

# A history of colonization and current status of the house sparrow (*Passer domesticus*) in the Faroe Islands

Ein søgulig lýsing av búsetingini hjá gráspurvanum í Føroyum og støðu hansara í dag

Sven-Axel Bengtson<sup>1</sup>, Kirstin Eliassen<sup>2</sup>, Laura Mary Jacobsen<sup>2</sup> and Eyðfinn Magnussen<sup>2</sup>

1. Museum of Zoology, University of Lund, Helgonav.3, SE-223 62, Sweden.  
Email: Sven-Axel.Bengtson@zool.lu.se
2. Fróðskaparsetur Føroya, FO-100 Tórshavn, Faroe Islands.  
Emails: Kirstin@Ostenfeld.dk, Laurel@Post.Olivant.fo, EyðfinnM@Setur.fo

## Úrtak

Gráspurvur (*Passer domesticus*) eigur í flestu býum og bygðum í Føroyum. Rættilig niðurseting byrjaði miðskeiðis í 1930unum, og síðani hevur hann spreitt seg um oyggjarnar. Úrslitini í greinini eru grundaði á nýggjar teljingar, samrøður við fólk og skrivligar frásagnir. Spjaðingarmynstrið er torskilt, bæði tá hugt verður at búsetingarmynstrinum kring landið, og hvussu hetta broytist við tíðini. Kanning okkara vísir, at tað helst eru fleiri sjálvstøðugir tilflytarar, og stuðlar hetta undanfarnar metingar. Alt bendir á, at spjaðingin av gráspurvi er tengd at fólki, og í hvønn mun bygdin eru avbyrgdar. Eisini hava livilíkindi og broytingar av stovninum á staðnum nógv at siga. Kanningin er gjørd í 118 bygðum og býum, og vísir hon, at gráspurvur búleikast í 80 % av teimum. Gráspurvurin tók fyrst búgv á teimum størri plássunum í landinum, og var at finna á flestu teirra fyrri 1960. Tey fyrstu 30-40 árinu búsettist gráspurvurin í 50% av føroysku bygðunum, og í fyrri helvt av 1980unum hevði hann breitt seg til 65% av bygðunum. Stovnsstøddin í 2001 og 2002 var mett at vera ávikavist 2.500 og 2.700 pør. harav ein triðingur er í Tórshavn (90 pør/km<sup>2</sup>). Talið av gráspurvi hevur verið eitt sindur óstøðugt, bæði í hvørjari bygd sær og samlað fyrri landið. Lítið er til av søguligum tilfari um stovnsstøddina gjøgnum árinu, og í lötuni hómast eingin týðilig broyting í gráspuvameinginum.

## Abstract

The house sparrow (*Passer domesticus*) breeds commonly in built-up areas throughout the Faroe Islands. The colonization began in the mid-1930s and the subsequent spread is described on the basis of previously published records, interviews with local people, and recent surveys of all habitations. Spatio-temporal pattern of spread is complex lending support to previous suggestions of possible, independent immigrations. It is suggested that the process of spread was influenced by the agency of man, geographical isolation (water-barriers and topography), and local conditions and population dynamics. Until now 80 % of the settlements (n = 118) have been more or less permanently colonized: first the larger ones (nearly all before 1960) and within 30-40 years c. 50% of those currently colonized (65% in the early 1980s). Total breeding population in 2001 and 2002 was estimated at c. 2,500 and 2,700 pairs, respectively; one-third being recorded in the capital Tórshavn (90 pairs/km<sup>2</sup>). The numbers (total and local) have fluctuated (though precise historical data are scarce) but currently no trend is discernible.

## Introduction

The house sparrow (*Passer domesticus*) is a companion of man, and aided by introductions and other human activities, it has successfully colonized many regions worldwide (Long, 1981; Summers-Smith, 1988). Before the start of its colonization of the Faroe Islands in the late 1930s, the house sparrow was considered a very rare vagrant, in fact having been recorded only once (Andersen, 1901; Salomonsen, 1935; Williamson, 1945). Today it occurs abundantly all over the Faroes and is confined to and breeds, or has bred, in virtually all built-up areas. In the British Isles, Scandinavia, and elsewhere in Western Europe, the house sparrow has decreased in numbers since the 1970s (markedly in the 1980s), especially in urban areas (Hansen, 1985; Summers-Smith, 1999; Hogstad and Øien, 2001; Lindell, 2002). As to the Faroes, the population has undoubtedly fluctuated and, at least for a period of time, probably declined in numbers; though in the absence of systematic counts the evidence is mostly circumstantial.

In this paper we report on studies of house sparrows carried out in 2001 and 2002 when each year effectively all built-up areas (i.e. settlements) were censused during the breeding season and the number of pairs estimated. During the course of the field-work, we also interviewed local people about the history of the house sparrow in the respective settlements. These amendments to the previously published data (see Jensen and Kampp, 1997) form an improved basis for a comprehensive description and a tentative discussion of the

history of the house sparrow's colonization of the Faroes.

## Material and methods

Human habitations, in the following referred to as settlements, are to be found on all 18 islands except for Lítla Dímun and range in size from a single farmstead or small village to the capital Tórshavn (15,000 inhabitants in an area of 8.72 km<sup>2</sup>). Mostly they form discrete units (the Faroese *bøur*, or infields) but in a few places settlements merge as e.g. along Skálafjørður (Eysturoy), around Tvøroyri (Suðuroy), and around Tórshavn (Streymoy). All but two (Vatsoygar and Kambsdalur) of the settlements are situated by the sea.

