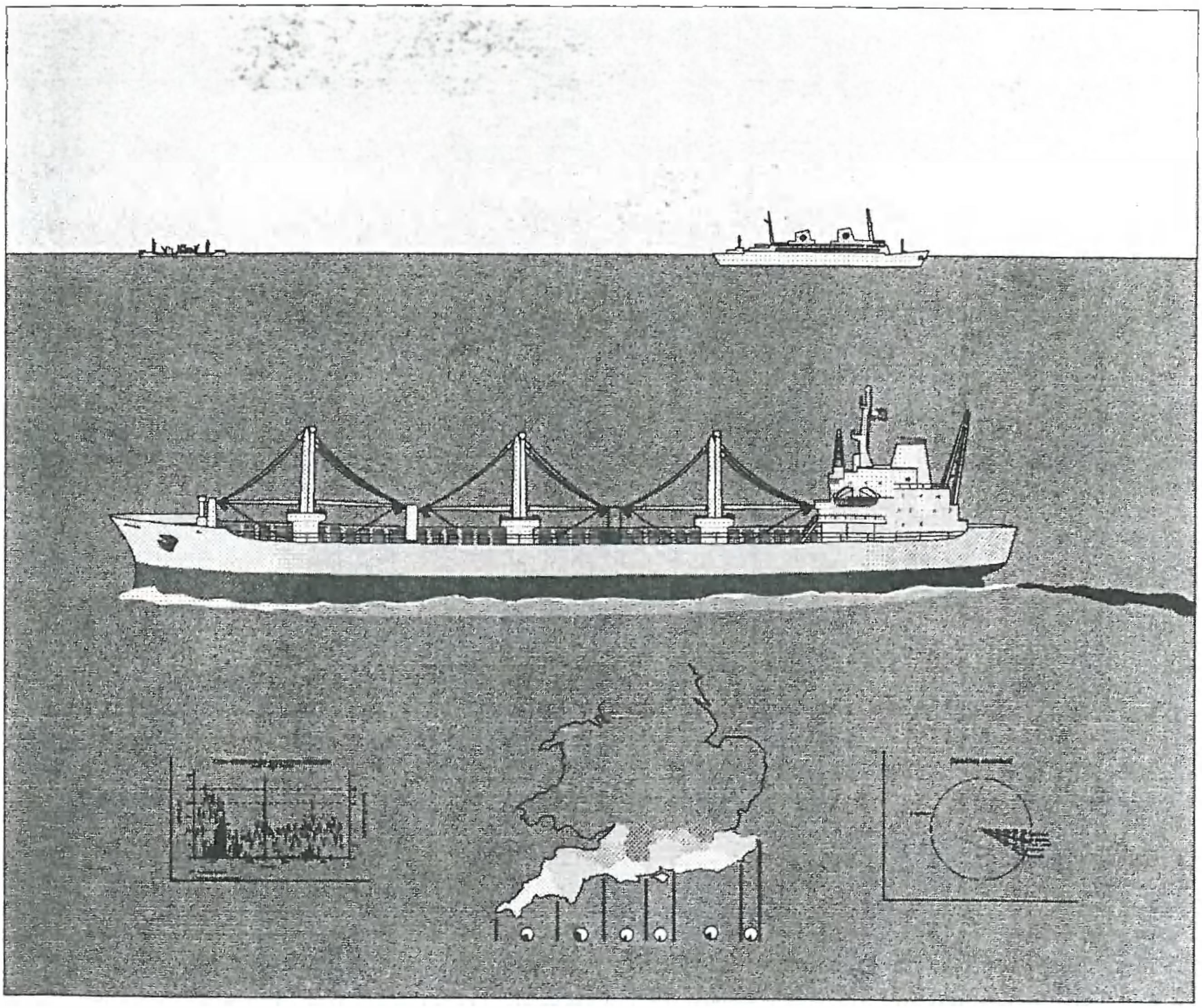
English Channel Oiling Incidents Jan-Apr 1993

Live contaminated seabirds stranded on the South coast of Britain

J. M. Stratford and K. E. Partridge



South West Oiled Seabird Group

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South West Oiled Seabird Group
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English Channel Oiling Incidents Jan-Apr 1993 is the first report in the SWOSG Technical Report series. This series of reports contain technical and scientific information from projects and general work of the group. The series is intended to make material available that is too extensive for publication in the SWOSG bulletin or as scientific papers.

Contents

1. Introduction

There were two major oil pollution incidents in British waters during the winter months of 1993. On January 5th the VLCC ***MV.Braer***, on passage from Norway to Canada with a cargo of North Sea crude, went aground at Garth Ness in the Shetland Islands. The entire cargo was lost, and attracted much media attention.

Six days later on January 11th oil contaminated seabirds started of come ashore along the Kent coast. These birds were oiled from an unknown source(s) of pollution in the English Channel. Both incidents involved the contamination of many hundreds of seabirds. In Shetland the majority of the contaminated seabirds were either washed ashore dead or were destroyed shortly after stranding. In the English Channel, live contaminated seabirds were stranded along the whole South Coast from Kent to Cornwall. A total of over 700 live contaminated seabirds were collected by the SWOSG and RSPCA, and an unquantified number of dead birds were removed from beaches by other organisations (local authorities *etc.*).

This report aims to quantify the extent of the live strandings along the English Channel coastline. Also to analyse the factors affecting the distribution of strandings along the S. coast and in greater detail within S. Devon (the SWOSG main study area). This includes reporting on:

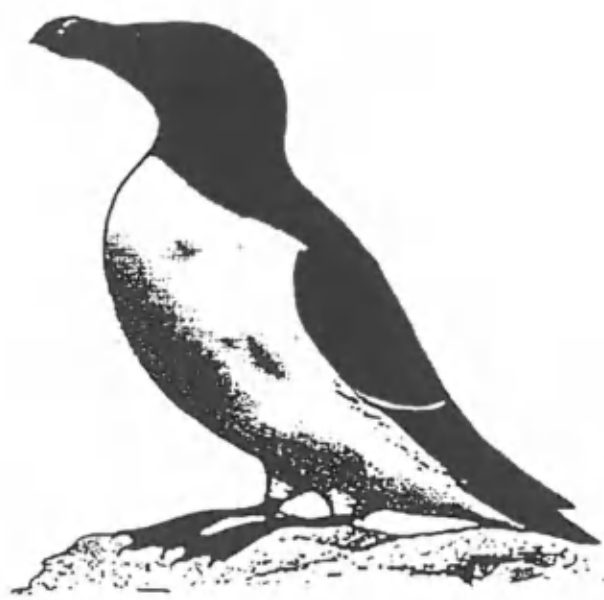
- the condition of stranded victims;
- the treatment process and release;
- biometric details, including a sample of post mortem internal examinations;
- prevailing weather conditions;
- recommendations for further studies and improvements to systems.

