Moult and moult migration of waterfowl in Estonia

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Waterfowl have been a favourite object of observation for Estonian ornithologists since Valerian Russov (1871) discovered the 'bird paradise' of Matsalu in 1870. Our indented coastline, rich in straits and bays, the numerous sea islands, a great number of lakes, fens and springs are all suitable for waterfowl not only at breeding time, but also in periods of passage and even in winter. Besides, since immemorial times waterfowl have been hunted in the Baltic countries. For this reason the public at large has also taken a lively interest in them.

In spite of this, the knowledge of the moult and moult migration of waterfowl has remained rather inadequate among Baltic ornithologists. It is not at all easy to investigate this interesting scientific problem; at the time of moult many dabbling ducks hide in dense vegetation, several species of diving ducks go far into the open sea where observation is difficult.

The present review tries to sum up the knowledge that has been accumulated in the past hundred years in Estonia with the aim of making it possible to plan further more detailed investigations. Salomonsen's review (1968) examined the problem as a whole.

We shall first describe those bodies of water which for decades have served as regular moulting places. The numbers indicate their locations on the map (Figure 1).

1. Matsalu Bay. The most famous 'bay of birds' in the east-Baltic area and a classical research area which has been designated a wetland of international importance. The eastern part of the bay includes reed beds of approximately 3,000 hectares and flooded meadows which are the moulting places of several species of ducks.
2. Käina Bay. A relict, very shallow, coastal lake on the Island of Hiiumaa having a rich vegetation. From the ecological point it is similar to Matsalu Bay (Mank & Kallas 1974).
3. Lakes of the Vooremaa (Drumlin Country). A group of seven eutrophic lakes located 20 km north of the town of Tartu. They are in general shallow, with a rich aquatic vegetation, lie in the depressions among drumlins in a wide agricultural landscape, and have a numerous bird fauna during breeding and at the time of passage.
4. Delta of the River Emajõgi. An extensive natural landscape on the shore of Lake Peipsi boasting several small eutrophic

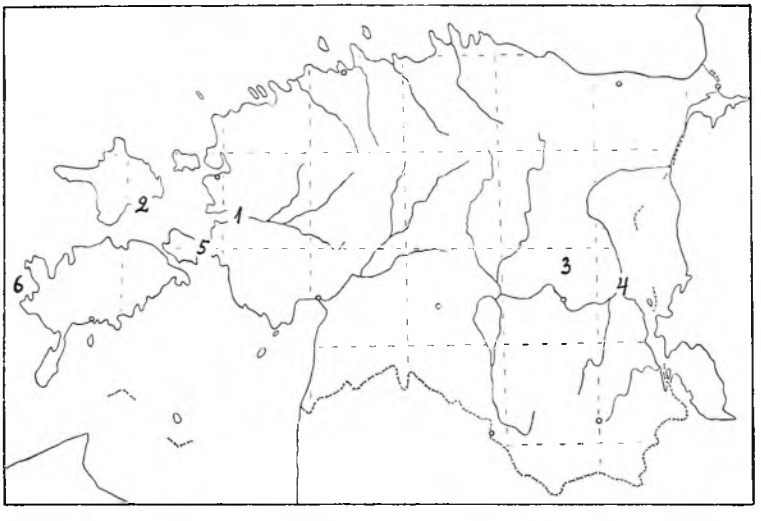

Figure 1. Moulting areas of waterfowl of major importance in Estonia. 1—Matsalu Bay, 2—Kaina Bay, 3—Lakes of the Vooremaa district, 4—delta of the river Emajõgi, 5—Great Sound, 6—coastal waters of NW Saaremaa.

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lakes and flooded meadows having a rich aquatic and marsh vegetation. This area is an important habitat for waterfowl in eastern Estonia.

5. The Great Sound. This is between continental Estonia and the Island of Muhumaa bordering in the north-east on Matsalu Bay, in the north-west on the Väinameri Sea. The sea here mostly has a depth of less than 6 m and a salinity not exceeding 5 to 6‰, and abounds in islets and shallows. The bottom is generally gravelly (occasionally sandy) and vegetation is relatively scarce.
6. The sea shelf to the north-west of the Island of Saaremaa. This is an archipelago—abounding in islets and shoals, involving part of the territory of the Vilsandi Nature Reserve. The water in the neighbourhood of the islets is shallow, but farther out mostly exceed 6 m. The bottom is gravelly and stony, vegetation is scarce, the salinity ranges up to 7‰.

Of these six important moulting areas, the first four are inland bodies of water rich in vegetation, where the chief moulters are dabbling ducks and the diving ducks Pochard *Aythya ferina* and Tufted Duck *A. fuligula*. The two last places are maritime, deep-water habitats with sparse vegetation suitable for several species of diving ducks. The data will now be reviewed species by species.