The field-work was carried out intermittently between early April and mid-June and included 101 settlements in 2001 (all censused by SAB) and 118 in 2002 (mostly censused by KE and LMJ). In a few instances, we had to rely on information from local people, mostly stating that there were no house sparrows to be seen in the respective settlements. The census work usually started at dawn and continued until early afternoon, with a break at mid-day when the activity of the house sparrows was markedly lower. The time spent in each settlement varied considerably depending on the circumstances (area, complexity of habitation, numbers of birds, and weather) from 15 minutes at a single farmstead to one hour in a small settlement and one day in the towns. Tórshavn was divided in 23 sub-areas that were surveyed over a number of days. On some occasions, the

censuses were interrupted due to unfavourable weather conditions. We invariably followed the same procedure by starting at one end (or opposite ends when more than one observer participated) and slowly walking through the settlement. All parts of the settlements were visited and all house sparrows heard or seen were recorded. Special attention was paid to gardens with lush vegetation, plantations, cemeteries, commons, older buildings, warehouses, farmhouses, sites where domestic fowl was kept and fed, and open utility patches of ground with more or less disturbed vegetation. Besides, in order to avoid counting the same birds more than once, we watched out for sparrows flying in or out of sections of the settlement already visited. This was greatly facilitated by the smallness of many settlements (often < 100 m across) and/or by the fact that the settlements are often located along one main street running parallel to the seashore. This, of course, did not apply to some of the largest settlements, which have a more complex structure. Thus, Tórshavn had to be surveyed over a period of time and possible effects of movements of birds between the different subareas cannot be evaluated.

We recorded the sex of each bird (usually not possible for flying birds) and whether it was observed alone, as one of a pair or in a flock. The house sparrow is a gregarious and semi-colonial species and even in relatively small settlements, there was often more than one aggregation of birds. Males were easily located as their calls were readily heard also in drizzle and light rain, while the silent females were more

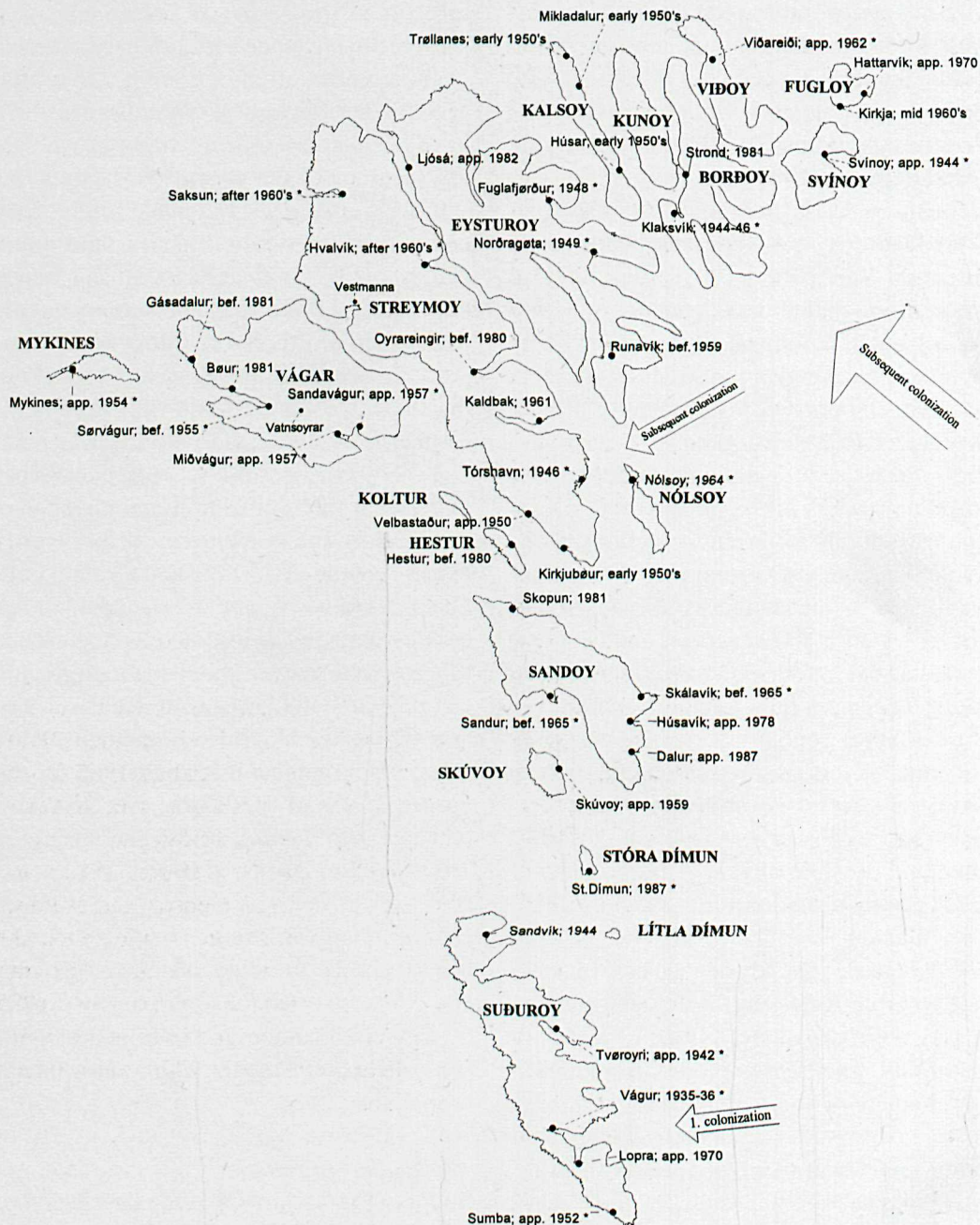
difficult to spot. Already before leaving a settlement, we made a preliminary estimate of the number of pairs present taking into account the prevailing circumstances. We have made no specific attempts to evaluate the accuracy of our counts but in some instances we were able to make preliminary comparisons between observers and found a reasonably good agreement and hence consistency. The counts and subsequent estimates should therefore allow us to compare settlements and years. Throughout the study, we made a point of obtaining information on birds and wildlife in general and the house sparrow in particular (especially year of colonization and changes in number) by interviewing local, preferably elderly people in the field and through public media (newspapers, radio, and TV). For each settlement, we also noted the presence of grown-up gardens and plantations and farming activities. Data on area was obtained from the MapInfo computer program using topographical electronic map for the Faroes (scale of 1:20,000). We also have had access to unpublished data collected in 1981 (see Bengtson and Bloch, 1983).

