than is apparent at first sight.

A similar disproportion in the sex ratio was noted at Cliffe pools on 24th February in a record flock of 1,400 Pintail which were flying out to East Tilbury flats. Of 45 which were photographed overhead, 31 (69%) were drakes. No disproportion was noted in Mallard however.

Examination of viscera from starved wildfowl

Viscera from wildfowl found dead on the Medway and Thames estuaries in February 1963 were examined by Mr. Peter Olney, whose findings were as follows:

Wigeon: (5) 2 empty; 2 containing grass; 1 undigested seeds of *Salicornia*.

Shelduck: (9) 2 empty; 7 with the snail *Hydrobia ulvae* (3 traces only); 1 also contained jaws of a Nereid, possibly *Nereis*

diversicolor; 1 had also been feeding on ragworms and another on the seeds and stem of *Salicornia*.

Pintail: 1, containing *Hydrobia ulvae*.

Mallard: 1, containing wheat and a single lead pellet in the gizzard, associated with the presence of much green bile. Clinically, this bird was suffering from lead poisoning.

Of these sixteen apparently starved birds, only four contained no food at all. There is some support for the suggestion that the weaker birds were being 'culled'. This is particularly true with the Mallard, which was found dead beside a large supply of wheat put out for wildfowl, on which it was feeding when it died; lead poisoning undoubtedly contributing to its cause of death.

It must be significant that the majority of deaths took place during the last week in January, although the cold spell was to last a further five weeks. Van Troostwijk (1964) also concluded from his observations of White-fronted Geese in Holland during the cold spell that 'it is obvious that the severe winter was selective, and mainly feeble birds died from the cold'.

The role of the persistent chlorinated hydrocarbons may be significant in deaths of starved wildfowl. Being stored in the fat, they are liable to be liberated during severe weather. As yet there are not enough data available, but it is a factor which must be considered.

Abnormal feeding habits

Kale fields, on account of the height of the plants, were often the only green fields not covered by snow and in Kent these attracted a number of wildfowl. White-fronted Geese (*Anser albifrons* (Scopoli)) fed on kale, both in north and south Kent, as did Mute Swans (*Cygnus olor* (Gmelin)) and Wigeon. Inland in the Sevenoaks - Tonbridge area, it was remarkable how often White-fronted Geese and Wigeon were seen in the vicinity of kale fields and a Wigeon shot from a kale field at North Frith near Tonbridge on 19th January contained kale pieces and the seeds of water pepper and buttercup in its crop. Three other Wigeon from the Sevenoaks - Tonbridge area shot between 26th December and 12th January had been eating grass. Mallard have very seldom been recorded as eating fish (Harrison and Harrison 1962), in fact Peter Olney in analysing the viscera contents of over 560 between 1957-1961 found no trace. Yet, two Mallard shot in the Sevenoaks area on 12th January, 1963, which he analysed, both contained, among other things, fish remains.

In East Sussex, White-fronted Geese, Mallard and Wigeon were also feeding on

kale and on brussels sprout leaves and were watched picking maize out of silage. Mr. J. Sutton also tells us that he saw White-fronted geese eating lamb- and ewe-pellets (B.O.C.M.), shaking them in their beaks to break them up. In the same area, Mute Swans were eating cooked meat put out for pigs, which must be unusual, although King (1962) has once recorded this species eating raw meat.

In North Kent, Wigeon fed quite extensively on the sea wall, where snow was melting before that covering the rest of the marshes.

Effect on wintering populations on the Thames and Medway estuaries

(a) THAMES

The following regular visitors showed *decreases* compared with a normal winter:

Mallard: Although 2,000 were recorded at Cliffe, numbers were below 400 on average, i.e. 20% of normal winter maxima.

Teal: Numbers remained at only about 300, i.e. 16-25% of normal.

Wigeon: In spite of peaks of 3,000 at Cliffe and 2,000 at Egypt Bay, numbers averaged only 1,000, i.e. 25-33% of normal.

Shoveler: A peak of 130 is only 25-30% of recent winter maxima and for most of the cold spell the population was below 50.

The following species showed *increases*:

Pintail: A flock of 1,400 at Cliffe on 24th February is the largest number ever recorded in Kent, but numbers on the estuary were rather lower than usual.