The main incidence of stranding from this pollution incident appeared to last an initial 3 weeks (Jan 11th to Feb 2nd), with further birds washing ashore in late February and in April. All these birds are included in this report, however approximately 300 birds are not referred to here having become stranded outside of the period reported. The total numbers of oil contaminated birds for the whole winter period for the South coast of Britain is in excess of 1000 seabirds.

Live oil contaminated seabirds are 'rescued' for a life saving purpose and therefore the vast majority rarely appear in any form of statistical report or survey (*e.g.* beached bird survey). The numbers involved during most winters are not inconsiderable and invariably exceed the number of birds detected on routine beached bird surveys (Stratford and Partridge, *in prep*). The numbers of birds involved in the 92/93 winter period are less than has occurred in some of the previous years, largely because of the relatively light winds encountered for this period. Chronic oiling incidents in British waters in the early 1950's were estimated to kill 50 000 - 250 000 birds oiled annually (Ampleford and Brown 1959). In the early 1980's the toll death on the Netherlands coast was estimated to total 30 000 birds (Camphuysen 1981). Chronic pollution of the sea has been estimated to have a greater impact on seabird populations than the more dramatic accidental oil spills from groundings and collisions. The most important factor currently influencing seabird populations is believed to be the quality and abundance of their food supply (Lloyd *et. al.* 1991).

Included in the conclusions of EBBS discussions at the IBBS workshop Copenhagen 1st December 1991 were comments referring to the dearth of data on live stranded seabirds from rehabilitation centres and of the desirability to include such data. Many members of the SWOSG have long felt that live stranded seabirds are a valuable source of data and have published several papers accordingly, the most recent being Partridge and Stratford (1992).

The group plans to publish annual reports of the status and distribution of live stranded seabirds in the southwest area and where appropriate to include the South coast of Britain. This will go some way to addressing the problem of insufficient data on live strandings from rehabilitation centres. It is envisaged that this will provide supportive information in the S. Devon area for participation in any EBBS scheme.



2. Distribution

2.1 South coast distribution

Live oil contaminated seabirds were stranded along the whole of the South coast of Britain during the winter period (Fig 1 and Table 1). It would appear that Devon, Cornwall, and Sussex have the highest numbers of strandings. The density of birds recovered from the Cornish coast is less than any of the other counties, however both north and south coastlines have been included in the

TABLE 1. LIVE OIL CONTAMINATED SEABIRDS STRANDED Jan-Apr 93

	Quantity	Coastal Length (excluding estuaries) km	Density (birds/km)
Cornwall	138	552	0.25
Devon	302	160	1.89
Dorset	74	136	0.54
Hampshire + I.O.W.	41	158	0.26
Sussex	126	145	0.87
Kent	64	87	0.74

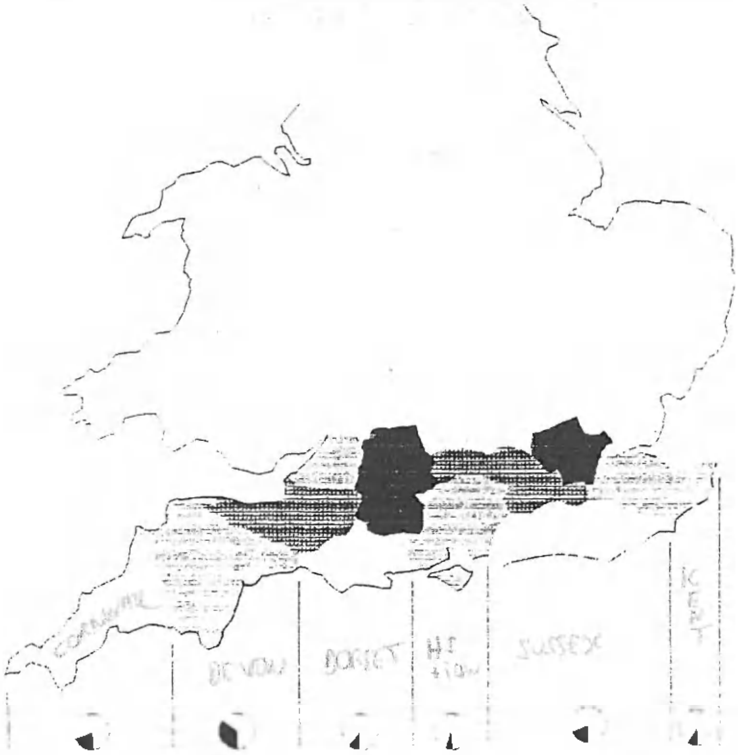


Fig 1. Distribution of live oil contaminated seabirds stranded Jan-Apr 93.

calculations, because precise stranding locations were not recorded. Consistent with previous years relatively few live oiled seabirds were recovered from Hampshire and Dorset. The species of seabirds stranded are shown in Table 2 and Fig 2 for the whole South coast and if Fig 3 - 8 for each county.

TABLE 2. SPECIES OF LIVE OIL CONTAMINATED SEABIRDS STRANDED ON THE SOUTH COAST OF BRITAIN Jan-Apr 93.

Species	Quantity	Proportion
Common Guillemot	672	90%
Razorbill	25	3.3%
Puffin	2	0.3%
Gannet	23	3.6%
Red Throated Diver	3	0.4%
Great Northern Diver	1	0.1%
Red Necked Grebe	1	0.1%
Kittiwake	10	1.3%
Black Headed Gull	3	0.4%
Common Gull	1	0.1%
Eider	2	0.3%
Shag	2	0.3%
Cormorant	2	0.3%