#### *History of colonization*

Fig. 1 shows in some instances the precise, or more often the approximative, year of first colonization of house sparrow for some 40 settlements for which information is available.

#### *The southern islands*

Suðuroy (164.6 km<sup>2</sup>) was the first island to be colonized by the house sparrow on the Faroes. This was in the winter of 1935-36



**Fig. 1.** First colonization of house sparrow at settlements in the Faroe Islands. Asterisks indicate previously published information referred to in the text. The arrows show the first colonization and two tentative subsequent colonizations.

when 4 birds arrived at Vágur (Williamson, 1945). This small propagule, the success of which is unknown, may have founded the first house sparrow colony on the Faroes, though one source states that the species did not colonize Vágur until 1940-41, at the same time or a year or two before it reached Tvøroyri some 10 km further north (Williamson, 1945; Herluf Thomsen according to Ferdinand, 1947). Anyhow, in 1944 and 1946, the house sparrow was reported to be common in both these settlements (in 1944 "hundreds" in Vágur and up to 25 pairs in Tvøroyri) and it continued to increase in numbers and was very abundant in 1960 (Williamson, 1945; Ferdinand, 1947; Thomsen, 1951; Potts 1961). In the meantime (c. 1952) it had colonized Sumba, about 10 km SE of Vágur (Jensen and Kampp, 1997) but it was not until sometimes between 1968 and 1974 that house sparrows settled in Lopra, halfway between Vágur and Sumba (Trygvi Vestergaard, pers.comm.). According to one statement, the house sparrow first appeared at Sandvík at the northern end of the island already during the war (Jacob Olsen, pers.comm.). For the other settlements, no detailed information on first appearance is available, though today (and presumably since long) the house sparrow breeds in all of them, except in the small, now not permanently inhabited, Víkarbyrgi where it is an occasional visitor (Aksal Poulsen, pers.comm.) and Nes just east of Vágur.

On Stóra Dímun (2.6 km<sup>2</sup>) the house sparrow first bred in 1987 (one pair) at the only farm on the island and the number subsequently increased to 7-8 pairs a few

years later but the colony is now exterminated (Jensen, 1991; 1992, pers.comm.).

Skúvoy (9.9 km<sup>2</sup>) was colonized in the late 1950s with 10-15 pairs in 1961 (Joensen, 1963) and has been present in moderate numbers ever since.

For Sandoy (111.4 km<sup>2</sup>) the data on first arrival is mostly vague and insufficient. In 1965, the house sparrow was established at Sandur and Skálavík (Dare, 1966) and in 1978 it occurred at Húsavík, where it, however, is not a regular breeder. In 1981 it was recorded at Skopun and Dalur, though in the latter place it was not established until c. 1987 (John Edwin Berg, pers.comm.). At Skarvanes (facing Skúvoy) the house sparrow is an irregular visitor but no breeding has been confirmed.

#### *Vágar and Mykines*

On Vágur (176.3 km<sup>2</sup>) all three major settlements were colonized in the 1950s: Sørvágur before 1955 and in 1960 it was numerous there (Petersson and Askaner, 1956; Potts, 1961), Miðvágur where it was common in 1960 (Potts, 1961) and Sandavágur ca 1957 (Jensen and Kampp, 1997). As to the smaller settlements, the house sparrow now breeds at Vatnsøyrar, Bøur (first in 1981; every year since 1995 according to Elinborg Joensen, pers.comm.) and at Gásadalur (since before 1981 but not every year).

On Mykines (10.0 km<sup>2</sup>), the isolated westernmost island, the house sparrow was first recorded c. 1954 (Jensen and Kampp, 1997) and has since then bred there from time to time in small numbers (e.g. Potts,

1961; Joensen, 1966; Grand, 1966; Melt-  
ofte, 1967).

#### *Nólsoy, Hestur and Koltur*

The first record of a house sparrow in the Faroes was a single male observed on Nólsoy (10.3 km<sup>2</sup>) in 1900 followed much later by other visits e.g. in 1949 and 1953 (Andersen, 1901; Williamson and Petersen, 1951; Williamson, 1954). However, it was not until 1964 that the colonization of the island began (Jensen and Kampp, 1997). Since the late 1980s there has been a relatively stable colony of 20-30 pairs, presumably much owing to the provision of nest boxes (Jensen, 1988, pers.comm.; Anon., 1989).

Currently there are no house sparrows breeding on Hestur (5.9 km<sup>2</sup>), though they used to nest in a building that was pulled down c. 1980 (Jóhan Niclassen according to Jens-Kjeld Jensen, pers.comm.).

For Koltur (2.3 km<sup>2</sup>) with its two farmsteads that are, however, no longer permanently inhabited there is no breeding record and the only observation is a flock of 13 house sparrows flying eastward over the island in early October 1984 (Søren Sørensen pers. comm.).

#### *Streymoy*

On Streymoy (374.1 km<sup>2</sup>) the house sparrow first became established in Tórshavn, by far the largest habitation on the Faroes. The first few pairs bred in 1946 and 1947 and the house sparrow was considerably more abundant in 1950 than in the preceding years and "common" in 1953 (Williamson, 1948; 1954; Williamson and Petersen,

1951). Since then Tórshavn has remained the stronghold of the house sparrow in the Faroes. Relatively soon after the colonization of Tórshavn it spread westwards to the nearby (5-7 km) settlements Kirkjubøur and Velbastaður; in the former there were large flocks of sparrows in 1953 (Elisabeth and Sámal Patursson, pers.comm.) and in the latter it arrived after the war and in the 1960s occurred in large numbers (Danjál Pauli Danielsen, pers. comm.). According to unconfirmed information, it also occurred further north at Vestmanna in 1953 (Williamson, 1954). Information on the subsequent colonization of other settlements on Streymoy, most of which today hold colonies of house sparrows, is scanty. Kaldbak, just north of Tórshavn, was occupied in 1961 (Eyðun Vang, pers.comm.) and at about the same time Hvalvík and Saksun further north were colonized (Joensen, 1966; see also Gibbs and Mawby, 1968). In the geographically isolated settlements of Saksun and Tjørnuvík the house sparrow has been an irregular breeder and at Skælingur (a small settlement not far from Kvívík) it is known as a visitor but no breeding has been confirmed (Árni Mortensen, pers. comm.).