Pochard (*Aythya ferina* (L.)): A flock of 950 at Cliffe is a record and numbers were higher than usual throughout the cold.

Scaup (*Aythya marila* (L.)): A flock of 600 at Cliffe is a record and numbers were higher than usual throughout the cold.

Tufted Duck (*Aythya fuligula* (L.)): A flock of 800 at Cliffe is a record and numbers were higher than usual throughout the cold.

Shelduck: Numbers reached a peak of 10,000 as in early 1956, during hard weather; throughout February they averaged 3-4,000, which is normal.

The only species to show no change compared with the previous winter was the White-fronted Goose which averaged 550-600, although first-winter birds only averaged 4% in 1963, against 35% in the previous winter (see also van Troostwijk, 1964).

(b) MEDWAY

A considerable effect was made on the wildfowl population of the Medway by Messrs. W. and H. Moulard, who were putting out 3 cwt. of wheat each day for the wildfowl, for about eight weeks. Being

genuine wildfowlers, they had stopped shooting and it was estimated that on their two farms at Barksore and Chetney, they were at one time feeding at least 2,000 duck.

(It is noteworthy that a flock of 2,000 Mallard was maintained on the ice at Stodmarsh, in the Stour Valley, during the hard weather, by feeding with corn.)

The following species showed *increases*:

Mallard: About 400 present, largely centred on the two farms mentioned.

Wigeon: Gradually built up to a peak of 3,000 on 17th February on Chetney. Initiated by feeding, when they were regularly taking wheat, the main flock then moved on to a large area of *Salicornia*.

Pintail: 250 on 23rd January was a record for the Medway estuary but, apart from this, numbers were about average.

The following species showed *decreases*:

Teal: After a peak of 1,200 on the south shore on 16th January, only 2 were seen 23rd and none 27th, but 100 had joined the Wigeon on the *Salicornia* flats on 17th February.

Shoveler: Peak of 25 seen 9th January, 4 on 16th January and no more after that.

The following species were in average numbers:

Brent Goose (*Branta bernicla* (L.)) and Shelduck.

Population fluctuations at High Halstow

Owing to the possibility of the weather having a marked effect on populations, the frequency of counts of White-fronted Geese was greater in the winter of 1962-3 than in the two previous winters. It is possible, therefore, that a more accurate picture was obtained for last winter than previous ones. It appears that the 1962-3 wintering flock was subject to much greater fluctuations than usual, and there can be little doubt that these were in some way related to the severity of the weather.

After heavy snow on 20th January numbers fell from 500 to 120 over the course of a few days. After snow on 19th February, numbers fell from 550 to 300. These sudden drops were presumably due to the difficulty of grazing on snow-covered marshes and the necessity to find food elsewhere. However, snowfalls at the end of December and beginning of February were followed by increases in numbers. Furthermore, sudden drops in numbers from 400 to 150 in the first week of March and 440 to 80 in the second week of March were unrelated to snowfalls, and since numbers built up again afterwards in each case it is probable that these were instances of local

dispersal. The pattern of movements was clearly not a simple one.

White-fronted Geese were seen, sometimes in large numbers, in widely scattered parts of the county well away from their normal quarters. Records of 1,000 at Wal-land Marsh and in east Sussex during the first week of February and 81 at Grove on 12th January increasing to 150 on 24th may possibly have included some Thames birds.

It is possible that the movements which occurred after the snowfalls resulted from the breaking of tradition in the continued use of a favoured wintering ground and the consequent need to search for fresh feeding grounds. This might produce an unsettled flock which subsequently moved periodically between the two areas.

In 1963 White-fronted Geese remained until 2nd April, compared with 22nd March, 1962 and 15th March, 1961. Wigeon were last seen on 28th April, 1963, 21st April, 1962 and 5th April, 1961. A Greylag Goose (*Anser anser* (L.)) was present on the Thames from 2nd April for about 10 days and a Pink-footed Goose (*Anser brachyrhynchus* Baillon) from 16th April to 19th May.

A sharp decline in the numbers of Wigeon from 1,500 to 500 at the beginning of February was apparently related to the weather, though not directly to snow cover. After the middle of February the numbers built up again to 1,100.

