km away (orthodrome). I suggest that the bird on Ekofisk, North Sea, was on its way from southern Norway to the British Isles, supposed to be the normal route for Starlings from northern Norway. The second recovery was the very first verification of a Scandinavian Starling found on Iceland.

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The survival of the Red-backed Shrike *Lanius collurio* in Sweden.

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The population of the Red-backed Shrike is decreasing in Sweden. The decline has been estimated to be 50% since the end of 1970s (Svensson 1996). The reason for the decline has been considered to be low survival of the nestlings. In resent years, from the beginning of the 1980s, the standardized capture of birds at Ottenby has shown a decline especially of juveniles (Pettersson 1993). However, locally the beeding success is good (Olsson 1995b).

Olsson (1995b) discussed the balance of survival and mortality of the Red-backed Shrike to maintain an unchanged population size. According to Jacober & Stauber (1987), a pair of Red-backed Shrikes must produce 2.9 fledglings per year to balance mortality. Olsson found in his study area that the Red-backed Shrikes produced 3.5 fledglings per year, a satisfactory number for maintaining at least an unchanged population size.

The survival may be different in different population. In an attempt to estimate the survival of Red-backed Shrikes in Sweden I have analysed 111 ring recoveries of Red-backed Shrikes of known age found dead or killed from 1950 to 1995. My analysis, using the maximum likelihood method of North & Morgan (1979), showed that the survival is 39.2 % (SE± 2.1%) in the first year, 52.7% (SE± 5.7%) in the second year and 57.7% (SE± 1.4%) in the third year and thereafter. Using these estimated survival figures, I calculated with the formula given by Henny et al. (1970) that the necessary number of fledglings to be produced by a pair of Red-backed Shrikes is 2.3 per year to maintain a stable population. If I used the lower 95% confidence interval limit of my estimated survival figures I found that the Red-backed Shrikes must produce 3.0 fledglings per year. According to my calculations the population development of the Red-backed Shrike in Sweden ought to be positive.

It is not possible to determine if the survival of the Red-backed Shrikes has changed during the last decades. Although there is only a small number of ring recoveries in the last fifteen years, I compared the mean survival for the Red-backed Shrikes between 1950–1979 and 1980–1995. I found that the mean survival is greater during the latter period, 459 days (n= 31), compared to 352 days (n=80) for the first 30 years. The difference is, however, not statistically significant (t=0.96; P=0.34). The result can be interpreted as a skewness in the population towards older birds. But the result can also be interpreted as a better survival in later years depending on fewer deliberately killed birds or other advantageous circumstances. There is a tendency that fewer Red-backed Shrikes were deliberatly killed during the last fifteen years but it is not significant in my small material ($\chi^2 = 1.64$; P=0.2; n=111).

Nothing in my calculations can explain the declining population of the Red-backed Shrike in Sweden. Bruderer (1993) (cited by Olsson 1995b) studied the Red-backed Shrikes in their wintering area and he did not find any special dangers for the birds. Nothing is known of altered losses of birds during the migration. The number of ringed Red-backed Shrikes and recoveries is nearly the same before and after the 1980s. The decline of the Red-backed Shrike in Sweden may be caused by shrinking good environments for the bird (Olsson 1995a).

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Sammanfattning

Törnskatans överlevnad i Sverige

Överlevnaden hos törnskata *Lanius collurio* tycks vara helt tillräcklig för att upprätthålla en stabil populationsstorlek och t.o.m. öka antalet törnskator. Den minskning av törnskator som har observerats i Sverige kan alltså inte förklaras med dålig överlevnad. Tyvärr är inte antalet återfunna törnskator tillräckligt stort för att överlevnadsstudier skall kunna göras mellan årtionden. De senaste 15 åren har dock medellivslängden ökat i jämförelse med de tidigare 30 åren. Men detta kan tolkas på två helt skilda sätt: 1) det finns färre unga fåglar i förhållande till äldre fåglar eller 2) överlevnaden har blivit bättre genom t.ex. minskad jakt.

Då överlevnaden i flera svenska områden är mycket god är den troliga förklaringen till det minskande antalet törnskator en förändrad miljö i Sverige. Öppna, solbelysta och insektsrika biotoper har minskat de senaste åren och landskapet förbuskas snabbt genom minskad betesdrift och granplanteringar.

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Seasonal trends in observations of raptors in the central Swedish mountains

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Introduction

Predation is one of the most important causes of death in many lagopid grouse (Steen 1989). However, inhospitable terrain and severe weather mean that very few studies of predation have recorded changes in lagopid predator abundance throughout the year and over several years (Jenkins *et al.* 1964, Newton 1979, Ratcliffe 1993). In this study we attempted to assess the seasonal abundance of avian lagopid predators in upland Sweden over three years. This information will be useful for identifying the periods in which adult and young grouse are potentially at risk from particular raptor species.

Methods

During field work for a larger study into the survival of Willow Grouse *Lagopus lagopus*, sightings of predators, their tracks and signs were recorded in the southern part of the central Swedish mountain range. The study area surrounded the Storulvån Hill Station (63°10'N, 12°22'E) and was divided into one hunted (treatment) area of 43.0 km^2, and two non-hunted (control) areas totalling 49.9 km^2. Willow grouse hunters were present during the open season for grouse (25 August - last day of February) on the treatment area. Details of vegetation cover can be found in Olsson *et al.* (1996). Snow cover was complete in winter from November through March in 1993 and April in 1994 and 1995. Summer was considered to be the period May to August and winter the period September to April.

Periods of observations were not evenly distributed through the year. To compensate for this potential bias, I used an observation index: the number of raptors observed in every 100 man hours of work for each period (Jenkins *et al.* 1964). Weather was not controlled for directly, but data were pooled (Schueck & Marzluff 1995) and field work rarely took place when visibility was very poor. Grouse remains found during the study were a source of information about the presence of predators; causes of death were determined from radio-tagged and opportunistically found carcasses.

Results

Between the start of May 1993 and end of August 1995, 6625 man hours of surveys were made in the field resulting in 321 raptor observations. At least 100 hours of observations were made on or within 6 km of the study area in every one of the 31 months. Only 9% of observation time (600 hours) was from days with poor (<1 km) visibility.

A seasonal trend in abundance was evident (Fig. 1), raptors being observed from February until November inclusive. After initial sightings in February, observations were infrequent until April in 1993 and May in 1994 and 1995. There was a clear drop in the numbers of observed raptors in June and July in all