Autumn Migration of the Honey Buzzard through Malta in Relation to Weather

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The general features of raptor migration through Malta were elucidated by Beaman and Galea (1974) as a result of a five year study. A similar study was undertaken in the autumns of 1974 - 1978, the results of which are here compared with those of Beaman and Galea. The interpretations of raptor migration through the Maltese islands offered by DeLucca (1969) and Beaman and Galea (1974) are examined with reference to Honey Buzzard *Pernis apivorus* and a reinterpretation of Honey Buzzard migration through the islands is offered.

METHODS

Most of the observations employed in this study were made at Buskett from the principal watch point used by Beaman and Galea (1974). On several occasions observations were carried out by the author elsewhere in the islands while E. Curmi generously substituted me at Buskett.

Details of the observation methods were published elsewhere (Thake 1977, 1980). Data recorded in the field included flock size, height and direction of flight, time of sighting as well as details of behaviour. Meteorological data were recorded at hourly intervals during the watch. Further meteorological data were taken from the records of RAF Qrendi and Luqa records published in 'The Times', while regional weather maps were supplied by the Deutscher Wetterdienst.

Observations were most extensive in 1976 when watches were maintained on most days from the second week of August to the third week of November. Watches in August and September lasted from 1000 to 1800 CET. About half of the remaining watches began at 1500 and ended at 1700 to 1800 CET. Observations in other years were less extensive, covering most of the period from late August to early October.

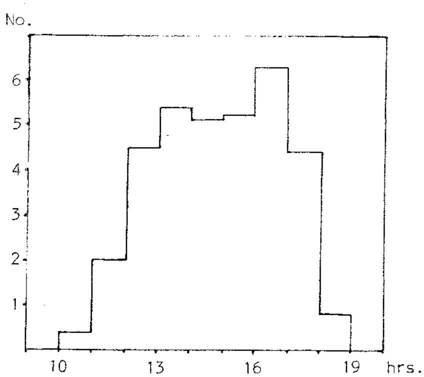

Fig.1. Variation of Honey Buzzard sightings with time of day. Sightings over the period 15-30/9 in 1976-78 were grouped in hourly intervals and the mean calculated over the watches during which that hourly interval was covered. The ordinates thus represent the mean number of Honey Buzzards sighted per hour during the interval in question.

RESULTS

Time of day

There was considerable day to day variation in the time of day when sightings were made. The average distribution of sightings is illustrated in Figure 1.

This histogram differs from that reported by Beaman and Galea (1964). Their afternoon observations started somewhat later than those in the present study and it seems likely that these observers missed many early birds.

A few wounded individuals were sighted repeatedly throughout the day. On a few rare occasuons a flock was sighted again an hour or more later. Such double sightings were more frequent and made counting difficult after 1600 hrs. Birds tended to linger in the vicinity of Buskett for increasingly long periods as the afternoon progressed. The earliest sightings were made on days when the gradient wind was a light north easterly. This effect was not very marked however.

Direction of flight

Scatter diagrams of headings of flocks (one or more) of Honey Buzzards, grouped in hourly intervals, are illustrated in Figure 2. The headings exhibit

