Changes in the bird fauna of the Matsalu Bay during the last 100 years

ERIK KUMARI
Eesti NSV Teaduste Akadeemia Zooloogia ja Botaanika Instituut, Tartu

In June, 1970 one hundred years will have passed since ornithological research in the Matsalu Bay area was begun. In June, 1870 Valerian Russow, curator of the Zoological Museum of Tartu University, discovered the "bird paradise" of Matsalu Bay, and since that time there have always been professional as well as amateur ornithologists who have devoted themselves to the study of the bird fauna of Matsalu Bay. Thus Matsalu has become a classic research area and there is nothing similar to it in the whole of the Baltic area.

It is natural that 100 years is too short a space of time for drawing far-reaching conclusions about the bird fauna of this area in the remote past. Nevertheless the data available enable us to explain the dynamics of the Matsalu landscape and ornithofauna during the past 100 years and at the same time to throw light on a number of zoo-geographical problems of the whole Baltic area.

The formation of the Matsalu landscape

Matsalu Bay, which is situated between Haapsalu and Pärnu on the western coast of Estonia, is a shallow bay, 21 kms long from east to west and 6 kms wide from south to north in its central part (KUMARI 1937). In the east Matsalu Bay lies adjacent to the delta of the Kasari River and the water meadow, the greatest length of which from west to east is nearly 13.5 kms and the greatest width from north to south is nearly 4.5 kms. Matsalu Bay and the Kasari water meadow with its peripheral areas cover a territory of approximately 200 square kilometres. Since 1957 the biggest and richest sanctuary of water and marsh birds, covering 50.5 sqkms, has been within this area.

Historical documents, old maps, data from literature, and oral recollections stored in the archives (KUMARI 1966) prove that until the second half of the eighteenth century the landscape of Matsalu Bay and its environs was "natural" and that the influence of man on its formation was small. It was during the first half of the nineteenth century that a more intensive economic exploitation of the natural resources of this area began, and during the last 150 years the landscape has become such as we find it at present.

Centuries ago Matsalu Bay stretched much farther east than it does at present and its waters occupied part of the territory of the present Kasari water meadow. The Kasari and other rivers running into the inner (eastern) part of Matsalu Bay formed a vast delta where dense water and marsh vegetation began to grow over a wide territory. Deposits brought along with the rivers began to fill up the delta and even in the middle of the nineteenth century vast areas covering scores of square kilometres were flooded, the water remaining there even in the summer.

From time immemorial people had used those areas. Reeds were cut for feeding cattle and, in the winter, they were cut from the surface of the ice to provide thatched the roofs. The most extensive hayfields of the neighbourhood where rich hay-crops were harvested were situated in the Kasari water meadow and in the areas neighbouring the eastern part of Matsalu Bay. In the coastal regions of Matsalu Bay there were vast pastures where thousands of cattle, sheep and horses

grazed during summer months. Thus for a long time man had helped to form the three vegetation types dominating even at the present time — reedbeds, hayfields, and pastures — which have closely been associated with all bird communities. Without human activity there would be neither the present-day vegetation types nor the abundant bird fauna characteristic of the vegetation types in this area at present. This must be borne in mind when investigating the genesis of the bird communities of Matsalu Bay and the Kasari Delta from time immemorial to the present.

When, in 1870, Russow discovered the bird fauna of Matsalu Bay (RUSSOW, 1874a, 1874b, 1874c, 1880), the reeds were distributed only in the easternmost part of the Matsalu Bay, in the area of the Kasari Delta. At that time the Kasari Delta abounded in water and Russow could row a boat on the water meadow over 5 kms (towards the east) from the estuary of the rivers. When Loudon visited the place nearly 40 years later (1910), the area nearly 40 square kilometres was still covered with swampy plains where water and marsh plants were predominant. Meadow plants grew only in the eastern section of the Kasari water meadow. Approximately 15 years later (HÄRMS 1926) the situation was nearly the same, but the reed-beds had extended considerably towards the west. Härms drew the correct conclusion that the inner part of Matsalu Bay showed a tendency to become steadily more overgrown.