#### *Eysturoy*

The island of Eysturoy (286.0 km<sup>2</sup>), with a large number of settlements was first colonized in 1948 when 2 pairs (and several in 1949) bred at Fuglafjørður and in 1949 (possibly 1948) 2 pairs were recorded at Norðragøta (Nørrevang, 1950; for Fuglafjørður confirmed by Ragnvald Joensen, pers.comm.). For the other parts of the

island reliable historical data on first appearances are almost completely lacking, though at Runavík, which nowadays is part of an almost continuous habitation along the eastern side of Skálafjørður, the house sparrows have been present at least since 1959 (anon., pers.comm.). Many of the other settlements on Eysturoy are known to have had breeding house sparrows in 1981, and it is most likely that a number of these sites were colonized much earlier than that. For some settlements with small house sparrow colonies, repeated extinctions and recolonizations are known to have occurred.

#### *The northern islands*

Among the northern islands, characterised by high mountains and narrow sounds and fjords, Svínoy (27.3 km<sup>2</sup>) was the first to become colonized. It was in c. 1944 when a small colony (about a dozen pairs in 1946) was established (Petersen, 1949). In the wake of the harsh winter of 1946/47 the population was down to a few pairs, but it soon recovered and has for many years maintained a level of about 12-25 breeding pairs (Petersen, 1949; Williamson, 1954; Potts, 1961; Joensen, 1966; Grand, 1966; present study).

In Klaksvík, the largest settlement on Borðoy (94.5 km<sup>2</sup>), house sparrows started to appear at about the same time as on Svínoy, but in 1953 it was still considered an irregular visitor and not until about 1960 was it reported as being common (Petersen, 1949; Williamson, 1954; Potts, 1961; Joensen, 1966). At the other few and small settlements on Borðoy the house sparrow has been an irregular breeder in small num-

bers, e.g. at Árnafjørður, Norðdepli, and the nowadays no longer inhabited Múli.

On Kalsoy (30.6 km<sup>2</sup>) the settlements Húsar, Mikladalur, and Trøllanes are all claimed to have been colonized in the early 1950s (Jákup Jacobsen and Liggjas Eliassen, pers.comm.), though only in Mikladalur has breeding occurred without interruptions. In Syðradalur, at the southern end of the island, the house sparrow is a regular visitor (more so some 15 years ago than today) but no breeding has been confirmed (Asbjørn Lómklett, pers.comm.).

For the island Kunoy (35.3 km<sup>2</sup>), the settlement with the same name has had breeding house sparrows for more than 20 years but no detailed information is available. There are no records of house sparrow for Haraldssund.

At Viðareiði, on Viðoy (40.6 km<sup>2</sup>), the house sparrow appeared for the first time in c. 1962 (Nils Jákup Absalonsen according to Jensen and Kampp, 1997).

Fugloy (11.0 km<sup>2</sup>), just north of Svínoy, was not colonized until in the mid-1960s; first at Kirkja (Laura Lydersen, pers.comm.) and a few years later at Hattarvík (Zacharias Zachariassen, pers.comm.). The occurrence on Fugloy has been irregular with extinctions and recolonizations.

#### *Overall view*

As seen above, for several of the larger islands and for the Faroes as a whole, the colonization by the house sparrow followed a rather irregular pattern in time and space (Fig. 1). It seems to have started in more than one place (see Discussion) at about the same time in the early 1940s, which obvi-

**Table 1.** *Estimated number of breeding pairs of house sparrow in the Faroe Islands (six islands, viz. Mykines, Koltur, Hestur, Stóra Dímun, Lítla Dímun, and Fugloy, were devoid of breeding pairs).*

Island	Year	
	2001	2002
Suðuroy	443	453
Skúvoy	26	15
Sandoy	86	133
Vágur	201	156
Streymoy	1143	1186
Nólsoy	26	40
Eysturoy	482	551
Kalsoy	19	17
Kunoy	3	10
Borðoy	68	96
Viðoy	7	18
Svínoy	27	25
<b>Total</b>	<b>2531</b>	<b>2700</b>

ously adds to the complexity of the pattern. The cumulative number of settlements colonized (not necessarily permanently) has increased steadily up to the present time (Fig. 2), i.e. to about 95 in 2002 depending on how some of the closely adjacent settlements (e.g. along Skálafjørður and around Tórshavn and Tvøroyri) are delineated. There are 23 (of 118) settlements that are considered potentially suitable for house sparrows but that have so far not been colonized. However, most of these so far empty habitations are small with only a few houses.

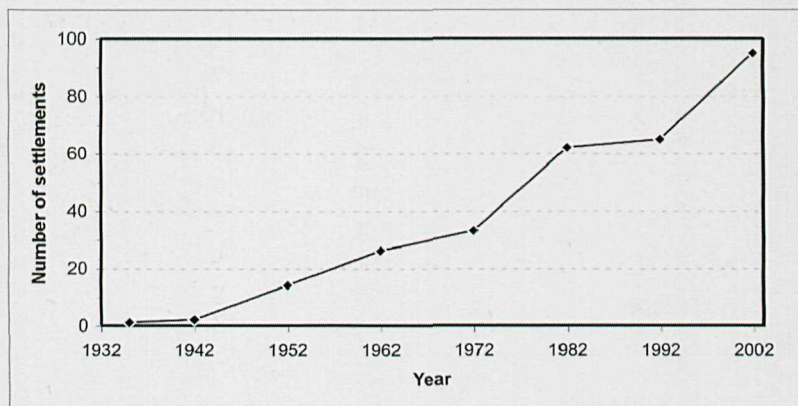
During the early phase of the colonization (i.e. 1940 to about 1960), when the house sparrow was still relatively uncommon and therefore paid attention to and reported, all the larger settlements became occupied but also many smaller ones (Fig. 3). From 1940

to 1962, c. one-fourth (27%) of the presently colonised settlements had been colonized and in 1972, the house sparrow had spread to about one-third of them (35%). In 1982 c. 65% and in 1992 c. 68% of the settlements had been colonized; the abrupt increases in 1981 and 2001-02 (Fig. 2) reflect years of intensive field work (Bengtson and Bloch, 1983; present study).