Mute Swan *Cygnus olor*

In the first decades of the 20th century a few pairs of this species bred on Saaremaa but they disappeared in 1928. It immigrated in 1959 and rapidly occupied suitable habitats on the islands of West Estonia as well as on the coast of the continent. At present at least 300 pairs are breeding. Together with the breeders there arrived small flocks of non-breeding specimens, which also moult here. Käina Bay is their most important moulting place. Since 1965 flocks of up to 85 have been met with in Käina Bay during the moulting season (June to August). Of these up to 20 were one-year-olds, easily distinguishable by their grey plumage (J. Kallas pers. com.).

According to the counts organized by the Ministry of Forest Management and Nature Conservation of the Estonian SSR at least 355 non-breeding young swans spent their summer in Estonia in 1974 (at least 175 on Hiiumaa Island). The number of non-breeding swans has since grown many-fold. Non-breeding flocks comprising some scores of swans have been met with every summer in Matsalu Bay and in the off-shore regions north-west of Saaremaa as well as in many coves and bays of southern Saaremaa, in the coastal waters of Hiiumaa and in the southern coastal regions of the Gulf of Finland. However the Mute Swan has not appeared in inland water bodies. Compared with the numbers of young Mute Swans resting and moulting in Swedish (Mathiasson 1973) and Danish (Joensen 1974) waters, the numbers in Estonian waters are very small. They are not very much higher in Latvia and Lithuania.

Greylag Goose *Anser anser*

This is one of the species whose distribution in the Baltic Sea has been very fluctuating, not only as a breeding bird, but also as a moulter. Thus, the sea-island of Hallands Väderö in SW Sweden was a moulting place in the 19th century but it has ceased to be that since the early 20th century (Andersson 1969). The lake district of Vejlerne in northern Jutland, where about two hundred pairs breed, was a moulting place for up to 3,000 geese, coming from the south and east, in the first half of the 20th century (Paludan 1965); today, however, this place is only used as a moulting place by local geese (Fig 1976). In the last few decades an extensive moulting place has come into being on the small islets of the eastern coast of Gotland (Andersson 1969; Jansson 1977) which is used by visiting geese even from Vejlerne and in all probability also from Estonia (Paakspuu 1972; Karin Jansson pers. com.). Many former moulting areas in Denmark and the GDR have been deserted and their places taken by new ones (Schröder 1971; Fog 1976; Klafs and Stübs 1977).

As for Estonia, in the late 19th century and early 20th century the Greylag Geese breeding in the reed-beds of the inner reaches of Matsalu Bay, and in the flooded meadows of the delta of the Kasari River moulted nearby (Russow 1871; Härms 1926). However, Kumari (1937) noticed that after raising young, few geese remained in the inner reaches of Matsalu Bay whereas the majority moved west to moult in the surroundings of the sea islets of the Great Sound. The distance is only 25 to 35 km, but the essential thing is that geese changed their habitats before moulting. After moulting (August to September) a part of the geese

returned to the eastern parts of Matsalu Bay, from whence they departed on migration in September to October.

In the last fifteen years the ecology of the Greylag Geese, including moulting in Matsalu Bay, has been studied by Paakspuu (1969, 1972, 1974). During this period the numbers of geese in the bays of the western coast of Estonia as well as on sea islands and islets have been steadily increasing. As a result, the breeding of geese on sea islands has also become common. At present at least 800 pairs of geese breed in the Estonian SSR as a whole, 300 to 350 of them on Matsalu Bay. Ten years ago the number of adult geese in the region of the Great Sound amounted to only 500 adults.

The moult migration begins in the second half of May when families of geese make their way towards their moulting places, stopping for a variable time off the southern shore of Matsalu Bay. Paakspuu (1974) reported that some adults begin to lose their flight feathers already during this migration but the majority of birds lose them in the second half of June. In the summer of 1972 about one thousand adults were in two large aggregations in the vicinity of the islets in the Great Sound. A mass loss of flight feathers began on the afternoon of 21st June and in a matter of 24 hours there congregations of birds became flightless. The period of flightlessness lasted for 23 to 24 days. According to Bauer & Glutz (1968) the new primaries of Greylag Geese grow 9 mm per day and are full grown in 35 days, although the geese are able to fly before that time. On 14th and 15th July the adults regained their capability of flight. At the same time young geese also started flying, at 55 to 60 days of age.

Moulting birds stay during the day on the sea; in the early morning they graze on the islets. At the approach of a boat the young birds as well as the flightless adults dive, which they never do under normal circumstances.

The breeding geese of Käina Bay (40 to 50 pairs), after hatching young also move to sea islets for moult. In late summer large flocks appear in the bay, and remain there till October. Their numbers may rise to 800, which indicates that at least part have come from other areas (Mank & Kallas 1974).