During recent decades more and more dense marsh vegetation growing in the Kasari Delta and in the inner part of Matsalu Bay has created an obstacle for the waters of the rivers running into the bay. In spring and in autumn as well as during the summer rains the Kasari water meadow is extensively flooded, the latter interfering with hay-making. That is why two large branches of the Kasari Delta and other rivers running into the inner part of Matsalu Bay were dredged in the period 1927—1937.

The Kasari Delta and the areas neighbouring the eastern part of Matsalu Bay began to dry owing to the dredging of the rivers and in the following 30 years (1937—1967) fundamental changes in the local landscape took place: not only did the reed-beds begin to extend towards the west (at present the territory occupied by reeds is twice as large as it was 30 years ago), but the extensive northeastern part of Matsalu Bay turned into a hayfield. The reed-beds of the delta became much drier and the meadow vegetation spread into areas formerly occupied by reeds. Watery areas, formerly the habitat of numerous water and marsh birds, characteristic of the northeastern and southeastern parts of Matsalu Bay ceased to exist. All these changes took place in the life-time of the present generation of ornithologists, who could follow them continually.

From this the naturalists have drawn the conclusion that the changes in nature resulting from human activity (dredging of rivers) repeat in a rapid and shortened way those natural processes that have gradually taken place in this area in the course of centuries: the natural areas are continually moving from the east to the west, making Matsalu Bay shallower and replacing its areas of water with vast plains of marsh vegetation.

History of the ornithological investigation of Matsalu Bay

Valerian Russow's (1874a, 1874b, 1874c) travels aimed at studying the bird fauna of Matsalu Bay took place on the following dates (the dates are not quite exact as they have been derived from his articles and from the limited materials preserved; all the dates have been given according to the new calendar): from May 27th—June 11th, 1870; from May 28th—June 17th, 1873, and from about June 15th—25th, 1874. On his travels he was accompanied by his friend, Julius von Gernet, an amateur ornithologist, who collected oological materials. A manuscript by v. GERNET (1897) has also been preserved, but it is of little interest, being too general.

On his excursions Russow stayed at the Ähmja estate, which was situated near the north-eastern part of Matsalu Bay. The owner of the estate was Alexander Hoyningen-Huene who, being an amateur ornithologist, had carried out several observations of local bird fauna (these data were later used by KOCH 1911). If Russow had put his descriptions of his travels into proper shape in a more detailed way, it would have been possible to use them for quantitative comparison as well. It is to be regretted that, in accordance with the manner characteristic of the period, he did not do it and therefore we can use the data presented by Russow in general outline only. Russow also collected birdskins, but only limited numbers of those have been preserved (Tallinn Natural History Museum) and they have been inadequately furnished with labels (KUMARI 1955).

Regardless of all these defects Russow was the person who discovered the Matsalu "bird paradise" and his three articles on this area are among our classic works on ornithology.

The local landlord, Baron Woldemar Stackelberg, the founder of a rich oological collection, was also one of the investigators of the area. Most of his clutches have been properly

labelled and are mentioned in the catalogue compiled by KOCH (1926); at present they are in the possession of the Institute of Zoology and Botany affiliated to the Academy of Sciences of the Estonian S.S.R. Stackelberg collected oological materials from Matsalu Bay during the period 1865—1889 (especially in the years 1877—1886), and his 460 clutches represent valuable supplementary data to those presented by Russow. The most numerous data were obtained in the years 1881, 1882 and 1883, i.e. immediately after Russow's death.

On June 25th—30th, 1907, Baron Harald Loudon and S. A. Buturlin investigated the outer (western) part of Matsalu Bay, but the data presented by them are of little interest, partly owing to the fact that they were collected under very bad meteorological conditions. More valuable data were obtained by Loudon during his second trip to the Kasari Delta lasting from May 26th—June 1st, 1909 (LOUDON 1910). Soon after that Koch's book came out (1911) which, together with books published since, gives supplementary data on the bird fauna of Matsalu Bay collected by amateur ornithologists.

After an interval of approximately 15 years the bird fauna of Matsalu Bay and the Kasari Delta was investigated by HÄRMS (1926) during the period May 17th—June14th, 1924. Härms presented a comparatively detailed survey of the results of his investigations. It is necessary to point out that Härms had, as early as 1897 visited Matsalu Bay as a member of the expedition led by the outstanding Baltic ornithologist, Ernst von Middendorff, but it is to be regretted that nothing has been published on the results of that expedition.

