A. LEITO & A. KURESOO, 2004 - Preliminary results of a national bird monitoring programme in Estonia. In: Anselin, A. (ed.) Bird Numbers 1995, Proceedings of the International Conference and 13th Meeting of the European Bird Census Council, Pärnu, Estonia. *Bird Census News* 13 (2000):81-86

PRELIMINARY RESULTS OF A NATIONAL BIRD MONITORING PROGRAMME IN ESTONIA

A. Leito[1] & A. Kuresoo[2]

ABSTRACT. Since 1994 a National Bird Monitoring Programme (NBMP) has been carried out in Estonia. Monitoring projects deal with breeding populations (6 schemes), bird habitats (2) and migratory populations (3). In 1994 there were over 300 monitoring sites all over the country. The number of bird species monitored was 220 in all samples combined. Five national institutions are involved in field activities. Extensive projects like bird phenology, point counts of breeding birds, White Stork scheme etc. are carried out mainly by amateur birdwatchers of the Estonian Ornithological Society.

[1] Institute of Environmental Protection, Estonian Agricultural University, Akadeemia St. EE-51003 Tartu, Estonia;
[2] Institute of Zoology and Botany, Estonian Agricultural University Riia St. 181, EE-51014 Tartu, Estonia

INTRODUCTION

A National Bird Monitoring Programme (NBMP), launched in 1994, is a long-term study on breeding and migrating populations and communities for proper protection and management. It is part of biological monitoring and belongs to the sub-program of Monitoring Species and Communities.

Ecologically, birds are on top of the food chain, so the compounds accumulating and cumulating in them are good environmental indicators. Assembling or absence of birds in certain areas reflects the quality and the condition of the ecosystem. The objective of national monitoring of birds is to provide a practical output for nature conservation and management. Data on bird monitoring can be used also in environmental expertise and in interpretation of the results of other aspects of monitoring.

Although monitoring of birds in Estonia has quite a long history, the national monitoring programme has still to be established. For this, an Integrated Bird Monitoring Programme was proposed in 1993 by ornithologists of the Institute of Zoology and Botany. The present programme was drawn up using the experience of the North European countries.

METHODS

Integrated monitoring of birds proceeds from the basic requirements of monitoring systems in general and has to be:

- continuous and long-term;
- based on widely used and internationally approved standardized methods;
- countrywide or sufficiently representative;
- compatible with other blocks of monitoring;
- linked to international monitoring systems.

All selected projects correspond to the above requirements. The structure and the general format of the database are uniform. At the same time, each project has its own specific data collecting routine as well as a reporting format. In the general database, information on monitoring sites and monitoring parameters is stored for all projects. Annual reports of projects are produced.

RESULTS

In 1994, the NBMP involved 11 projects (Table 1). Observations were made all over Estonia, with higher frequency in West and East Estonia and with lower frequency in Central and North-West Estonia. Altogether birds were observed at 302 monitoring sites in 270 UTM 10 × 10 km permanent squares. The number of bird species monitored was 220 in all samples combined. The most extensive projects with more than 300 monitoring sites were those of the White Stork, Eagles and Black Stork, Gallinaceous birds, Geese and point counts of breeding birds.

Table 1. The bird monitoring projects in Estonia in 1994.

Project		Co-ordination
I	**Breeding populations**	
	Point counts of breeding birds	EOS /A. Kuresoo/
	Bird phenology	EOS /A.Ader/
	White Stork	EOS /M.Ots/
	Raptor grid scheme	EOS /A.Lõhmus/
	Eagles and Black Stork	"Kotkas" /E.Tammur/
	Tetraonids	FPRC /E.Viht/
II	**Habitats**	
	Birds of bogs	Nigula NR /A.Leivits/
	Birds of sea-islands, flood plain and coastal meadows	Matsalu NR /T.Kastepõld/
III	**Migratory (stop-over) populations**	
	Common Crane	EOS /A. Leito /
	Whooper and Bewick's Swans	IZB /L.Luigujõe/
	Geese	NCRC /A.Leito/

EOS – Estonian Ornithological Society
IZB –- Institute of Zoology and Botany
NCRC – Nature Conservation Research Centre
FPRC – Forest Protection Research Center
"Kotkas" – Nature Conservation Co-operative Society "Kotkas"

Monitoring of breeding populations

Point counts of breeding birds have been carried out in Estonia continuously since 1983. Each route consists of twenty 5-min. stops at least 200 m apart. Twenty-two different habitats are employed in use in the project, while in analysis similar habitats are grouped. Population indices are calculated for up to 64 most common bird species using chain index method. The preliminary results of the analysed data confirm that the positive trend of several resident birds and short distance migrants is connected with mild winters in Europe in 1988-1992 (Kuresoo, 1994).

