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An alarming decline of the Shore Lark *Eremophila alpestris* in Sweden

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A strong decline of the Shore Lark population of Scandinavia has been reported both from breeding grounds in Swedish and Finnish Lapland and from migration sites at Ottenby, Falsterbo and the Polish coast. The Shore Lark is assumed to be a recent immigrant in the Fenno-Scandian mountains and this is in accordance with increasing numbers of winter records in South Scandinavia and England from around 1850. The cause for the recent decline cannot be determined, either in terms of climatic change or competition with other species. Another explanation is suggested, namely deterioration of winter habitats. It is possible that use of herbicides on cropland and fertilization of coastal meadows have decreased the amount of seed producing herbs. It is also mentioned that there are reports about stable or even increasing winter populations in south Poland and the DDR. It is therefore possible that the decline is confined to the Scandinavian population.

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A strong decline of the Shore Lark population has been reported both in a breeding area (Ammarnäs, southern Lapland; Svensson *et. al.* 1984) and at a migration site (Falsterbo; Roos 1984). In the Finnish Bird Atlas the Shore Lark was found in only 19 squares in the five year period of 1974-1979 (Hyytiä *et. al.* 1983), which shall be compared with Merikallio's (1958) estimate of thousands of pairs (line transects in 1941-56). Recently Hildén (1987) compiled all Finnish data and concluded that "the present Finnish population can be estimated to be some tens of pairs, at most".

The Shore Lark is assumed to be a recent immigrant in the Fenno-Scandian mountains. According to Kolthoff (1907) and SOF (1978) it first appeared there around 1830, and according to Salomonsen (1967) it began to visit southern Sweden and Denmark on migration and as a winter guest around 1850. This was, however, questioned by Ekman (1922) and Haftorn (1971), who pointed out that the Shore Lark was known from Finnmark already during the sixteenth century. Possibly, the species did not breed in southern Norway at that time, but by the end of the seventeenth century it was known also there. The Shore Lark was apparently a rather common bird around the middle of the seventeenth century when large flocks were recorded in Scania (Nilsson 1858).

In the present century the Shore Lark has had a rather continuous breeding range in the eastern parts of the Scandinavian mountains, with a gap in the province of Jämtland (see maps in Haftorn 1971 or Harrison 1982).

Observations

Breeding population at Ammarnäs

A census has been made within a plot of one square kilometre of suitable Shore Lark habitat from 1964 through 1987 (Svensson *et. al.* 1984, Svensson 1984). In addition to that plot about 32 hours of line transects were made every year since 1972 (excluding 1984). Complete data are found in Tab. 1.

In the plot there was a stable population of 2-4 pairs through 1976 and only one case of breeding thereafter. The line transects revealed a similar pattern: about the same number of observations in 1972-1977 and only one observation after 1977.

Table 1. Number of Shore Larks *Eremophila alpestris* recorded at different sites. P = one square km plot, L = standard line transects, LD = last date of counts. Ottenby figures for 1947-1956 refer to migration, those for 1963-1987 to observations around the bird station. N = no. of individuals, D = no. of days with observations. R = no. of records. Pn = no. of *Plectrophenax nivalis* at the line transects.

Year	Ammarnäs breeding			Falsterbo migrating		Ottenby		Poland wintering	
	P	L	Pn	N	LD	N	D	N	R
1942				3	22 Oct				
1943				3	1 Nov				
1944				27	12 Nov				
1945									
1946							migrating		
1947							----------		
1948						66			
1949						353			
1950				14	17 Oct	381			
1951				93	26 Oct	35			
1952						31			
1953				17	31 Oct				
1954				16	31 Oct	5			
1955				16	1 Nov	39			
1956				19	17 Nov	33			
1957				1	15 Nov	55			
1958				0	17 Nov	81			
1959				4	17 Nov				
1960				13	15 Nov				
1961				0	17 Oct				
1962							migrating		
1963							& resting		
1964	1						----------		
1965	2					24	5		
1966	3					34	3		
1967	4					20	7		
1968	2					20	9		
1969	2					38	7		
1970	2					21	8		
1971	3					17	8		
1972	2	7	9			29	7		
1973	2	9	11	32	20 Nov	30	17		
1974	4	2	17	40	20 Nov	60	15	191	28
1975	2	6	-	24	20 Nov	128	21	486	45
1976	3	4	16	28	20 Nov	31	7	146	12
1977	0	6	6	14	20 Nov	136	17	137	14
1978	1	0	4	11	20 Nov	29	12	52	6
1979	0	0	6	7	20 Nov	54	14	67	7
1980	0	1	4	3	20 Nov	59	13	31	4
1981	0	0	2	19	20 Nov	3	1		
1982	0	0	0	15	20 Nov	2	2		
1983	0	0	0	4	20 Nov	11	7		
1984	0	-	-	4	20 Nov	8	2		
1985	0	0	0	5	20 Nov	0	0		
1986	0	0	0	3	20 Nov	3	1		
1987	0	0	0			18	4		
						4	4		

