NOCTURNAL BIRD PROBLEMS ON AERODROMES

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SUMMARY

This paper describes an attempt to identify the pattern of occurrence of birds on UK aerodromes by night. The results of an enquiry covering 31 aerodromes indicate that the problem is diverse. Most aerodromes reported the presence of birds by night but on only one were they present consistently. There are indications that, at least on occasions, bird numbers may be influenced by precipitation, moon phase, tide states and winds. The dangers presented by birds at night are increased by their intermittent occurrence and the difficulty of detection.

1. INTRODUCTION

As a result of a number of birdstrikes on aerodromes by night, the Ministry of Defence asked the Aviation Bird Unit (ABU) to investigate the situation. Although birds occur on aerodromes at night, they are difficult both to detect and study. In order to minimise the birdstrike problem, it is necessary to establish what species are present, where and when, and to devise means of controlling their numbers.

The approach adopted, therefore, was to attempt to identify typical situations suitable for closer study. It was hoped that survey data would reveal periods when birds were likely to be numerous so that aerodrome controllers could be warned and be on their guard. It was also expected that detailed observations would be possible on how birds responded to scaring measures by night. These expectations have not all been fulfilled but this paper describes what has been discovered so far.

2. AERODROME ENQUIRIES

In 1984, bird controllers at 25 RAF airfields were asked whether gulls (Laridae), which were considered to create the most likely problem, occurred on their airfields at night. The answer was not known at five aerodromes and was affirmative in only nine of the remainder. The only common pattern in the replies was that gull presence was intermittent and three stations mentioned July or August as the times of occurrence.

A more comprehensive survey was carried out between 1 October 1986 and 31 March 1987 in order to identify suitable study sites. In this, operators present on both military and civil aerodromes at night were asked to record the numbers of birds seen during routine duties. The data were computerised and average numbers of birds seen for each week were derived. Records within two hours of sunrise and sunset were disregarded because gulls, for example, may leave their nocturnal roost sites (normally on lakes, reservoirs or estuaries) before daybreak and arrive on aerodromes before it is light (Horton 1986). Some people infer erroneously that the birds have been present on the aerodromes all night.

Completed report forms were received from 31 aerodromes, about half military and half civil. Some aerodromes managed to provide data for all nights for the whole 26 weeks, some provided a useful sample each week for the whole period and others for shorter periods. As there are inherent difficulties in both detecting and counting birds by night, the figures obtained are best regarded as minima and counts of zero as no birds seen rather than none actually present.

Since the end of the survey, data continued to be collected on a small number of military aerodromes. Data from two of these have been especially useful and have been analysed separately.

3. INCIDENCE OF BIRDSTRIKES BY NIGHT

Analysis of 4971 birdstrikes on the Civil Aviation Authority's database for 1976-87indicates that, where times of occurrence are known, 8.7% were at night. The predominance of daytime incidents reflects the fact that most birds and aircraft movements are diurnal. For the 57 aerodromes

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which recorded any birdstrikes in the 12-year period, the annual average number of strikes per aerodrome was 7.3 and the annual average number of night-time strikes was 0.6. Of the 57 aerodromes, 24 recorded only one nocturnal strike each in the 12-year period. The greatest number of nocturnal strikes was reported from London Heathrow but even here the number averaged only 4.4/year.

Analysis of the data by month shows a distinct seasonal trend, most strikes occurring from August to January inclusive (Fig. 1).

4. GENERAL RESULTS OF THE SURVEY

4.1 Gulls

Gulls were reported from 21 (68%) of the aerodromes. The numbers of aerodromes on which gulls were recorded according to month are shown in Fig. 1. Most aerodromes recorded gulls in October when the greatest numbers were also seen. In most cases the numbers of birds were rather small or they were not seen regularly. At London Heathrow, however, gulls were present throughout the survey and the largest weekly average was 2300 (Fig. 2).

Gulls occurred fairly regularly on only six other aerodromes, generally between October-December/January. On a few occasions the numbers of birds seen reached the low hundreds but there were usually less than five. At one of these aerodromes, many nights elapsed when no, or few gulls were seen and then several hundred occurred for only one or two nights.

4.2 Waders

Waders (generally lapwing *Vanellus vanellus*, golden plover *Pluvialis apricaria*, curlew *Numenius arquata* and oystercatcher *Haematopus ostralegus*) were seen at night on 20 (65%) of the aerodromes usually in small numbers (cf Milsom & Rochard 1981) and rarely over 100. They occurred most frequently in November when the greatest numbers were also recorded (Table 1).

5. ANALYSIS OF DATA FROM RAF KINLOSS AND RAF LOSSIEMOUTH

Data from Kinloss and Lossiemouth were comprehensive and extensive and birds were relatively abundant. These data were, therefore, suitable for individual examination. Both aerodromes are situated on the coast in NE Scotland and are subject to influences not found at sites inland.

5.1 Effects of precipitation

In each of the four seasons at RAF Kinloss, gulls were more numerous at night during wet rather than dry conditions. This difference was not statistically significant during the summer (May-July) and autumn (August-October) but it was highly significant during the winter (November-January) and spring (February-April) (Fig. 3). A similar situation was found to occur at RAF Lossiemouth except that no data were available for the summer (Fig. 4). Waders (generally lapwing, curlew and oystercatcher) were also found to be more numerous during wet conditions at Kinloss although the difference was not statistically

significant for the summer (Fig. 5). Although other factors may be involved, rainfall has often been observed to improve conditions for birds which feed on soil invertebrates.

5.2 Influence of the moon

The influence of moon phase was examined because it may affect the amount of light available for feeding at night. However, a comparison of gull numbers around full moon, new moon and intermediate phases at Kinloss revealed no clear cut pattern except for a significantly greater proportion of birds present during full moon in winter (Fig. 6). Even if moon phase does influence numbers via light intensity, its effects on aerodromes may be moderated to some extent by artificial sources of illumination and certainly by cloud cover for which no allowance has yet been made.

Waders at Kinloss in all seasons were more numerous during full moon than during new moon (Fig. 7). These differences were not statistically significant, however, although they were close to being so in the autumn and winter periods. In as much as waders are more likely than gulls to feed on aerodromes by night if the conditions are right, their numbers would be expected to be influenced by moon phase more than those of gulls (Milsom & Rochard 1987).