The aim of the project of **bird phenology** was to test the possibilities of using ornithophenological data in monitoring. A network of phenological observations was set up in

1992 and since 1948 it has been operating continuously. A detailed analysis of phenological data was made for the years 1966-1993. In this period, 109-234 observers took part annually in recording of spring arrival of migratory birds. Data analysis demonstrated that observations can be used for bird monitoring, as the registration frequency of arriving birds depends on bird numbers. By this method, it was established that the breeding numbers of the Corn Crake *Crex crex*, Kestrel *Falco tinnunculus*, Cuckoo *Cuculus canorus*, Roller *Coracias garrulus* and Woodlark *Lullula arborea* have decreased and the numbers of White Stork *Ciconia ciconia*, Nightingale *Luscinia luscinia* and Marsh Warbler *Acrocephalus palustris* have increased in Estonia during 28 years (Ader, Keskpaik, 1994).

The first countrywide **count of the White Stork** *Ciconia ciconia* was carried out in 1939, and since 1954 counts have been made annually. Altogether 42 total counts of the White Stork have performed up to now. In 1994, more than 500 observers took part in counts of the White Stork and the total population was estimated at 2 400 pairs (Ots, 1994). Population density was the highest in South Estonia, up to 11 pairs/100 km². The species is very rare on large islands - on Saaremaa (only 2 pairs) and on Hiiumaa (no pairs). Breeding success was quite low in 1994 - 1.75 and 2.1 young fledged for all registered pairs and successful pairs, accordingly (Ots, 1994). The long-term trend shows a continuous and steady increase in the Estonian population in the last 40 years. Estimated numbers have increased tenfold – from 310 pairs in 1954 up to 3 000-4 000 pairs in 1998 (Veroman, 1994, Lõhmus *et al.,* 1998).

The first permanent plot for studying **raptors and owls** was established at Halinga in Pärnumaa county in 1978. In 1994 six plots with a total area of 670 km² were monitored. The plots were situated in Pärnumaa county (2 plots), Tartumaa county (2), Läänemaa county (1) and 1 plot on the border of Valgamaa and Võrumaa counties. On each plot the number of breeding territories and the population density of birds of prey were registered. Altogether 19 species of birds of prey were recorded on six study plots, including 13 species of raptors and 6 species of owls. In total, 243 inhabited breeding territories and 93 inhabited nests were recorded. The population density of raptors was 17-35 territories/100 km², on average 16 territories/100 km² and the population density of owls was 8-16, on average 10 territories/100 km² (n=6) (Lõhmus,1994). On five plots the dominating species was the Common Buzzard *Buteo buteo*, whereas on Laeva plot the dominant was the Ural Owl *Strix uralensi*).

The first inventory of the nesting sites of **eagles (6 species) and the Black Stork** was carried out at the beginning of 1960s, and regular monitoring started in the 1970s. In the last ten years the activity has been countrywide. Of 216 eagle nests checked in 1994, 114 were inhabited (Lõhmus, Tammur, 1994). The population size of the White-tailed Eagle *Haliaeëtus albicilla* was estimated at 45-50 pairs, while the breeding success was 52 % (n=6). In the last 10 years the number of White-tailed Eagles has slowly but steadily increased and the present population is estimated at 70-80 pairs (Lõhmus *et al.,* 1998). The size of the breeding population of the Golden Eagle *Aquila chrysaëtus* was estimated at 30-35 pairs, while breeding success was 83 % (n=12). Although there have been no essential changes in the population size of this species in Estonia in the last 10 years, the present population is estimated at 35-45 pairs (Lõhmus *et al.,* 1998). The population size of the Osprey *Pandion haliaëtus* was estimated at 30-35 pairs in 1994, while breeding success was 93 % (n=14). The number of Osprey has slightly increased in the last decade and is estimated at 40-45 pairs at present (Lõhmus *et al.,* 1998). The Short-toed Eagle *Circaëtus gallicus* has always been a rare breeding bird in Estonia. The population size was estimated at 1-3 pairs in 1994 (5-8 pairs at present, Lõhmus *et al.,* 1998) and no inhabited nests were found. The population size of the Lesser Spotted Eagle *Aquila pomarina* was estimated at 200-300 pairs in 1994 and breeding success at 63 % (n=19). The population has probably increased in recent decades (Tammur, 1994 a,b), the present population is estimated at 480-600 pairs (Lõhmus *et al.,* 1998). A detailed study of two similar *Aquila* species has shown that Spotted Eagle *Aquila clanga* is not such a rare breeder in Estonia; its present population is estimated at 15-30 pairs (Lõhmus *et al.,* 1998). The number of