In all 10 to 11 moulting places of Greylag Geese are known to exist in Estonia at the present time, four of them being extensive (Paakspuu 1974). All of them are located round about small sea islands. Stoll (1909) reported that on the southern and western coasts of Saaremaa the families from bays and coves, as well as in coastal lakes, make their way to the neighbourhood of sea islands to moult. One of the present-day moulting areas is located in the archipelago of NW Saaremaa, serving nearby islands and shores with about a hundred breeding pairs (Aumees 1972). It has to be added that family migration is characteristic only of the Greylag breeding in the coastal regions of Estonia, not of geese which breed on sea islands. The population of Estonia after moult is up to 6,500 geese, although with geese coming from outside it may amount to 8,000 birds (Paakspuu 1974).

Shelduck *Tadorna tadorna*

During July they depart from the neighbourhood of their nesting places. There is no information as to whether they go to the moulting areas in the North Sea.

Mallard *Anas platyrhynchos*

Extensive moulting aggregations and long moult migrations of dabbling ducks such as take place in the interior of the Eurasian continent are unknown in Central and Western Europe. Moulting flocks of a few hundred males must be regarded as large (Joensen 1974; Klafs & Stübs 1977). Congregation of males starts in the second half of May and the loss of primaries begins in the first ten days of June. By the middle of July the majority of males in Germany are flightless. The moulting of flight feathers ends in the second half of August (Bauer & Glutz 1968).

The moult of Mallard is similar in Estonia. The difference lies only in that the moulting gatherings of males are considerably greater than in the western areas. The extensive reed-beds of the inner reaches of Matsalu Bay are a moulting place of Mallard of an international importance. Russow (1871) observed enormous gatherings of males on the delta of the Kasari River and saw areas where the grass had been trampled down and was densely covered with feathers. Härms (1926) saw flocks of thousands of males flying above the reedbeds and reports mass moulting in the Bay of Matsalu.

The circumstances of today are not comparable. One reason for a considerable decrease in the numbers of ducks in the gradual drying up of the bay as a result of the dredging of its rivers in the years 1927–1937; another is a general decrease in

ducks in regions from which ducks converge on Matsalu Bay.

In the period 1928–1936 every year 18,000 to 20,000 Mallard drakes performed their moult in the reed-beds of Matsalu (Kumari 1937). Congregation of ducks began in the middle of May; at the end of May stocks of up to 5,000 birds were to be seen. During the first half of June they split into groups of 5 to 50 individuals and hid in the reeds. In the course of July the drakes regained their capability of flight and by the beginning of October large numbers of birds were in breeding plumage.

According to Renno (1968) and Paakspuu (1969), thirty years later the numbers had considerably decreased and the total number of drakes was estimated at 7,000 to 11,500 individuals. It seems that with slight variations these numbers have persisted to the present day. The change of body feathers still starts in the second half of May, that of flight feathers begins in June.

In the inner parts of Estonia moulting places of Mallard drakes are the lakes of the district of Vooremaa and the estuary of the river Emajõgi. The numbers do not exceed a hundred in the first, and three hundred in the second area. Smaller gatherings can be found in a great number of bays and coves as well as on inland lakes; apparently these moulting birds come from nearby.

Teal *Anas crecca*

In Central Europe the moult of males lasts from the middle of June to the middle of August (Bauer & Glutz 1968) and occurs in small flocks in the vicinity of their nesting places (Wolff 1966; Joensen 1974). The same seems to be true of Estonia. The chief moulting places are Matsalu Bay (with about 200 birds) and the lakes of the Vooremaa district (with about 100). The birds start to arrive in the last decade of June, in July they can be seen there in large numbers. On a great many inland lakes one can see groups of a few individuals.

Garganey *Anas querquedula*

This often moults together with the Teal, though in smaller numbers. Matsalu Bay is an exception where according to Paakspuu's (1969) estimate up to 500 males may moult. In late July groups in eclipse appear, which soon depart on autumn migration.

Gadwall *Anas strepera*

A new inhabitant of Matsalu Bay, spreading within recent decades. According to Paakspuu (*in litt.*) about 30 pairs are nesting at present, and not more than 20 males are moulting in the inner (eastern) part of Matsalu Bay.

Wigeon *Anas penelope*

The moult performed by this species has undergone some changes in Estonia during the past one hundred years. Throughout that time the Wigeon has been a very sporadic breeding bird.

Russow (1880) met large groups of Wigeon drakes moulting in Matsalu Bay and expressed the view that Wigeon migrate into the bay from the middle of June onward. Individual males and groups of a few birds have often been observed in June and July (Kumari 1937, 1962). Immigration can be seen in July. Onno (1959) reports the same situation on inland lakes. According to Donker (1959), the chief moulting period of this species in Europe is in July and August. Kumari (1937) estimated the moulting gatherings in Matsalu Bay at no more than 50 males.