### Censuses in 2001 and 2002

The total number of house sparrows in the Faroes was estimated at 2,531 pairs in 2001 and 2,700 in 2002 (Tab. 1). A small increase in 2002 (7.3%) was true for most of the islands with a reasonable number of pairs, except for Skúvoy and Vágur where there was a decline of 42% and 22%, respectively. The geographical distribution in 2002, as depicted in Fig. 4, shows that the largest concentrations of pairs were to be found in the Tórshavn area, around Skálafjørður (especially along the eastern shores at Toftir and Runavík), in Klaksvík, Fuglafjørður, Vestmanna, and on Suðuroy (Vágur and Tvøroyri). These areas together accounted for about 60% of the current Faroese population. Tórshavn (including Argir) alone had an estimated number of 878 pairs (890 in 2001), or very nearly one-third (35%) of the total population. In 2002, the house sparrow was absent on some of the outlying islands (Mykines and Fugloy) and in some relatively small and isolated settlements on the northern islands and northern Streymoy (e.g. Saksun and Tjørnuvík).

As to breeding density, and disregarding some small-sized settlements with one dense colony of house sparrows, the high-



**Fig. 2.** Cumulative number of settlements colonized (not necessarily permanently) by the house sparrow in the Faroe Islands.

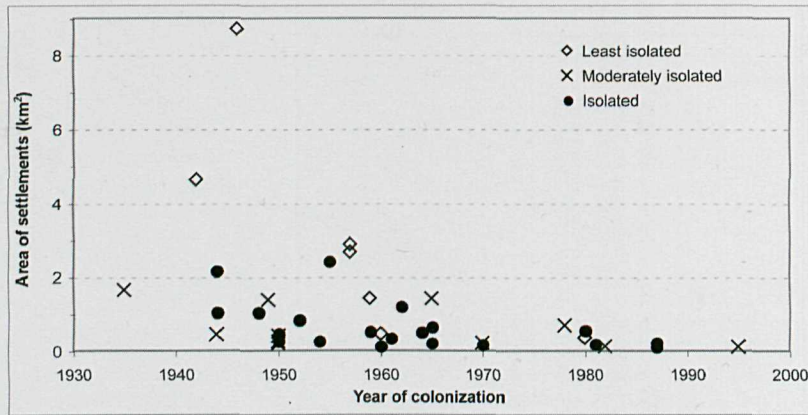
est were found in Tórshavn (90 pairs/ km<sup>2</sup>), Vágur (79), Runavík (78), Kollafjørður (69), and Fuglafjørður (67). On Vágar, Sandoy, and Borðoy (Klaksvík) the larger settlements did not have densities exceeding 50 pairs/ km<sup>2</sup>.

### Discussion

The irregular pattern and spottiness of first records cannot be easily recognized as an expanding wave of invasion sweeping over the Faroes but rather as a series of forward leaps, a “jump-dispersal” governed by local conditions. Already within a few years of its first landfall (1935-36) the house sparrow had become established on Suðuroy (early 1940s) and soon thereafter also in several other far apart places and islands: Tórshavn (1946), Svínøi and Klaksvík (1944-46), and Fuglafjørður and Norðragøta (1948-49). Morphometric studies of house sparrows from different parts of the Faroes indicating differences in origin lead Jensen and Kampp (1997) to suggest that the colonization of the Faroes was the

result of two or three (and by implication possibly more) immigrations. They also argue that the house sparrow seems reluctant to cross even short stretches of water; e.g. 18 years elapsed between the colonization of Tórshavn and Nólsoy separated by 6 km of water and only one individual of more than 800 house sparrows ringed on Nólsoy has been recovered outside this island; furthermore they referred to other factors delaying dispersal such as high mountains on Suðuroy (Jensen and Kampp, 1997).

The first 4 birds that arrived on Suðuroy in 1935-36 are reported to have come onboard a ship (Williamson, 1945). Such unintentional human transportation of house sparrows has previously been known to occur, e.g. in the colonization of northern Norway (Lund, 1956) and as a case in point the observation of a house sparrow on board a ship in the North Sea (Reinsch, 1971). Such dispersal could explain the relatively early appearance of house sparrows in larger harbours such as Tórshavn, Klaksvík, Fuglafjørður, and perhaps also Sørvágur. Be-



**Fig. 3.** Relationships between date of first colonization by house sparrows and area ( $\text{km}^2$ ) and degree of isolation (using an arbitrary scale) of settlements in the Faroe Islands.

sides, the timing of these events coincides with the rather intense shipping activities during the war when fishing vessels and the British Royal Navy were frequently sailing at these ports, going to and from the British Isles.

House sparrows are, of course, fully capable of reaching all parts of the archipelago by means of flight and thus simultaneously disperse from more than one centre (source area) and in different directions depending on the local conditions. On Suðuroy the house sparrow relatively soon spread from source areas to colonize other settlements and from the source area of Tórshavn it spread westwards and Velbastaður and Kirkjubøur had their first breeding house sparrows before long. However, the crossing of open waters proved an obstacle and successful colonization of Nólsoy and Hestur occurred much later as did the spread northwards on Streymoy, possibly because of the high terrain north of Tórshavn. This may also be true for Kunoy and Kalsoy in particular. The relatively late colonization of

Sandoy (*viz.* mid-1960s) may be due to this island's position at some distance from, and between two likely source areas, Suðuroy and Tórshavn. Also on Eysturoy, and especially on the northern islands, the spread appears to have been slowed down by barriers such as water and mountains. However, there are elements of stochasticity as flocks of house sparrows are frequently reported to roam the islands, especially in autumn when they may indeed even attempt to migrate (Bloch and Sørensen, 1983), and the species has reached and bred more or less regularly on the most far away and isolated islands such as Mykines, Stóra Dímun, Skúvoy, and Fugloy.