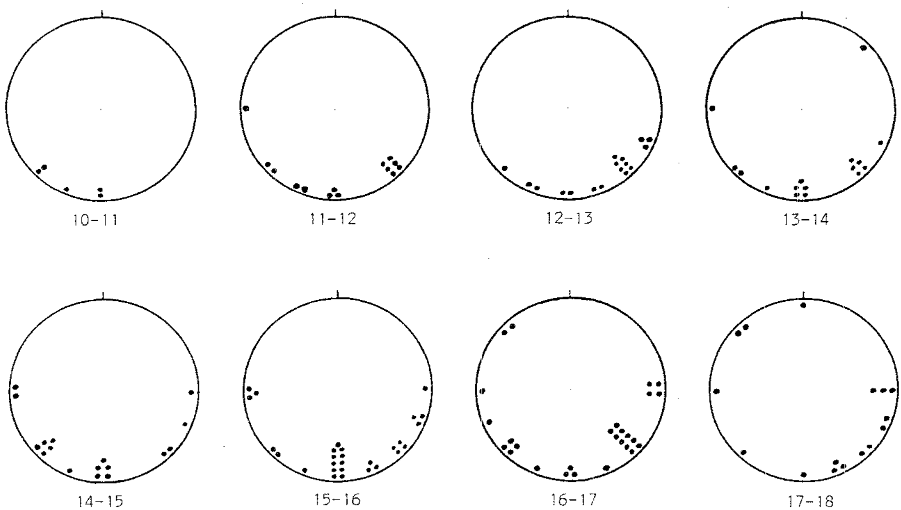

Fig.2. Variation of the dispersion of headings of Honey Buzzards with time of day. The headings of birds which passed within 100m were estimated ($\pm 10^{0}$) by reference to known compass points. All estimates were made by the author. Sightings were grouped in hourly intervals and separate scatter diagrams plotted. The direction of geographical north is marked above each diagram.

clear directionality until approximately 1700 hrs, after which time the direction of flight does not appear to be related to the direction of migration. The obvious interpretation is that Honey Buzzards become reluctant to continue migrating and start looking for a suitable roost. Most birds seen after 1700 hrs seemed to be attempting to roost (Beaman and Galea 1974, pers. obs.). Certain weather conditions may induce birds to attempt to roost earlier than usual (Thake 1977).

Wind

Previous studies of Honey Buzzard migration through Malta have concentrated on the effects of wind. DeLucca (1969) stated that most diurnal migrants are sighted in westerlies, an assertion with which Sultana et al. (1975) appear to agree. Galea (1969) noted most Honey Buzzards in south westerly winds. Beaman and Galea (1974) reported an association between larger raptor passages in autumn and southerly winds. Thake (1978) found a significant positive correlation between strength of the southerly component of wind strength and the number of Honey Buzzards sighted. However most larger passages have been reported in light winds, when sea breezes dominate the islands. A short description of sea breezes at Buskett is given below. The account is drawn largely from Lamb (1955), amplified by personal observations and examination of weather maps.

Sea breezes dominate the circulation on about one third of the days in September. On a few other days a trough may develop over a small part of the island or may be present for only a short time. Full sea breeze development does not usually occur with gradient windspeeds exceeding 10 knots. Troughs in the airflow form when the gradient wind is too strong for a thermal low to develop. Sea breezes generally start at approximately 0800 hrs and cease at around 1700 to 1800 hrs in September (Lamb 1955). Sea breezes at Buskett are probably modified slightly by anabatic breezes. Most sea breezes at Buskett are observed to blow between west south west and south south east, and are weaker than those on Dingli cliffs. Typically maximum strength is reached about 1200 - 1400 CET, and is usually below 10 knots. Wind direction varies most during the day when the gradient wind is north easterly. Under such conditions the thermal low and convergence line lie close to Buskett, and small movements of either can result in marked changes of wind direction and speed. Such conditions also result in the greatest amount of convective activity over Buskett. This occurs less frequently when the gradient wind is south easterly. At such times the centre of the thermal low generally lies further north, giving breezes between south south west and south east which can attain strengths of up to 15 knots when gradient wind and sea breeze partially reinforce one another. Gradient winds from the north westerly and south westerly quadrants result in sea breezes whose direction varies little during the day at Buskett. The centre of cyclonic circulation or trough line can usually be located by the associated stationary patch of cumulus cloud.

Sea breeze systems are limited in both vertical and horizontal extent, and cannot be invoked as evidence of any proposed vertical movements of birds into and out of visible range. Beaman and Galea (1974) proposed that large passages of raptors occur when southerly winds force high flying birds to fly at lower levels where they can be seen. This hypothesis can be tested quite readily by examining the correlation between numbers sighted at Buskett and the strength of the southerly component of the upper winds. According to the hypothesis, there should be a significant positive correlation with the strength of the southerly component of the upper winds. Data obtained between 30/8 and 10/10/76 were examined in conjunction with Qrendi radiosonde data on wind direction and speed at 850 mb (approximately 1500 m) at 1800 CET. The number of Honey Buzzards sighted was not significantly correlated with the strength of the southerly component of the winds at this level ($r = -.1613$; $P > .1$). No significant correlations were found with winds at 3000 m and 5500 m. These results do not support the hypothesis and Beaman and Galea do not report any such correlations in support of their hypothesis.