5.3 Effect of tide

In addition to its potential to influence bird numbers on aerodromes by night through available illumination, the moon may perhaps at coastal aerodromes also exert an influence via the tides because birds which are not adapted to swimming will be forced off the inter tidal areas by rising tides, especially high water springs. A trend in this direction was not found in the case of gulls at Kinloss in spring. A small non-significant tendency in the predicted direction was found in the winter, however, and a significant difference occurred in the autumn (Fig. 8). Gulls, of course, are adapted to swimming and may not therefore be so responsive to tidal changes. The extent, moreover, to which they feed on the inter-tidal areas in this locality is unknown

Although a stronger association was expected in the case of waders, no significant differences were found. Waders were less numerous than gulls at Kinloss and the extent to which they fed on the inter-tidal areas was also unknown.

5.4 Effect of onshore/offshore winds

Wind direction *per se* is unlikely to influence bird numbers on aerodromes. However, in coastal situations birds might be driven ashore, especially by strong onshore winds. The data for Kinloss suggest that gulls occurred more frequently with onshore than offshore winds in spring and autumn although the difference was statistically significant only for spring (Fig. 9). In winter, by contrast, there was a tendency for more birds to be present during offshore than onshore winds. At Lossiemouth, gulls also occurred significantly more frequently in the spring during onshore than offshore winds, the differences in the other periods being non-significant (Fig. 10). That these differences were not more marked is perhaps not surprising as adverse conditions at sea due to strong winds might occur with almost any wind direction. The effects of

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Waders, which do not alight on water, were not expected to be influenced by wind direction and this proved to be the case (Fig. 11).

6. GENERAL DISCUSSION

Perhaps the most characteristic feature of bird occurrence on aerodromes at night is its diversity, ranging from one airport which, throughout the winter, has many hundreds of gulls roosting on it by night to other aerodromes which have none. There are no examples of regular gull occurrences in small numbers. Even at RAF Kinloss, where gulls may occur at night in hundreds, they are not present consistently.

The situation at Heathrow is clearly unusual. The number of birds present each night is fairly consistent which suggests that the same individuals keep returning. In this respect, the problem seems similar to that described at Nice Airport by Laty (1974). The birds occupy illuminated aprons amongst the buildings of the terminal area which is not typical of gull roost sites. The more usual inland roost sites, on reservoirs, are abundant in this vicinity and the majority of gulls in the area frequent them. Moreover, the birds on the airport generally arrive at the roost several hours after normal dusk gull roost movements have ended. Attempts, often very labour intensive, have been made by BAA to dispel the gulls from the airport but relocation within the airport boundary has usually been the only result. During the 1989-90 winter however, the birds were successfully dispersed by taking determined steps to counter them at the beginning of the season. Intriguing although the Heathrow roost was, because of the airport's size, complexity, activity and necessary security restrictions, it was not a convenient place for biological investigations.

The survey findings confirm that gulls constitute the greatest nocturnal bird problems, but five of the 31 aerodromes recorded the presence of waders but no gulls. Furthermore, gulls are more prone to alighting on runways than are waders.

Some of the data indicated that wet conditions increase nocturnal bird numbers. Full moon may, on occasions, be significant as may the tide state. But the effect of onshore/offshore winds at coastal aerodromes appears to be variable. So far, these factors have only been considered on their own. Combinations of factors might prove important. As an example, J R Allan (unpub.) has found up to 10,000 gulls on Blackpool Airport during high spring tides combined with strong onshore winds. No gulls were found during high water springs in the absence of strong winds. Circumstances such as these may profoundly affect bird numbers on aerodromes at night: they will be identified only through good record keeping.

There is much yet to be learnt about birds on aerodromes at night. Their sporadic occurrence emphasizes the need for constant vigilance, especially as means of detection are not simple. Dispersal techniques require study. The current recommendation is that the sealed surfaces of the airfield should be inspected prior to each aircraft movement. Any birds found should be discretely and quietly moved onto the grass areas trying not to disturb other birds possibly already there. Indications from the present data suggest that extra vigilance in the form of

continuous patrolling will be necessary in autumn and winter, especially during wet weather.

Table 1. NUMBE

OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH

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ACKNOWLEDGEMENTS

Much of the work reported here has been carried out under contract to the Ministry of Defence and the Civil Aviation Authority to whom all thanks are due. The authors are indebted to the 31 aerodromes which supplied the data on which the paper is based. Special thanks are due to Airfield Wildlife Management for the extensive data from RAF Kinloss and RAF Lossiemouth. Tim Milsom has kindly assisted in the preparation of the paper.

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Laty, M. (1974). Au sujet des nouveaux risques de collision presentes par les mouettes rieuses sur l'Aeroport de Nice, Cote d'Azur. 9th Bird Strike Committee Europe, Working Paper 10, Frankfurt.

Milsom, T.P. & Rochard, J.B.A. (1987). Lapwings and birdstrikes. CAA Paper 8705. Civil Aviation Authority, London.

