

POPULATION DYNAMICS OF THE HOUSE SPARROW: AN APPROACH

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With 3 figures and 1 table

ABSTRACT. The main objective of this work is to investigate movements of a population of the House Sparrow in the Azores archipelago (36° 55' 43" to 39° 43' 23" N, 24° 46' 15" to 31° 16' 24" W) throughout the year. As this species was introduced to the Azores from the Portuguese mainland in 1960 and as it causes damage to crops it is particularly timely to study aspects of its population dynamics.

1242 adults and 514 juveniles were collected in one site (Laranjeiras - São Miguel - Azores) during 24 months (May 1991 - April 1993). All the individuals were ringed with one metal ring and three colour rings and liberated on the site of capture. The nets were set daily during the first year and three times a week during the second year and were distributed regularly in an area of 0.5 Km² in 76 different positions. This and a larger area around it (2 km²) were checked with binoculars (10 x 50) for ringed birds on the same days of capture. The main results are: 1 - Home ranges of all individuals have a mean radius of 56 m (27.5 m to 135 m). Although adults move less than juveniles there were no statistical significant differences between their movements. So all the individuals show site tenacity; 2 - The number of recaptures obtained during this study (27.9%) is higher than the number of recaptures obtained by WILL (1970) during a similar study (4.75%). This may suggest a higher level of residence of the House Sparrow in the Azores islands. The relevance of this result to the pest status and control of the House Sparrow will be discussed.

INTRODUCTION

The House Sparrow *Passer domesticus* (LINNAEUS, 1758) is a sedentary species - home ranges usually have a radius of less than 200 m (HEIJ and MOELIKER, 1990). House Sparrows are actually well suited to research movements and dispersal as they are conspicuous. It is particularly timely to study this species in the Azores as it has only bred there since 1960 but has become a pest causing widespread economic damage and as it could show a tendency

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to further change its behaviour in an insular environment. There have also been no studies of its population dynamics on oceanic islands. The main aim of this study is to investigate movements of a population of the House Sparrow in the Azores throughout the year.

MATERIAL AND METHODS

1242 adults and 514 juveniles were collected using mist nets at Laranjeiras during two years (from the beginning of May 1991 to the end of April 1993). All the individuals were ringed with one metal ring and three colour rings and liberated at the site of capture.

The nets were set (daily during the first year and three times a week during the second year) and were distributed regularly in an area of 0.5 Km² in 76 different positions. A larger area around it (2 Km²) was checked with binoculars (10x50) for ringed birds. This larger area was visited on the same days the birds were caught in order to record the exact position of each sighting on a map.

As the sexes of immature House Sparrows prior to post-juvinal molt is difficult to determine I used the results obtained by JOHNSTON (1967) and the method developed by NORTH (1968) to sex the juveniles. So birds with a white postocular spot, slightly darkened throats and with orange-brown feathers on the sides of their heads were said to be males. Birds with light throat color buff or brown postocular spot and no orange-brown head color were called females. The accuracy of this sexing technique was evaluated according to recoveries of previously sexed birds after their post-juvinal molt. Only 2 of the 69 recoveries had been incorrectly sexed. These were males mistaken for females. So this sexing method was considered reliable in 97.1% of the cases.

Both the home range of the birds and the centre of activity were calculated with the convex polygon method (SOUTWOOD, 1966; BAKER and MEWALT, 1979; DIXON and CHAPMAN, 1980; FORD and MYERS, 1981; WAUTERS and DHONDT, 1992) with a computer package developed by Allan Fielding of the Manchester Metropolitan University.

Mean distances between successive captures and mean distances between each capture and the centre of activity were calculated and compared between sexes and ages.

