

The Fulmar 'wreck' of 1962

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Plate 21

INTRODUCTION

During the latter half of February 1962 numbers of dark-phase Fulmars *Fulmarus glacialis* were reported off various parts of Britain and many were subsequently found dead, mainly on the east coast of England. An appeal for information regarding dead Fulmars in the early months of 1962 was made in this journal and the following account of the 'wreck' is based on the material received from individual observers and county and local recorders as a result.

The wreck was also noted on other coasts of north-west Europe, notably in the Netherlands and Sweden. A summary of the Dutch data has kindly been supplied by J. J. C. Tanis (*in litt.*) and the Swedish records were fully reported by Mathiasson (1963a, 1963b). Unprecedented as this wreck may have appeared in Britain, it was not the first time that numbers of Fulmars had been known to perish in north European waters: in 1959, also in February, a similar disaster took place on the Danish and Swedish coasts (Larsson 1960, Joensen 1961).

The Fulmars of the north Atlantic and adjacent Arctic vary in the colour of their plumage and in the length and robustness of their bills. The species is dimorphic, there being dark (or 'blue') and light phases. Fisher (1952) distinguished four colour types amongst the two phases—double-light (LL), light or light intermediate (L), dark (D) and double-dark (DD)—and these are illustrated in Palmer (1962). This classification will be followed in the present paper (see also pages 103-104) and two of the colour types are seen on plate 21. The dark phase predominates in such areas as Baffin Island (Admiralty Inlet), north-east Greenland, Spitsbergen and Franz Josef Land (all 95%), as well as south-east Greenland (Scoresby Sound) and Bear Island (both 50-60%). On Jan Mayen and in west Greenland and Iceland, however, the light phase predominates (99%) and in Faeroe and the British Isles only the light phase breeds (Fisher 1952). Indeed, Fulmars other than LL are unusual at any time in British waters. Little is known about the distribution of intermediates, mainly 'due to a lack of unanimity among field-ornithologists as to what constitutes a dark Fulmar' (Fisher 1952).

Bill-size varies throughout the range, the smallest being found in the west and north. Wynne-Edwards (1952) divided the populations into three groups according to bill-size: Baffin Island, smallest; east Greenland, Jan Mayen, Bear Island and Spitsbergen, intermediate; and Iceland, Faeroe and British Isles, largest and heaviest. The Baffin Island population was considered sufficiently distinct to be separated as *F.g. minor* (Salomonsen 1950, supported by Wynne-Edwards 1952 and Watson 1957, but not Vaurie 1958-65). Salomonsen (1965) considered that small-billed individuals occurred in all high arctic populations and proposed only two groups: Baffin Island, north-east Greenland, Jan Mayen, Bear Island and Spitsbergen; and west Greenland, Iceland, Faeroe and the British Isles. He confirmed, however, that the Fulmars from Baffin Island had the shortest bills.

THE 1962 WRECK IN BRITAIN

In the first half of February 1962 strong westerly winds over the North Atlantic culminated in severe gales across the British Isles, the North Sea and western parts of the Continent on the 11th-12th and 15th-16th. Most of the dead Fulmars were found during eleven weeks from late January to mid-April and this period can be split into three stages. A break-down of the stages by individual counties is given in table 1. The records are necessarily summarised very briefly in this section, but complete lists under counties are being deposited with the editors of *British Birds* and in the files of the Edward Grey Institute at Oxford.

Stage 1. Late January to 18th February

The first dead Fulmars reported were one at Holbeach (Lincolnshire) on 27th January, two at Freshfield (Lancashire) on 4th February and one at Southport (Lancashire) on 6th February. On the 14th twelve dark-phase or blue Fulmars flew north-east past Hunstanton (Norfolk). On the 17th an L (or an intermediate between L and D) flew over the Humber at Spurn (Yorkshire), and the remains of another bird were found at Cuckmere Haven (Sussex). On the 18th one classified as D was seen off Bridlington (Yorkshire), the observer stating that several more far out in Bridlington Bay 'looked similar', and further casualties included one on the shore of Lough Neagh (Co. Antrim), several dark-phase individuals near Hunstanton, and a live bird picked up at Spurn Point; the last died later and was classified as L. No more Fulmars, dead or alive, were recorded until 22nd February, when the second stage began.