Table 1. NUMBER OF AERODROMES ON WHICH GULLS AND WADERS WERE RECORDED AT NIGHT BY MONTH

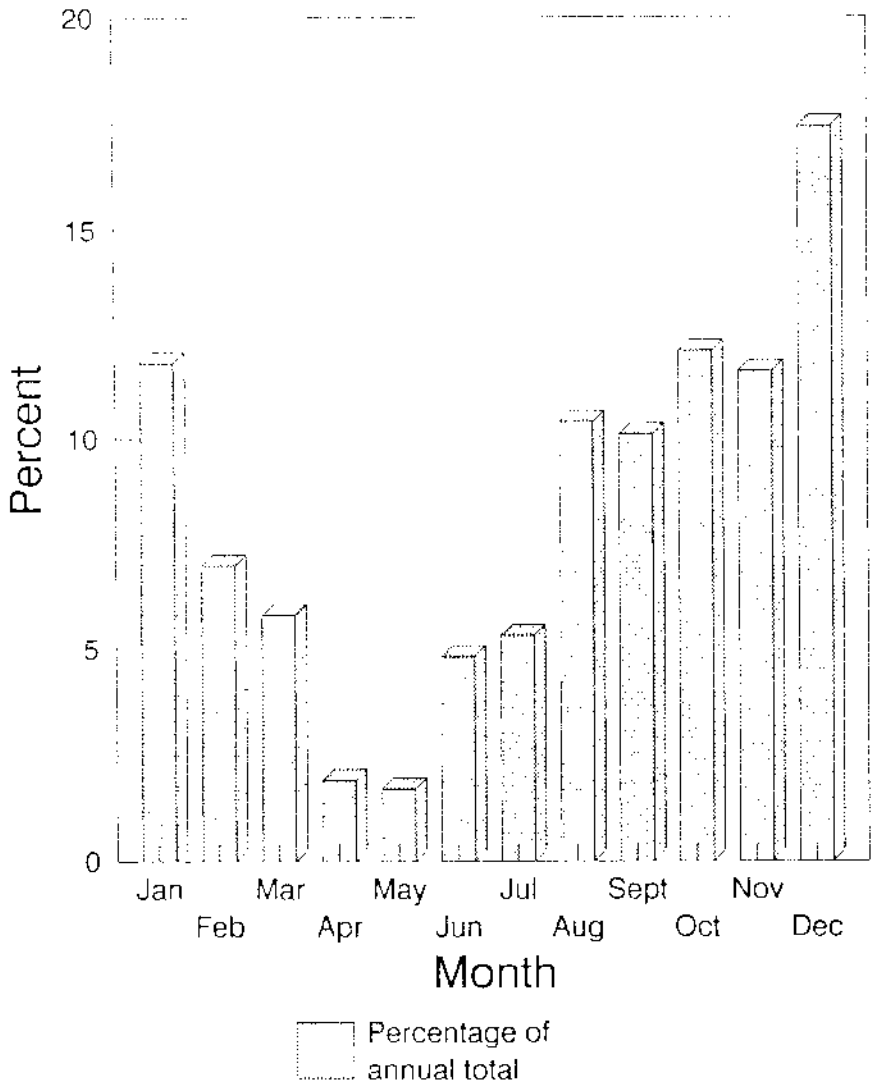
	Number of aerodromes at which			
	Gulls		Waders	
	were seen	were in max nos	were seen	were in max nos
October	17	10	17	4
November	15	3	22	11
December	12	2	17	9
January	10	3	9	1
February	13	2	9	1
March	9	3	7	0