Migration at Falsterbo

From Falsterbo there are counts from a number of autumns since 1942 (Rudebeck 1950, Ulfstrand *et. al.* 1974, Roos 1984) although the counts in many years ended too early to cover the whole migration period of the Shore Lark. With this reservation I give the Falsterbo totals in Tab. 1. The years when the counts continued until mid-November ought to provide almost full coverage (cf. Fig. 1), however. For the years 1949-1960 another problem is that many different observers were involved, and it is not at all certain that all of them knew the flight call of the species. It is therefore likely that several of the figures are too low. From 1973 onwards, the figures are comparable since migration has been counted by the same observer in all years.

Because of these inadequacies of the early counts at Falsterbo it is rather difficult to draw any conclusions about differences in Shore Lark numbers between the early and late count periods. In at least one year (1950) the number was high although the counts did not last longer than through 26 October. And in 1956-1958 very few were observed through mid-November. For the period 1973-1986 it is, however, quite clear that the number have declined to a very low level in the last few years.

Migration at Ottenby

There are two sets of data from Ottenby. One set comes from a ten year period (1947-1956) with regular counts of all migrants through 31 October (Edelstam 1972). Numbers varied considerably, from more than 300 in 1948-1949 to only 5 in 1952. In the two years with very high numbers a majority of the birds passed in a few days (207 on 19 October 1948, 199 and 105 on 22 and 25 October 1949, respectively). These counts were also made by a great number of observers with variable capabilities to count and recognize birds.

The second set of data comes from the diary of the bird station (provided in litt. by Jan Pettersson). All observations of birds made during the ordinary ringing work and other outdoor activities were recorded. Such data lack of course much of the comparability of true standardized counts. Nonetheless they will provide a rough indication of the

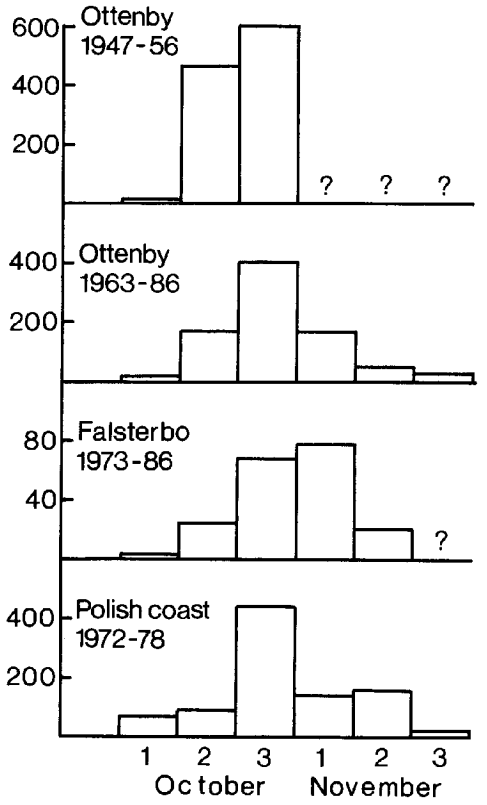
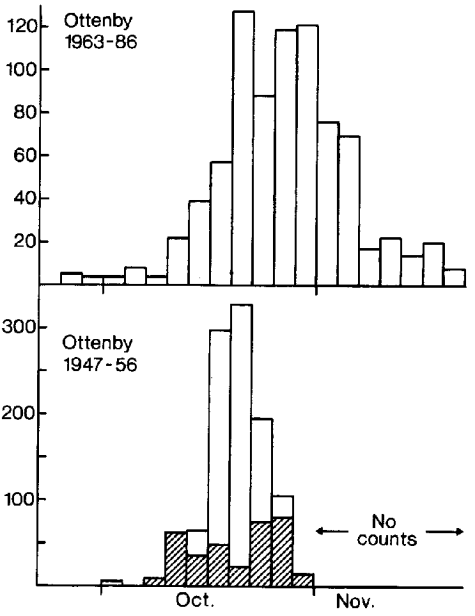