Since that time the interest of ornithologists has continually been focused on Matsalu Bay. In the 1920's (and even earlier) trips were made here by amateurs — ornithologists Herbert Hunnius and Gustav Weltz from Haapsalu, Arnold Oldekop, Alexander Oklon and others from Tallinn. On May 16th—24th, 1926, R. F. Meiklejohn, a staff member of the British Consulate in Tallinn, stayed here to collect eggs of rare birds (MEIKLEJOHN 1926); later a number of foreigners followed his example (in the nineteen-thirties as well).

In the years 1928, 1931, 1933—1936 Erik Kumari studied the bird fauna of Matsalu Bay for a longer period. The book published by him (KUMARI 1937) can be regarded as the only thorough faunistic-ecological survey of the birds of the area. Kumari has also made excursions of shorter duration to Matsalu Bay in later years.

Since 1957 Sven Onno has been investigating the bird fauna of the inner part of Matsalu Bay. He has written two articles on the subject (ONNO, 1958, 1963) that give a thorough survey of the bird fauna of the area during the period 1957—1960. In 1958 Matsalu Bay was made a nature reserve and a number of articles have been published by members of its staff on the results of their work. But those articles have mostly been devoted to individual problems and do not deal with the bird fauna of the area as a whole.

It is to be regretted that during the past years ornithologists' interests have been focussed on the study of the bird fauna of the outer part of Matsalu Bay and of the Moonsund (Väinameri) islands. Therefore less attention has been paid to the classic investigation area — the inner part of Matsalu Bay and the Kasari Delta. We hope that in connection with the 100th anniversary of the investigation of Matsalu Bay further studies will again reach the areas where they were begun by Russow a hundred years ago.

Changes in the bird fauna in the period 1870—1970

While comparing the specific and numerical distribution of the basic stock of breeding bird fauna during the last 100 years, considerable fluctuations in different years and groups of years can be observed, but no qualitative variations can be registered.

During the past decades numerous articles have been published (including especially those on Fennoscandia) on the enrichment of the bird fauna of eutrophic water deposits and their coastal areas by more southerly bird species which are more "fastidious" about their living conditions. The spreading of such elements of bird fauna to the north can be observed in the areas situated to the north of us.

It is obvious that in the Baltic area the same process has taken place earlier, as investigations carried out in Matsalu Bay, our most reliable investigation area, do not provide ample evidence (or provide only to a limited extent) of any such phenomena the last 100 years.

The specific composition and the relative numerical strength of birds preferring eutrophic water deposits with rich vegetation and their coastal areas are, in Matsalu Bay immediately before

1970, rather similar to those immediately after 1870. Thus there are ample grounds for stating that the following species breeding in great numbers in Matsalu Bay nowadays inhabited the area 100 years ago as well:

Botaurus stellaris, Anser anser, Anas platyrhynchos, Anas acuta, Anas querquedula, Anas clypeata, Aythya ferina, Aythya fuligula, Circus aeruginosus, Porzana porzana, Crex crex, Fulica atra, Vanellus vanellus, Callinago gallinago, Numenius arquata, Limosa limosa, Tringa totanus, Calidris alpina schinzii, Philomachus pugnax, Larus canus, Larus ridibundus, Larus minutus, Chlidonias nigra, Sterna hirundo, Motacilla flava, Acrocephalus schoenobaenus, Acrocephalus arundinaceus.

As can be seen from the investigations carried out by KUMARI (1937) and ONNO (1958, 1963), many of those species show sharp annual fluctuations and the numerical strength of several species has decreased considerably during recent decades. There may be several causes for annual fluctuations (e.g., preceding severe winters caused the small numbers of *Fulica atra* in 1940 and 1963, floods in the nesting area and the high mortality of young birds — the ducks, epidemics — *Larus ridibundus,* etc.). The decrease in numerical strength observed for some time past depends on the fact that suitable habitats have become rarer (*Aythya ferina, Chlidonias nigra, Sterna hirundo*), and on shooting (during migration and also in the area before the foundation of the nature reserve; *Anas platyrhynchos, Circus aeruginosus*). At the times of the investigations carried out by LOUDON (1910), HÄRMS (1926), and KUMARI (1937) the specific composition of the breeding birds mentioned was the same and in the period 1928—1936 KUMARI could observe considerable annual fluctuations in the numerical strength of several species.