Sample size N = 31

Figure 1

Night strikes at UK civil aerodromes 1976-87

frequency by month



Gulls

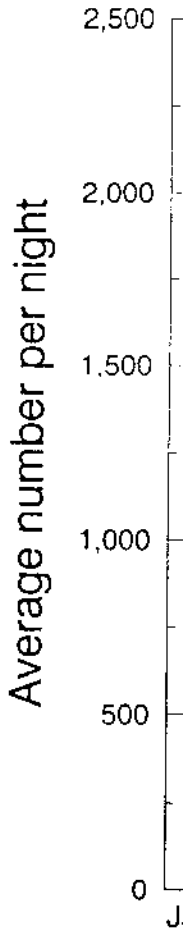


Figure 2

Gulls at night at London Heathrow

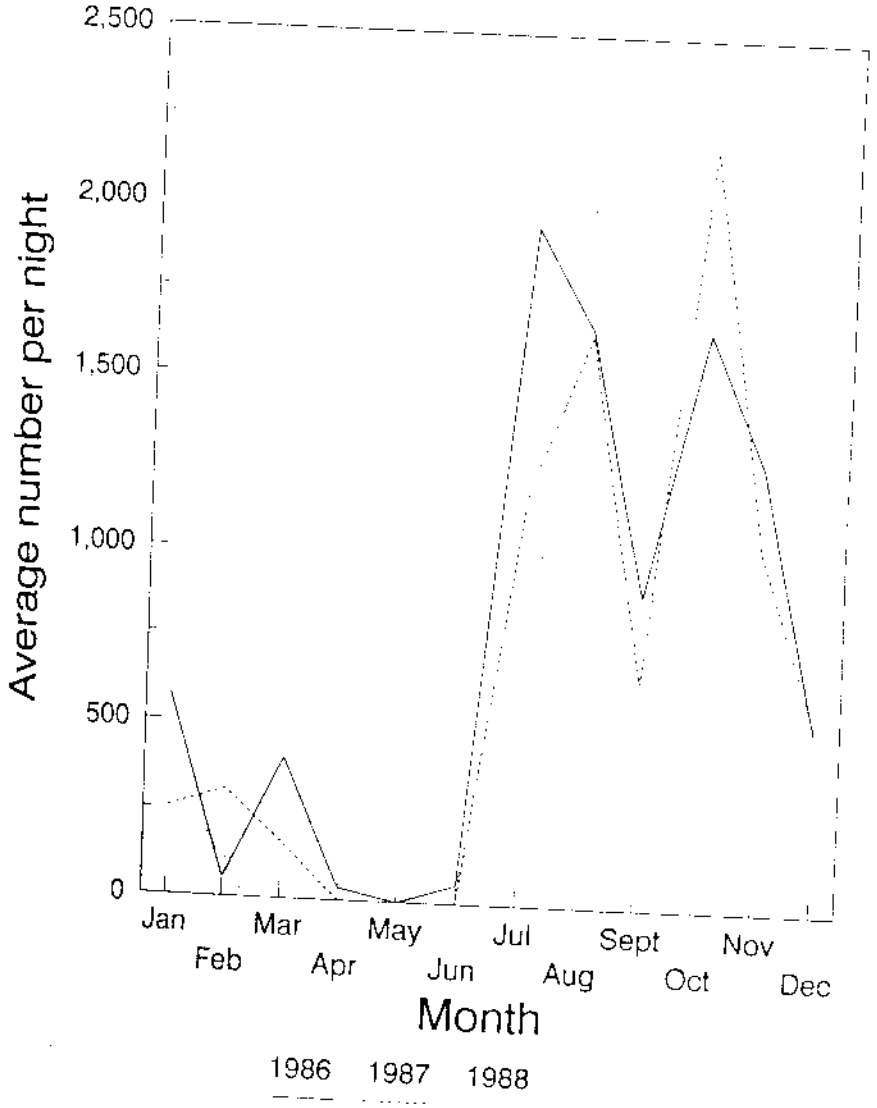
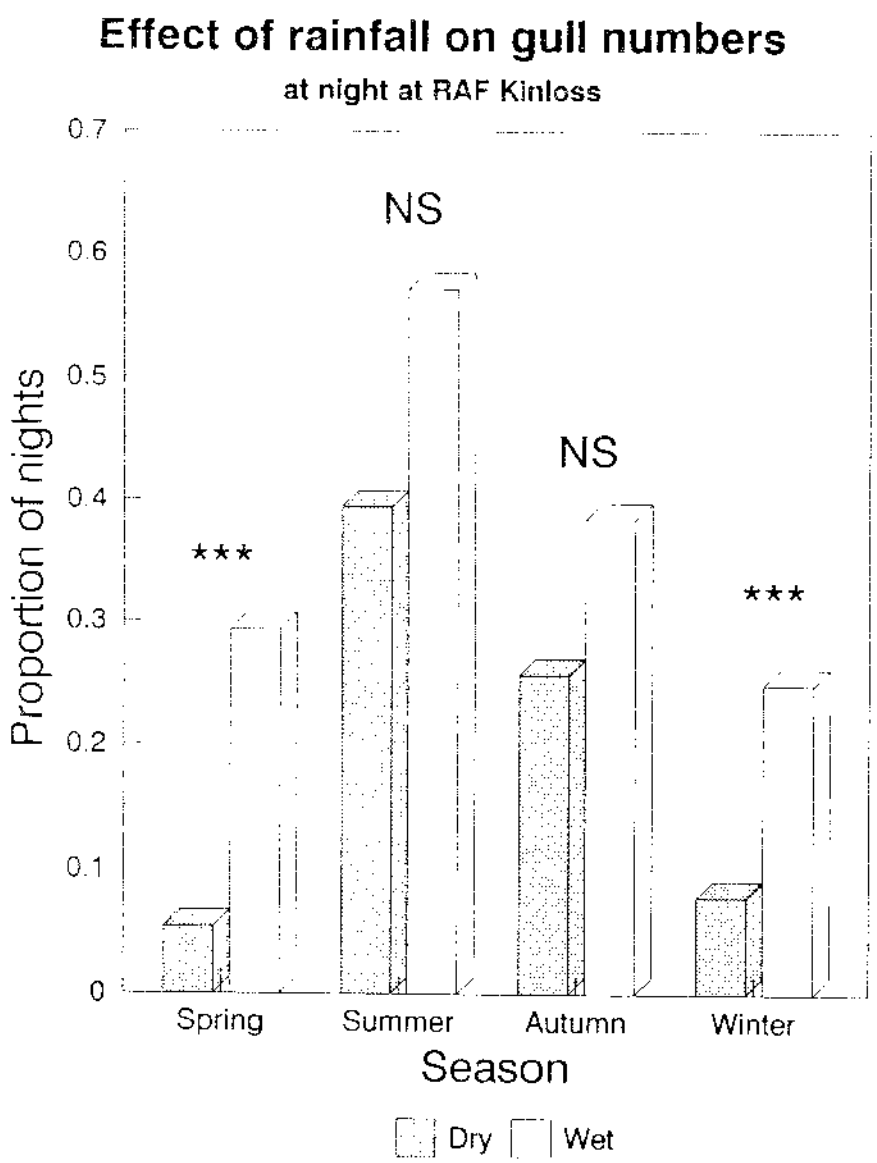