Stage 2. 22nd February to 15th March

On 22nd February two dead Fulmars were found at Minsmere (Suffolk) and then on the 24th a number of corpses were reported along the east coast from Yorkshire to Kent. These included 33 at Bridlington, two at Winterton (Norfolk), nine at Lowestoft (Suffolk), two at Walton (Essex)

and one each at Lower Hope Point and Dungeness (both Kent). That

Table 1. Numbers of Fulmars *Fulmarus glacialis* found dead in individual counties of Britain during each stage of the 1962 wreck

The bracketed figures under stage 3 show the totals described as 'freshly dead' between 18th March and 15th April

	STAGE 1	STAGE 2	STAGE 3	TOTALS
	27 Jan-18 Feb	22 Feb-15 Mar	After 18 Mar	
Sussex	1			1
Kent		47	37 (3)	84
Essex		17	20	37
Suffolk		81	5	86
Norfolk	8	144	49 (1)	201
Cambridgeshire		1		1
Lincolnshire	1	35	11 (7)	47
East Yorkshire	1	261	26 (22)	288
North Yorkshire		55	1 (1)	56
Co. Durham		5		5
Northumberland		31	2 (2)	33
Anglesey		1		1
Lancashire	3	4		7
Co. Antrim	1			1
Sutherland			1	1
	15	682	152 (36)	849

same day blue Fulmars were seen in flight off Seaton Sluice (Northumberland), South Shields and Hartlepoons (Co. Durham), and Bridlington; at the last locality five were watched close enough for them to be classified as one DD, three D and one L. Eight were also found dead at Seaton Sluice during the last week-end in February and it is very possible that these, too, had been washed ashore on the 24th—or on the 25th when an intermediate L-D was seen flying north off St. Mary's Island (Northumberland), two more were found dead at Dungeness and three more at Bridlington. Meanwhile, three or four blue Fulmars were observed from a trawler fishing 10-15 miles west of the Outer Hebrides between 23rd and 27th February: these were among a party of 300-400 Fulmars following the ship and they all appeared quite healthy, feeding on whole small fish from the trawl.

The interval of five days between 18th and 24th February, during which only two dead Fulmars were reported, may appear to reflect a 'week-end bias', but this was probably not the case for various reasons. First, observations were made daily at three or four points on the east coast from Spurn to Minsmere and Dungeness, yet no dead Fulmars were reported then at these places. Secondly, the occurrence of a Ross's Gull *Rhodostethia rosea* at Bridlington on 17th February (*Brit. Birds*, 55: 480-481) ensured a daily watch there throughout the following week. In fact, the 2½ miles of beach on which the 33 dead

Fulmars were found on the 24th were actually covered on the 22nd without any being seen. These 33 corpses can therefore be said to have been the first real evidence of a large-scale wreck, but reports of similar concentrations soon followed before the end of February. Particularly noteworthy were 79 dead along four miles of beach at Hornsea (Yorkshire) on the 26th and 'dead Fulmars every few yards' between Gorleston (Norfolk) and Hopton (Suffolk) on the 28th. It was obvious from the notes of various observers that fresh corpses were being washed ashore on each high tide and that, unless these were counted immediately, the strong winds quickly caused them to be hidden by the blown sand.