Several factors other than human transport (which may in fact be one of the least important) inevitably must have influenced the spatio-temporal pattern of the spread. The habitat-patches (*i.e.* the settlements) differ not only in isolation (*e.g.* distance from source areas and presence of dispersal barriers) but also in habitat quality (present authors, unpubl.). The relationship between

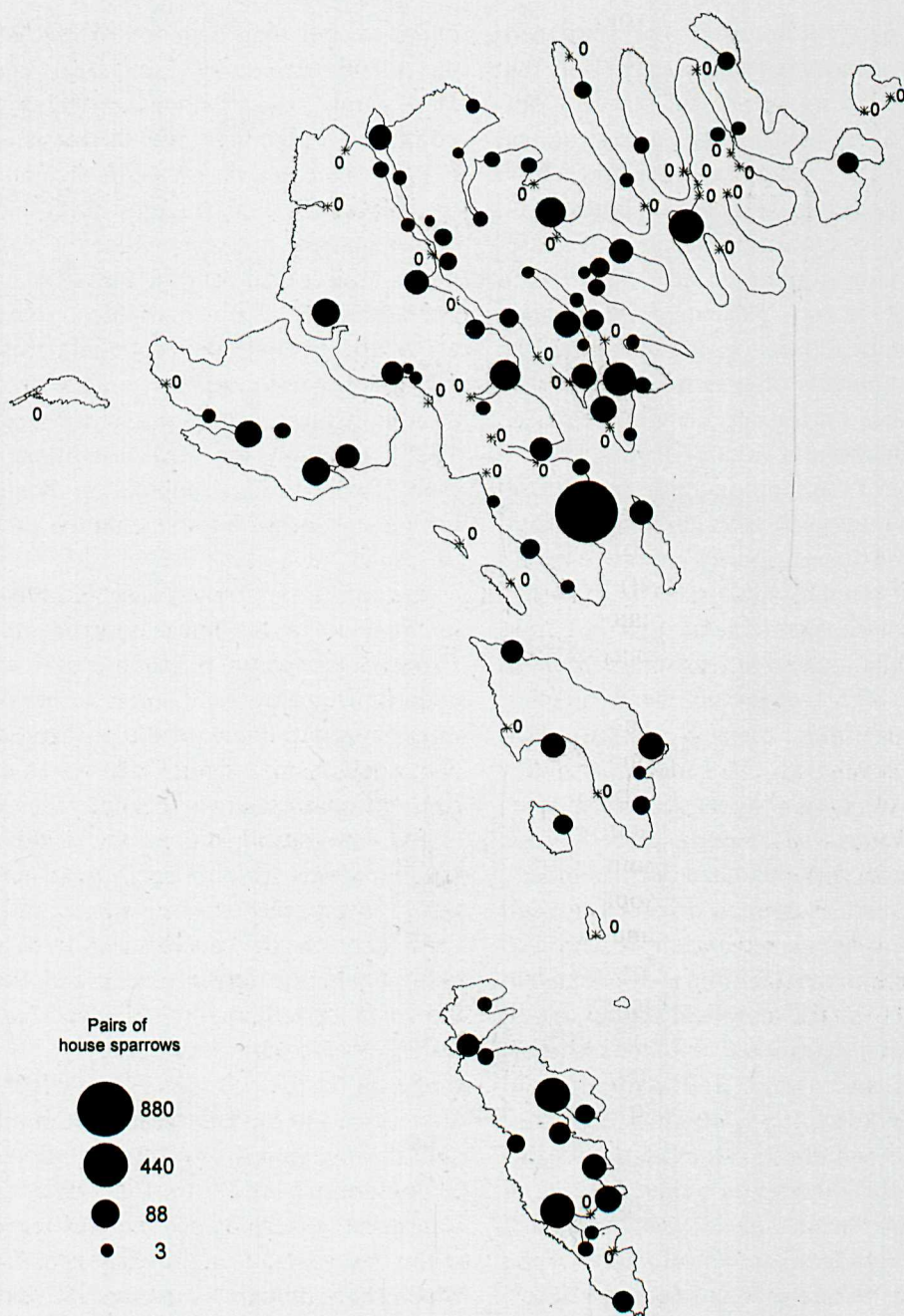


Fig. 4. Distribution and number of pairs of house sparrow at settlements censused in 2002 in the Faroe Islands. Population size is reproduced by circles-area on a  $\log_{10}$  scale. The 0-figures refer to settlements without house sparrows. The following adjacent settlements are joined: Tórshavn-Argir, Hvalvík-Streymnes, Toftir-Saltnes, Sandur-í Trøðum. The total estimated number of breeding pairs is 2,700 (see Tab. 1).

year of first colonization and settlement area (Fig. 3) does not necessarily imply that area *per se* is important but that it is other variables related to the Faroese human habitations, e.g. there is a strong correlation between area and numbers of houses and inhabitants (unpubl.). Hence, a large settlement provides more nest sites, shelter, and food (warehouses, gardening *etc*) than a small one. In addition, as argued above, the larger settlements offer more opportunities for human aided transport leading to rescue effects (Brown and Kodric-Brown, 1977).