Figure 3

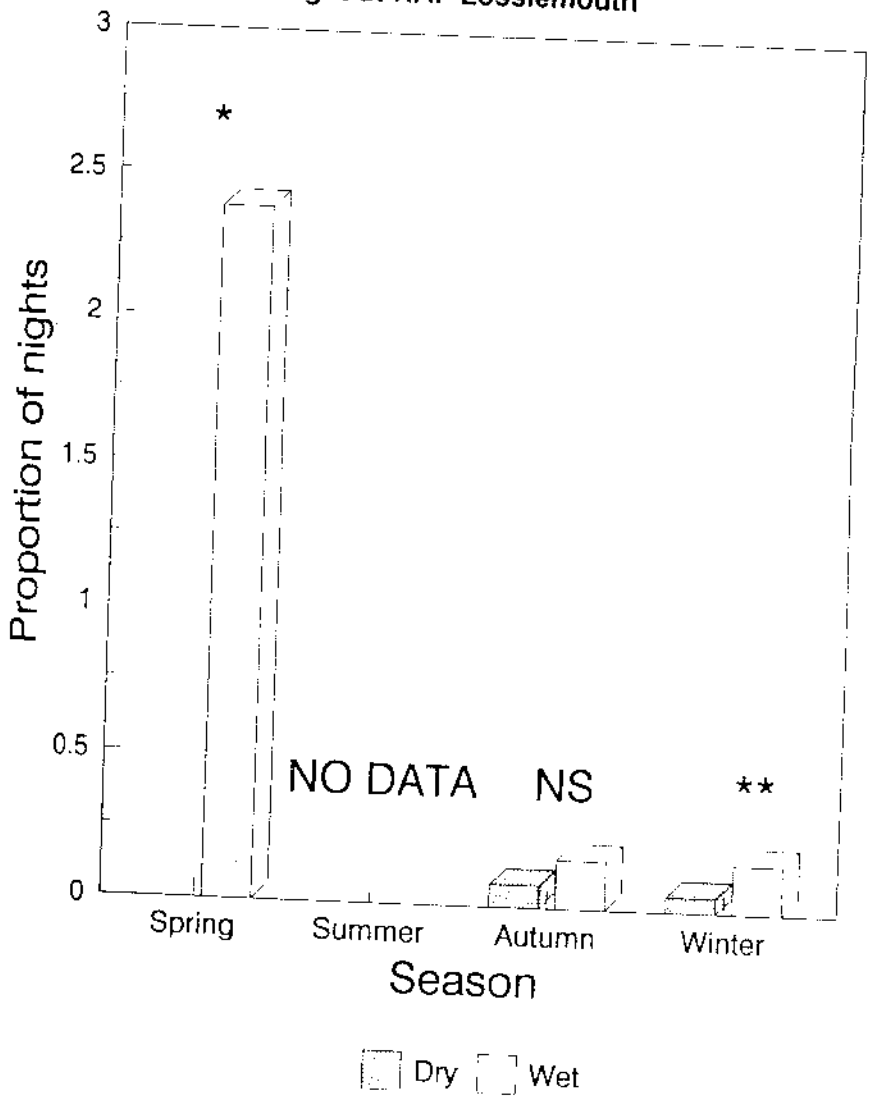


NS = not sig. *** = P<0.001

Figure 4

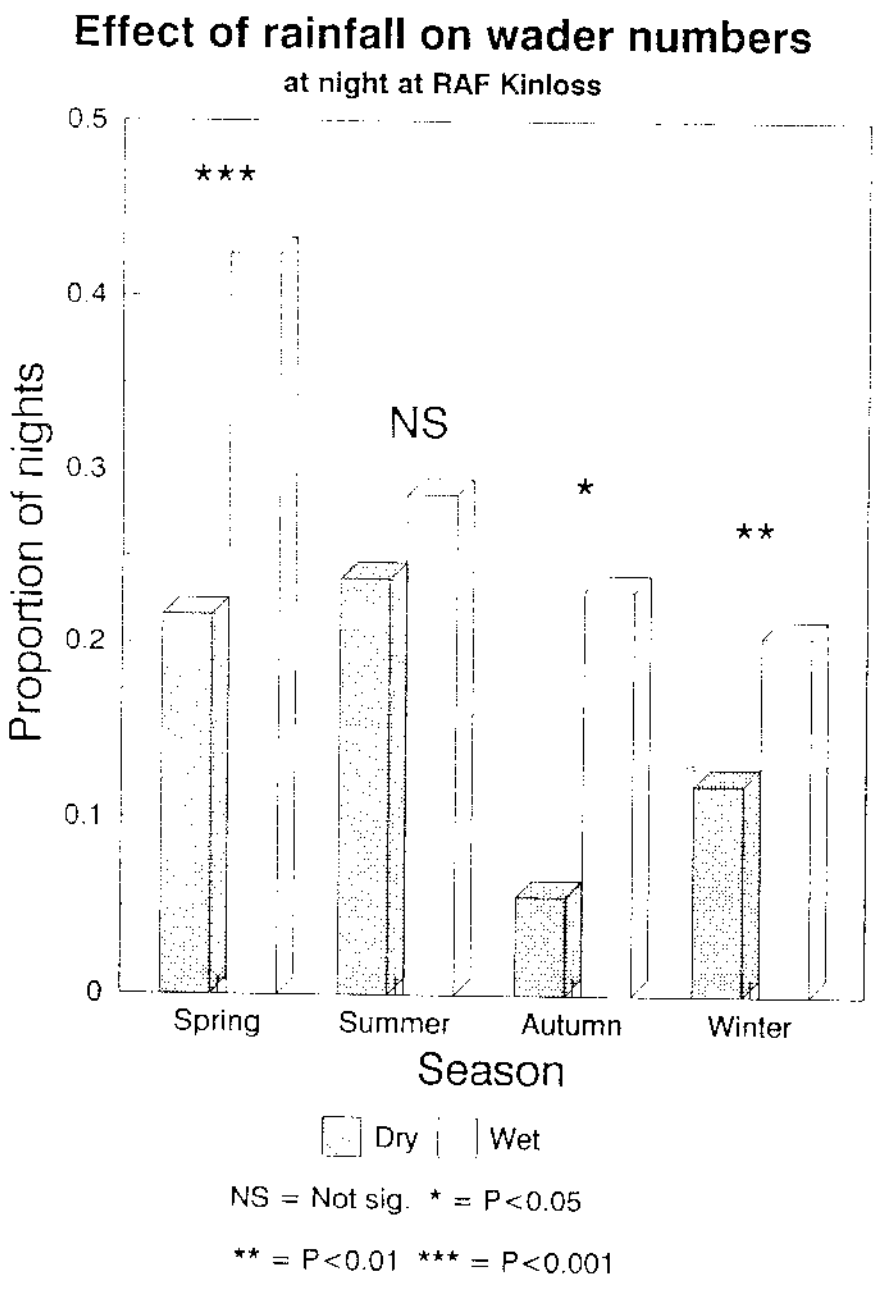
Effect of rainfall on gull numbers

at night at RAF Lossiemouth



NS = Not sig. * = P<0.05 ** = P<0.01

Figure 5


Effect of rainfall on wader numbers