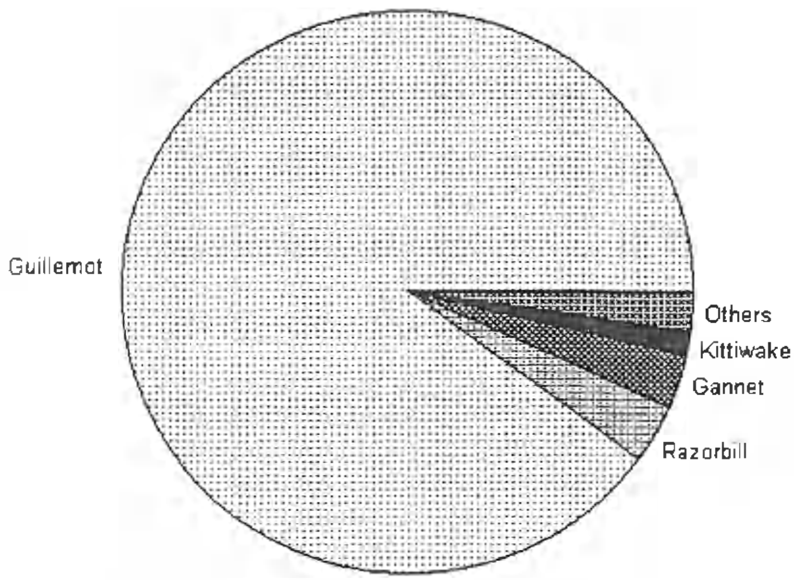
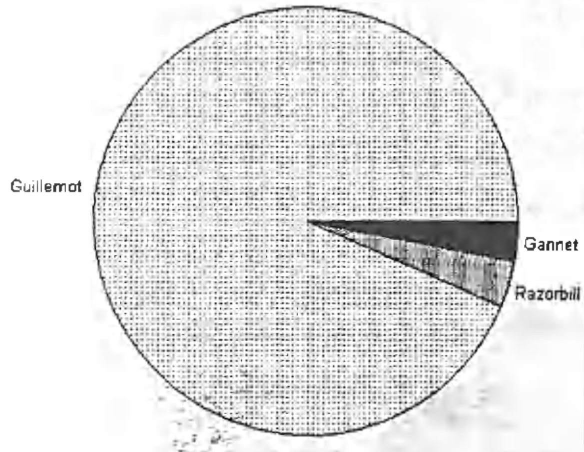
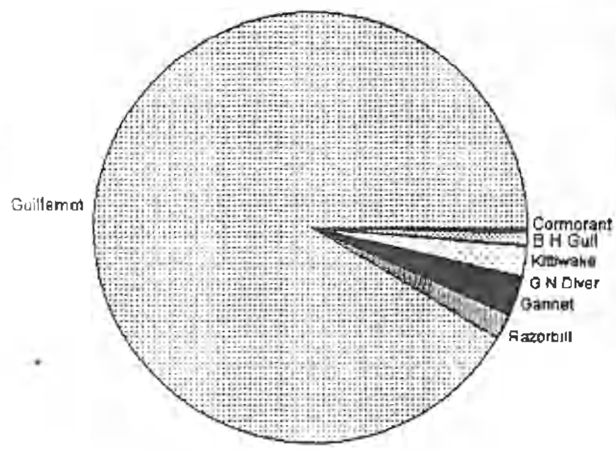


Fig 2. Live oil contaminated seabirds stranded on the South coast of Britain Jan-Apr 93



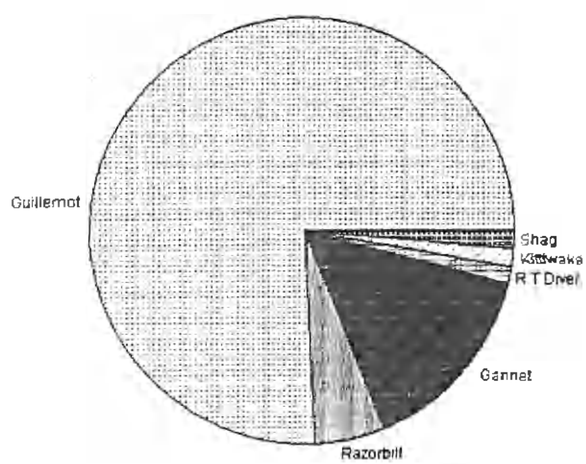
Species	Quantity
Common Guillemot	129
Razorbill	5
Gannet	4

Fig 3. Live oil contaminated seabirds stranded on the S. Cornwall coast Jan-Apr 93



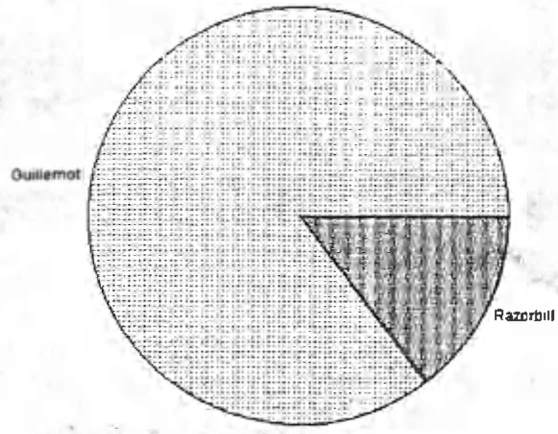
Species	Quantity
Common Guillemot	276
Razorbill	6
Gannet	8
G N Diver	1
Kittiwake	7
B H Gull	3
Cormorant	1

Fig 4. Live oil contaminated seabirds stranded on the S. Devon coast Jan-Apr 93



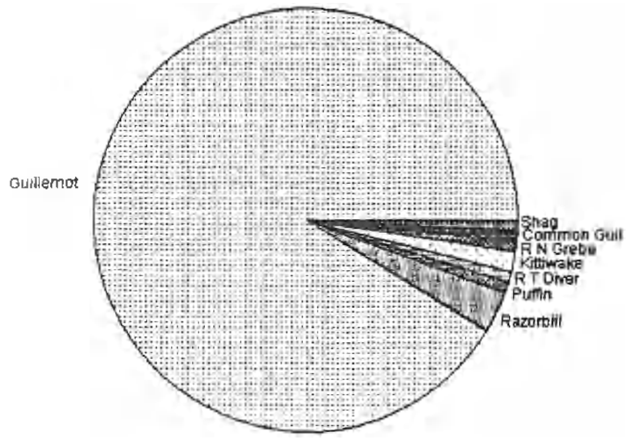
Species	Quantity
Common Guillemot	56
Razorbill	4
Gannet	11
R T Diver	1
Kittiwake	1
Shag	1

Fig 5. Live oil contaminated seabirds stranded on the Dorset coast Jan-Apr 93



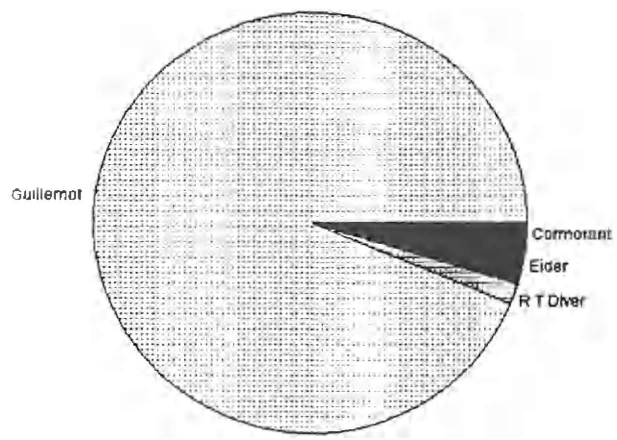
Species	Quantity
Common Guillemot	35
Razorbill	6

