

**P-08-89**

## **Oskarshamn site investigations**

### **Bird monitoring in Simpevarp 2002–2008**

Martin Green  
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November 2008

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*Keywords:* AP PS 400-08-006, Site investigations, Simpevarp, Monitoring, Birds, 2008

This report concerns a study which was conducted for SKB. The conclusions and viewpoints presented in the report are those of the author and do not necessarily coincide with those of the client.

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A pdf version of this document can be downloaded from [www.skb.se](http://www.skb.se).

## Abstract

This report is a summary of the monitoring of breeding birds species in Simpevarp 2002–2008. The report summarizes the population development of eight selected listed species (Swedish Red List and/or the European Unions' Birds Directive) in the area. The aim of the report is to evaluate possible impacts from the now completed site investigations, conducted by SKB, on the breeding bird fauna. Selected listed species were monitored in the whole regional model area with specially designed methods. For most species selected for detailed monitoring proper data is now available for six years.

The general conclusion from the more detailed monitoring of selected listed species is that the site investigations, associated potentially disturbing activities and increased human presence in the area, have had very little impact on the breeding birds of the area.

For listed species selected for detailed monitoring, the general stable or positive population development recorded in earlier years continued in 2008. Seven of the eight species (honey buzzard, white-tailed eagle, eagle owl, wryneck, lesser spotted woodpecker, nightjar and red-backed shrike) show stable or increasing numbers during the whole study period. Only one species, the osprey, have decreased in local numbers during the period. On a larger regional scale the ospreys show tendencies of a small increase in numbers and the decrease in Simpevarp is thus regarded as a re-distribution of birds rather than a decrease in population size. Comparing results between 2007 and 2008, five of the eight species remained stable or increased in numbers to 2008 (honey buzzard, white-tailed eagle, osprey, eagle owl and red-backed shrike). The remaining three species (wryneck, lesser spotted woodpecker and nightjar) decreased somewhat in numbers between the last two years, but the decrease was in all cases small and well within what can be regarded as normal variation.

## Sammanfattning

Denna rapport är en sammanfattning av övervakningen av häckande fåglar i Simpevarpsområdet under perioden 2002–2008. Populationsutvecklingen hos åtta listade arter (Svenska Rödlistan och/eller arter listade i EU:s Fågeldirektiv Annex 1), utvalda för årlig övervakning redovisas. Dessa följdes upp med specialdesignade metoder inom hela det regionala modellområdet. För de flesta utvalda listade arterna finns nu data från minst en sexårsperiod.

Den övergripande slutsatsen från övervakningen av listade arter är att platsundersökningarna, med tillhörande provborring, andra potentiellt störande aktiviteter och en generellt ökad mänsklig närvaro i området, har haft en mycket liten påverkan på de häckande fåglarna.

De listade arterna utvalda för mer detaljerad uppföljning fortsatte precis som tidigare år att i stort uppvisa stabila eller ökande bestånd. Sju av åtta arter (bivråk, havsörn, berguv, göktyta, mindre hackspett, nattskärna och törnskata) uppvisar stabila eller ökande lokala populationer under perioden i sin helhet. Endast en art, fiskgjuse, har minskat i antal kring Simpevarp under perioden. Sett till en större regional skala tenderar dock fiskgjusarna att öka i antal och minskningen i Simpevarp tolkas därför mer som en omfördelning av fåglar än en reell populationsminskning. Jämför man utvecklingen mellan 2007 och 2008 för de studerade arterna finner man att fem arter (bivråk, havsörn, berguv och törnskata) höll sig på en stabil nivå eller ökade i antal. Tre arter minskade något i antal (göktyta, mindre hackspett och nattskärna) mellan 2007 och 2008, men i samtliga fall var minskningarna av liten omfattning och håller sig väl inom vad som kan klassas som normal variation.

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# 1 Introduction

This document reports the data gathered within the monitoring bird surveys, one of the activities within the site investigations in Simpevarp, in 2008. The bird surveys have now been going on for seven years. For most of the species presented more in detail here, data enabling proper comparisons are available from 2003 onwards, allowing comparisons during a six-year period. The aim of this report is to evaluate the effects of the now finished site investigations on the breeding bird fauna in the area for a number of selected listed species (according to the Swedish Red List and/or the European Union Birds Directive). The surveys were made according to activity plan AP PS 400-08-006 which is SKB: s internal document. The project has been conducted by the Department of Animal Ecology, Lund University. The report covers the whole regional model area east of highway E22 for selected listed species.

## 2 Objective and scope

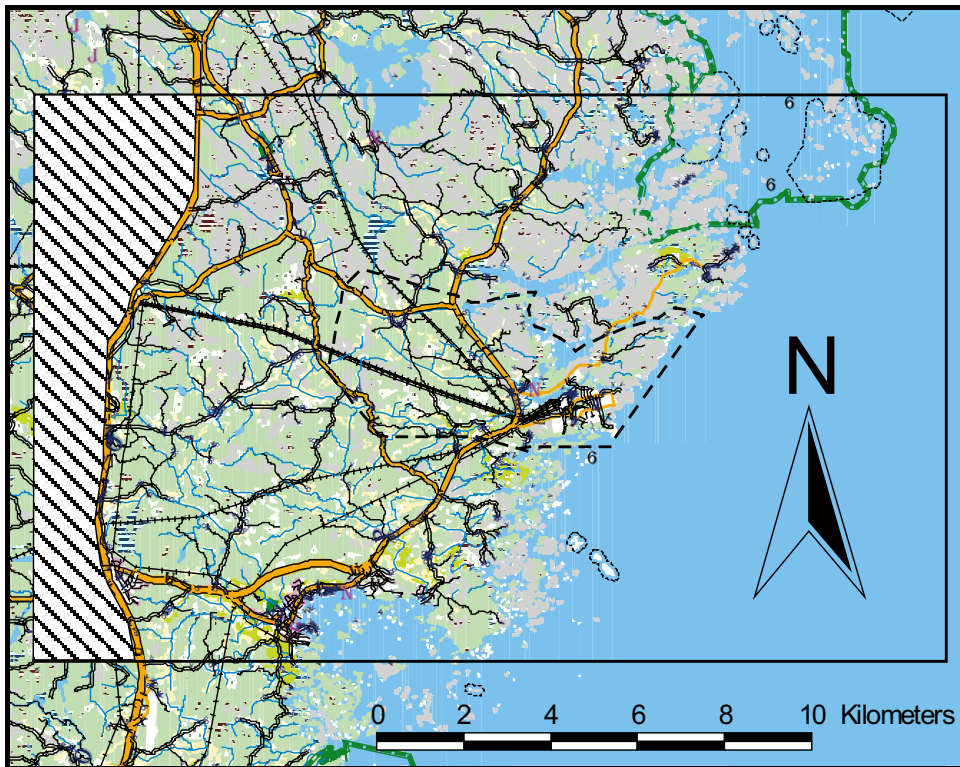
The site investigations in Simpevarp started in 2002. SKB has from the start of the investigations aimed at monitoring the effects from all the activities on the fauna in the area. This in order to ensure that the site investigations were carried out in such a way that disturbances to the fauna, especially sensitive and vulnerable species, could be held at a minimum level (without hindering the essential parts of site investigations).