The following week-end, 3rd-4th March, can be called the key period. Large numbers of dead Fulmars were found on the shores of all the eastern counties of England, plus a single one on the Lancashire dunes. Examples of counts of corpses during early March were 39, 32 and 30-40 on three stretches of Norfolk beach between $2\frac{1}{2}$ and $4\frac{1}{2}$ miles in length; 36, 34 and 29 on three Yorkshire beaches of similar length; and 14 in the quarter-mile between the two lighthouses at Dungeness, plus another 14 on one mile of beach to the north. During the following two weeks up to 18th March all but four miles of the Holderness beach from Spurn Point to Sewerby (Yorkshire), a distance of about 43 miles, was searched and a further 149 bodies were found. This was in spite of the fact that the very high tides of 7th-9th March had washed large stretches of beach clean and had caused extensive cliff falls which had probably buried many corpses.

Whether these tides had a similar effect on other east coast beaches we do not know, but in that case many dead Fulmars would have gone unrecorded. The difference caused by the high tides on the Yorkshire beaches is illustrated by the fact that before 7th March an average of 15-20 dead Fulmars per mile was calculated and yet after the 9th the beaches not previously searched showed averages of ten and under per mile, a figure similar to that in Norfolk at the same period. The last freshly dead Fulmar during stage 2 was found on 11th March, after which no fresh ones were reported until the 18th when stage 3 began. Although many dark-phase corpses were recovered along the whole of the east coast of England, the sight records of live blue Fulmars were restricted to the coasts of Norfolk, Yorkshire, Co. Durham and Northumberland, the latest being off Holy Island (Northumberland) on 10th March.

Stage 3. 18th March to 15th April

This stage could almost be classed as a second, but very minor wreck, 36 freshly dead Fulmars being recorded between 18th March and 15th April. These new ones included a higher proportion of LL than had stages 1 and 2. Nevertheless, a freshly dead D was found at Swanscombe Marsh (Kent) on 31st March.

THE WRECK ON OTHER NORTH SEA COASTS

Dead Fulmars were also reported on the coasts of Sweden, Denmark and the Netherlands and the numbers are summarised very briefly in this section.

On the west coast of Sweden the wreck also occurred in three stages, the first corpses being picked up in late January and early February at Skälderviken. After an interval of about a week more dead bodies were seen along the whole of the west coast during 16th-20th February: a total of 96 were found between Hunnebostrand and Ystad during the 10th-28th, including 32 at Båstad on the 20th. None was reported from the beginning of March up to the 10th, after which the third stage began with 23 between Rörö (Gothenberg archipelago) and Skäldeviken during the 11th-25th. Reports of live and dead Fulmars indicated a peak around 20th February, some six days earlier than in Britain (Mathiasson 1963a).

In the case of Denmark Dr Finn Salomonsen informs us that the coasts are not regularly searched for the bodies of seabirds, but that incidental observations reported in *Feltornithologen* (1962) showed that Fulmars were found dead or exhausted along the coast of Öresund in February and March 1962 and that numbers of Fulmars, many of them dark-coloured, were seen south of the island of Funen after the storm of 17th February. In addition, nine were found dead on the Kattegat island of Anholt in 'spring' (L. Ferdinand *in litt.*).

In the Netherlands large numbers of dead Fulmars were recorded in early 1962. Counts on the coast from Walcheren in the south-west to the German frontier (nearly 400 km) totalled 2,389. Most were found near IJmuiden and on the beaches of the West Friesian Islands, particularly Terschelling and Schiermonnikoog, and there were many fewer in Zeeland. The first corpses occurred about 14th January and the greatest numbers reached the shores between the first half of February and the middle of March, but fresh bodies were still being washed up until the second half of April. On Terschelling two stages could be distinguished: from the middle to the end of January and from mid February to about 13th March, the latter period being the more important (J. J. C. Tanis *in litt.*). Between Zandroost and Katwyk (a distance of about 11 km) 128 were found during 17th-25th February with a peak of 65 over seven km on 25th (F. Niesen *in litt.*).