Fig 6. Live oil contaminated seabirds stranded on the Hampshire coast Jan-Apr 93



Species	Quantity
Common Guillemot	115
Razorbill	4
Puffin	1
R T Diver	1
Kittiwake	2
R N Grebe	1
Common Gull	1
Shag	1

Fig 7. Live oil contaminated seabirds stranded on the Sussex coast Jan-Apr 93



Species	Quantity
Common Guillemot	60
R T Diver	1
Eider	2
Cormorant	1

Fig 8. Live oil contaminated seabirds stranded on the Kent coast Jan-Apr 93

2.2 Devon distribution

The distribution of auks on the South Devon coastline is far from even (Fig 9 and Table 3), and shows a similar pattern to that observed over the previous decade (Partridge and Stratford 1991). The coverage of Devon to the east of the R. Exe has been improved since last reported and will

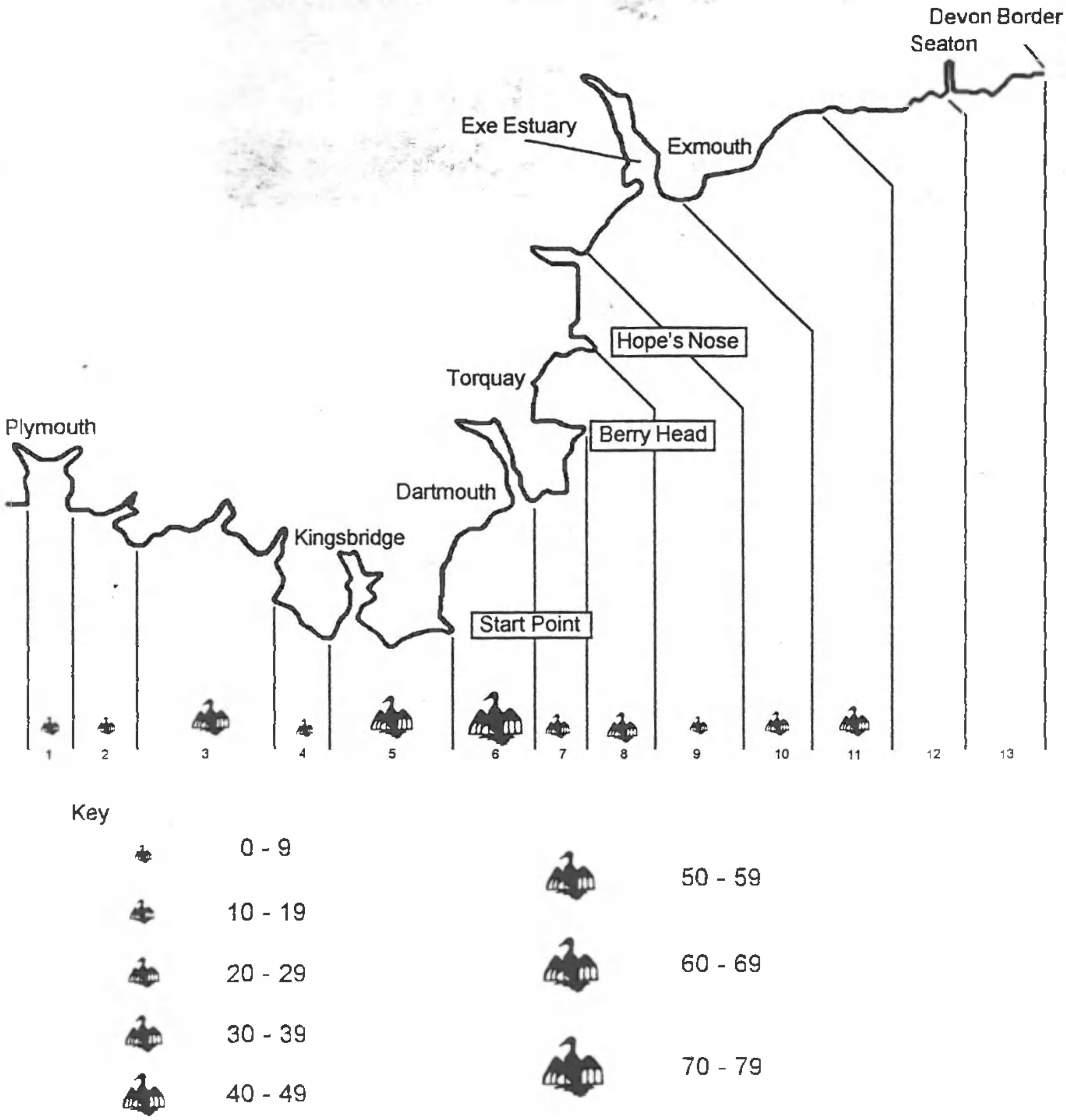


Fig 9. Distribution of live oil contaminated auks on the South Devon coast, Jan-Apr 93.

TABLE 3. AUKS STRANDED ON THE S. DEVON COAST Jan-Apr 93.

Winter	1	2	3	4	5	6	7	8	9	10	11	12	13
92/93	7	8	33	3	42	51	2	2	2	18	24	0	0

provide a more complete picture over the forthcoming years. The area to the east of Start Point is consistently a black spot for the stranding of oil contaminated seabirds, an aspect which will be discussed further in a later section.

3. Factors affecting distribution

3.1 Environmental factors

The major environmental conditions to affect the movement of an oiled seabird at sea are the wind and currents. Given that an oiled seabird is often in a weakened condition, then such environmental factors are likely to be of greatest importance in the movement of a debilitated seabird at sea. Each of these factors will be presented and discussed in the following sections. The distributions of strandings of S. Devon will be used extensively.

3.1.1 Wind

The frequency and strength of the wind has been described as a major factor in the drift path of an oil contaminated seabird (Jones 1969, Jones 1970, Bibby 1981, Camphuysen 1989, Underwood & Stowe 1989). In this study, the wind strength and direction did not appear to be such a major influence directly on the final site of stranding. The prevailing wind direction for the winter period and in particular during the main stranding events is from the SW (A2 plot insert). If wind strength and direction was the main factor influencing stranding site, then birds would be expected to be most prevalent to the west of Start Point in S. Devon. The quantities of birds stranding to the east of Start Point are significantly higher than those stranding on the west side (Fig 9).