Simpevarp is an area rich in birds, holding high densities of both common species and more rare or threatened ones such as species listed in the Swedish Red List /Gärdenfors (ed.) 2005/ and the European Union Birds Directive 79/409/EEG: Annex 1, ([www.naturvardsverket.se](http://www.naturvardsverket.se)) (cf. /Green 2003, 2004, 2005, 2006ab, 2008/). The monitoring part of the bird surveys aim at tracking changes in overall bird numbers for certain listed species (Swedish Red List and the EU:s Birds Directive) in the whole regional model area. In addition to looking at overall numbers for these species, the programme aims at investigating breeding success when this is possible.

The monitoring programme has been carried out at different levels, both geographically and regarding which birds that has been monitored. More details about these levels are presented in /Green 2003, 2004, 2005, 2006ab, 2008/.

**Regional model area.** This is a level covering an area of about 270 km<sup>2</sup> (area of possible large-scale effects). In Simpevarp the land area of the regional model area is about 150 km<sup>2</sup>. This area is shown by a thick unbroken line in Figure 2-1. Within this area a number of selected species listed in the Swedish Red List and/or the EU Birds Directive are monitored (from 2004 onwards, but during 2002 and 2003 all listed species as well as non-listed raptors and owls were monitored). The aim of the surveys is to find out the yearly number of breeding pairs within the area, and for a few species also to establish the breeding success of these. The parts of the regional model area situated west of highway E-22 (shaded in Figure 2-1) are excluded from our surveys as these are situated far away from the main activities within the site investigations. Hence, a land area of about 130 km<sup>2</sup> is monitored.

**Local area.** This level involves a smaller area covering all the drilling sites used in 2003–2007, the core area of the site investigations. The size of the area in Simpevarp is about 20 km<sup>2</sup> (in 2002 a larger preliminary local area of about 50 km<sup>2</sup> was used, but this was scaled down to the present one before the surveys in 2003). The local area is shown with a thick, broken line in Figure 2-1. Also in this area special attention is directed at listed species.



*Figure 2-1. Map of the survey area in Simpevarp. The regional model area is shown with a thick unbroken line (shaded part west of highway E-22 is excluded from the surveys); the local area is shown with a thick, broken line. From GSD-Terrängkartan © Lantmäteriverket Gävle 2001. Consent M2001/5268.*



## **3 Equipment**

### **3.1 Description of equipment**

The following equipment was used when conducting the bird surveys.

- GPS (Garmin 12 or Garmin GPS 60).
- Binoculars and telescopes.
- Field maps showing each days work.
- Note books and paper forms.
- Vehicles for transport to and from the study area.
- Cell phones (safety equipment when working alone in the field).

## 4 Methods

The methods used are described in detail in activity plan AP PS 400-08-006 – SKB:s internal controlling document.

An overview of the methods used for monitoring purposes is presented below.

### 4.1 Listed species (Swedish red list; EU Birds directive annex 1)

The species occurring in Simpevarp and included in the Swedish Red List and/or the EU Birds Directive, together with the latest updates on estimated local population size in Simpevarp are shown in Appendix 1.

Starting from 2004, a selection of these species has been monitored on a yearly basis. The species in question are shown in Table 4-1. Selection of monitoring species was made according to a set of different criteria. A species was included for further monitoring if one or several of these criteria were fulfilled: **i)** Simpevarp is a vital area for the species in a larger (e.g. national) perspective; **ii)** The species in question is suspected to be sensitive to disturbances and could thus possibly have been affected in a negative way by the site investigations; **iii)** The species show a negative long-term population trend at the national level (but not necessarily in Simpevarp and not necessarily during later years); **iiii)** Simpevarp holds high densities of the species.

These species were monitored in 2008 by visiting known nesting places/territories used in 2002–2007, combined with visits to habitats suspected to possibly hold the species in question. Visits to nest sites/territories/suitable habitats were made during relevant periods when presence of the birds is expected to be easy to detect. Detailed following up of breeding results was made for some species, i.e. white-tailed eagle, osprey and eagle owl. All observations of the selected listed species were registered with data on bird species, number of birds, position (from GPS or recorded on field maps) and local time during the field work. For one of the more numerous species, monitoring was not made in the whole regional model area but in a selected part of this (red-backed shrike).

**Table 4-1. Listed species selected for monitoring in the Simpevarp area during 2004–2008.**

English name	Swedish name
Honey buzzard	Bivråk
White-tailed eagle	Havsörn
Osprey	Fiskgjuse
Eagle owl	Berguv
Wryneck	Göktyta
Lesser spotted woodpecker	Mindre hackspett
Nightjar	Nattskärra
Red-backed shrike	Törnskata

## 4.2 Execution

The monitoring field work in 2008 was carried out between 2008-04-30–2008-08-09. The field work was partly made by local ornithologists, mainly Tommy Larsson but also Arne Schönbeck participated in the follow ups of breeding results of white-tailed eagles, ospreys and eagle owls. The white-tailed eagle work is carried out within the ongoing national project concerning this species (through Björn Helander, Swedish Museum of Natural History, Stockholm). Tommy Larsson also made the main part of the honey buzzard field work. Martin Green carried out the remaining part of the surveys of listed species (lesser spotted woodpecker, wryneck, nightjar and red-backed shrike).