RESULTS

Table 1 and figure 1 show the mean distances between successive captures for adult males (29.6 m), for adult females (41.2 m), for juvenile males (36.8 m) and for juvenile females (45.9 m). It appears that females move more than males. As the confidence limits are higher for juveniles than for adults it seems that there is a tendency for the juveniles to disperse more than adults, as expected. Anyway if we compare the four groups of individuals there are no statistical differences in the mean distance between successive captures (ANOVA - $F=9.57$; $p>0.05$). There are also no statistical differences between movements

during the breeding season and during the winter. Figure 2 shows the mean distance between each capture and the centre of activity. Again the confidence limits of the juveniles are much higher than the confidence limits of adults and adults move less than juveniles. If we compare the four groups of individuals there are no statistical differences in the mean distance between each capture and the centre of activity (Kruskal-Wallis - $H=1.15$; $p>0.05$). There are also no statistical differences between movements during the breeding season and during the winter.

WILL (1970) caught 1785 House Sparrows using mist nets in the United States during two years of field work. Although most of the birds were banded near the end of the breeding season and during the fall the total number of birds caught was very similar to the present study. In figure 3 a comparison is made between the number of captures and recaptures of the House Sparrow obtained by WILL (1970) and during this study. From those individuals banded by WILL (1970) only 4.75% were recaptured. During this study from the 1756 individuals captured 490 were recaptured (27.9 %) suggesting once more that this population show site tenacity.

DISCUSSION

Individuals were sedentary (table 1, figure 1 and figure 2). They only moved a mean of some tens of meters from the ringing places and used the same site all year round. The maximum distance they travelled was 582 m and that is very close to the maximum distance found by HEIJ and MOELIKER (1990) for a population of the same species in Holland. According to these authors 61.3% of the colour - ringed House Sparrows moved no more than 100 m away from the place they were ringed, 32.1% moved from 100m to 300m and 6.6% moved from 300m to 600m. During this study the distances obtained were very similar, 61.7%, 31.9% and 6.4% respectively.

There were no statistical differences in the distances travelled by the birds between males, females and juveniles and in the two seasons. These suggest: 1 - site tenacity by the majority of birds in the study area throughout the year; 2 - that the different groups of individuals didn't need to travel very far to find food. Figure 3 also suggests a high level of residence of the majority of the House Sparrows in the study area. This may result from the size of the islands, from the availability of food during all the year, from the low competitive pressure with other species and from the presence of few potential predators (two). The fact that the birds live in an insular environment with small annual temperatures changes which reduces metabolic stress, may play an important role. These results could be useful in a preliminary study to evaluate the efficiency of a control strategy.

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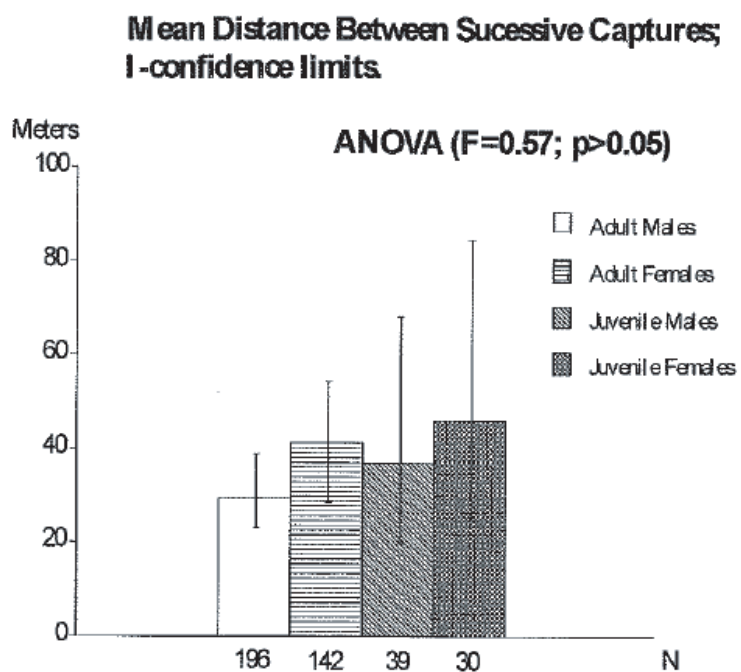


Fig. 1 - Mean distances (meters) between successive captures of *P. domesticus* at Laranjeiras (Azores Islands) During Two Years (1991-1993).