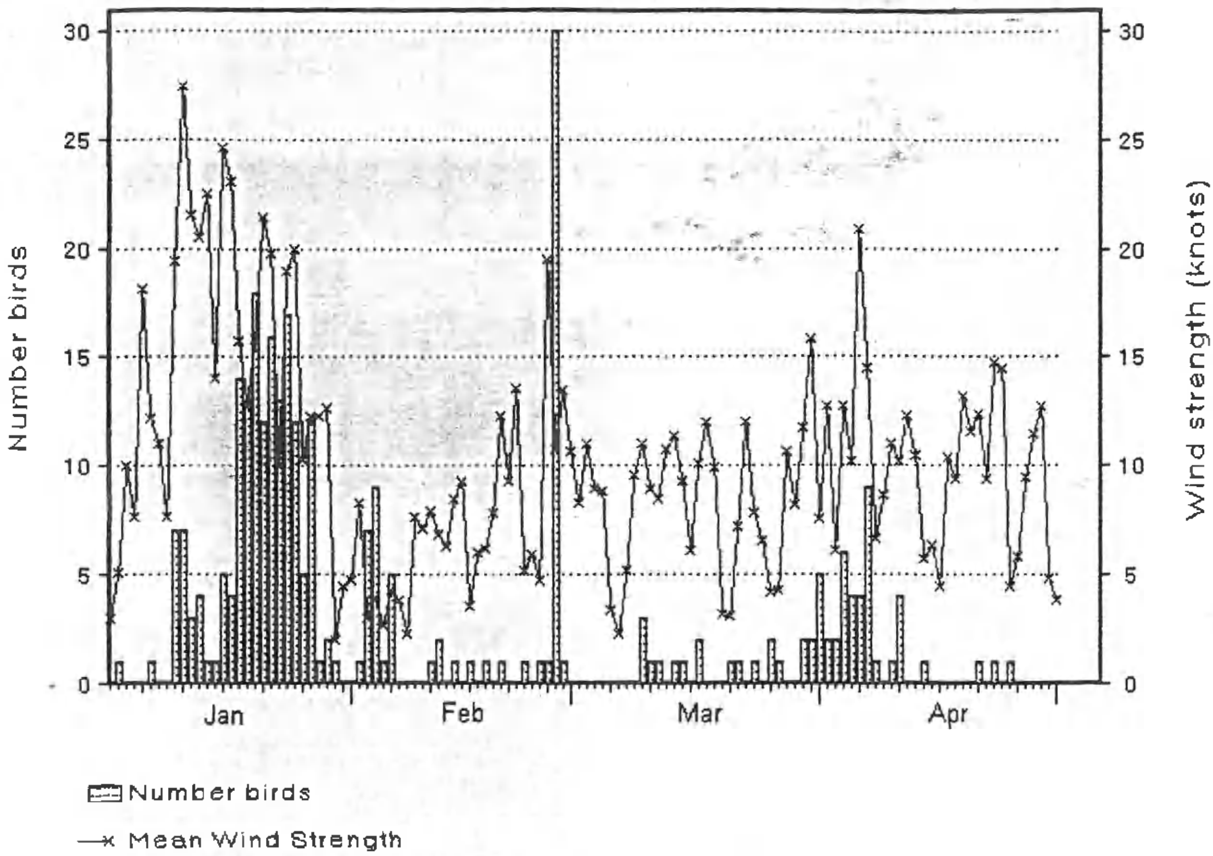


Fig 10. Numbers of oiled seabirds stranded on the S. Devon coast and mean daily wind strength.

The effect of wind strength on the numbers of oiled seabirds stranded is shown in Fig 10. Significant stranding events appear to slightly lag periods where the daily mean wind strength is greater than 15 knots.

3.1.2 Currents

The large number of factors affecting currents make such analysis very complicated, so the discussion here will necessarily be a synopsis of the most important features. The instantaneous direction of a current will be dependant on the state of the tide. The strength and direction of currents at sea will obviously have some effect on the final stranding site of an oiled seabird. The wind stress can enhance or degrade the strength of currents generated by other forces (Pingree and Griffiths 1980).

3.1.2.1 Currents around Start Point

The currents around Portland Bill and Start Point have been well studied and are fairly well understood (Maddock and Pingree 1978, Pingree and Maddock 1979, Pingree and Mardell 1983). As the tide flows around Start Point, the tidal streams in the vicinity of the promontory increase as a result of conservation of volume. Tidal streams near the headland, move faster than those further offshore to maintain irrotational flow near the headland. The radius of the curvature of the flow at this point is smaller than further out. The water depth inshore is shallower and as a result the frictional forces, which oppose the flow, here will be greater. Large frictional forces inshore and a small frictional force further offshore constitute a torque, which in effect generates vorticity locally. This vorticity will then result in a rotational flow.

The anti-clockwise vorticity generated near the headland by a northeasterly tidal flow (flood tide), is advected by the tidal stream to regions where the local vorticity is smaller. This imparts vorticity to Start Bay, with the greatest effect being closest to Start Point. The result of this vorticity is a southerly flow between the Skerries Bank and Hallsands, whilst the offshore current continues to flow northeasterly. The flow between the Skerries Bank and Hallsands will continue in a southerly direction when the tide reverses. During the ebb tide the offshore current reverses to a southwesterly flow. The flow of current in Start Bay is predominantly southward, and remains so for 10 hours out of the tidal cycle (*c.* 80% of the time).

The effect of wind on this pattern of current flow is dependant on its direction and strength. A southwesterly wind tends to weaken the effect of the vorticity, and a northeasterly wind stress tends to strengthen the vorticity and hence rotational flow. As shown the prevailing wind direction at the time of most strandings, was in a southwestly direction. The rotational current and predominantly southward inshore flow prevailing in Start Bay will tend to move birds towards the Start Point and Hallsands area.

3.1.2.2 Channel currents

The currents of interest in the English Channel are anticlockwise gyral currents within Lyme Bay and off the Sussex coast (Oerlmanns 1978, Pingree and Griffiths 1980). These currents are re-inforced by northerly to easterly winds and degraded by southerly to westerly winds. The wind effect is dependent on the state of tide, position along the channel, etc. The currents along the S. Coast and their effects on strandings of seabirds are currently under review and may be reported in much greater depth at a later date. The data currently available, however, appear to show some link between gyral currents and numbers of stranded oiled seabirds. It may be that such currents 'concentrate' strandings into particular areas.