## 4.3 Data handling

In the field all registered birds of the selected species were recorded in notebooks with data on species, number of individuals and position together with additional data on bird behaviour and circumstances where such data were relevant. Observations of selected listed species were registered with exact position individually taken directly from the GPS in the field. Positions for selected listed species have the same resolution as the GPS-system. After each days field work the bird data were transferred to pre-made paper forms. Data were then entered into Excel-files from paper forms where after the file was cross-checked against the field notes by the project leader. This base-file with data on species, numbers and positions can then be used for different GIS applications, for evaluating bird densities and further calculations.

## 4.4 Analyses and interpretations

Changes in numbers of territories at the species level for selected listed species are now for the second time statistically tested in this report. The same procedure is also used for comparing breeding results in a few cases. Statistical power will however still be low (i.e. there is a low probability of finding statistically significant results even though true, biologically significant changes may have occurred), due to the short time frame. Another way to put it is that large differences is required (strong trends) to reach statistical significance.

For most species the actual numbers of recorded territories/nests/pairs are reported and shown in figures. For the red-backed shrike however, population change is shown in the form of a chain-index. The reason for not using the recorded number of territories directly in this case is that the monitored areas have not remained exactly the same during the years. To come around this problem, but still be able to compare the population development in an easily understandable way, a chain index is constructed. The chain index is created by comparing *areas checked equally well* in two following years and calculating the change in percent between these two. Then the procedure is repeated for next two following years and the new change (in percent) is added/subtracted to/from the figure. In the red-backed shrike case the calculation was made as follows (in this case with regional model area, excluding the local area as an example).

- Index for the start year is set to 1. This is the basis for all future comparisons.
- In our first year with a reasonable coverage of shrikes in Simpevarp (2003), 34 occupied territories were recorded. Of these, 13 were in areas covered equally well also in the following year (index calculations can only be made when at least two years of data is collected, since it is made in a back-wards calculating mode).
- In 2004, our second year of good coverage, 54 occupied territories were recorded. Of these, 19 were in parts checked equally well in 2003.
- The index for 2004 is calculated as:  $((19-13)/13) + 1 = 1.46$ . Interpreted as a 46% increase in numbers between 2003 and 2004.

- There were 35 recorded territories in 2004 in areas covered equally well also in 2005.
- 30 occupied territories were recorded in these parts in 2005.
- The index for 2005 is then calculated as:  $((30-35)/35) + 1.46 = 1.32$ . Interpreted as a 14% decrease in numbers between 2004 and 2005 (but still on average a 32% increase from 2003 to 2005!).
- Coverage in 2006 was identical to 2005. 24 occupied territories were registered. Hence, the index will be  $((24-30)/30) + 1.32 = 1.12$
- In 2007, 53 occupied shrike territories were found in areas covered during 2006. Coverage in both years was identical. The index for 2007 will then be  $((53-24)/24) + 1.12 = 2.33$

and so on.

For statistical tests of trend data the Spearman rank correlation test /Sokal and Rohlf, 1997/ was used. This test is a non-parametric correlation test where one simply test whether a variable  $y$  (number of bird pairs in most of our cases) has changed in a significant direction (upwards or downwards) in relation to variable  $x$  (year in this case). Statistical results presented are the correlation coefficient  $r_s$ , which varies between  $-1$  and  $1$ . A value of  $0$  means that there is no correlation at all, the higher the value of  $r_s$ , the stronger the positive correlation (increase in this case), the lower the value of  $r_s$ , the stronger the negative correlation (decrease in this case).  $p$  is the probability that the true result is actually different from the obtained result, or to put it in other words, the probability to find the significant result by random.  $N$  is number of data points entered into the correlation. Hence, a high or low  $r_s$  value (close to  $1$  or  $-1$ ) means that there is a strong correlation and will yield a low  $p$ -value. Non-parametric tests were used to avoid assumptions about data distributions. All tests were performed in the software SPSS 16.0. for Windows /SPSS inc./.

## 5 Results

### 5.1 Listed species

#### Listed species selected for monitoring

The following section gives a summary of the population development in the last five-seven years of eight selected species listed as endangered, threatened or vulnerable according to the Swedish Red List /Gärdenfors (ed.) 2005/, and/or listed in the European Unions' Birds Directive Annex 1 (79/409/EEG) within the Simpevarp area. These eight species were selected for monitoring because they are of high conservation concern or because the Simpevarp area is a stronghold for the species in question. The information presented is based on data gathered in all seven years (2002–2008) although a complete coverage of the regional model area was not gained until 2003.

The text covering breeding success of white-tailed eagles is written by Björn Helander, Swedish Museum of Natural History, Stockholm.

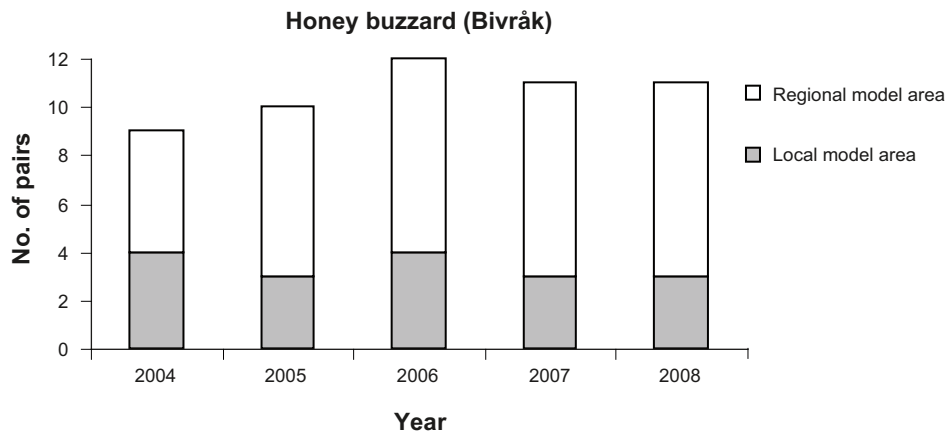
#### **Honey buzzard** *Pernis apivorus* *Bivråk* (Sw. Red List; EU Annex 1)

Special surveys directed at finding honey buzzard territories have now been carried out for five years in the area. During this time numbers of occupied territories have been very stable, varying between nine and twelve in the whole regional model area. Also the numbers of territories with parts in the local model area has remained stable, varying between three and four. 2008 fell nicely within this pattern with altogether eleven occupied territories where of three had parts within the local model area. There is no significant trends in overall numbers of honey buzzards in Simpevarp (Spearman's rank correlation  $r_s = 0.67$ ,  $p = 0.22$ ,  $N = 5$  for the whole area), nor for the local model area as such (Spearman's rank correlation  $r_s = -0.58$ ,  $p = 0.31$ ,  $N = 5$ ). There is however a weakly significant increasing trend in the regional model area outside of the local area (Spearman's rank correlation  $r_s = 0.89$ ,  $p = 0.04$ ,  $N = 5$ ). However, as mentioned initially generally speaking numbers have been very constant and part of the recorded small increase in the regional model area may actually be a result of that it takes a few years to find all territories in an area as large as this.