The general decline in the numbers of large birds and of those susceptible to human influence (*Botaurus stellaris, Anser anser, Circus aeruginosus, Haliaeetus albicilla*) as a result of the changes in the landscape and direct human activity during the past 100 years must have had its influence in Matsalu as well, and, in all probability, they are represented at present in smaller numbers than 100 years ago. As a result of nature conservation the numbers of *Anser anser* have begun to increase considerably in recent decades and it has nested also on maritime islands more often.

There are a number of species which have become rare or have even given up nesting at Matsalu during past decades. In this connection it is necessary to mention, first of all, *Tadorna tadorna* which according to Russow (mostly on the strength of oral information from local landlords) nested in several localities near the inner part of Matsalu Bay at that time. In the same connection it is an astonishing fact that *Mergus merganser* was not included in the list compiled by Russow while according to all other sources it occurred in the inner part of Matsalu Bay then just as it does at present.

There were sharp fluctuations in the breeding population of *Larus minutus* in the Matsalu Bay when Russow, Loudon, Härms and Kumari were working there. Russow and Loudon registered them in great numbers, while Härms recorded the species only in limited numbers. During the interim period 1928—1936 the Little Gull was most numerous in 1936 — as many as 1 000 pairs. Later this species became much rarer again and in the period 1957—1960 there might have nested only 150 pairs approximately (ONNO 1958, 1963).

In earlier decades it was character-

istic of the coastal regions of the inner part of Matsalu Bay that a few solitary pairs of *Phalaropus lobatus* nested here (KUMARI 1937, 1938). In post-war years the last pair was seen on the coast of Äärenurga in 1952 (ONNO 1958); since that time only solitary individuals have been registered in the summer, but there are no reliable data on its nesting here.

The period of the nineteen-thirties was favourable for the birds of Matsalu Bay owing to good breeding conditions in the locality and favourable wintering conditions in the areas to the south. Thus, during the period when the bird fauna of the inner part of Matsalu Bay was studied by KUMARI (1937) the following species were registered in greater numbers than 25 years later when counts were taken by ONNO (1963):

Botaurus stellaris, Anas platyrhynchos, Aythya ferina, Circus aeruginosus, Fulica atra, Larus ridibundus, Larus minutus, Chlidonias nigra, Sterna hirundo.

Since Russow's time up to the present day a certain dynamic balance in the local distribution of the main breeding species in connection with the displacement of plant formations has existed in the inner part of Matsalu Bay and the Kasari Delta. In the years 1870—1909—1924 the local distribution of these species appeared to be comparatively stable. When a more rapid displacement of plant formations from the east towards the west began owing to the dredging of the branches of the river traversing the Kasari Delta and to the drying of the water meadow, this meant that numerous former nesting places disappeared in the area of the delta and new ones came into being in Matsalu Bay. Thus ONNO (1963) could state that in the course of the last 25 years:

1) the numbers of reedbirds have decreased considerably owing to the changes in the landscape and partly also due to human activity: *Fulica atra, Chlidonias nigra, Larus ridibundus, Aythya ferina*;

2) due to the circumstance that the inner part of Matsalu Bay dried up, the numerical strength of the following species has decreased in the coastal region: *Fulica atra, Larus ridibundus, Sterna hirundo, Aythya ferina, Aythya fuligula*;

3) because the hayfields of the Kasari Delta dried up and bushes appeared in the hayfields, the numerical strength of the following species has considerably decreased: *Larus canus* and meadow waders.

In the course of the same 25 years the breeding population of the central part of Matsalu Bay has greatly increased in number and more species which formerly inhabited the coastal areas of the inner part of Matsalu Bay or the Kasari Delta have come to nest here. The numbers of meadow waders have increased considerably and they have occupied the western part of the bay: *Calidris alpina, Philomachus pugnax, Limosa limosa.* It is necessary to point out that in recent years the Black-tailed Godwit has occurred in some localities in the interior of Estonia where it had not been registered earlier.