3.2 Observer coverage and terrain

The coastline of South Devon is now well covered by teams of observers and holding stations. The recording and reporting systems have been organised such that data is collected on a sectorised basis. Close liason with the RSPCA group communications centre has ensured that some of the gaps in data recording have been filled. All units and observers report strandings on 'Transfer Forms', which are returned periodically in batches for entry into the computerised database. A small proportion of the coastline is relatively inhospitable, access being difficult and irregular.

3.3 Location of birds at sea

The location and distribution of birds at sea will have a major influence on the site of stranding. The populations of seabirds in the Western Approaches are currently being investigated by the JNCC. When this work is published, comparisons with live oiled seabird strandings will be made and reported for the southwest area.

3.4 Location of oil at sea

The location of oil spilt or discharged at sea will have some influence on the sites where birds strand. To date, surveillance flights by the MPCU and others have failed to detect major spills. Most observations are confined to small patches of oil or 'sheen'.

4. Rehabilitation

4.1 Overview

The prime purpose of 'rescuing' a live stranded oil contaminated seabird is to attempt a cleaning and rehabilitation process. This section briefly comments on these aspects, especially with regard to the more recent methods and recommendations of the RSPCA and SWOSG. It is well accepted that the rehabilitation of oiled seabirds can play a very limited role in seabird conservation (Clark 1978, Ford *et al* 1982), however the welfare of individual birds is to be taken into consideration. The degree to which oil pollution and contamination of seabirds becomes 'accepted' is a reflection on human society itself. The techniques learned and developed at this point in history may well be vitally important at some later time.

4.2 Finding

The SWOSG has an established system of 'search and rescue' for stranded oil contaminated seabirds. The system comprises of volunteer 'searchers' each with a designated section of coastline and a series of strategically placed holding stations, where immediate 'first aid' treatment can be administered. The treatment although basically simple is vital to the survival of many victims found, and addresses the physiological and psychological effects (SWOSG 1993). The system gives very comprehensive coverage of the South Devon coast and to a lesser extent cover for the N. and S. Cornish coast and the Dorset coast. The initial treatment at holding stations is also important with regard to subsequent transportation of a seabird to a specialised unit, allowing for a short recovery, medication, rest and food, before the journey is undertaken. It is well established that seabirds travel reasonably well (ACOPS 1972) and in S. Devon such journeys are relatively short, there being two cleaning and rehabilitation units in the immediate area.

4.3 Condition of birds

The clinical condition of oil contaminated seabirds is very difficult to determine and dependant on many factors *e.g.*. type of oil and its toxicity, degree of contamination, length of time between contamination and stranding, prevailing weather conditions and sea state. All of these factors result in the bird becoming emaciated, possibly hypothermic and poisoned by toxins. In addition the bird can suffer other injuries whilst coming ashore, particularly in a heavy swell. In practice, two conditions are considered in the 'field' when assessing the condition of a bird:

- ❑ the general appearance and activity;
- ❑ the weight.

Currently weighing is only carried out at seabird rehabilitation centres and is often overlooked in the course of events when large numbers of birds are being processed. It has been recommended (ACOPS 1973) that guillemots weighing less than 600g and razorbills weighing less than 425g have very little chance of recovery, and as such cleaning and rehabilitation is not recommended as being worthwhile. The weight limits given by ACOPS are used as a guide when assessing birds in care, but it can be seen that there is considerable overlap in the survival/non-survival weights measured (Table 4). It is obvious that other factors are likely to affect survival chance. Assessment of birds is currently under review to bring other factors into the equation, however it is unlikely that simple rules will result.

TABLE 4. WEIGHTS OF BIRDS STRANDED ON THE S. DEVON COAST, WINTER 1992/3

	Mean	S.D.	N	Range
Survived	697	76.0	20	570-850
Died	618	62.7	14	550-730
Difference	t = 3.21 p<0.005			

TABLE 5. LIVE SEABIRDS RECEIVED AND RELEASED DURING Jan-Apr 1993 FROM THE SOUTH COAST BY REHABILITATION UNITS

		West Hatch	Plymouth	Perranporth	Teignmouth	Total
Guillemot	Received	343	115	129	48	635
Guillemot	Released	203	93	51	39	386
	Success Rate	59%	81%	46%	81%	61%
Razorbill	Received	15	2	5	1	23
Razorbill	Released	9	2	2	0	13
	Success Rate	60%	100%	40%	0%	57%
Gannet	Received	17	0	4	1	22
Gannet	Released	15	0	1	0	16
	Success Rate	88%	~	25%	0%	73%
Kittiwake	Received	4	3	0	1	8
Kittiwake	Released	4	2	0	1	7
	Success Rate	100%	66%	~	100%	88%
Others	Received	13	0	0	1	14
Others	Released	11	0	0	0	11
	Success Rate	85%	~	~	0%	79%

Post mortem examinations of guillemots revealed only 3 birds from the sample of 29 birds had any trace of subcutaneous and/or depositional fat. This is consistent with the birds not washing ashore immediately. If birds were close in to shore, then they would be likely to strand relatively quickly. The guillemots stranded are likely to have been contaminated some distance from shore and to have used up much of their energy reserves in the intervening period.

4.4 Process

Oil contaminated seabirds admitted to RSPCA, and independently controlled seabird rehabilitation units within the SWOSG area (4 in total), undergo a standardised cleaning and rehabilitation protocol. This is largely based on the work of the Advisory Committee on Oil Pollution of the Sea, Research Unit on the Rehabilitation of Oiled Seabirds (ACOPS 1971-75, Clark & Croxall 1972) methods, with refinements and improvements developed by the RSPCA wildlife hospital and SWOSG units. The success rates of rehabilitation to release for seabirds in 1993 are shown in Table 5, and is indicative of the improvements of rehabilitation methods over the years. Of the nearly 8 000 birds oiled in the Torrey Canyon disaster only 100-150 were released back to the wild and 16 of 60 rung were subsequently washed ashore dead within a month (Conder 1968).

Factors influencing the success rate to release are:

- a quick 'rescue' response;
- condition of the bird;
- adequate first aid treatment;

The provision of first aid treatment has been set up in all of S. Devon and we are now in a position to assess its effectiveness. Birds received by the Plymouth and Teignmouth units will almost all have received first aid treatment and have been stabilised by a holding station prior to receipt at a unit. The birds received by the Perranporth and West Hatch units will almost all have received no first aid treatment at a holding station but will have been delivered to the unit by a member of the public or RSPCA inspectorate. The administration of first aid immediately after rescue, significantly increases the chance of survival and to a successful rehabilitation back to the wild (Table 6).