Fig. 1. Autumn migration of the Shore Lark *Eremophila alpestris*. Left diagram: No. of birds in ten days periods. Right diagram: No. of birds in three days periods to show that the numbers declined earlier in 1947-56 than in 1963-86. The dark parts of the bars show numbers in all years except 1948-49 indicating that it is the pattern of these two years that dominate the early period.



numbers present in the vicinity of the bird station (although higher numbers will be recorded if a flock stays for some time than if only passing birds are counted). It is clear from this series of figures (Tab. 1) that very low numbers have been recorded after 1978.

Polish coast

The Shore Lark is a regular visitor on autumn and spring migration at the Polish coast. In December-February it is rare along the coast, but is instead observed inland further south (Tomialojc 1976). In the winters 1972/73-1978/79 Górski (1982) made regular bird counts (3-5 days a week) in the coastal area surrounding the towns of Darlowo, Koszalin and Slupsk. His data are given in Tab. 1. It is evident that the number of migrants also declined there.

Discussion

All the available data indicate a recent decline of the Shore Lark population. But there are conflicting evidence conserning numbers before the last few decades. There are even conflicting views of the first occurrence of the species in Scandinavia.

Nilsson (1858) refers to Linné (1758) and Brisson (1760), who knew this species only from America, and suggests that it has spread rapidly from Siberia westwards during the late eighteenth and early nineteenth century. Nilsson tells that before about 1830 hardly any Shore Larks had been observed on the Scandinavian peninsula. The first birds were shot in southern Sweden in the 1840s, and the first two records from Lapland came during the same decade: Jukkasjärvi 1842 and Kvickjock 1843. Around 1849-1850 it began to appear in flocks in Scania and in the winter of 1856/57 it was observed in great numbers. Only slightly earlier the first breeding record in Norway was reported from Vadsø in 1837. During the next two decades it was found at several localities in east Finnmark (Haftorn 1971), and by the 1880s Collett (1872) found it as common in West as in East Finnmark. He found it at all suitable localities at Porsangerfjord and at Gjæsvær west of Nordkapp.

The numbers observed in the winter quarters fits well with the assumed increase in north Scandinavia. According to Witherby *et. al.* (1943) the first record in England came in 1830. The Shore Lark was then an irregular winter visitor until 1879, when considerable visitation occurred. It then increased and was a regular winter visitor by 1940. Glutz von Blotzheim & Bauer (1986) summarized the early records from the Continent: first Danish record in 1850, regular from 1864, first record on Heligoland in 1837, regular and increasing from 1847. Already in that year 60 Shore Larks were trapped in the autumn and 20 were shot in one day on Heligoland. After 1847 it was observed every autumn in considerable numbers. In 1869 there were hundreds every day and in 1883 the island was "completely covered with the birds" on certain days (Gätke 1895).

The available data on both breeding records in Lapland and winter records in western Europe seem to suggest a rapid westward expansion of the range during the 19th century. The first breeding records in the Dovrefjell area in 1887 and on Hardangervidda in 1934 suggest that the species continued to spread well into the 20th century. There are several reports that indicate that this increase became still more pronounced from around 1950, when the Shore Lark also began to winter in considerable numbers in the inland of Poland and Germany.

In order to understand the recent decline of the Shore Lark, it is important to keep in mind that, as far as we know, the Shore Lark has a recorded history in Europe (at least outside the Soviet Union) that goes back only about one hundred years. Taking into consideration that a majority of birds breeding in the northern parts of the Soviet Union west of the Ural mountains winter in west and central Europe it is not unlikely that Nilssons (1858) suggestion about the rapid westward spread of the Shore Lark all the way from Siberia to Norway during the later part of the 18th century is correct. Otherwise the species ought to have been known to the naturalists of the late 1700s.