No efforts were made to follow up breeding results in any detailed way this year, but incidental observations indicate that several pairs may have successfully raised young.

Simpevarp hold relatively high densities of honey buzzards (about 0.10 pairs/km<sup>2</sup>). It is likely that the small-scaled landscape dominated by forest with many small agricultural areas interspersed, together with a high number of sun-hours during summer (typical for the south-east coast of Sweden) promotes a high insect abundance. Honey buzzards are dependent on larger social insects like wasps, bees and bumble-bees for successful breeding. The young honey buzzards are mainly raised on a diet consisting of insect larvae.

The honey buzzard is classified as 'Endangered' (starkt hotad) in the Swedish Red List. National population size has declined with 50–70% during the last three decades and was estimated to about 5,000 pairs in 2004. The main causes of the decline are thought to be large-scale landscape changes due to both agriculture and forestry, at the same time as conditions along the migration routes and in the wintering areas have deteriorated /Tjernberg and Svensson (ed.) 2007/. The national population has however probably remained fairly stable during the last ten years /Ottvall et al. 2008/.



**Figure 5-1.** Number of territorial pairs of honey buzzards in Simpevarp in 2004–2008. Shaded parts show the number of territories with parts extending into the local area.

### White-tailed eagle *Haliaeetus albicilla* Havsörn (Sw. Red List; EU Annex 1)

The breeding success of white-tailed eagle was comparably poor in the Simpevarp area in 2008. As in 2007, the main reason is believed to be observed aggressive interactions between neighbouring territorial pairs in this study area. The reference population performed more successfully this year. Breeding success in the Simpevarp area as well as in the reference area has tended to decline in the latest years, compared to 1998–2001 and 2002–2005, but it is too early to say if this is really a trend. Except for 2003, when investigations by SKB started at Simpevarp and lead to a strong increase in human disturbance in the area, there is no conclusive evidence that the activities in the local model area has had an impact on the breeding success of the eagles at Simpevarp.

### Osprey *Pandion haliaetus* Fiskgjuse (EU Annex 1)

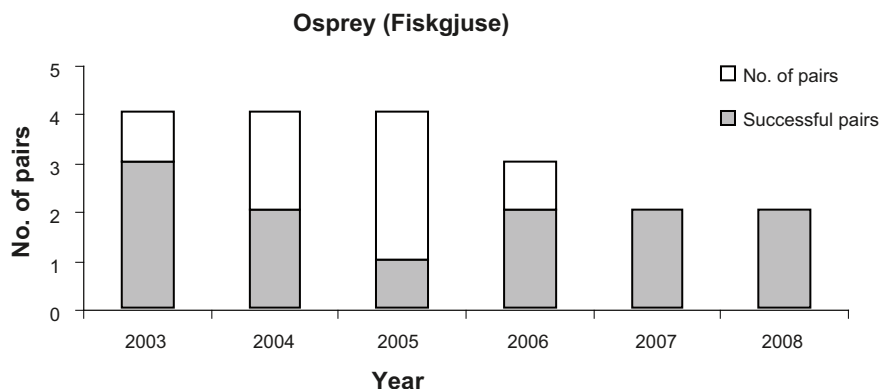
The number of active nests remained on the same low level in 2008 (two) as in 2007. As in earlier years, there was an occupied (and this year successful) nest just outside the regional model area. Both pairs within the regional model area produced large young in 2007 and four young were fledged. Breeding success of the present pairs was hence good (above average). The local population trend in Simpevarp is significantly negative (Spearman's rank correlation  $r_s = -0.93$ ,  $p = 0.008$ ,  $N = 6$ ) for the period 2003–2008.

Breeding results for ospreys has been surveyed along the coast of eastern Småland by Tommy Larsson and Arne Schönbeck since 1999 (1998 was a start-up year with a smaller coverage). Each year 15–25 nests are checked; the number of breeding attempts registered, the number of large young is counted and the young are ringed. Breeding results during 1999–2008 for the whole surveyed area (including the SKB regional model area) are shown in Table 5-2.

**Table 5-1. Percent successfully breeding pairs of white-tailed eagle in 1998–2001 (background, before site investigations) and in 2002–2008 (during and after site investigations) at Simpevarp (N = number of checked territorial pairs).**

Area	1998–2001	2002	2003	2004	2005	2002–2005	2006	2007	2008	2006–2008	N
Simpevarp	78	100	0	100	100	78	100	25	33	50	28
Reference	77	88	75	88	75	81	57	60	71	63	77

(Report by Björn Helander, Swedish Museum of Natural History, Stockholm)



*Figure 5-2. Number of breeding pairs of ospreys (fiskgjuse) in the regional model area at Simpevarp 2003–2008. Shading shows the number of successful pairs.*

**Table 5-2. Breeding results of ospreys along the Mönsterås-Oskarshamn-Simpevarp coast (including the SKB regional model area) during the last ten years.**

Year	Controlled nests	Breeding attempts	Successful nests	% successful breeding attempts	No. of large young per breeding attempt
1999	15	11	7	64	1.0
2000	20	12	10	83	1.8
2001	17	12	11	92	1.2
2002	18	15	12	80	1.4
2003	21	18	11	61	1.4
2004	23	18	10	56	1.2
2005	22	15	11	73	1.8
2006	18	14	9	64	1.5
2007	19	17	11	65	1.1
2008	19	16	12	75	1.4
<b>Mean</b>	<b>19</b>	<b>15</b>	<b>10</b>	<b>71</b>	<b>1.4</b>

**Table 5-3. Breeding success of ospreys in the regional model area at Simpevarp compared to the reference area south of this in 2003–2008.**