TABLE 6. ADMINISTRATION OF FIRST AID TREATMENT TO OILED GUILLEMOTS

	First Aid Administered	First Aid Not Administered
Died	31 (19%)	218 (41%)
Released	132 (81%)	254 (59%)

$\chi^2_1 = 37.5$

$p<0.001$

4.5 Releasing

The current policy of the SWOSG is to release rehabilitated seabirds, particularly guillemots, from the Southern Redoubt cliffs at Berry Head, Brixham (grid ref. SX9456). This is not always logistically possible and alternative release sites are used: Wembury (grid ref. SX5148) by the Plymouth unit; and North Cliffs, Perranporth (grid ref. SW7454) by the Perranporth unit. The Berry Head site is preferred because the breeding colony maintains a relatively high winter attendance. On only 30 days were no guillemots observed on the ledges for the winter period 1990/91 – 153 days from 17th October 1990 to 19th March 1991 (N Smallbones pers. comm.). It is felt that releasing rehabilitated birds into an area where guillemot are present increases the chance of success. There is a reasonably reliable food source within the area and re-integration into the wild is likely to be much quicker. An analysis of the release sites used is shown in Table 7.

TABLE 7. SITE USEAGE FOR THE RELEASE OF REHABILITATED SEABIRDS Jan-Apr 1993

Release Site	%
Berry Head	75.8
Wembury	13.4
North cliffs, Perranporth	10.8

4.6 Ringing and marking

All species of rehabilitated seabirds are fitted with standard BTO metal rings prior to release. The low recovery rate within seabird ringing requires large numbers to be rung to give a realistic opportunity of meaningful controlled recoveries (Table 8). The guillemot is the only species where numbers rehabilitated and rung, are large enough. As such, only guillemot ringing will be discussed

TABLE 8. GUILLEMOT RINGING RECOVERIES FOR 1990 AND 1991 (MEAD & CLARK 1992)

Year	No. Rung	No. recovered	Recovery rate
1990	42 644	510	1.2%
1991	154 710	318	0.2%

in detail here. Included in the 1991 guillemot recoveries are 2 rehabilitated birds released in the Netherlands and sighted on the Isle of May, one of which was reported to be breeding in 1992 (Mead and Clark 1992). Controls of 2 guillemots were made in Lyme Bay during the winter of 1992, which had been rehabilitated and released 6 and 5 years previously (Mead and Clark in lit.).

The ring sequences used for guillemots in winter 1992/93 of the rehabilitation programme are shown in Table 9. Further to ringing, a small proportion of guillemots were dye marked on the white ventral plumage with picric acid. The marked plumage will moult out in the post nuptial moult (autumn). The birds marked were selected from the adult summer plumage birds, with characteristics that could establish them as having come from the Berry Head colony. If any of the birds subsequently return to the Berry Head colony, then breeding behaviour and success could be evaluated, allowing further studies of post contamination/rehabilitation breeding. The breeding colony is fully wardened and has in place a CCTV camera, with which daily observations are made. During the winter of 1993 this pilot study was launched and 9 birds were marked, however none were observed on the colony. It is intended to continue this scheme during 1994, marking a larger number of birds.

TABLE 9. GUILLEMOT RINGING DATA FOR Jan-Apr 1993.

Unit	Ring Sequence	Quantity
West Hatch, Taunton	T98149 to T98392	243
Plymouth	T96080 to T96100	21
Plymouth	X20001 to X20038	37
Perranporth	T73059 to T73100	41
Teignmouth	T20101 to T20133	33
Total		**375**

5. Morphology

5.1 Methods

Corpses of guillemots were collected, wherever possible, from rehabilitation units and subjected to detailed examination, largely following Jones et. al. (1982). Measurements were taken of: culmen length; gonys depth; head and bill length; wing chord; and weight. Internal measurements were taken of: bursa length and width; testis length and width (males); and maximum follicle size (females). The maximum flattened chord of the left wing, carpal joint to tip of primaries, was measured to ±1mm using a stop rule. Other linear measurements were made to an accuracy of ±0.1mm using vernier calipers. Weight measurements were made using calibrated digital scales. Other measurements and observations were made, including plumage characteristics, but will not be reported here.

Age was determined from the presence of cloacal bursa and the presence of a distended oviduct in females. The amount of subcutaneous and abdominal fat was scored on a simple scale of 0-3 – no fat to thick deposits respectively. The liver, kidney, gonads, flight muscles and alimentary canal, were removed for chemical analysis in another laboratory, and will not be reported here. Stomach contents were not investigated because most birds would have been fed to a greater or lesser extent by holding stations, and data gathered could be spurious.

5.2 Results

The sex ratio (Table 10) is not significantly different from 50/50 for the total of all birds (χ^2_1=3.58). The sex ratio of adult birds was significantly different from 50/50 (χ^2_1=7.36, $P < 0.01$), with 91% of the sample females. There were no significant differences in the ratios of the age classes.

TABLE 10. SEX RATIO OF GUILLEMOTS STRANDED ON THE S DEVON COAST Jan-Apr 93.

	Male	*Female*	*Total*
Juvenile	1	4	5
Sub-Adult	7	5	12
Adult	1	10	11
Total birds	9	19	28

TABLE 11. EXTERNAL MEASUREMENTS OF GUILLEMOTS STRANDED ON THE S DEVON COAST Jan-Apr 93. LINEAR MEASUREMENTS IN mm AND WEIGHT MEASUREMENTS IN g, SEE TEXT FOR DETAILS MEASUREMENTS.

	Mean	*S.D.*	*No*	*Range*
Find Weight	671.8	83.2	29	550-850
Wing Chord	193.1	6.8	93	180-211
Culmen	46.5	2.4	93	41-53
Head and Bill	111.8	3.9	93	104-129
Gonys	12.58	0.98	93	10-15

Subcutaneous and abdominal fat deposits were non existent in 26 and very slight in 3 birds in this sample. It is not known whether birds were full weight and well fed prior to contamination. Unfortunately, therefore, there is insufficient data available for an estimate of the time taken to deplete energy reserves, and hence for an estimate of time between contamination and stranding. There are two extremes of possiblity for the sequence of events prior to stranding:

- feeding was difficult, the birds became emaciated and were then contaminated with oil because they unable to escape;
- the birds were reasonably well fed, became contminated with oil and were unable to feed.

The time taken to strand will be dependant on the distance from shore the birds are, and the environmental conditions. It may be that birds were far from the shore for this particular year, although there is insufficient data to support any theory. In previous years there have been significant numbers of birds with large deposits of fat, and it may be that the sequence of events prior to stranding was different or that they were contaminated closer to the shore.

