Sex-ratios of Swedish Mallard during the non-breeding season

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Introduction

Sex-ratios among waterfowl, especially in the Mallard *Anas platyrhynchos* have been much studied (Bellrose *et al.* 1961; Bezzel 1970; Nilsson 1970). In some species of diving ducks Nilsson (1970) found marked local and seasonal variation in sex-ratios in south Sweden, whereas according to published information the situation was less clear in the Mallard (Engström 1961; Gyllin and Larsson 1967; Hansson 1966; Nilsson 1965, 1967, 1972).

Study areas

Observations were made in three special study areas in south-west Scania (Figure 1). These areas and their waterfowl fauna have been described in detail by Nilsson (1975a). Öresund and the south coast are shallow coastal areas, the Öresund area in particular being good for dabbling ducks with vast extents of very shallow water. The third area comprises a series of eutrophic lakes in south Scania. Moreover data were obtained from the international waterfowl counts in Sweden, from many different types of habitats including urban waters, exposed and sheltered coast, rivers and various types of lakes.

Methods

In the special study areas sex-ratio data were collected during standardized counting and mapping tours made from September to April. As the main aim was to study diving duck ecology, Mallard sex-ratios were not obtained on all occasions, but when counts were made they covered the whole of the study areas. Observations were made by 40 × 60 telescope from fixed observation points.

The data from the waterfowl counts were obtained as a part of the ordinary counting programme. Observers were asked to make complete sex-ratio counts as often as possible. As this type of data is heterogenous and the sample sizes vary no suitable statistical method to handle the data was found, so they have simply been added together according to month, region and main habitat type after inspection for marked inconsistencies. The waterfowl count data used include the international November and January counts, 1967 to 1974, and monthly counts 1961–1962 to 1973–1974. In all, the sex of more than 500,000 Mallard was recorded.

Results

Seasonal variation

In Scania, in all years, September and October yielded a significantly higher percentage of males than November to April (Table 1). The difference was most marked in the Öresund study area.

In areas north of Scania, coastal waters showed the same type of seasonal pattern, whereas no such tendency was found for urban waters (Table 2). Similar changes to those at the coasts might occur in some urban localities (Gyllin and Larsson 1967; Hansson 1966). In lakes north of Scania a slight increase in the percentage of males was found between October/November and December, when the lakes were freezing. Local studies (Nilsson 1965, 1972) indicate that the percentage of males might be slightly higher in the first migratory flocks than in later arrivals.

Table 1. Percentages of males among Mallard in three study areas in south-west Scania (Figure 1) in 1965–1966 to 1972–1973. Mean values (± standard error). Number of counts given in brackets.

Month	Lakes	Öresund	South coast
September		70·3 ± 0·9(3)	
October	62·6 ± 1·0(24)	70·3 ± 1·0(16)	65·5 ± 1·5(6)
November	57·5 ± 1·1(15)	64·0 ± 1·1(17)	60·4 ± 1·9(8)
December	57·3 ± 1·7(9)	60·8 ± 1·0(12)	59·5 ± 1·3(8)
January		61·3 ± 1·4(15)	60·7 ± 1·5(7)
February		61·0 ± 1·2(12)	59·4 ± 1·1(10)
March	56·4 ± 1·3(12)	58·8 ± 1·0(12)	58·1 ± 1·5(8)
April		59·9 ± 1·1(14)	58·0 ± 2·8(3)