In spite of the rapid increase in numbers in source areas such as Vágur and Tórshavn it took the house sparrow more than 30 years, but probably less than 40, to spread to 50% of the settlements that currently have been colonized at least once ( $n=95$  in 2002; i.e. 80.5% of the number available), and possibly more than 50 years to reach the 65% level (Fig. 2). Empirical studies of the average velocity of the house sparrow invasions into Siberia from Europe and in North America have been estimated to be 28 and 17 km/year, respectively; and when aided by man between 48 and 120 km/year (Summers-Smith, 1956; Johnston and Klitz, 1977). Theoretical studies, based on diffusion equations and demographic characteristics, suggest a velocity of 15-30 km/year (Okuba, 1988; Bosch *et al.*, 1992). Compared with these velocities the colonization of the Faroes was a slow process, at least during its first 20-25 years for which the most detailed data is available. For the 1960s and 1970s the actual numbers of settlements colonized are probably higher than those recorded here and thus the cumulative

curve steeper than depicted in Fig. 2. For the period between 1981 and 2001, when a large number of settlements probably were colonized for the first time, the information is inadequate and the shape of the cumulative curve uncertain. It seems likely that the house sparrow had a potential for a much more rapid spread over the Faroes than has been the case since geographical distances are relatively short and propagule pressure may be high as most pairs produce two, occasionally three, broods per season (Jensen, 1988). Probably the local conditions and their effects on local population dynamics have a significant influence on the process of spread.

Regarding population size and changes in numbers of the house sparrow on the Faroes information is meagre and rarely quantitative. However, some authors and interviews with local people accounted for above testify to a rapid build-up of numbers of house sparrows in some areas soon after immigration and in the 1960s the species seems to have been quite numerous in several places. For instance, in 1972 the house sparrow was reported to be very common in the larger places and breeding in most settlements (Flensted-Jensen, 1973). While still increasing its overall range on the Faroes (see Fig. 3), it thereafter is said to have decreased in numbers and disappeared from some settlements (Salomonsen, 1982). Burton (1995: 296) states that "a serious decline was reported in the Faroe Islands in the early 1980s" and Bloch (n.d., though issued in 1988 and referring to the 1980s, Bloch, pers. comm.) claims that the house sparrow "is declining

rapidly and has already disappeared from several islands". These statements are not contradicted by opinions held by a number of local people that we have spoken to. Is it possible that this apparent decline was most noticeable in the larger settlements, e.g. in Tórshavn. The current breeding density in Tórshavn is the highest in the Faroes but low compared to densities in most European cities (Cramp, 1994). For the smaller settlements the picture is variable: there are cases where the house sparrow has gone extinct or been eradicated as pests (e.g. Fugloy and Stóra Dímun), decreased (Húsar), increased (Nólsoy) and remained relatively stable (e.g. on Skúvoy and Svínoy). The reasons for the assumed but insufficiently documented general decline are not known but in the mid-1990s, not based on any actual counts but educated guesswork, the total population size was estimated at 3,000 pairs (Bloch *et al.*, 1996). This is remarkably similar to the census data from the present study with an estimated number of c. 2,500 pairs in 2001 and small increase to c. 2,700 pairs in 2002. This suggest that the total population is currently at least not declining.

### Conclusions

Man has played a significant role in the success of the house sparrow in the Faroes. The house sparrow only breeds in close association with man, who provides nest-sites, food and shelter. The colonization started on Suðuroy in 1935-36 with a few birds probably arriving onboard a ship and the house sparrow then spread, probably from

two or more centra of separate immigrations (see also Jensen and Kampp, 1997), and has until now bred in about 80% of the inhabited areas (settlements). The spatio-temporal pattern of spread is complex and influenced by human activities and local conditions (e.g. water-barriers, topography, local population dynamics *etc*). It took the house sparrow more than 30 years to colonize 50% of the settlements known to have been more or less permanently colonized (including practically all the larger ones). The total population (and certainly some of the local populations) have probably fluctuated a great deal in numbers, though quantitative data is lacking. Presently the breeding population seems relatively stable with an estimated total of c. 2,500 and 2,700 pairs in 2001 and 2002, respectively. Tórshavn has by far the largest concentration of house sparrows with about one-third (c. 900 pairs) of the total Faroese population.

### Acknowledgements

The field-work was supported by the Faculty of Science and Technology (Náttúruvísindadeildin) at the University of the Faroe Islands. We also received valuable logistic support from the Museum of Natural History in Tórshavn through its director, professor Dorete Bloch who also made data from 1981 available to us. We also gratefully acknowledge the assistance given to us by a number of local people (some mentioned in the text) and media in obtaining information. We are particularly grateful to Mr. Jens-Kjeld Jensen for his valuable help during the project and the families, spouses, and friends of the second and third authors for their support during field-work.