at night at RAF Kinloss
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NS = Not sig. * = P<0.05
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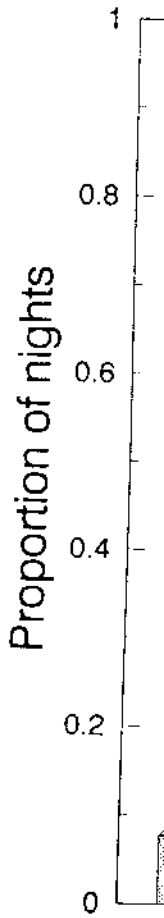
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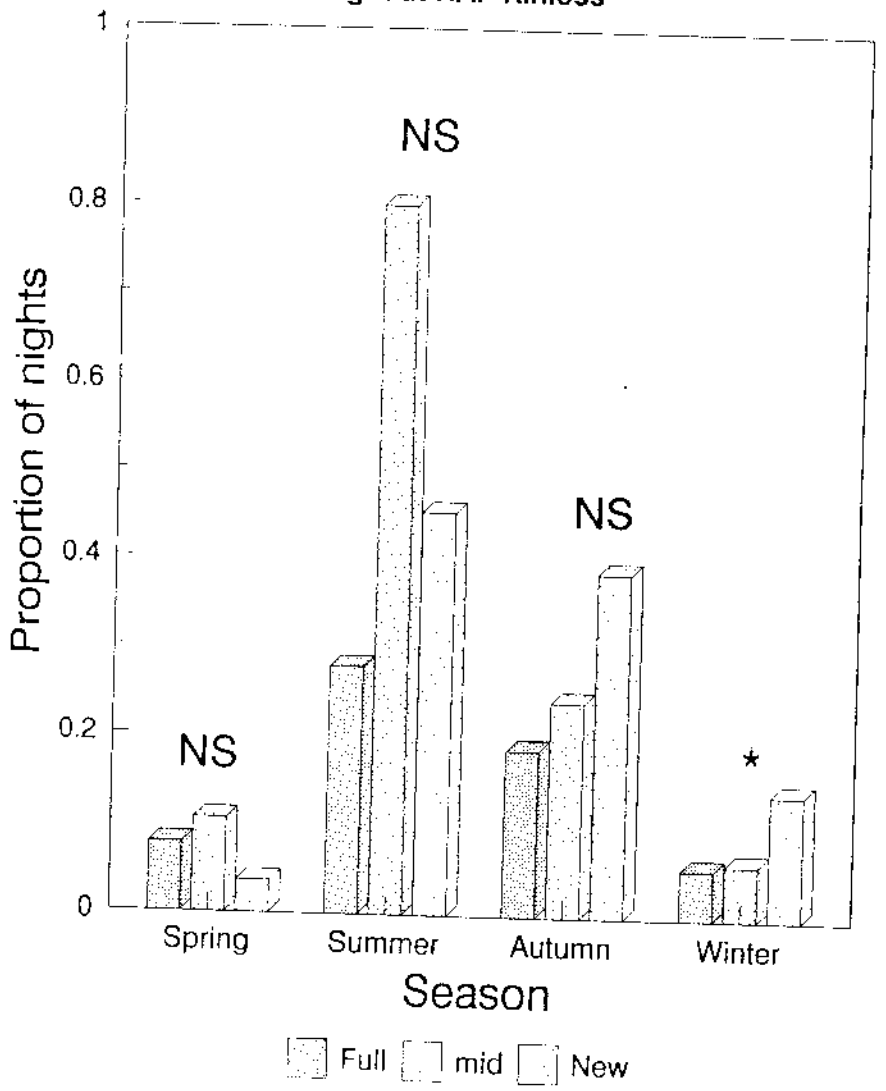
Figure 6