Of the ducks, the numbers of *Anas clypeata* (especially after 1940), *Anas acuta, Podiceps cristatus* have increased considerably; of the passerines nesting in the reed-beds, *Acrocephalus arundinaceus* and *A. scirpaceus* have increased in numbers. The latter species was registered nesting in Matsalu Bay for the first time in 1934 (KUMARI, 1936). Although, in the case of some species of waders, it is clear why they have extended their range, we cannot say much to explain why ducks and warblers have done so.

In the course of the last 15 years two newcomers (not registered here before) have arrived to nest in Matsalu Bay: *Remiz pendulinus* since 1954—1955

(AUMEES & PAAKSPUU, 1963) and *Cygnus olor* since 1960.

As to the numbers of some rarer species, we can point out the following.

According to Russow *Mergus serrator* was a common nesting bird even in the central part of Matsalu Bay. None of the later authors found it to be so, and they state the same of *Mergus merganser*. It is rather doubtful that the Red-breasted Merganser as a maritime species could have regularly nested so far inland. *Anas strepera* was encountered by RUSSOW (1880) only twice. It was not until the 1950 investigations that solitary individuals of this species were registered again.

In Russow's times *Podiceps auritus* was a breeding bird represented in small numbers, but Stackelberg's collection contains six clutches from Matsalu Bay. Härms considered it to be a rare breeding species, similar to the position it had in the 1930's. In the period 1957—1960 ONNO (1963) did not register this species at all.

Of the Ralliformes, Russow discovered *Porzana parva,* a rare breeding bird which has remained in the ornithofauna of Matsalu up to the present day in the Kasari Delta, as early as 1873. This species was not mentioned again by authors until Kumari rediscovered it in 1934. In the post-war years several nests of the Little Crake have been found by staff members of the Matsalu nature reserve. In the 1930's *Gallinula chloropus* was registered in small numbers in the reed-beds at Matsalu, but it was the only time that data on the presence of this species have been obtained. That *Rallus aquaticus* must have been here continually for a long time (probably in Russow's time as well) is proved by its local popular name and by elderly people who take an interest in nature. But it was only in 1933 that Kumari established the fact of its existence. Up to the present time the Water Rail has regularly been present in the reed-beds at Matsalu, but there are sharp fluctuations in its numbers in different years. The same is also true of *Grus grus* which was represented by solitary pairs nesting regularly in the reed-beds of the Kasari Delta in the last century, but at present it is encountered only occasionally.

Capella media seems to be a species not nesting in the Kasari water meadow at present. However, there are a few clutches in Stackelberg's collection and it was at the end of May, 1909, that LOUDON (1910) observed a few individuals in the Väike-Röude water meadow.

Olav Renno has made an attempt to estimate the quantitative composition of present-day birds breeding in Matsalu Bay and the Kasari Delta. According to him (1966—1967 data) 40 000—50 000 breeding pairs nest within the limits of the Matsalu nature reserve (including maritime islands situated outside the bay) in the summer. The numbers of birds inhabiting the areas of the bay and the water meadow are the following: in the reed-beds 6 000 pairs, along the river-banks 1 000 pairs, in Kasari water meadow 2 000 pairs, in the hayfields and pastures near the bay — as many as 9 000 pairs.

Summary

In the period 1870—1970 the specific composition of the ornithofauna of the Matsalu Bay and the Kasari Delta has been to a great extent stable. Most of the species which commonly bred there 100 years ago also inhabit the area at present, while it is natural that their numerical strength has decreased if compared with the position 100 years ago. In some species it has decreased to a great extent, in others to only a limited extent.

Species breeding in eutrophic water deposits, which by origin belong to the southern faunistic complex and which at the end of the last century and at the beginning of the present century have extended their range in Fenno-

scandia to the north, inhabited the Matsalu Bay as breeding birds even in 1870. It might be possible that their numbers increased in the Baltic area while in Fennoscandia they rapidly expanded towards the north. In recent years, in connection with the change in the landscape and intensive human activity, the numerical strength of all the species inhabiting Matsalu Bay has decreased. The wild-life protection established at the end of the 1950's has contributed to the stabilization or even to the growth in numbers of several species.