The maximum wing chord, culmen, head & bill and gonys depth (Table 11) were not analysed with respect to sex or age because the sample size of birds internally examined was too small. The mean and range of body weight were not dissimilar to that observed in other incidents, including non-oiling mortality (Mudge 1991). A full analysis of the biometric data from recent years is currently underway and will be reported at a later date.

6. Acknowledgements

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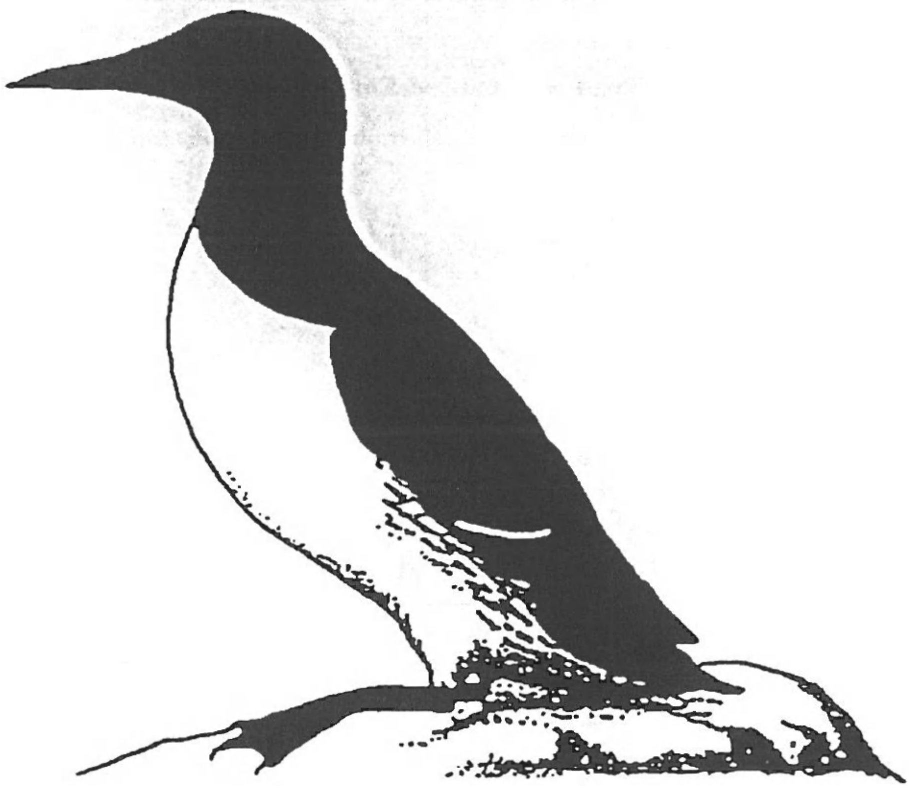
We hope that no contribution has been overlooked in these acknowledgements, but if there are any omissions we apologise.



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8. Recommendations

Each winter season highlights improvements to procedures, techniques and/or systems. The following recommendations are made to improve the effectiveness of rehabilitation work and to reduce its necessity.

1. The current legislation related to oil pollution should be more strictly enforced, and strengthened where required.

2. Regular beached bird surveys (BBS) should be carried out to monitor the effectiveness of legislation. The data collected should be collated with data from rehabilitation units and other organisations. Currently local authorities have a statutory duty to clean beaches and birds removed do not appear on any BBS. This results in valuable data being lost and BBS data being incomplete.

3. The group should actively participate in any European Beached Bird Survey (EBBS), in order to monitor the effectiveness of policy measures to reduce oil pollution at sea. Pollution of the sea is an international problem and as such requires international action to reduce its occurrence. In a recent report (Camphuysen and Franeker 1992), S. Devon was proposed as a study area within the EBBS. The group should participate fully in the furtherance of the aims of the scheme.

4. Closer co-operation and dialogue is needed between conservation, statutory and welfare organisations. This would aid the collection of meaningful data, in furtherance of the aims to reduce/eliminate chronic oil pollution of coastal waters.

5. The success of the holding stations and first aid treatment for live stranded seabirds has proved to be very effective in 1993. It is important to extend fully the programme established in S. Devon into Cornwall and Dorset.

6. The detailed recording of stranding sites should be extended to include the all of the south west coastline. The data gathered for the S. Devon coast has proved useful in highlighting some of the factors affecting the eventual stranding site for a contaminated bird and will be more effective as more data becomes available. This could then be used to predict where birds will strand and hence to utilise the limited resources available more effectively. Stranded birds could then be 'rescued' earlier.

7. Measurement and recording of biometrics of birds should be carried out. Much biometric information is currently not being recorded for rehabilitated birds. The system for release of rehabilitated birds in the south west area is likely to change in the near future, making the systematic measurement of biometrics easier. These measurements may in the future be used to resolve the geographical origin of birds, when data becomes available.

8. Live stranded seabirds that have subsequently died have provided some information on the distribution of sex and age classes of birds in the area. It is important that the research programme undertaken by the group be continued and wherever possible extended to gather more information. This would contribute to our understanding of the winter populations of seabirds and their distribution in the English Channel.

Appendix

The species mentioned in this report are listed here with their scientific name.

Great Northern Diver	*Gavia immer*
Red Throated Diver	*Gavia stellata*
Red Necked Grebe	*Podiceps grisegena*
Gannet	*Morus bassana*
Cormorant	*Phalacrocorax carbo*
Shag	*Phalacrocorax aristotelis*
Eider	*Somateria mollissima*
Common Gull	*Larus canus*
Black Headed Gull	*Larus ridibundus*
Kittiwake	*Rissa tridactyla*
Common Guillemot	*Uria aalge*
Razorbill	*Alca torda*
Puffin	*Fratercula arctica*

The SouthWest Oiled Seabird Group

The group was formed in June 1990, to act as an umbrella group for pollution issues. Its primary role is to liaise between the various organisations and individuals involved with oil pollution and its effects on seabirds. The regular participants within the SWOSG are:

RSPCA No 1 Region (South West)
RSPCA Wildlife Department
RSPCA Wildlife Hospital
RSPCA Oiled Seabird Cleaning Units (Plymouth and Perranporth)
British Wildlife Rehabilitation Council
Teignmouth and District Oiled Seabird Unit
Devon Bird Watching and Preservation Society
Devon Wildlife Trust
RSPB
Gweek Seal Sanctuary
NRA
Teignbridge Borough Council
BP Exploration

The group organises and carries out research programmes in the following area:

Welfare issues
Treatment and rehabilitation regimes for contaminated seabirds
Environmental studies related to seabirds and their rehabilitation
Studies related to shipping and seabirds.