the Black Stork was estimated at 100-150 pairs, while breeding success was 44 % (n=16). The population of the Black Stork has steadily declined in recent decades and the last estimation was 80-120 pairs (Lõhmus *et al.,* 1998).

Transect censuses of **tetraonids** (*Tetraonidae*) have been carried out regularly since 1970. In 1994 monitoring was performed in 9 sample areas, altogether on 38 km² in mainland Estonia. According to the data of these censuses, the population of Hazel Grouse *Bonasia bonasia* decreased up to 3-fold during 1978-1985. The population was estimated at 20-30 in thousand pairs at the beginning of the 1990s (Viht, 1994) and at 15-25 thousand pairs at present (Lõhmus *et al.,* 1998). Crash of the Willow Grouse *Lagopus lagopus* population took place in the early 1980s. In the 1970s the population size was estimated at 300 pairs, in the late 1980s, at 50 pairs (Viht, 1994) and at present 100-150 pairs (Lõhmus *et al.,* 1998). The Estonian population of the Black Grouse *Tetrao tetrix* has decreased from about 39 thousand males in 1970 to only 11 thousand males in 1980. During the last decade the total population, estimated at 8-12 thousand males at present (Lõhmus *et al.,* 1998), has remained more or less stable. The total population of the Capercaillie *Tetrao urogallus* decreased from 5 500 to 2 800 males in 1964-1970. The population size was estimated at 2 000-3 000 males in the late 1980s (Viht, 1994) and at 1 200-2 000 males at present (Lõhmus *et al.,* 1998).

Monitoring of breeding habitats of birds

Breeding birds of bogs have been monitored continuously in Nigula bog since 1968 and in Männikjärve bog since 1987. The breeding fauna has been studied since 1988 also on some other bogs in Southwestern and Northeastern Estonia. The single-visit mapping census has been used. The parameters calculated from the census results are species density, population index and dominance. The breeding bird fauna of the Nigula bog, Männikjärve bog and Muraka bog was studied in 1994. The number of bird species was between 24 and 45, and total breeding density varied between 20-59 pairs/km². The dominant species were the Tree Pipit *Anthus triviali*) in Männikjärve and Nigula bogs and the Skylark *Alauda arvensis* in Muraka bog (Leivits, 1994). In general, the total number of breeding bird species as well as the total number of breeding pairs has increased during recent decades. In particular, the numbers and the relative frequency of dendrophilous passerines have increased in the last two decades. At the same time, several birds formerly characteristic of Estonian bogs as the Black-throated Diver *Gavia arctica*, the Peregrine Falcon *Falco peregrinus* and the Willow Grouse *Lagopus lagopus* have became very rare or disappeared.

The first censuses of **breeding birds of sea-islets** were carried out in Estonia already in the 1920s on Vaika Islands at Saaremaa. Continous monitoring on the islands of the Vilsandi and Matsalu Nature Reserves started in 1958 and on the islets of Hiiumaa in 1975. Altogether 45-60 sea-islets have been monitored annually since 1958. Several hundred other islets have been visited periodically or randomly. Within the NBMP the breeding fauna of 5 islets in the Moonsund was studied in 1994. On all study islets, the number of breeding pairs of the Common Eider *Somateria mollissima*, the Herring Gull *Larus argentatus* and the Great Black-backed Gull *Larus marinus* has increased several times during the last 30 years. At the same time a remarkable decline of the numbers of surface-feeding ducks, the Black-headed Gull *Larus ridibundus* and terns has been recorded. The newcomers are the Cormorant *Phalacrocorax carbo* (since 1984) and the Barnacle Goose *Branta leucopsis* (1981). In recent years the size as well the breeding range of the population of the Cormorant have increased dramatically. The total population is estimated at 2 000 pairs in 1994 and at 4 000-5 000 pairs at present (Lõhmus *et al.,* 1998).