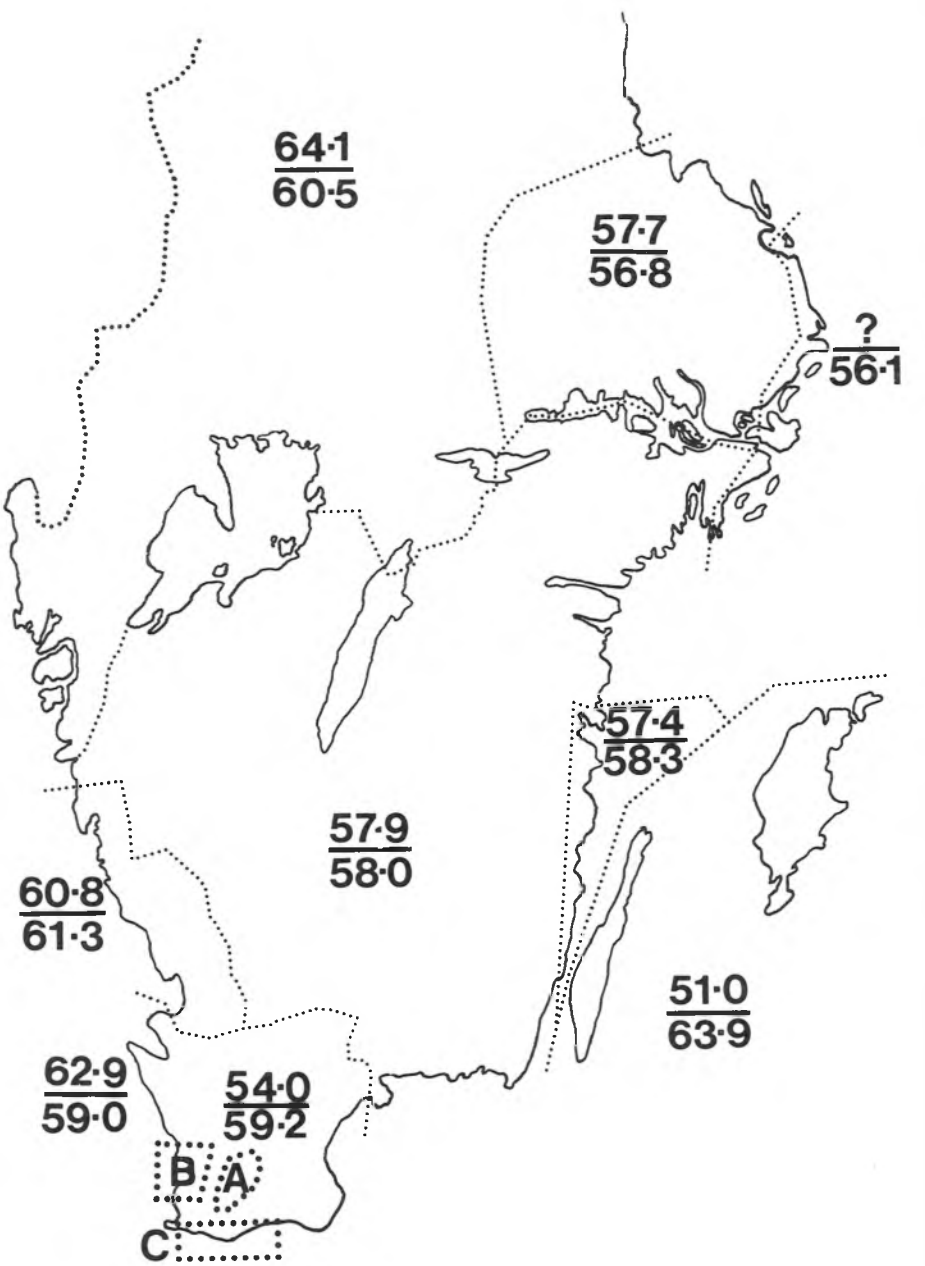

Figure 1. Percentages of males among Mallard in south Sweden in November (upper value) **and January** (lower value). Total numbers counted in November were 48,911 and in January 132,399. The special study areas in Scania (southernmost province of Sweden) are also shown on the map. A = inland area, B = Öresund, C = south coast.

Habitat variation

The autumn counts in the special study areas yielded higher percentages of males in the coastal areas than inland (Table 1). On the other hand no significant differences were found between different parts of the study areas.

For the areas north of Scania natural lakes yielded a lower percentage of males than coastal localities and urban waters (Table 2). No significant differences were found between coastal and urban localities in this region.

Regional variation

In November the north-westernmost inland area showed a higher percentage of males than the rest of the country (Figure 1). Similarly areas north of Scania had a higher percentage of males than inland areas in Scania. Coastal areas yielded a higher percentage of males than inland areas except for the protected areas in the archipelagoes.

In January, most differences had levelled out. The north-west region still had the highest percentage of males among inland areas but the difference was smaller than in November. At the coasts, Scania and the sheltered areas in the archipelagoes showed the same sex-ratios as inland areas, whereas exposed localities in Halland and Öland-Gotland had a higher percentage of males. Counts from March (Nilsson 1967) showed no regional differences within Sweden.