There is no information about whether the Shore Lark may have bred in north Europe (or anywhere in the arctic or subarctic parts of the Old World) before the time of the 17th century records in north Scandinavia. Glutz von Blotzheim & Bauer (1986) suggest that the tundra subspecies *flava* must have spread to its northern haunts quite recently since there is no indication of morphological differentiation. Actually, the often cited reports by Pallas (1771-1776, 1811) about the species being common all over Siberia cannot refer to the arctic Siberian breeding grounds since Pallas's expeditions were confined to southern Siberia.

Species that were divided into isolates during the last glaciation often show subspeciation. This is the case for the Shore Lark in the New World and in the southern parts of the Palaearctic region. Thus, the species does have a strong capacity for geographical differentiation. The subspecies *flava* does not show any sign of morphological differentiation and it is therefore likely that the tundra biome was populated rather late after the end of the ice age. There is in southeast Siberia a population that Dementiev & Gladov (1954) list as belonging to the *flava* subspecies. It might therefore be that the northern tundras quite recently was invaded by birds from this population, which is also the one that has the best habitat connection with the tundras via the mountain ranges in east Siberia.

There are no subfossil remains of Shore Larks, that could indicate its presence in West Europe before recent times. Löppenthin (1967) suggests that a bone from Denmark, originally thought to be a Skylark *Alauda arvensis* bone, may be a bone of a Shore Lark, but this has not been confirmed.

Thus, it is possible that when the Shore Lark first appeared in the northern parts of Europe in the 18th century it may have been for the first time after the last glaciation. If so, the westward spread and numerical increase continuing for 200 years in Fennoscandia, at least through the 1960ties, may

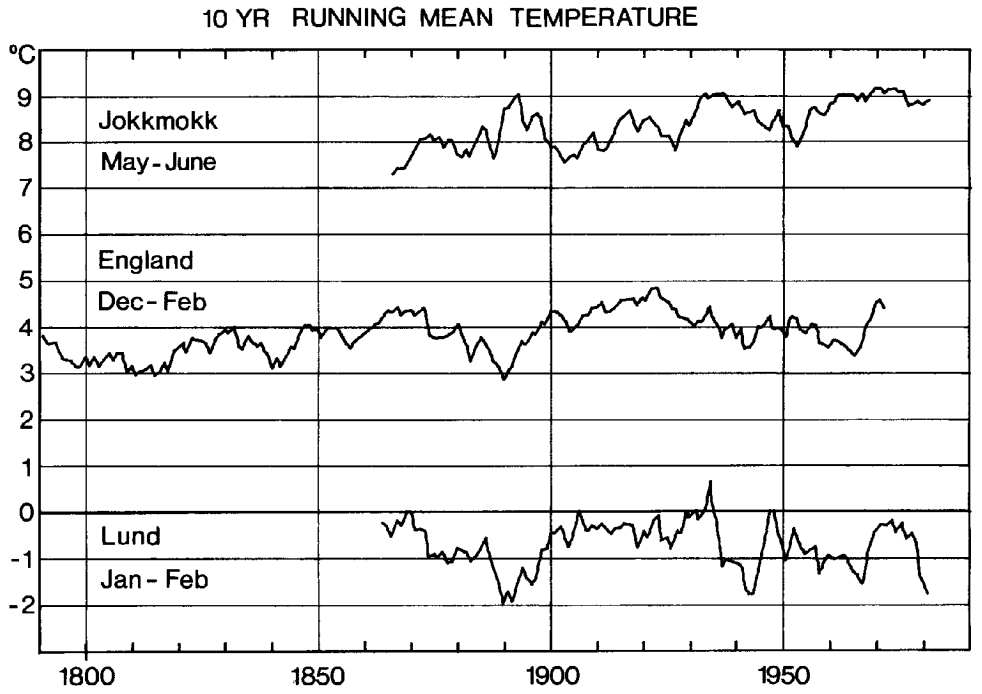


Fig. 2. Ten year running mean of temperature showing a long-term increase in the winter quarters in England and in the summer quarters in Lapland (Jokkmokk).

have been the last phase of a westward range expansion of many hundred years.