SIZE OF THE WRECK

Joensen (1961) estimated a total of 7,000 casualties in the 1959 wreck, basing this on the finding of only 153 over a wide area, but he himself admitted that such a figure was questionable! To attempt to estimate the number of Fulmars which died in the 1962 wreck is impossible. The only parts of the coast of Britain that were thoroughly checked for dead birds were some of the shoreline of Yorkshire and a good many

of the beaches of Norfolk, Co. Durham and Northumberland. It is a pity that no information from counties further north was forthcoming, as we think that the number of dead Fulmars per mile began to fall from Teesmouth northwards. The only possible evidence of any wreck in Scotland, however, was the remains of one long dead on the shore of Loch Badenloch (Sutherland) on 6th June. Similarly, the seven recovered on the Lancashire coast, the one at Lough Neagh and one at Newborough Warren (Anglesey) were the only indications that the wreck had affected the west coast in any way. This may have been partly due to the fact that much of the west coast is unsuitable for the finding of birds cast ashore, a situation similar to that in Norway (Dr H. Holgersen *in litt.*). In addition to the one in Scotland, other inland occurrences involved single birds at Pyemore near Ely (Cambridgeshire), at Abberton Reservoir (Essex) and at Ludham (Norfolk).

The total number of dead Fulmars found and reported to us was 849, a figure that excludes such vague references as 'every few yards' and 'many'. No less than 489 of these were recovered in east Yorkshire and Norfolk alone, which is probably a reflection of the strength of coastal watchers in these two counties rather than of any other factor, though the more open beaches doubtless made the finding of dead birds easier than on coastal saltings or rocky shores.

COLOUR PHASES

The four colour types distinguished by Fisher (1952) are explained on page 98. Separating these is straightforward enough with the LL and D examples on plate 21, but this was not always a simple matter in 1962 when the bodies were dishevelled and waterlogged, and some had also been in contact with oil. Indeed, close inspection of corpses on wind-swept beaches in showers of snow and sleet to divide L and D birds could hardly have been expected. Consequently, most observers who made any distinction at all simply separated 'light', 'dark' and the occasional 'intermediate'. Greater accuracy was possible if the corpses were collected and brought indoors to be examined at leisure, although any reluctance to introduce dead Fulmars into the home is fully understandable!

A total of 92 of the bodies found on the Yorkshire and Lincolnshire coasts were grouped according to Fisher's classification, including 36 collected at Spurn Bird Observatory on 3rd March. These are set out in table 2, together with broader groupings (based on colour details supplied by the observers) for 344 others found elsewhere on the English coast. The 62 listed as 'dark' included some which the observers described as showing grey on the head and which could therefore have been either L or D (perhaps even DD). In view of the proportion of LL to L found in Yorkshire and Lincolnshire, it seems likely that only about half of the 276 listed as 'light' would have been classified as LL.

if they had been examined in detail. (The finding of a dead Fulmar was an unusual event for most observers, many of whom doubtless never considered the possibility that the birds were other than the British LL.)

Three observers in Norfolk, Suffolk and Essex each stated that the great majority of the dead Fulmars found were 'dark'. High pro-

Table 2. Colour phases of Fulmars *Fulmarus glacialis* found dead on the coast of England in 1962

The numbers listed for Spurn Bird Observatory were all picked up on 3rd March, and they are included in the figures for the East Riding of Yorkshire and north Lincolnshire in the second line. These birds were all classified according to the colour types distinguished by Fisher (1952) (see page 98 in the present paper). This was not done, however, in most cases from the rest of the coast of England, for which a broader grouping has had to be based on colour details provided by observers

	LL	L	Undetermined	D	DD	TOTAL
Spurn Bird Observatory	15	14	6	1	—	36
E Yorkshire-N Lincolnshire	46	40	15	5	1	92
	Light		Intermediate	Dark	TOTAL	
Rest of English coast	276		6	62	344	

portions of darker populations were also noted in Sweden where, out of 126 dead, only 39 were certainly 'light', 31 were 'unclassified' and 56 were 'dark', as were 20 or more seen alive at Båstad on 20th February (Mathiasson 1963a). In the Netherlands, similarly, F. Niesen (*in litt.*) stated that 'only very few' of the 128 corpses found by him were 'light', although he could not give exact figures.