Whereas normally Mallard, Teal and Shoveler show a gradual decline after early January winter maxima to the beginning of March, as winter visitors disperse and only summering populations remain, figures for this last winter fluctuated markedly. There was presumably, therefore, considerable movement, probably on a local scale, in a constant search for adequate feeding grounds. The Shoveler population built up from 20 in the third week of February to 90 in the first week of March, at about which time there is normally a marked movement of passage migrants.

Effect of the winter on local breeding stocks

As might have been expected after a winter of such severity, the effects were not confined simply to the period of harsh weather. Both summering and breeding populations of a number of species were abnormal, and the breeding season was delayed. There were, furthermore, indications that clutch size and brood size were larger than normal.

On the Thames the numbers of Shelduck were only $\frac{1}{4}$ - $\frac{1}{3}$ of those in the summer flocks of 1961 and 1962, non-breeders being reduced from 3-400 to 35-40. The Mallard

population was about the normal 100 birds. Shoveler, about 40 birds, were about $\frac{1}{4}$ of the 1961 and 1962 populations. There were only one pair of Teal and one or two pairs of Garganey (*Anas querquedula* L.), but these small numbers are usual. Pochard, at least 30 birds, were slightly more numerous than in the previous two seasons.

Breeding season at High Halstow

As a result of low temperatures in March and April 1962 breeding was inhibited to such an extent that the first Mallard nests were started 3 to 4 weeks later than in 1961. A similar postponement was observed in 1963, except that the first nests were started only 2 to 3 weeks later than in 1961.

Apart from the inhibition of nesting behaviour, the low temperatures in the spring of 1962 delayed the onset of spring growth and consequently when temperatures rose to reach the breeding stimulation threshold, there was a marked shortage of adequate cover. An increased number of Mallard nested on saltings where *Halimione portulacoides* offered suitable cover unaffected by the weather. Shoveler were observed breeding on saltings for the first time, 14 nests out of 23 being found on saltings whereas normally nests are found in small tussocks on the grazing marsh. However, the Shoveler ignored the *Halimione* and followed their normal habit of nesting in grass. The salt-marsh grasses, being ungrazed and more rank than those of the grazing marsh, offered more cover than the latter.

While there was no intensive survey of nests in 1963 there was an indication that a similar situation obtained and that Shoveler again nested on the saltings, though perhaps not to the same extent as in 1962.

Table II. Breeding populations at High Halstow

species	no. of pairs 1963	usual no. of pairs	no. of broods seen in 1963
Shelduck	20	30	12
Mallard	40-45	45-50	18
Shoveler	20	25	12
Teal	1	1	1
Garganey	1	1	1
Pochard	15	6-10	15
Mute Swan	1	7-8	1

A few large clutches were recorded in nests found at High Halstow, but since deliberately no systematic search was made others may have escaped notice and no

Table III. Large clutches and broods seen at High Halstow in 1963

<i>species</i>	<i>large clutches 1963</i>	<i>average clutch locally</i>	<i>large broods 1963</i>	<i>average class 1 brood locally</i>
Shelduck	20	12-15	13 (24 June)	11-12
Mallard	14, 15, 15	10-11	14 (8 May), 10 (16 June)	8-9
Shoveler	several 11 & 12	9-10	11 (25 May), 12 (16 June)	7-9
Pochard			9 (24 June)	6-7

assessment can be made of the proportion of abnormally large clutches. The records again suggest a tendency for larger than normal broods (Table III).

In addition, a W.A.G.B.I. hand-reared Mallard at Sevenoaks hatched 14 and reared 11 ducklings in the wild. This was the same bird which last year reared 9 out of 11 hatched in the wild (W.A.G.B.I. ring No. 31374).

Broods counts of wildfowl species are not easily made and for this reason comparison of numbers of different species in late summer may give a better indication of the success of the breeding season (Table IV).