Effects of climate

When analysing climate it is the summer climate of the northern breeding area and the winter climate of the wintering area, particularly around the North Sea and the Channel, that is of primary importance. A lot of climate data has been collected and analysed by Lamb (1977).

Mean temperature in July in Arkangelsk (Lamb 1977, p. 482) increased by 3° C from 1900-1910 to 1930-1939 and then decreased equally much to 1940-1949. This seems to be an example of a general trend for large parts of the northern hemisphere, although the increase of temperature seems to have been most pronounced in winter time and more pronounced in the arctic than further south. In central England, from where data are available from about 1660, the forty year average January temperature stayed at just above 3° C until about 1750, then at 2.5° C until 1810, increased to 3.5° C by 1840, remained there until 1880, increased again to about 4° C until 1960. Thus the winter climate has become considerably warmer in the period 1810-1960. The high temperatures of the early 18th century was a temporary increase covering the period 1700-1750. Before that the climate had been predominantly rather cold since about 1550.

The brief temperature peak during the first half of the 18th century is mentioned because it coincides with the only 18th century record of the Shore Lark. Collett (1921) reports one bird that had been obtained from Norway by Klein. Collett presumed that it originated from Finnmark, but I have so far not been able to trace the original reference. Glutz von Blotzheim & Bauer (1986) mention a few early records, which they consider reliable, from Gdansk (1667 and 1747), Brandenburg (1739), Marburg a.d. Lahn (1784) and Metz (1788).

Considering only what has happened after about 1800 it is clear that there has been a strong temperature increase from about 1810 to about 1940 (Fig. 2). This is the period during which the species spread from Finnmark through the rest of the Scandinavian mountains and became a regular and later common winter visitor to the North Sea coast and also mainland/inland continental Europe.

The events after about 1930-1940 seem difficult to explain in terms of temperature change. The mean May-June temperature at Jokkmokk in Lapland rose from around 1860 up to recent time (Johnsson 1965). It seems difficult to explain the disappearence of the species by an increase in temperature (Fig. 2).

If any changes of the climate has affected the Shore Lark those changes may have caused shifts of the migration times of the species. Fig. 1 shows the temporal distribution of autumn migration at Ottenby as revealed by migration counts in 1947-56, and recorded observations in the surroundings of the bird station in 1963-86. Although the absence of counts after 31 October in the early period makes the comparison more difficult, it seems that the peak occurred earlier in that period. In the early period the numbers were clearly declining rapidly well before the end of October, whereas numbers remained high throughout that month in the later period. But even if this change of migration time is real it is not possible to draw any conclusions about the cause. Different populations with different passage periods may have been involved and if different populations have declined with different rates the shift of migration period may simply be an effect of early populations declining faster than late populations

Competition with other species

In the breeding area of Lapland there are only two potential competitors, the Lapland Bunting *Calcarius lapponicus* and the Snow Bunting *Plectrophenax nivalis*. It is, however, not very likely that competition could be important since there is little overlap in habitat choice. The Snow Bunting breeds in rocky areas at the highest levels and the Shore Lark at lower levels where the ground is sandy and flat. The Lapland Bunting breeds at still lower levels, usually in the willow belt and reaches only marginally up into the region of the Shore Lark. Besides, at least in the Ammarnäs region there has been no such increase of Lapland Buntings that it could explain the decline of the Shore Lark.

It is more likely that if competition is important it occurs in the winter quarter, where there are also other species that could compete. The Lapland Bunting is not among them since it winters in southeasterly quarters outside the winter range of at least west European Shore Larks. The Skylark is instead a more probable competitor and also some other seed-eating species such as Greenfinch *Carduelis chloris*, Linnet *C. cannabina*, Twite *C. flavirostris* and Snow Bunting.

Almost no information, however, indicating the existence of interspecific competition between these species is available. Thus this explanation remains hypothetical.