Year	SKB RMO % successful breeding attempts	SKB RMO No. of large young per breeding attempt	REF % successful breeding attempts	REF No. of large young per breeding attempt
2003	75	2.0	50	1.1
2004	50	1.0	57	1.3
2005	25	0.8	91	2.2
2006	67	1.3	64	1.5
2007	100	2.0	60	1.0
2008	100	1.5	71	1.4
<b>Mean</b>	<b>70</b>	<b>1.4</b>	<b>66</b>	<b>1.4</b>

The number of breeding attempts in 2008 was at the same level as in 2007. Breeding success was just above average for the whole period. Overall there is a close to significant increasing trend in the recorded number of breeding attempts from 1999 to 2008 (Spearman's rank correlation  $r_s = 0.61$ ,  $p = 0.06$ ,  $N = 10$ ). The number of breeding attempts/ controlled nests also tend to increase but not significantly so (Spearman's rank correlation  $r_s = 0.55$ ,  $p = 0.10$ ,  $N = 10$ ). There has not been any significant changes in the proportion of successful breeding attempts (Spearman's rank correlation  $r_s = -0.22$ ,  $p = 0.54$ ,  $N = 10$ ) or in the number of produced large young per breeding attempt (Spearman's rank correlation  $r_s = 0.07$ ,  $p = 0.84$ ,  $N = 10$ ). In other words there are indications of a general population increase in the whole area, but breeding success remains at the same level through the whole period.

The breeding results in the SKB regional model area (SKB RMO) is showed in Table 5-3 in comparison with results from the remaining study area (REF), here used as a reference area. There is no statistical difference in the proportion of successful breeding attempts (Wilcoxon's sign rank test,  $Z = 0.52$ ,  $p = 0.60$ ,  $N = 6$ ) or in breeding success (Wilcoxon's sign rank test,  $Z = 0.10$ ,  $p = 0.92$ ,  $N = 6$ ) between the regional model area and the surrounding reference area during 2003–2008.

Local population size (within the regional model area) has decreased during the study years. At the same time regional population size (within the reference area) shows tendencies of an increase during the last ten years. This indicates that the decrease in numbers within the regional model area is more a result of a re-distribution of birds than a general population decrease. None of the pairs 'missing' from the SKB area in later years are likely to have been disturbed by the site investigations, as none of the nests are in areas close to where these has been conducted. Still, it is likely that human disturbances are responsible for the loss of at least one pair as these had their territory in an area with high levels of human presence. Ospreys are sensitive to prolonged disturbances around nest sites, especially during the early stages of the breeding cycle. National population size of ospreys have remained fairly stable during the last ten years after a period of large-scale increase in numbers during the previous decades (Ottvall et al. 2008/).

#### Eagle owl *Bubo bubo* Berguv (Sw. Red List; EU Annex 1)

Four occupied territories were recorded in 2008, the normal number of territories for the whole study period and one up from last year. One of the pairs successfully produced young, the first successful breeding in the area since 2005. There is no trend in eagle owl numbers in Simpevarp (Spearman's rank correlation  $r_s = -0.41$ ,  $p = 0.36$ ,  $N = 7$ ) or in number of successful pairs (Spearman's rank correlation  $r_s = 0.29$ ,  $p = 0.53$ ,  $N = 7$ ) over the seven years. Breeding success has remained constantly low during the whole study period.

Breeding output for the regional model area and the reference area as a comparison is shown in Table 5-4.

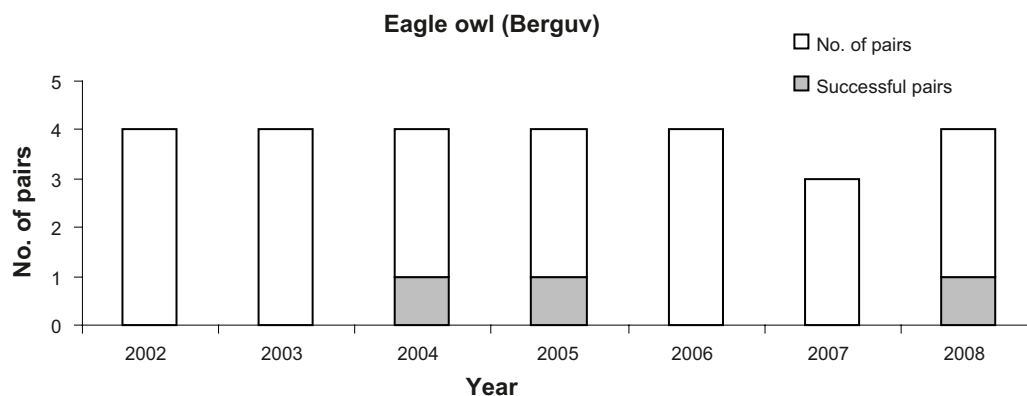


Figure 5-4. Number of eagle owl (berguv) pairs in the regional model area in Simpevarp 2002–2008. Shaded parts show number of successful pairs.



**Table 5-4. Breeding results (number of young/controlled territory) for eagle owls in the regional model area (SKB RMO) and reference areas north and south of this (REF) in 2002–2008.**

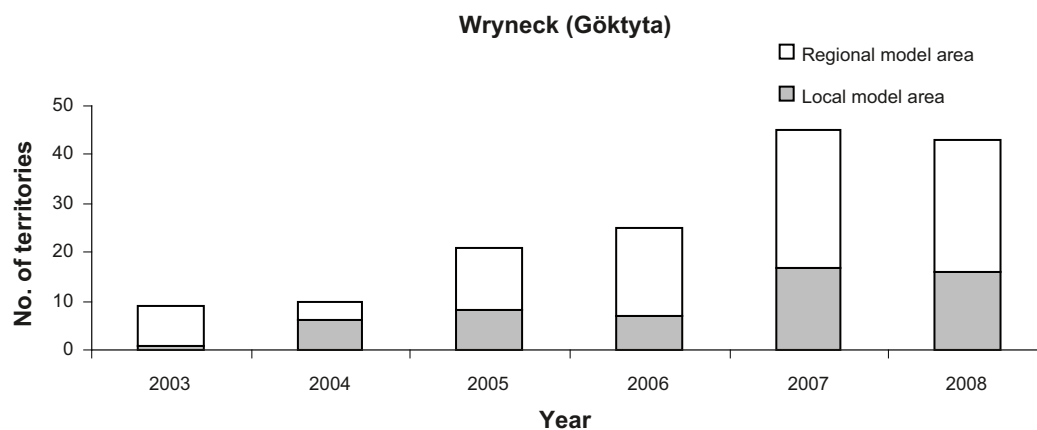
Year	SKB RMO No. of large young per territory	REF No. of large young per territory
2002	0	1.0
2003	0	2.3
2004	0.8	1.3
2005	0.8	1.3
2006	0	0
2007	0	1.2
2008	0.5	0.8
<b>Mean</b>	<b>0.3</b>	<b>1.1</b>