A dynamic balance exists in the distribution of the bird fauna of Matsalu Bay. In accordance with the changes in natural complexes — the rise in one locality and the disappearance in the other — the habitat distribution of breeding species also changes. Extensive drainage of the Kasari Delta in the period 1927—1937 has greatly influenced the displacement of habitats of birds and the expansion of landscape types formerly prevailing in the Kasari Delta the west. In connection with these circumstances the distribution of the breeding bird species characteristic of this landscape has also changed.

A limited number of species, which formerly nested at Matsalu in small numbers, have given up nesting here. Several other species, not formerly represented here, have become breeding species.

Selostus: **Matsalu-lahden linnustollisista muutoksista sadan viime vuoden aikana**

Vuosien 1870 ja 1970 välisenä aikana alueen linnusto on pysynyt varsin samanlaisena. Eteläiset eutrofisten vesien lajit, jotka ovat Fennoskandiassa laajentaneet levinneisyysaluettaan tällä vuosisadalla, esiintyivät Matsalu-lahdella jo sata vuotta sitten, mutta on mahdollista, että ne ovat samanaikaisesti lisääntyneet myös Baltian maissa. Kaikkien lajien kannat ovat laskeneet viime vuosina, mutta 1950-luvun lopulla aloitettu luonnonsuojeluohjelma on onnistunut pysähdyttämään laskun.

Maatumisen vaikutuksesta kasvillisuusvyöhykkeet siirtyvät alueella länttä kohti. Lintulajien levinneisyys seuraa dynaamisesti tätä habitaattien siirtymistä.

References

AUMEES, L. & V. PAAKSPUU 1963. Uusi haudelinde Eesti faunas. Ornitoloogiline kogumik 3:195—205.

GERNET, J. v. 1897. Ornithologische Notizen. Manuskipt.

HÄRMS, M. 1926. Matsalu lahe ja selle ümbruse linnustikust. Loodusuurijate Seltsi aruanded 32:55—78.

KOCH, O. 1911. Übersicht über die Vögel Estlands. Reval und Leipzig.

— 1926. Eiersammlung Oscar Koch. Manuskript.

KUMARI, (Sits), E. 1936. Kahe huvitava linnu leiust Eestis. Loodusuurijate Seltsi aruanded 42:63—69.

— 1937. Materjale Matsalu lahe linnustikust. Tartu.

— 1938. Beobachtungen über Phalaropus lobatus an det Matsalu-Bucht. Loodusuurijate Seltsi aruanded 43:16—24.

— 1955. V. Russowi ja E. Middendorffi ornitoloogilisest tegevusest ja nende tähtsusest Baltimaade linnustiku uurijatena. Loodusuurijate Seltsi aastaraamat 48:47—58.

— 1966. Lindude laht. Tallinn.

LOUDON, H. BAR. & S. A. BUTURLIN 1908. Eine ornithologische Fahrt an die Matzal Wiek. Journ. f. Orn.:61—72.

LOUDON, H. BAR. 1910. Meine II. Fahrt an die Matzalwiek. Orn. Jahrbuch 21:1—18.

MEIKLEJOHN, R. F. 1926. A nesting expedition in Esthonia. The Oologists' Record 6: 75—83.

ONNO, S. 1958. Matsalu lahe ornitoloogilisest uurimisest viimastel aastatel. Ornitoloogiline kogumik 1:246—255.

— 1963. Matsalu Riikliku Looduskaitseala haudelinnustikust. Ornitoloogiline kogumik 3:23—56.

RUSSOW, V. 1874a. Ergebnisse einer ornithologischen Reise durch die Ostseeprovinzen während der Sommermonate 1870. Sitzungsber. d. Naturforscher-Gesellschaft zu Dorpat 3:150—164.

— 1874b. Bericht über die Ergebnisse einer zoologischen Reise durch Liv- und Estland im Frühjahre 1873. Ibid. 3:401—418.

— 1974c. Bericht über Ergebnisse einer ornithologischen Reise im Jahre 1874. Ibid. 3:483—491.

— 1880. Die Ornis Ehst-, Liv- und Curland's. Dorpat.

Address of the author: Prof. Dr. Erik Kumari, Eesti NSV Teaduste Akadeemia Zooloogia ja Botaanika Instituut. Tartu, Vanemuise 21. Eesti NSV.