When the dead Fulmars collected at Spurn were laid out on their backs with wings spread, we noted what seems to be a clear character for distinguishing LL from L in the field. The under-wing of LL is white except for a blackish leading edge from the carpal joint outwards and a dark trailing edge, whereas that of L is uniformly pale grey until it darkens towards the tip. (Types D and DD also have uniform underwings, but darker than L.) This is mentioned by Witherby *et al.* (1938-41) under 'Description', but they do not suggest it as a field character for separating the two light phases.

BILL-SIZES

With so many dead Fulmars on the Yorkshire beaches, it soon became obvious that, in addition to differences in colour, there were also differences in bill length, and that the darker-headed individuals had the smaller bills (plate 21). Several observers elsewhere also remarked on the small sizes of the bills and of the birds themselves, though without taking measurements. We measured the bills of six Fulmars from east

Yorkshire which had been preserved as specimens and of 37 others from east Yorkshire and north Lincolnshire to the nearest 0.5 mm. Boylan (1967) examined these data and attributed two of the specimens to the Baffin Island race *F. g. minor*. It is also likely that two more specimens and possibly two of the measured but unsexed corpses belonged to this race, and that a substantial proportion of the others measured were from western or northern populations. At the same time five specimens from the Swedish coast (Mathiasson 1963a, 1963b) and one from Schleswig-Holstein in north Germany (Ruthke and Frantzen 1963) were attributed to *F. g. minor*.

P. J. Boylan (*in litt.*) considers that the reappraisal by Salomonsen (1965) of the grouping of Fulmars according to bill-size does not really affect the conclusion that those with bills of less than 34.5 mm come from the Baffin Island population. He prefers to follow the widely (but not universally) accepted separation of *F. g. minor* to describe this population, particularly as Salomonsen proposed renaming the North Atlantic Fulmars by adopting *F. g. glacialis* for the high-arctic populations and *F. g. auduboni* for the boreal ones.

Of 18 white-headed Fulmars (LL) found dead along the coasts of the Netherlands and measured by Professor Dr K. H. Voous, two were males with bills of 37 mm and 38.5 mm and the remainder females with bills ranging from 35 mm to 39 mm.

PHYSICAL CONDITION

Several observers remarked on the extremely light weights and emaciated condition of the Fulmars they handled. Others noted superficial wounds in the regions of skull, neck and breastbone. A small proportion of the birds had oil marks on the under-parts, but none showed evidence of any other maltreatment (such as shot wounds).

Post-mortem examinations were carried out independently on a total of ten Fulmars by B. Fewster (Whitby), E. Gorton (Bolton), A. H. Rider (Hull) and P. Yeoman (Newcastle). All found a complete lack of subdermal fat, gross wastage of muscular tissue, and only small pieces of debris in the digestive tract (a few feathers in two cases). Superficial wounds which had been sustained after death may have been due, in part at least, to live Fulmars mauling the carcasses in an attempt to find food: several instances of this behaviour were reported. Oil contamination may have followed or preceded death; there was no evidence that preening of oiled parts had taken place, but it was not possible to establish whether oil was a contributory cause of death in any case. All the four people who carried out the post-mortems were of the opinion that death was due to exhaustion from lack of nourishment over a considerable period.

In addition to the post-mortems, other specimens were tested for radioactivity to determine whether, as had been suggested, there was any possible link between this wreck of more northerly populations of

Fulmars and the series of nuclear trials carried out in the Arctic in 1961. Tests made on a total of about 15 corpses by T. J. Tully of the Hull Royal Infirmary, Dr Hughes of the Leeds Royal Infirmary, Dr G. H. Spray of the Radcliffe Infirmary at Oxford, Mrs E. Lloyd of the Churchill Hospital at Oxford, and L. Salmon of the Atomic Energy Research Establishment at Harwell did not support this. Duplicated details of the results of these tests can be obtained by sending a stamped, addressed envelope (9" x 4") to B. S. Pashby at the address on page 109.