For the period 2002–2008 there is a significant difference between the SKB-area and the reference area (Wilcoxon's sign rank test,  $Z = -2.21$ ,  $p = 0.03$ ,  $N = 7$ ) with lower numbers of young produced in the former (see Table 5-4). As pointed out several times before, this was however also the case before the site investigations started and we have no reasons to suspect that the low breeding output in any way is connected to the site investigations (none of the territories are in close contact with the sites where the intensive parts of the site investigations have been conducted). The reason behind this difference is still unknown but points out that the local population can not be sustained without immigration from other areas with higher reproductive output.

#### **Wryneck *Jynx torquilla* Göktyta (Sw. Red List)**

Wryneck numbers almost remained at the high level recorded in 2007. Numbers were marginally lower both in the local and the regional model areas in 2008, but the small difference is well within the error margin of the used method. Hence, the conclusion is that numbers remained stable in the last two years after the large increase between 2006 and 2007. Seen over the whole study period there is a significant increasing trend for wrynecks in Simpevarp overall (Spearman's rank correlation  $r_s = 0.96$ ,  $p = 0.003$ ,  $N = 6$ ), in the regional model area (Spearman's rank correlation  $r_s = 0.93$ ,  $p = 0.007$ ,  $N = 6$ ) and in the local model area (Spearman's rank correlation  $r_s = 0.93$ ,  $p = 0.008$ ,  $N = 6$ ).

The wryneck is classified as 'Near-Threatened' (missgynnad) in the Swedish Red List /Gårdenfors (ed.) 2005/. The number of wrynecks in Sweden decreased with over 50% between 1975 and the late 1990-ies, but the numbers have increased quite dramatically again in later years /Ottvall et al. 2008/. National numbers are however still below the numbers found in the mid 1970-ies, despite the recent increase. The reason behind the large decline is probably



**Figure 5-5.** Number of recorded occupied territories of wrynecks (*göktyta*) in Simpevarp 2003–2008. Shaded parts show the number of territories within the local area.

loss of suitable habitats as a large proportion of small-scale farms in largely forested areas were abandoned in the mid 1900-s. National population size is estimated to be 5,500–15,000 pairs /Tjernberg and Svensson (ed.) 2007/. After the increase in recent years the later figure is probably closer to the present situation.

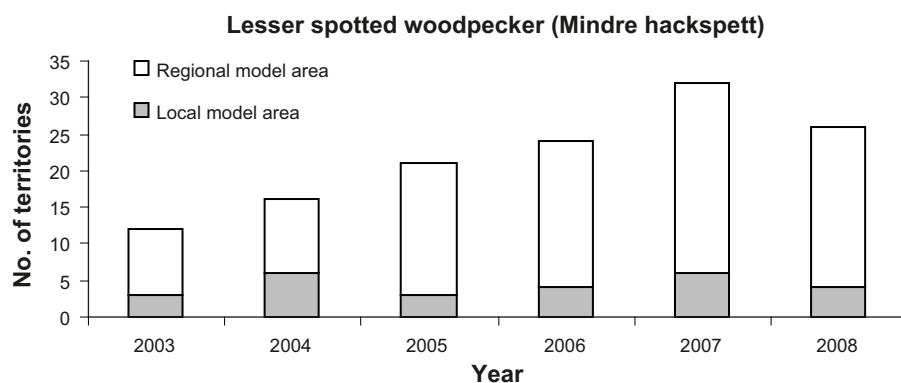
There are no signs what so ever of that wrynecks should have been negatively affected by the site investigations. Local population trend is positive and seemingly following the present national trend, even though the observed increase in Simpevarp is much stronger than the one recorded on the national level so far.

### Lesser spotted woodpecker *Dendrocopus minor* *Mindre hackspett* (Sw. Red List)

After showing a consistently increasing pattern during 2003–2007, recorded numbers of lesser spotted woodpecker decreased slightly from 2007 (32 recorded territories) to 2008 (26 recorded territories). A similar decrease occurred both the local model area and in the remaining parts of the regional model area. Despite the decrease there is a significant increasing overall trend during 2003–2008 (Spearman’s rank correlation  $r_s = 0.94$ ,  $p = 0.02$ ,  $N = 6$ ). All of this increase has occurred in the parts of the regional model area outside of the local model area (Spearman’s rank correlation  $r_s = 0.94$ ,  $p = 0.02$ ,  $N = 6$ ) and numbers within the latter have remained constant (Spearman’s rank correlation  $r_s = 0.36$ ,  $p = 0.48$ ,  $N = 6$ ) with some variation between years.

The earlier registered difference in population development between the local model area and the remaining parts of the regional model area remains. As pinpointed in last years report /Green 2008/ this could have been a result of the disturbing parts of the site investigations but it is more likely that there are other factors behind this. The study has been going on during a period of general population increase on a much larger level than followed here and it is likely that suitable parts (for lesser spotted woodpeckers) of the local area were saturated with birds already from the start of this study, being the ones with the best woodpecker habitat. If so, we would not expect any increase in these parts even if total population size increased. The increase would rather take place and be noticed in areas having ‘vacant possible territories’ and it might be that in the case of our study area, the regional model area had just this.

The lesser-spotted woodpecker is classified as ‘Near-Threatened’ (missgynnad) in the Swedish Red List. National numbers decreased with about 50% between 1975 and 1990, but recovered remarkably during the last decade, especially during last few years /Ottvall et al. 2008/. The lesser-spotted woodpecker was negatively affected by the loss of dead wood due to modern forestry and also by the conversion of mixed and deciduous forests to monoculture conifer forests. National population size was earlier, after the strong decrease, estimated to about 3,000 pairs /Tjernberg and Svensson (ed.) 2007/, but may now again be even higher than in the mid 1970-ies. The reasons behind the recent increase have not been studied in detail but the new forestry policy introduced in the 1990-ies have resulted in that the amount of deciduous trees and the amount of dead wood, both factors favouring lesser spotted woodpeckers, have increased again in later years /<http://www-riksskogstaxeringen.slu.se/>.