The **breeding bird fauna of coastal and flood plain meadows** has been studied in the Matsalu Nature Reserve in 1957-1960, 1978-1980 and from 1983 until now. In 1994 censuses

were carried out on the southern coast of the Matsalu Bay and in the Kasari alluvial meadow. In the first study period a combined transect and mapping method was used, in second period, the mapping method and in the last period, line transect method were employed (Onno, 1963; Kuresoo *et al*., 1985; Mägi, 1993). In 1957-1992 the numbers of waders, except for the Turnstone *Arenaria interpres*, have been decreased and the numbers of passerines, especially those of the Skylark *Alauda arvensis*, have increased in open shores and coastal meadows. Also, in the Kasari flooded meadow the numbers of breeding waders, except for the Curlew *Numenius arquata*, have decreased and the numbers of open-landscape passerines have steadily increased (Mägi, 1993).

Monitoring of migratory bird populations

Counts of **autumn staging of Common Cranes** *Grus grus* started in the Matsalu NR and in its vicinity in 1980. The first countrywide count of staging cranes was carried out in 1983 when 24 thousand cranes were registered (Keskpaik *et al*.,1986). The numbers of cranes were recorded during roosting flights (from the feeding area to the roosting site and *vice versa*). In 1994 the programme concentrated on the study of the distribution pattern and dynamics of the number of autumn staging cranes in Matsalu. The staging period lasted 38 days – assembling of birds started in early August, peak numbers were observed in mid-September and the assembly disappeared in early October (Keskpaik, 1994). The maximum number of registered birds was 21.5 thousand and the calculated maximum number was almost 27 thousand. A long-term study shows a steady increase in the numbers of autumn staging cranes both in Matsalu and elsewhere in Estonia from the 1960s until the beginning of the 1990s and a decrease in the second half of the 1990s (Leito 1998). Several changes in the local distribution of cranes, obviously due to changes in agricultural practices in Estonia as well in neighbouring countries, have been observed in the last ten years. For example, on Hiiumaa Island the area of arable land has decreased about 2 times during the last ten years.

The first **countrywide count of the Whooper and Bewick's Swans** was carried out in spring 1990. The total number of staging Bewick's Swans *Cygnus columbianus bewickii* was estimated at 5 thousand and the number of Whooper Swans *Cygnus cygnus* at 6 thousand (Leito, Luigujõe, 1991). In spring the numbers of Bewick's Swan reached up to 9 (1993) and 15 thousand (1994). The numbers of autumn staging were much lower – up to 3 thousand in 1993 (Luigujõe *et al*. 1994). The most important staging areas of Bewick's Swans are located in Western Estonia (up to 14.5 thousand birds in the Matsalu Bay and up to 11 thousand on the Audru polder) and on Peipsi Lake in Eastern Estonia (up to 3 thousand). The numbers, length of the staging period and the distribution of flocks varies to a great extent in different years.

The history of **geese counts** in Estonia goes back to the end of the 1950s. Breeding Greylag Geese *Anser anser* have been counted regularly in Matsalu and Vilsandi Nature Reserves since 1958, in Käina Bay since 1960 and on the islets of Hiiumaa since 1975. The size of the Estonian population of the Greylag Goose has increased from 500 pairs at the beginning of the1960s to about 1 500 pairs in the second half of the 1980s (Leito, 1990; Paakspuu, 1994). In recent years the population has been declining and the total number of breeding pairs is at present estimated at 1 000-1 200 pairs (Lõhmus *et al.,* 1998).

Autumn staging Greylag Geese have been counted regularly since 1990. In mid-September 1990-1994, 10-15 thousand halting geese were counted in Western Estonia. The most important concentration areas of the species are situated around the Matsalu Bay (up to 10 thousand) on Saaremaa and Muhu Islands (up to 5 thousand) and on Hiiumaa Island (up to 4 thousand). Although the distribution pattern of geese is quite different in different years, the total numbers of staging geese do not reveal any steady trend.