Effect of moonphase on gull numbers

at night at RAF Kinloss



NS = Not sig. * = P<0.05

Figure 7

Effect of moonphase on wader numbers

at night at RAF Kinloss

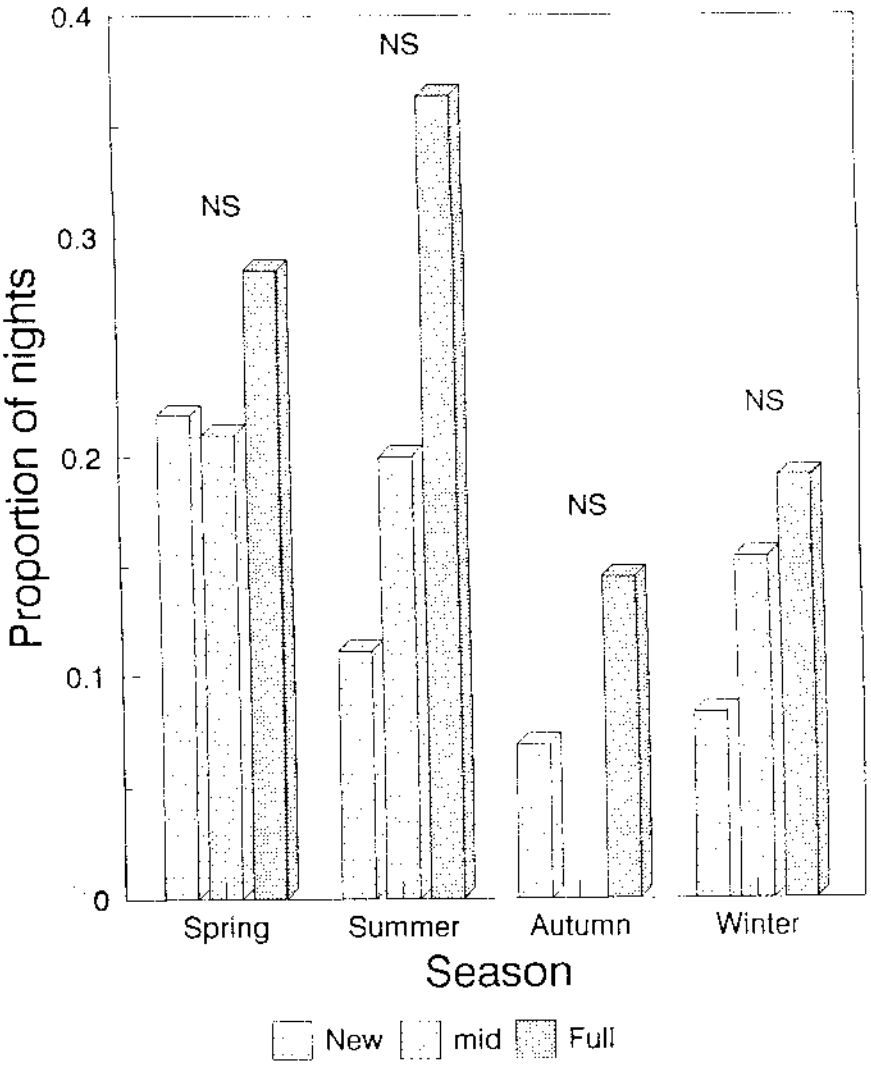


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Figure 8

Effect of tide on gull numbers at night at RAF Kinloss

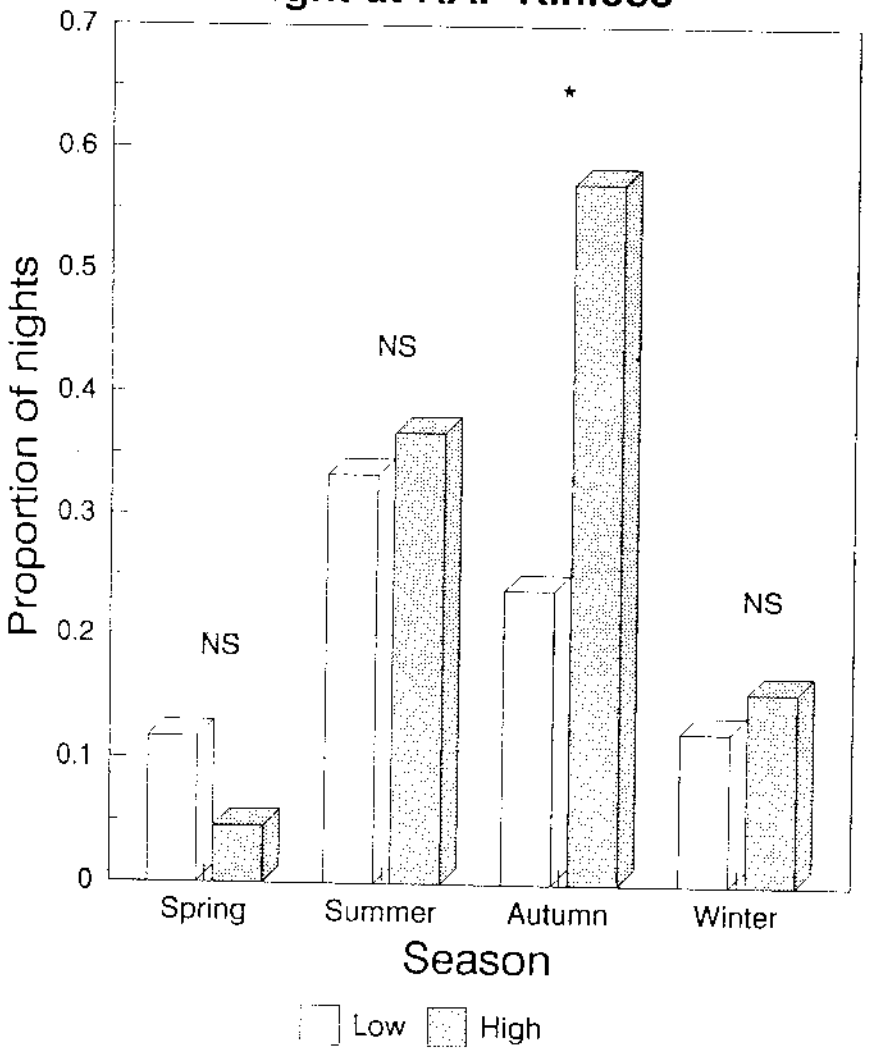

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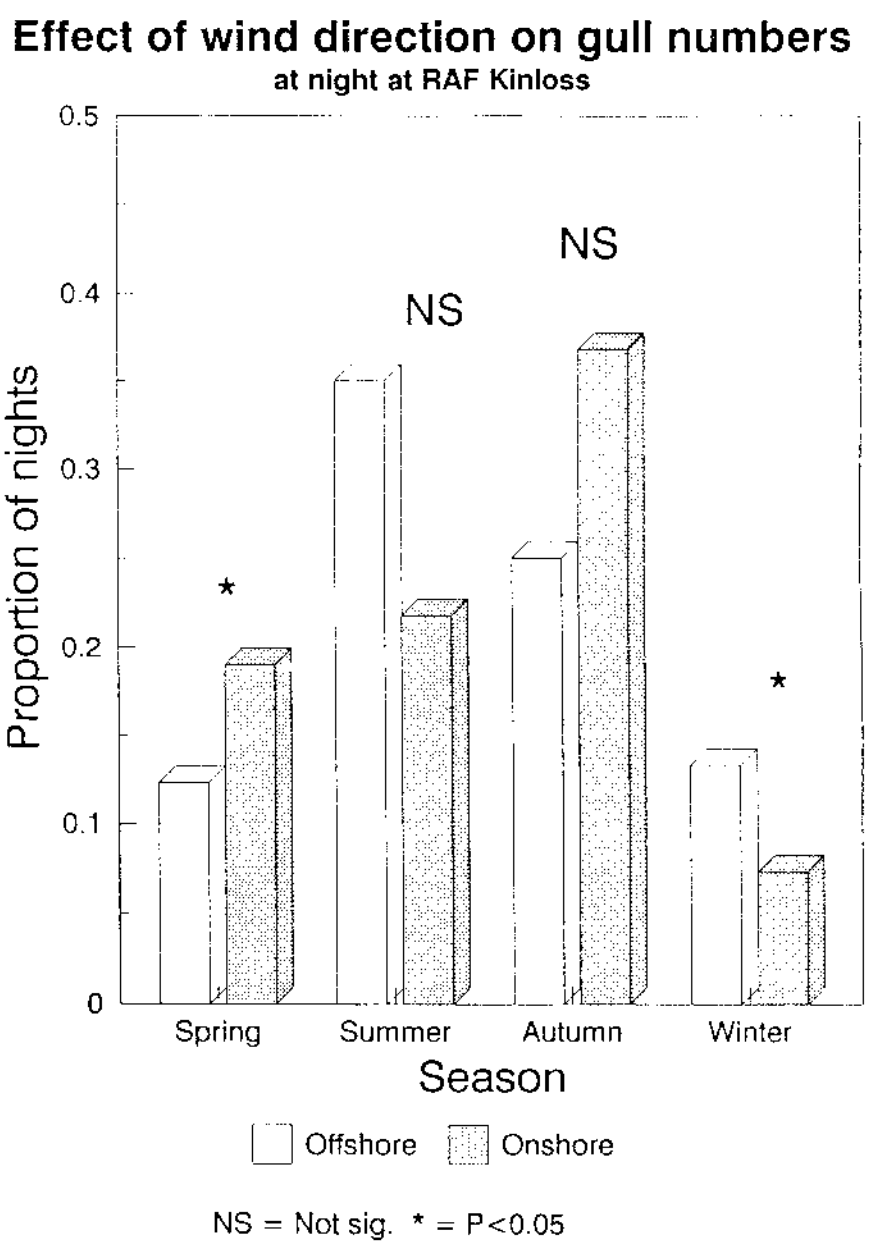
Figure 9