**Figure 5-6.** Number of occupied territories of lesser spotted woodpecker (*mindre hackspett*) in Simpevarp 2003–2008. Shaded parts show number of territories within the local area.

**Nightjar *Caprimulgus europaeus* Nattskärra (Sw. Red List; EU Annex 1)**

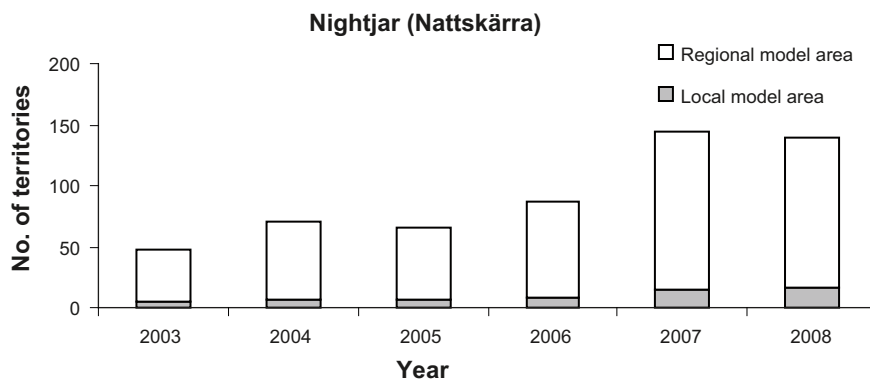
Nightjar numbers remained at the very high level recorded in 2007 (144 occupied territories) also in 2008 (140 occupied territories). Numbers increased slightly in the local area (+21%) and decreased slightly in the regional model area outside of the local area (-5%). There has been a significant general increase in numbers in the whole area 2003–2008 (Spearman’s rank correlation  $r_s = 0.89$ ,  $p = 0.02$ ,  $N = 6$ ). Nightjars have increased in numbers both in the local area (Spearman’s rank correlation  $r_s = 0.99$ ,  $p < 0.001$ ,  $N = 6$ ) and in the regional model area excluding the local area (Spearman’s rank correlation  $r_s = 0.89$ ,  $p = 0.02$ ,  $N = 6$ ). One should bear in mind though that coverage was not complete in 2003, probably inflating the estimate of the observed increase. Still, that numbers of nightjars have increased in last six years is absolutely clear. The proportion of birds registered in the northern half of the regional model area was at a similar level as in last year (91% 2008, 92% 2007, annual variation 2003–2006: 71–89%).

The nightjar is classified as ‘Vulnerable’ (sårbar) in the Swedish Red List. National numbers probably decreased with up to 20% between 1975 and 1995. This certainly applies to the more northern parts of the distribution range in Norrland and Svealand. If a similar decrease also took place in the southern parts of Sweden remains uncertain. The factors behind the decrease were probably related to large-scale changes in forestry and agricultural practises. National numbers have probably increased again during the last decade /Ottvall et al. 2008/.

The latest estimate of the national population size is 2,000–2,500 pairs, but these figures are quite uncertain /Tjernberg and Svensson (ed.) 2007/ and most probably true numbers are higher than this. A national survey of the species was made in 2007, but the results have not been published yet. In any case the Simpevarp area holds the highest recorded densities of nightjars in Sweden and, as pinpointed earlier, the area is to be regarded as of national importance for the species.

**Red-backed shrike *Lanius collurio* Törnskata (Sw. Red list, EU Annex 1).**

Numbers of red-backed shrike decreased somewhat within the local area between 2007 and 2008 (-51%) but remained completely unchanged in the regional model area. The population development of red-backed shrikes in Simpevarp is shown below in figure 5-8. As in earlier years population development is shown by an index where the percent change between areas checked equally well in years following each other are compared. Index for 2003 (the first year with decent coverage of the species) is set to one. The figure should be read as there has been a 75% increase in red-backed shrike numbers within the local area between 2003 and 2008 (index series 1-1.09-0.93-1.36-2.26-1.75) etc.

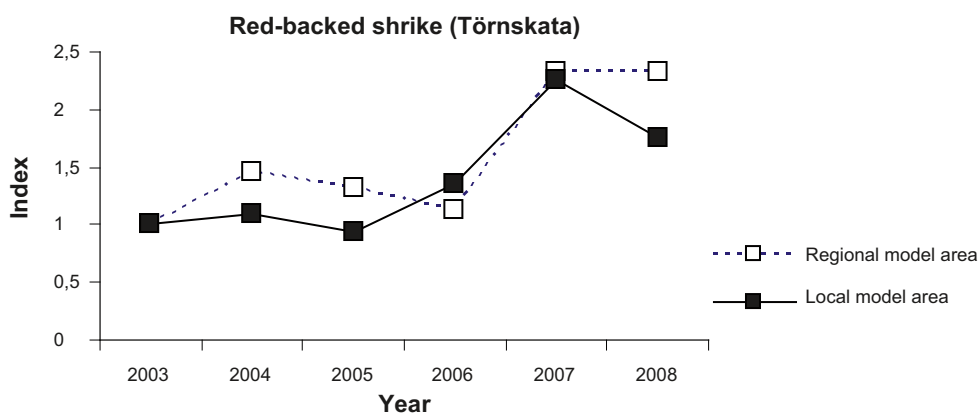


**Figure 5-7.** Number of occupied nightjar (nattskärra) territories in the regional model area of Simpevarp 2003–2008. Shaded parts show the number of pairs in the local area. Note that coverage of the area was not complete in 2003, probably making showed numbers in that year an underestimate of true numbers.

Even though there has been an increase in recorded numbers over the period, this increase is not statistically significant (Spearman's rank correlation  $r_s = 0.77$ ,  $p = 0.07$ ,  $N = 6$ ), mainly due to that the short period covered would need even larger changes to correctly classify the change as significant. Numbers within the local area and the regional model area outside of the local area has followed each other through the years up until 2008 when a decrease was recorded in the local area.