Discussion

The seasonal changes in sex-ratio found here are similar to those reported from other studies (Bezzel 1970; Eygenraam 1957; Hansson 1966; Urbanek 1962). The later moulting of the females causes a preponderance of males in the resting areas during early autumn followed by a levelling out when the females have completed the moult. In the Netherlands the sex-ratio approached equality later in the season (Eygenraam 1957), whereas Bavaria was more similar to Sweden (Bezzel 1970).

Comparing midwinter sex-ratios for the Mallard in different parts of Europe (Table 3), sex-ratios in north-western Germany and the Netherlands are near equality, whereas there is a preponderance of males in Fennoscandia and continental parts of Europe. However, local studies (Gyllin and Larsson 1967) in areas where the Mallards were fed revealed a more equal sex-ratio in winter (see also Haukioja and Soikelli 1970).

Comparable data for other dabbling ducks in Sweden are almost lacking. Spring counts

Table 2. Percentages of males among Mallard counted during the monthly waterfowl counts in Sweden. Numbers counted shown in brackets.

Month	Scania		North of Scania		
	Coast	Lakes	Coast	Lakes	Urban waters
October	63·0 (14837)	61·1 (6374)	61·1 (2190)	53·3 (3106)	58·2 (16066)
November	63·3 (15492)	57·8 (8691)	56·0 (2337)	52·2 (3753)	57·7 (16349)
December	58·1 (13547)	55·2 (6732)	55·3 (2759)	57·7 (2492)	56·2 (23192)
January	58·6 (11398)	57·9 (1738)	59·0 (19121)	53·5 (1665)	58·0 (24065)
February	58·2 (12079)	51·2 (944)	58·6 (3680)	56·5 (2710)	55·4 (32448)
March	56·1 (10377)	55·9 (3744)	58·9 (1422)	54·4 (3539)	56·1 (25295)
April	52·8 (3252)	58·5 (905)	58·5 (1617)	54·1 (6556)	57·4 (5565)

Table 3. Percentages of males among Mallard in winter (Dec.-Feb.) in different parts of Europe.

Helsinki, Finland	52·3–56·5	Raitasuo 1964
Turku, Finland	56·7–73·3	Hukioja and Soikkeli 1970
Schleswig-Holstein	51·0	G. A. J. Schmitt, *in litt.*
Netherlands	51·4–51·9	Eygenraam 1957
NW Germany	50·0–51·2	Bezzel 1959
Germany, excl. NW	53·1–59·3	Bezzel 1959
Bavaria	56·5–60·0	Bezzel 1959, 1970
Bohemia	53·9–60·0	Urbanek 1962
Prague	54·8–58·2	Kral 1964 (Bezzel 1970)
Upper Austria	64·5	Firbas (Bezzel 1959)
Zürich	50·0–60·0	Epprecht (Bezzel 1970)
Switzerland	54·3	Burckhardt 1952 (Bezzel 1959)

of Teal *Anas crecca* and Wigeon *Anas penelope* yielded respectively 53·5% and 54·9% males (about 2,000 counted of each species). In these species, and Pintail *Anas acuta* and Shoveler *Anas clypeata,* Lebret (1950) found in the Netherlands a similar pattern as reported for the Mallard in the present study.

In conclusion, the Mallard was found to have a seasonal and regional variation in sex-ratio as do most diving ducks (Nilsson 1970). This variation was smaller and in no areas were females more common than males in winter. The preponderance of males was more marked in northern, continental and exposed coastal areas. The difference between the Mallard and diving ducks in the extent to which the sexes appear separately are probably related to the earlier pairing-up of the Mallard but also to differences in feeding habits. The artificial feeding of Mallard in urban areas might be of importance in this respect.

Summary

Sex-ratios of non-breeding Mallard *Anas platyrhynchos* in south Sweden were compared with published information from other parts of Europe. Males outnumbered females on all occasions, this dominance being especially marked early in the season. In winter, this preponderance of males was more marked in northern, continental, and exposed coastal areas. Habitat variation was slight, the preponderance of males being slightly lower on natural lakes as compared with urban waters and coastal waters.

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