Spring staging Barnacle Geese *Branta leucopsis* have been counted regularly since 1964. Complete ground and aerial surveys have been used for estimating the numbers of staging Barnacle Geese in Estonia. Count results demonstrate about tenfold increase in the numbers of spring staging Barnacle Geese during the last 30 years (from 10 thousand birds in 1964 to 102 thousand in 1993). At the same time the whole distribution pattern of staging areas has changed.

For the other goose species no complete counts have been made earlier. In April 1994, 11.2 thousand Bean Geese *Anser fabalis* and 6.2 thousand White-fronted Geese *Anser albifrons* were counted at 13 monitoring sites in Estonia. Geese were monitored in Estonia altogether at 38 sites in 1994.

REFERENCES

Ader, A., Keskpaik, J. 1994. Ornitofenoloogilise materjali kasutamise võimalused Eestis/Possibilities of utilising ornithophenological data in monitoring. Hirundo 7(2): 16-23 (in Estonian with English summary).

Keskpaik, J., 1994. Sookure koondumine Matsalus. Bird monitoring Annual Report, 1994. Tartu, 19 pp. (in Estonian).

Keskpaik, J., Paakspuu, V., Leito, A., Lilleleht, V., Leht, R., Kastepõld, T., Kuresoo, A. & Rattiste, K., 1986. Autumn concentration of Granes *Grus grus* in Estonia. Vår Fågelv. Suppl. 11: 81-84.

Kuresoo, A., 1994. Haudelinnustiku punktloenduse projekt. Bird monitoring Annual Report, 1994. Tartu, 8 pp. (in Estonian).

Kuresoo, A., Laidna, A., Lilleleht, V., Renno, O. & Veroman, H., 1985. Bird communities of flood plain meadows of the Kasari River. In: Kumari, E. (ed.). Matsalu - rahvusvahelise tähtsusega märgala. Tallinn, pp. 236-255 (in Estonian with English summary).

Leito, A., 1990. Geese and agriculture. Eesti Loodus, 12: 784-788. (in Estonian).

Leito, A. 1998. The Common Crane in Estonia in 1997. Hirundo 11 (1): 35-43 (in Estonian with English summary).

Leito, A., Luigujõe, L., 1991. Results of a Whooper Swan and Bewick's Swan count in Estonia. Eesti Loodus, 6:388-390 (in Estonian with English summary).

Leivits, A., 1994. Rabalindude seire. Bird monitoring Annual Report, 1994. Tartu, 4 pp. (in Estonian).

Luigujõe, L., Kuresoo, A. & Beekman, J.H., 1994. Report on study and conservation of the Bewick's Swan in Estonia. Tartu, 14 pp.

Lõhmus, A., 1994. Röövlindude seire püsialadel. Bird monitoring Annual Report, 1994. Tartu, 6 pp. (in Estonian).

Lõhmus, A., Tammur, E. 1994. Seireprojekt "Kotkad ja must-toonekurg". Bird monitoring Annual Report, 1994. Tartu, 9 pp. (in Estonian).

Lõhmus, A., Kuresoo, A., Leibak, E., Leito, A., Lilleleht, V., Kose, M., Leivits, A., Luigujõe, L. & U. Sellis., 1998. Status and number of Estonian birds. Hirundo 11 (2): 63-83 (in Estonian with English summary).

Mägi, E., 1993. Composition of nesting avifauna in Kasari alluvial meadow. Loodusevaatlusi 1992, I. Tallinn, pp. 41-63. (in Estonian with English summary).

Onno, S., 1963. Nesting Ornithofauna of the Matsalu National Park. Ornitoloogiline kogumik III. Tartu, pp. 23-53. (in Estonian with English summary).

Ots, M., 1994. Valge-toonekurg. Bird monitoring Annual Report, 1994. Tartu, 5 pp. (in Estonian).

Paakspuu, V., 1994. Greylag Goose. In: Leibak, E., Lilleleht, V. & Veroman, H. (eds.). Birds of Estonia. Status, Distribution and Numbers. Tallinn, p. 39.

Viht, E., 1994. Hazel Grouse. Willow Grouse. Black Grouse. Capercaillie. In: Leibak, E., Lilleleht, V. & Veroman, H. (eds.). Birds of Estonia. Status, Distribution and Numbers. Tallinn, pp. 87-90.