The red-backed shrike is classified as 'Near-Threatened' (Missgynnad) in the Swedish Red List /Gärdenfors (ed.) 2005/. National numbers have according to existing data decreased strongly over the last 30 years /Lindström et al. 2008, Ottvall et al. 2008/. The reason for the decrease at a general level is thought to be habitat loss, as many semi-natural grazing pastures have disappeared during later decades. Questions are however now being raised about whether this actually mirrors the national situation correctly. Recent analyses have shown that maybe up to 80% of the Swedish red-backed shrikes occur in other habitats than semi-natural grazing pastures, i.e. clear-cuts etc. If so, numbers recorded in agricultural areas may not show the situation in other habitats. On the other hand, if factors outside of the breeding area are driving the population development, similar patterns would be expected irrespective of chosen breeding habitat. At present there are no good data on development in different habitats, but studies indicate that shrikes in clear-cuts may face lower nest predation pressure than shrikes in agricultural landscapes /Söderström 1996/.

In Simpevarp about 70% of the recorded red-backed shrike territories in 2002–2008 were in clear-cuts or under power wires. About 30% were connected to agricultural land.



**Figure 5-8.** Population development of red-backed shrikes in Simpevarp 2003–2008 shown as a chain index. Index for year 2003 is set to 1. See text for further explanations.

**Table 5-5. Population changes of selected listed species in Simpevarp between 2007 and 2008. A + sign means that the number of territories has increased, a – sign means that it has decreased, a 0 that there is no major change and denotes that the situation is unclear.**

Species	Regional model area	Local area	Whole area	Long-term trend
Honey buzzard	0	0	0	0
White-tailed eagle	0		0	+
Osprey	0	0	0	–
Eagle owl	+	0	+	0
Wryneck	–	–	–	+
Lesser spotted woodpecker	–	–	–	+
Nightjar	–	+	–	+
Red-backed shrike	+	–	+	+

## 6 Discussion

After six to seven years of monitoring, patterns recorded during a specific year tend to be very similar to what has been recorded earlier. No dramatic changes normally occur and reports like these tend to be repetitions of what has been said earlier. This is also the case with this report. The underlying question to answer when the monitoring activities started was if selected listed bird species were affected in any way by the site investigations. This question has been quite convincingly answered on a general level in earlier reports. The answer was no, there were no large general impacts on the breeding bird fauna around Simpevarp from the site investigations /Green 2003, 2004, 2005, 2006ab, 2008/. General changes in the local bird fauna have instead followed large-scale patterns at the national level.

Interestingly, some of the very few possible negative impacts from the site investigations seem to have been temporary. Nightjars showed signs of changed local distributions (but not numbers) during the early years of the surveys in that they seemingly avoided the parts of the area where the most intensive parts of the site investigations were carried out. During the last years nightjars have again been found in these parts.

Local breeding success of white-tailed eagles has in later years decreased below the levels before the site investigations started, but so has breeding success in surrounding reference areas. Even though there are indications of that the eagles were disturbed by site investigation activities during the first year of these, the situation during later years indicate that something has happened also at a larger scale.

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## Appendix 1

**Table A-1. List of all listed (Swedish Red List, SRL, and EU Birds Directive Annex 1, EU) bird species, possibly breeding in Simpevarp and recorded during 2002–2007. The listing follow the updated version of the Red List /Gärdenfors (ed.) 2005/.**

English name	Swedish name	Latin name	Listing	Estimated population size (pairs/territories) in Simpevarp (regional model area)
Whooper swan	Sångsvan	<i>Cygnus cygnus</i>	EU	3–4
Shoveler	Skedand	<i>Anas clypeata</i>	SRL	0–1
Velvet scoter	Svärta	<i>Melanitta fusca</i>	SRL	5
Hazelhen	Järpe	<i>Bonasia bonasia</i>	EU	10
Black grouse	Orre	<i>Tetrao tetrix</i>	EU	20
Capercaillie	Tjäder	<i>Tetrao urogallus</i>	EU	10–15
Black-throated diver	Storlom	<i>Gavia arctica</i>	EU	2
Bittern	Rördrom	<i>Botaurus stellaris</i>	SRL, EU	1
Honey buzzard	Bivråk	<i>Pernis apivorus</i>	SRL, EU	10–12
White-tailed eagle	Havsörn	<i>Haliaeetus albicilla</i>	SRL, EU	4
Marsh harrier	Brun kärrhök	<i>Circus aeruginosus</i>	EU	2
Osprey	Fiskgjuse	<i>Pandion haliaetus</i>	EU	2
Crane	Trana	<i>Grus grus</i>	EU	30–40
Turnstone	Roskarl	<i>Arenaria interpres</i>	SRL	5
Common tern	Fisktärna	<i>Sterna hirundo</i>	EU	30
Arctic tern	Silvertärna	<i>Sterna paradisaea</i>	EU	180
Caspian tern	Skräntärna	<i>Sterna caspia</i>	SRL, EU	1
Stock dove	Skogsduva	<i>Columba oenas</i>	SRL	20
Pygmy owl	Sparvuggla	<i>Glaucidium passerinum</i>	EU	13
Tengmalms owl	Pärluggla	<i>Aegolius funereus</i>	EU	0–2
Eagle owl	Berguv	<i>Bubo bubo</i>	SRL, EU	4
Nightjar	Nattskärra	<i>Caprimulgus europaeus</i>	SRL, EU	65–150
Wryneck	Göktyta	<i>Jynx torquilla</i>	SRL	45–50
Black woodpecker	Spillkråka	<i>Dryocopus martius</i>	EU	>30
Lesser spotted woodpecker	Mindre hackspett	<i>Dendrocopus minor</i>	SRL	26
Wood lark	Trädlärka	<i>Lullula arborea</i>	EU	40–50
Skylark	Sånglärka	<i>Alauda arvensis</i>	SRL	10
Wheatear	Stenskvätta	<i>Oenanthe oenanthe</i>	SRL	25
Grashopper warbler	Gräshoppsångare	<i>Locustella naevia</i>	SRL	0–1
Red-breasted flycatcher	Mindre flugsnappare	<i>Ficedula parva</i>	SRL, EU	5
Marsh tit	Entita	<i>Parus palustris</i>	SRL	350–400
Red-backed shrike	Törnskata	<i>Lanius collurio</i>	SRL, EU	150–200
Nutcracker	Nötkråka	<i>Nucifraga caryocatactes</i>	SRL	10
Linnet	Hämpling	<i>Carduelis cannabina</i>	SRL	?–20
Scarlet rosefinch	Rosenfink	<i>Carpodacus erythrinus</i>	SRL	20