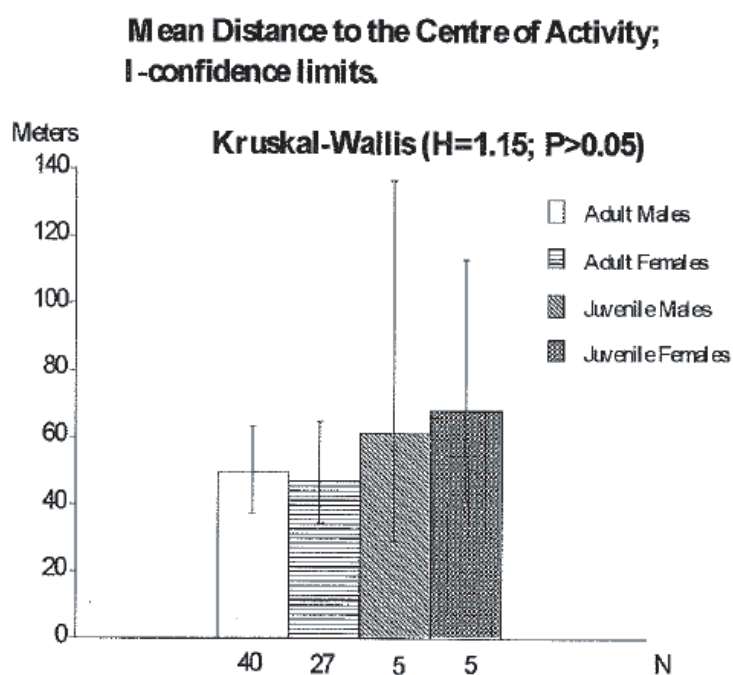
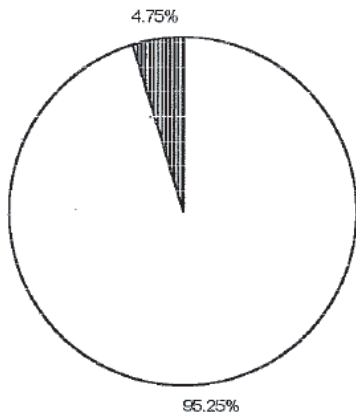


Fig. 2 - Mean distances (meters) between each capture and the center of activity of *P. domesticus* at Laranjeiras (Azores Islands) During Two Years (1991-1993).

TABLE 1 - Movements of *P. domesticus* at Laranjeiras (Azores Islands) during two years (1991/1993) - mean distances (meters).

Sex and age	Season	N	Distance between successive captures	N	Distance to the center of activity
Adult Males	all year	196	Mean/Confidence Limits 29.6/ 22.3 to 39.0	40	Mean/Confidence Limits 49.4/ 38.2 to 63.8
Adult Females	all year	142	41.2/ 29.9 to 56.6	27	46.8/ 33.5 to 65.5
Juvenile Males	all year	39	36.8/ 20.1 to 66.8	5	61.0/ 27.5 to 135.1
Juvenile Females	all year	30	45.9/ 24.8 to 84.3	5	67.7/ 41.0 to 111.5

**Captures-1 and Recaptures-2 From Will, 1970
(Two Years of Field Work)**



Captures-1 and Recaptures-2 From This Study (Two Years of Field Work)

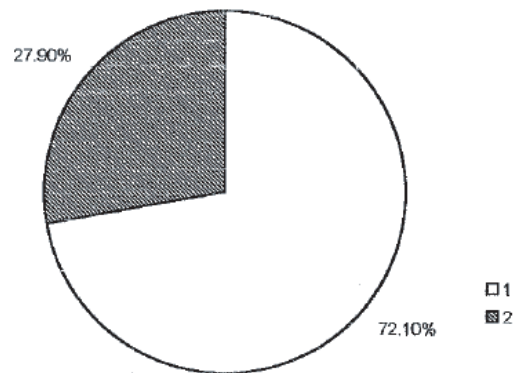


Fig. 3 - Comparison of the number of captures and recaptures of *P. domesticus* obtained by WILL (1970) and during this study.

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