## References

- Andersen, K. 1901. Meddelelser om Færøernes Fugle. 4de Række. Efter skriftlige Oplysninger fra P.F. Petersen, Nolsø, og S. Niclassen, Myggenæs. *Vidensk. Medd. fra Dansk naturh. Foren.* 53: 253-294.
- Anon. 1989. Støðan hjá búfuglunum. *Frágreiðing frá Føroya Fuglafrøðifelag* 3: 7-9.
- Bengtson, S.-A. and Bloch, D. 1983. Island land bird population densities in relation to island size and habitat quality on the Faroe Islands. *Oikos* 41: 507-522.
- Bloch, D. 1988. *The Birds of the Faroes*. The Faroese Tourist Board. Tórshavn. 18 pp.
- Bloch, D. and Sørensen, S. 1983. The autumn migration at Akraberg, Faroe Islands, 1982. *Fróðskaparrit* 31: 75-93.
- Bloch, D., Jensen, J.-K. and Olsen, B. 1996. Liste over fugle der er set på Færøerne. List of birds seen in the Faroe Islands. (1. ed.) Føroya Náttúrugripasavn, Føroya Fuglafrøðifelag og Føroya Skúlabókagrunnur. Tórshavn.
- Bosch, F. van den, Hengeveld, R. and Metz, J.A.J. 1992. Analysing the velocity of animal range expansion. *J. Biogeogr.* 19: 135-150.
- Brown, J.H. and Kodric-Brown, A. 1977. Turnover rates in insular biogeography: effect of immigration on extinction. *Ecology* 58: 445-449.
- Burton, J.F. 1995. *Birds and Climate Change*. Christopher Helm (Publishers) Ltd., London.
- Cramp, S. (ed.). 1994. *The Birds of the Western Palearctic*, Vol. VIII.
- Dare, P.J. 1966. Notes on the birds seen in the Faroe Islands in May and June 1965. *Dansk Orn. Foren. Tidsskr.* 60: 88-91.
- Ferdinand, L. 1947. Studier af Fuglelivet paa Færøerne. *Dansk Orn. Foren. Tidsskr.* 41: 1-37.
- Flensted-Jensen, E. 1973. Fugleiaagttagelser fra Færøerne 1972. *Danske Fugle* 25: 65-75.
- Gibbs, R.G. and Mawby, P.J. 1968. Ornithological observations in the Faroes, 1966. *Dansk Orn. Foren. Tidsskr.* 62: 137-140.
- Grand, F. 1966. Iagttagelser på Færøerne, sommeren 1962. *Dansk Orn. Foren. Tidsskr.* 60: 45-46.
- Hansen, P. 1985. Gråspurven. *Natur og Museum* 24(3): 3-30. Naturhistorisk Museum. Århus.
- Hogstad, O. and Øien, I.J. 2001. Endringer i norsk fuglefauna – hvad har skedd i løpet av de siste hundre år. *Vår fuglefauna* 24: 54-66.
- Jensen, J.-K. 1988 Gråspurvenes udbredelse på Færøerne i 1987. *Frágreiðing frá Føroya Fuglafrøðifelag* 2: 25. Tórshavn.
- Jensen, J.-K. 1991. Áhugaverdar eygleiðingar í árinum 1990. *Frágreiðing frá Føroya Fuglafrøðifelag* 5: 1-5. Tórshavn.
- Jensen, J.-K. 1992. Áhugaverdar eygleiðingar í árinum 1991. *Frágreiðing frá Føroya Fuglafrøðifelag.* 6: 5-10. Tórshavn.
- Jensen, J.-K. og Kampp, K. 1997. Gråspurven på Færøerne. *Dansk Orn. Foren. Tidsskr.* 91: 74-78.
- Joensen, A.H. 1963. Ynglefuglene på Skúvoy, Færøerne, deres udbredelse og antal. *Dansk Orn. Foren. Tidsskr.* 57: 1-18.
- Joensen, A.H. 1966. *Fuglene på Færøerne*. Rhodos. Copenhagen.
- Johnston, R.F. and Klitz, W.J. 1977. Variation and evolution in a granivorous bird: the house sparrow. In: Pinowski, J. and Kendeigh, S.C. (eds). *Granivorous birds in ecosystems*: 15-51. Cambridge University Press.
- Lindell, L. 2002. *SOF: Sveriges fåglar*. 3. ed. Stockholm.
- Long, J.L. 1981 *Introduced birds of the world*. David and Charles. London.
- Lund, H.J.M.-K. 1956. Gråspurven (*Passer domesticus* (L.)) i Nord-Norge. Utbredelses historie, utbredelsesmetoder og litt om dens biologi. *Dansk Orn. Foren. Tidsskr.* 50: 67-76.
- Meltofte, H. 1967. Iagttagelser på Færøerne sommeren 1966. *Dansk Orn. Foren. Tidsskr.* 61: 186.
- Nørrevang, A. 1950. Nogle ornithologiske iagttagelser fra Færøerne. *Dansk Orn. Foren. Tidsskr.* 44: 192-199.
- Okuba, A. 1988. Diffusion-type models for avian range expansion. *Acta XIX Congress Inter-Nationalis Ornithologici*, vol. 1: 1038-1049. Univ. of Ottawa Press, Ontario.
- Petersen, S. 1949. Gråspurven (*Passer d. domesticus*) på Færøerne. *Dansk Orn. Foren. Tidsskr.* 43: 166-167.
- Petersson, I. and Askaner, T. 1956. Två veckors exkursioner på Färöarna sommaren 1955. *Vår Fågelvärld* 15: 182-187.
- Potts, G.R. 1961 Observations on birds of the Faroes, 1960. *Dansk Orn. Foren. Tidsskr.* 55: 152-160.
- Reinsch, H.H.v. 1971. Zugbeobachtungen im Seegebiet zwischen Island, den Färöer und den Britischen Inseln. *Beitr. Vogelkd.* 17: 415-423.
- Salomonsen, F. 1935. Aves. In: Jensen, Ad.S., Lundbeck, W., Mortensen, Th. and Spärck, R. (eds.). *The Zoology of the Faroes* 3(2): 1-268.
- Salomonsen, F. 1982. Færøernes fugle. In: Nørrevang, A. and Lundø, J. (eds). *Danmarks Natur*, 12. Bind

- (Færøerne): 88-114. Politikens Forlag. Copenhagen.
- Summers-Smith, J.D. 1956. Movements of house sparrows. *Brit. Birds* 49: 465-488.
- Summers-Smith, J.D. 1988. *The Sparrows*. T. and A.D. Poyser. London.
- Summers-Smith, J.D. 1999. Current status of the House Sparrow in Britain. *British Wildlife* 10: 381-386.
- Thomsen, H.B. 1951. Fuglenyt fra Færøerne. *Dansk Orn. Foren. Tidsskr.* 45: 114-116.
- Williamson, K. 1945. Some new and scarce breeding species in the Faroe Islands. *Ibis* 87: 550-558.
- Williamson, K. 1948. Notes on the Ornithology of the Faroe Islands, 1945-47. *Dansk Orn. Foren. Tidsskr.* 42: 202-215.
- Williamson, K. 1954. Beretning om nogle Færøske ynglefugle. *Dansk Orn. Foren. Tidsskr.* 48: 139-149.
- Williamson, K. og Petersen á Botni, N.Fr. 1951. Fugletræk på Færøerne i 1949, med notater fra Fair Isle til sammenligning. *Dansk Orn. Foren. Tidsskr.* 45: 121-138.