Table IV. Wildfowl counts at High Halstow on 1st August 1961-63

<i>species</i>	<i>1961</i>	<i>1962</i>	<i>1963</i>
Shelduck	5	61	280
Mallard	375	450	250
Teal	50	35	50
Shoveler	45	70	60
Pochard	0	3	100

On 1st August, 1963, numbers of Shelduck and Pochard were higher than in previous years. Teal and Shoveler were about average, while the 1963 Mallard count was considerably lower than in the two previous years. At least 200 juvenile Shelduck were included in the 1963 figure, indicating clearly a very successful breeding season. 1962 was a later season, so that the differences are not to be accounted for by a later moult-migration in 1963 than in 1962.

While the other four species had average or good breeding seasons in 1963, the early autumn 1963 numbers of Mallard were considerably lower than in the previous two years. The breeding population has been estimated as of normal size, so that the low apparent production requires some explanation. From observations on local Black-headed Gull (*Larus ridibundus* (L.)) colonies, D. F. Musson (personal communication) concluded that abnormally high tides in the summer of 1963 had seriously reduced their breeding success. Since a large proportion of local Mallard

nest on saltmarsh it is likely that their breeding efforts were also upset by high tides. This is to some extent confirmed by the situation in the Romney Marsh area of south Kent, where nesting Mallard are all inland. On Walland Marsh, Harrison and Romer found 1,500 Mallard at the end of August, while many other broods were still scattered throughout Romney Marsh, so that there were probably at least 2,000 Mallard present. This is the highest population recorded there in at least the past twelve years. Similarly, on the south side of the Medway Estuary, 500 Mallard were seen in September, 50% above the monthly average in recent years. The Priority Wildfowl Counts for September, 1963, issued by the Wildfowl Trust, also suggest that any losses suffered in last winter's cold spell may have been largely replaced, so far as British Mallard are concerned.

The autumn population of Teal is made up almost entirely of immigrants and gives no indication of local breeding success.

The slightly lower autumn 1963 Shoveler count is in proportion to the estimated breeding population. Shoveler are not conspicuous in early autumn and no doubt many escape notice – so that the figures quoted may not give a true representation of the population.

The 1963 Pochard count bears little relation to that of the previous two years, since for some unexplained reason the broods remained in the breeding area later than in the previous years. Hatching dates and distribution of hatching were normal. The estimate of breeding population was considerably higher than in previous years and this is confirmed by the large autumn populations.

Effect of the cold spell on lower salt marsh vegetation

Observations on the Medway Estuary during the autumn of 1963 show that up to 80% of the *Enteromorpha* beds were destroyed by the cold weather, the remaining 20% being on the highest part of its zone, against the islands. It is likely that frozen snow accumulated here and afforded the plant some protection. *Zostera*, which was

first found on the south side of the Medway in 1962, has been quite unaffected by the cold and, in fact, has spread considerably and is establishing itself in areas where the *Enteromorpha* has been destroyed. *Salicornia* on the estuary is quite unaffected, or even more prolific than usual. It seems likely that the holding capacity of the estuary for both Wigeon and Brent will be reduced this year, until either the *Enteromorpha* recovers or the *Zostera* spreads sufficiently to take over as a main food source for these species.

Practical application

On 8th January, 1963, the joint appeal of the Wildfowl Trust and the Wildfowlers' Association to stop shooting ducks and geese until the end of the cold spell was broadcast by the B.B.C. Looking back on events, one can now see that the appeal was timed absolutely correctly so far as Kent was concerned. Already the cold spell had lasted for two-and-a-half weeks and two days after the appeal the inter-tidal zone started to freeze. This, in our opinion, is the key to the problem and is far more important than snow cover, unless the snow is exceptionally deep. The correct time to stop wildfowling is, if possible, when the inter-tidal zone freezes, exactly as happened in 1963.

The voluntary ban was well supported by members of the Wildfowlers' Association, but not, unfortunately, by some irrespon-

sible gunners from London and the towns, who owed no allegiance to any wildfowlers' club or to W.A.G.B.I. It is also regrettable that a small minority of big landowners were equally irresponsible and far more lethal and at one time large numbers of wildfowl were on sale in Maidstone Market at prices which cannot have equalled the cost of the cartridges. Several were still carrying rings, which is a further reflection on the irresponsibility of the particular landowner who had brought them to market. It is encouraging, however, that the number of W.A.G.B.I. hand-reared Mallard reported shot in January and February 1963 was not above average (Wardell and Harrison, 1964).

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