Honey Buzzard sightings were not significantly correlated with the westerly component of the surface wind at 1200 and 1800 CET (Qrendi meteorological data). This result contradicts DeLucca's (1969) assertion that most raptors occur in westerlies.

The tendency for most migration to occur when wind strength in the early morning is low, was shown statistically by Thake (1977). This was interpreted as being due to most Honey Buzzards deciding to migrate only if wind strength in the early morning is low.

Other weather variables

Honey Buzzard daily totals (15 - 30 September 1976 and 1978) were not significantly correlated with visibility. If high totals of Honey Buzzard were due to convergence on the islands over a wide area, the number sighted ought to be significantly correlated with visibility. This negative result suggests that large scale convergence on the Maltese islands is not responsible for the high totals. The possibility of convergence on a small scale and concentration within the islands is not affected by this negative result.

Overcast conditions are known to cause falls in a wide variety of bird species, especially if accompanied by rain (Richardson 1978). In the present study only one large passage was recorded under a totally overcast sky (26/9/77). While this particular observation might be attributable to a fall situation, this is not the case with the other large passages recorded. Honey Buzzard sightings were not significantly correlated with average cloud cover. Numbers were not significantly correlated with the amount of convection cloud. This suggests that the observed variation of numbers is not due to variation of the availability of thermals.

Rain seemed to induce Honey Buzzards to fly lower and attempt to roost. Data were however too few to test statistically.

DISCUSSION

DeLucca's assertion (1969) that most raptors are sighted in westerlies is not supported by the results of Beaman and Galea (1974) and those presented here. The fact that most sightings occur in light winds also contradicts this hypothesis. There appear to be no grounds for believing that most Honey Buzzards appear in these islands when drifted eastwards by westerly winds.

Beaman and Galea (1974) hypothesised that contrary winds induce large totals by forcing birds to fly at lower levels where they can be seen. This is contradicted by the available evidence. Thus Honey Buzzard sightings are not correlated with the southerly component of the upper winds, despite a significant positive correlation with the southerly component at low level. It is difficult to see how birds might be induced to fly lower by contrary winds below them. The observed variation of sightings throughout a watch differed markedly from that reported by Beaman and Galea (1974) but was quite similar to that described earlier by one of the above authors (Galea 1969). The author's data (Figure 1), showing many sightings when thermals are at peak development, does not support the interpretation that most birds are seen when thermals start to weaken in the late afternoon. Birds sighted in the early afternoon were flying higher but were nevertheless readily visible to the unaided eye when overhead. The conclusions of another study (Evans and

Lathbury 1973), which attributed variation of numbers to movements into and out of visible range, have since been disputed (Finlayson et al 1976).

It might be argued that convergence on the islands occurs in contrary winds, resulting in the observed correlation with southerly winds at low level. As has been explained, the southerly winds under which most Honey Buzzards are sighted are mostly sea breezes which do not extend far enough out to sea to result in large scale convergence on the islands. The absence of a significant positive correlation with visibility also suggests that convergence on the islands is unimportant.

Honey Buzzard migration across the Sicilian channel occurs almost exclusively when wind strengths are low. Though other studies (eg Alerstam 1978) have shown a negative correlation with wind strength, much migration has been observed elsewhere in strong tail winds (Porter and Willis 1968, Alerstam 1978). The situations may not be comparable. Most migration in strong tail winds has been observed at narrow crossings where the opposite shore was clearly visible. This is not the case in Malta where visibility is such that the Maltese islands are not usually visible from the south Sicilian coast. The criteria employed by Honey Buzzards deciding to undertake a long sea crossing may well be different from those operating at narrow crossings. Wind determined drift becomes more important and difficult to correct for. In particular the length of the crossing makes some form of persistence forecast necessary (Thake 1977). By opting to migrate under anticyclonic conditions, Honey Buzzards minimise the risk of being caught at sea in bad weather.