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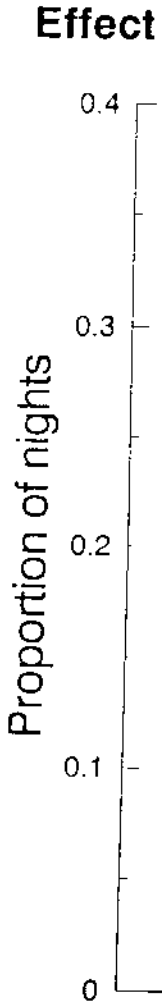
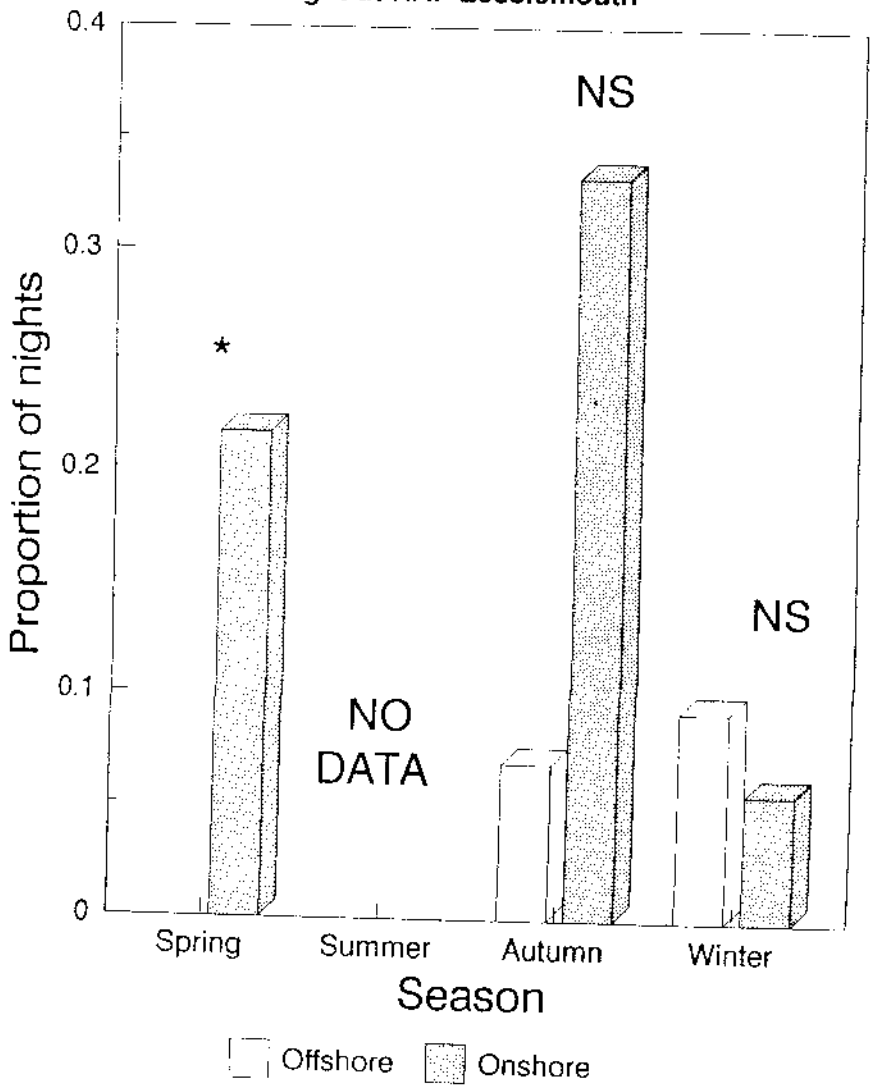


Figure 10

Effect of wind direction on gull numbers

at night at RAF Lossiemouth

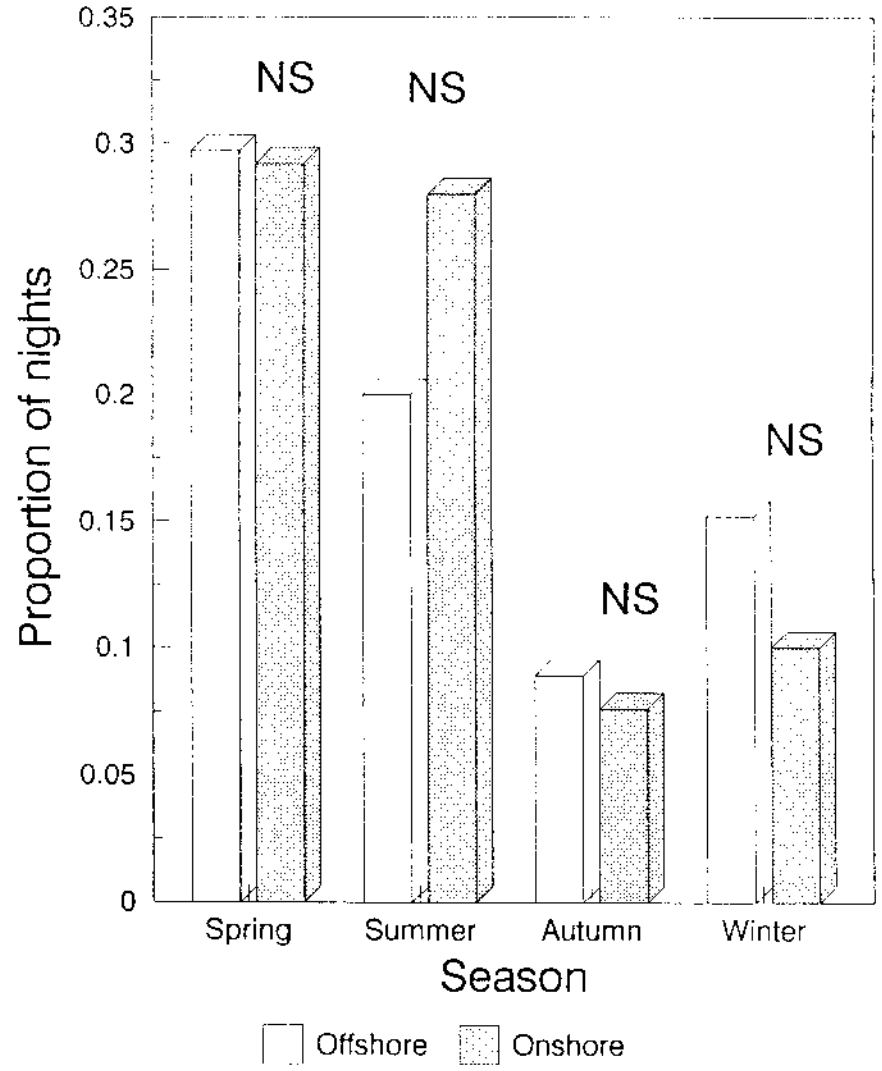


NS = Not sig. * = P<0.05

Figure 11

Effect of wind direction on wader numbers

at night at RAF Kinloss



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