Only two of the freshly dead Fulmars examined in Sweden weighed more than the lowest established weight for healthy individuals of this species. Examination of corpses showed that they were emaciated and that most had intestinal parasites. Signs of oiling or external injury were found in very few cases (Mathiasson 1963a). In the Netherlands, too, where the beach surveys were primarily to find victims of oiling, it was concluded that only a few Fulmars died from this cause.

WEATHER CONDITIONS

A study of the Daily Weather Reports for the North Atlantic during January and February shows that the pressure systems follow a fairly regular pattern each year: depression follows depression in the north, while ridges of high pressure are maintained further south, causing a series of storms accompanied by west and north-west winds. In early 1962, indeed from late autumn 1961, the severe westerlies were more widespread and frequent than usual, commonly reaching force 10-11 and often force 8 over a large area. In January 1962 the Ocean Weather Stations each recorded between 20 and 44 six-hour periods with winds of gale force or higher, and from 1st to 16th February between 16 and 33 such periods. At the same time, very high waves of over 16 feet persisted for up to 66 six-hour periods in January, and up to 37 such periods in the first 16 days of February (*Ocean Weather Station Reports*, January-February 1962).

Snow and sleet showers were frequent and in some areas the factors producing the phenomenon of 'black ice' were present. Generally, these storms abated somewhat before reaching European waters, but one came right across the Atlantic on 11th-12th February to be followed on the 15th-16th by another which was severe enough to cause widespread damage in Britain and serious flooding at some points on the west coast of continental Europe. This latter storm was the result of a very deep depression which originated in the Davis Strait on the 13th-14th and which moved quickly eastwards; it was east of Iceland by the 15th and centred over central Scandinavia on the 16th, producing very strong northerly winds over the sea area between Iceland and Norway.

By the 17th this depression had moved over the Baltic and a high to the south-west of the British Isles, with a ridge extending north,

resulted in strong north winds over the whole North Sea area. The high moved slowly north, at first causing westerly winds in the North Sea, but by the 21st, when it was centred over south-east Scotland, light easterly winds were affecting the very southern part of the North Sea. The high continued to move north-east and was centred over Scandinavia by the 22nd with easterly winds over the whole North Sea area. These easterly winds, very strong at times and affecting all of the east coast of Britain, continued until 1st March.

From 16th February conditions in the North Atlantic were much better until 6th March, when a very deep depression developed south of Denmark Strait and caused gale or severe gale force winds until at least the 15th. This depression was centred further south than those of mid-February, so that the gales affecting Denmark Strait and the seas south of Greenland and west and south-west of Iceland were easterly. From 12th to 15th March a northerly airstream blew down into the North Sea.

REASONS FOR THE WRECK

Many writers have described the wonderful flight of the Fulmar and how this species apparently revels in stormy conditions. But how long can Fulmars endure such conditions if they are unable to get food? Studies at breeding colonies have shown that they can go almost nine days without food (Williamson 1952), but this is during incubation and not while being buffeted by gales at sea.

In January and February Fulmars collect in great numbers on the Newfoundland Banks. These are mixed populations, mainly from Greenland and arctic Canada, but including some from Europe as has been shown by British-ringed recoveries in that area (Fisher 1952). Large numbers also occur in the southern part of Davis Strait, in the Cape Farewell Seas and in Denmark Strait, and some are probably scattered south to latitude 50°N and east to longitude 20°W.

Conditions in these areas were particularly severe in January and the early part of February 1962. One observer described the sea as 'a huge mass of froth'. Sir Alister Hardy (*in litt.*) suggests that in these circumstances Fulmars may have been unable to obtain plankton, even if it was available, owing to their specialised method of feeding by 'dabbling'. At the same time, as trawling was severely curtailed by the continual storms and also in some areas by the hazard of 'black ice', they could not even rely on the offal from man's fishing operations. Thus they faced a double shortage and it seems likely that populations of Fulmars in the western North Atlantic had little or no food for a month or more, while subjected for long periods to gale force winds and heavy seas.