The observed correlation of Honey Buzzard numbers with strength of the southerly component of surface wind at 1200 hrs (Thake 1978) can be explained by the following hypothesis. It should be noted that Hobbys *Falco subbuteo* also migrate under anticyclonic conditions yet their numbers are not correlated with contrary winds (Thake 1978). The fact that Honey Buzzards on autumn migration are commoner on the higher ground of west Malta was noted by Beaman and Galea (1974), who pointed out that Buskett totals are much higher than those reported elsewhere. Sultana et al (1975) suggest that this is due to convergence on Buskett, without explaining precisely how or why this occurs. The suggestion that they do so for roosting purposes can only apply to sightings made late in the afternoon. The generally south to south eastward trend of the coastline of west Malta should allow it to act as a leading line, with a proportion of birds prefering to follow the coast rather than commence migration over the sea immediately. The fraction following the trend of the coastline is likely to depend on a number of variables including local weather, time of day, and strength and direction of the observed wind. It is conceivable that a greater proportion will prefer to follow the coast in southerly winds, even if these are in fact only sea breezes. This should result in a greater concentration of birds at the south western end of Malta where Buskett lies. This interpretation explains how an essentially local weather factor like a sea breeze might affect daily totals.

A few published results might be reinterpreted in the light of the present hypothesis. Thus the tendency for totals (and flock size) to be slightly higher when there are scattered thunderstorms (Thake 1976) could be due to a greater reluctance to cross the sea after witnessing a thunderstorm. The skewness of the seasonal histograms might similarly be due to the increasing magnitude of the leading line effect.

More work is required on the effects of gradient wind on the totals observed. There is every reason to expect birds to arrive earlier in northerlies, but at the low wind speeds at which the birds migrate the effect may not be very marked.

Acknowledements

I am grateful to E. Curmi for supplementing my observations on a number of occasions. Thanks are also due to Messrs. Wright and Pace for permission to examine meteorological records.

Summary

Honey Buzzard sightings at Buskett, Malta, in autumn were not significantly correlated with the strength of the southerly component of wind speed at various upper levels. This contradicts the hypothesis that large passages are due to contrary winds at upper levels inducing birds to fly lower, within visible range. The observed absence of correlation between large passages and westerly winds contradicts the hypothesis that large passages occur when birds are drifted eastwards by westerly winds. Most migration occurs during anticyclonic weather. Correlations with wind direction at low level are attributed in part to prevalence of sea breezes under anticyclonic conditions. The higher totals at Buskett are ascribed to a leading line effect of the west coast acting throughout the day, with birds converging on Buskett for roosting purposes in the late afternoon. Presumably, the

leading line effect increases in importance with increasing strength of the southerly (contrary) component of the surface wind, thereby accounting for the observed correlation for the observed correlation with southerlies at low level.

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~~Sparrows on Crete~~

~~D. SUMMERS-SMITH~~

~~The Sparrows on Crete are generally considered to belong to the sub-species *italiae* of *Passer domesticus*, though there is some variability in the plumage of the males. Meise (1934, 1936) on the basis of 7 museum specimens considered that the birds were indistinguishable from *P.d.italiae*, the birds scoring 40, 45, 50(4) and 60, mean 49, in his index (0 = *domesticus*, 50 = *italiae*, 100 = *hispaniolensis*). Johnston (1969) examined 74 museum specimens (48 taken in 1925, 16 in 1942 and 10 in 1960) and found variations in his hybrid index from 3 to 12 (0 = *domesticus*, 17 = *hispaniolensis*), viz. 18 to 71%, with a mean value of 7.3 (43%).~~

~~During a visit to Crete from 8th to 22nd October 1980 particular attention was paid to the Sparrows. Almost all the birds seen were close to *italiae* or showed some *domesticus* characters, viz. grey flecking of the crown to almost completely grey crown, with the exception of one bird associating with *italiae*-type birds at Limin Hersonissos on 11th October, which was close to an autumn-plumaged *hispaniolensis* with chestnut crown and extensive flank streaking.~~

~~In addition to these birds, however, a flock of ca. 100 *P.hispaniolensis* was seen in cultivated land at Cape Hersonissos from 13th to 31st October. The males in this flock had~~