Habitat changes in the winter quarters

It is well known that many farmland habitats have been transformed in the last few decades (Bezzel 1982 for Germany and O'Connor & Shrubb 1986 for Britain). The habitat requirements of the Shore Lark seem to be very broad, from common farmland to coastal meadows. To me it seems unlikely that so much of suitable habitat could have disappeared in recent time that this could explain the decline. There are vast (in comparison with the small Shore Lark population of today) areas of suitable habitats in England and on the Continent, but in spite of this the numbers of wintering birds has continued to decline drastically.

If deterioration of winter habitat should be the cause of the decline it is likely that the heavy use of herbicides on farmland or the intensive use of fertilizers on meadows would be the cause. The herbicides kill off the weeds and the fertilizers make seed-producing herbs disappear in favour of grasses.

Is there a difference between West and East Europe?

There is some information that contradicts the very clear picture of a marked decline, coming from Poland and the DDR.

Based on a recent survey of all Polish records in 1965-1984, Chylarecki & Lewartowski (1987) argued that there was no support for a recent decline of the Shore Lark. It was not possible to find any unquestionable method for comparing different years so they used ratios between the number of Shore Larks and the numbers of Twites and Snow Buntings. The trends of these ratios was negative in the case of the Snow Bunting but zero for the Twite. This is, however, a very uncertain measure since we know little about the population trends of the Twite and the Snow Bunting. The actual number of records of Shore Larks did not show any trend but varied very much (from 3 to 60 records in one winter). But over the twenty years the number of observers reporting Shore Larks more than doubled, so it is possible that an increasing number of bird watchers and better reporting habits are responsible for the lack of decline.

In a letter Wojciech Gorski provided me with some new data from the area where he collected data for his 1982 study. In the winter of 1986/87 he collected information near Kozaling and Slupsk. With visits 3-5 times a month he met with Shore Lark flocks at 35 occasions and counted a total of 596 individuals. Although this area was smaller than that of the earlier study and the number of visits fewer, the number of birds was greater.

The data provided by Schmidt (1983) and Nehls (1977) for the DDR seem to indicate stable or increasing winter populations in that country.

Thus it is possible that we have at least two different Shore Lark populations, one in the west (Fenno-Scandia) probably wintering mainly in the North Sea area, and one in the east (northern Russia) wintering mainly in central Europe. If so, it should be the western population that has suffered a decline.

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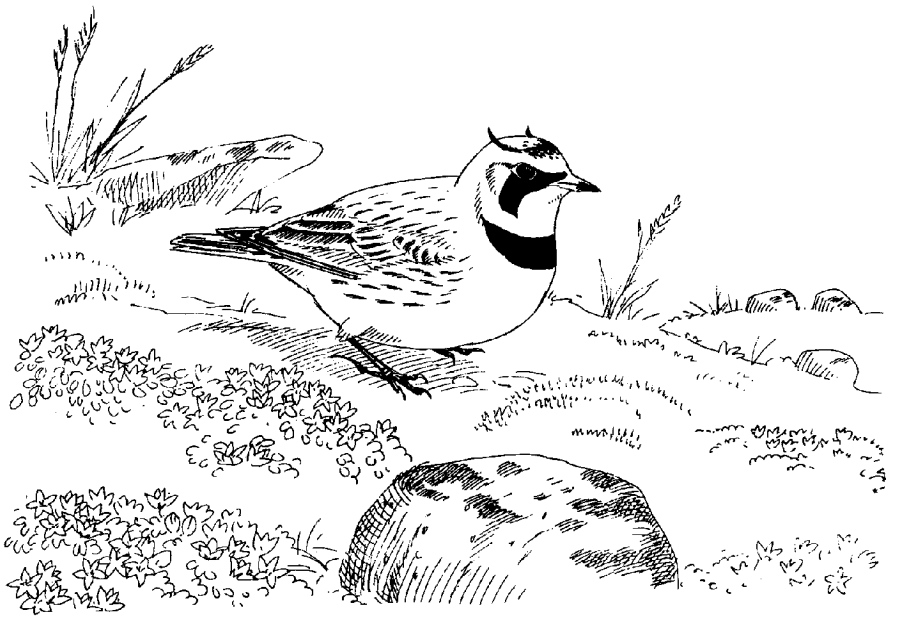

Drawing by Rune Roalkvam