The gales reached a peak with those that affected western Europe on 11th-12th and 15th-16th February, having originated in the region of

the Davis Strait. Large numbers of already weakened Fulmars must then have been carried into the sea area between Iceland and Norway. There, with some probably already dead and others physiologically beyond the point of no return, they came under the influence of strong to gale force north winds on the 17th and were driven down into the North Sea. Those that were still alive evidently sought sheltered areas, such as Bridlington Bay and the Wash. Some of the dead or dying were caught on the north-facing coasts of Norfolk and the Netherlands. Many more were drifted eastwards by the west winds of the following three to four days and found dead off the Swedish west coast.

Dead or dying birds were probably scattered throughout the southern North Sea and, with easterly winds from 20th February, strong at times, they were gradually washed ashore in eastern England, first in the south at, for example, Minsmere on the 22nd and then, as the high moved northwards, at Bridlington on the 24th. A few may have been swept direct to Britain by the storms of January and early February, accounting for the early casualties and west coast records.

The first two stages of the wreck can thus be explained, but the third stage is more difficult to understand. The only weather factor common to the main wreck and this minor one was the northerly airstream blowing into the North Sea for several days beforehand. There had been severe weather in the North Atlantic in early March, but the winds had been easterly. We can only conclude that some numbers of Fulmars had been carried east by the February gales, but not far enough to be affected by the northerly winds that followed. These birds, still very weak, may then have moved into the sea areas north of Britain and been driven down into the North Sea when the northerly winds developed again from 12th to 15th March. Shortly afterwards more dead Fulmars were found on the coasts of the Netherlands, Sweden and eastern England.

Only small numbers of other species of seabirds were reported. Guillemots *Uria aalge* and Razorbills *Alca torda* probably represented 'normal' winter casualties, but Kittiwakes *Rissa tridactyla* were certainly affected. On 14th February about 1,000 were seen off Hunstanton and later in the month several extremely exhausted individuals were seen resting on the harbour wall and beach at Bridlington. In March dead Kittiwakes were found in Northumberland, Co. Durham, Yorkshire, Norfolk, Essex and Kent, and some were recorded inland in Cambridgeshire. The fact that Kittiwakes obtain a certain amount of their food in a manner similar to that of Fulmars supports the impression that the specialised surface-feeders suffered worst in the gales, while the submarine feeders were unaffected.

Wrecks of Fulmars may be more frequent than we realise. Only the northerly winds following the conditions that weakened the birds brought this one to our notice. If the winds had remained westerly

the deaths of many Fulmars would probably never have been recorded.

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SUMMARY

A 'wreck' of Fulmars *Fulmarus glacialis* in Britain in February-April 1962 was divided into three parts: sight records of 'blue' Fulmars, the main wreck and, after an interval, some further casualties. This 'double-wreck' was also recorded in the Netherlands and west Sweden. In all, 849 Fulmars were reported dead in Britain (835 in eastern England, four inland in south-east England, seven in north-west England, one in Wales, one inland in Northern Ireland and one inland in north Scotland). Unusual numbers of blue Fulmars were found: two out of seven preserved as museum specimens were assigned to the race *F.g. minor*. Individuals of this race were also identified in Sweden and Germany.

It is concluded that large numbers of Fulmars in the western North Atlantic were unable to obtain food, either natural or provided by man, because of the weather conditions during January and early February 1962. These birds were so weakened that they were swept eastwards by the two intense depressions of mid-February into the sea areas between Iceland and Norway. They were then caught in a northerly airstream and driven down into the North Sea, where many died through long-term starvation.

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PLATE 21. Two Fulmars *Fulmarus glacialis*, both females, out of 835 found dead on the east coast of England in February-April 1962 when many arctic 'blue' ones were seen. Here a double-light (LL), bill 37.8 mm, is compared with a blue or dark (D), bill only 34.3 mm and thought to be *F. g. minor* (pages 97-109) (photos: A. Marshall)