In the 1960s the numbers of this species began to increase in South Finland and in the years 1969 to 1972, 10 to 14 pairs of the species nested on an observation area near Helsinki (by Kalevi Raitasuo *in litt.*) In the years 1967–1969 counts were made in SW Finland over 50,000 sq km and the total number of nesting Wigeon was estimated at 444 pairs (Haapanen & Paasivirta 1972). In 1970 several nests of Wigeon were found on the shores of Eru Bay, North Estonia (Kahru 1971) Since 1972 several pairs of Wigeon have nested on Lake Neitsijarv at 40 km SSW of Tartu.

This extension of the breeding range has raised the total of the moulting population. Thus Renno (1968) noted the presence of flocks of up to 80 in Matsalu Bay and Paakspuu (1969) estimates the total moulting population of drakes at 850. An increase in the number of immigrants has generally been observed from the end of June onward, part of them being already in moult.

The lakes of the Vooremaa district as well as the delta of the river Emajõgi have also served as permanent moulting places, each with up to 50 males. There are also a great number of such lakes with individual drakes or small groups of individuals.

Pintail *Anas acuta*

The immigration of males in larger numbers into Matsalu Bay starts no earlier than July. Paakspuu (1969) estimates the number of moulting males at a hundred.

Shoveler *Anas clypeata*

In the 1930s groups of moulters started to form in Matsula Bay in the first half of June, in July part of the birds had already shed many of their feathers. At that time a few hundred males moulted there (Kumari 1937). In the early 1940s an increase in their numbers was observed. In the 1950s groups of moulting birds (including Matsalu Bay) ranged between 30 and 100 individuals. In the following decade some groups contained up to 250 males, and the total number of the moulting population at Matsalu increased to 2,200 (Paakspuu 1969). On 23 June 1976, Paakspuu (*in litt.*) observed a mass of moulting males (with 1% of females among them) on the delta of the Kasari River which he estimated at 2,000 individuals.

A few individuals moult on several other Estonian waters but in larger numbers only on the lakes of the Vooremaa district and on the delta of the river Emajõgi.

Pochard *Aythya ferina*

This belongs to those species whose changes in breeding range have involved changes in the numbers on moulting areas. As recently as the 1960s up to a thousand pairs nested in Latvia (with 350 to 400 pairs on Lake Engure and up to 200 pairs on Lake Babite (Bezzel 1967; Michelsons, Lejins & Mednis 1968). Only 400 pairs nested in Estonia (150 pairs in Matsalu Bay). The numbers of Pochard in Estonia had decreased considerably. In the 1930s the moulting population amounted to at least 3,000 males and flocks of up to 1,000 specimens were observed (Kumari 1937). Males appeared in Matsalu Bay simultaneously with the males of Mallard and the numbers of moulting birds was highest at the end of May and in the first days of June. After that they disintegrated into groups of some scores up to some hundreds of individuals (Kumari 1962). Body plumage was shed during June, flight feathers during July.

In the postwar years a large increase in the numbers of the moulting drakes has occurred. The Ismaninger ponds near München boasted 6.200 birds in 1960, 11,250 in 1963 (Bezzel 1964) and over 20,000 in 1968 (Bauer & Glutz 1969). The Mecklenburg area in the GDR has 11,000 to 12,000 moulting birds (Klafs & Stübs 1977). The IJsselmeer in the Netherlands has had tens of thousands of moulters in the years since 1974 (van der Wal & Zomerdijk 1979).

In the 1960s estimates put the numbers of moulting Pochards in Matsalu Bay at only 300 to 400 (Renno 1968; Paakspuu 1969). During the next decade several surprising influxes took place. On 11th June 1975 a great flock of Pochard numbering about 2,000 drakes gathered on the delta of the Kasari River; on 9th September 1975 8,000 individuals were counted in Matsalu Bay (V. Paakspuu *in litt.*). Whereas in the middle 1960s moulting groups of 100 to 200 males could be seen in the neighbourhood of the Puhtu Ornithological Station (at 20 km from Matsalu) (Jõgi 1970b), by the early 1970s their numbers in the Great Sound had grown considerably.

In addition, hundreds of males moult on the lakes of the Vooremaa district and on the delta of the river Emajõgi; in smaller numbers they can be found on a great many other lakes of the Republic.

Tufted Duck *Aythya fuligula*

Nonbreeding and moulting Tufted Ducks generally accompany Pochards, but always in lesser numbers. In the 1930s a few hundred males moulted at Matsalu from early June onward, larger groups consisting of 50 individuals (Kumari 1937). In the 1960s Paakspuu (1969) estimated the moulting population at 350 individuals. In the first half of September, after the shedding of flight feathers one may sometimes see thousands of individuals whose origin is unknown. Thus, on 13th September 1974 Paakspuu (*in litt.*) observed large flocks of males estimated at 7,000. Small groups of birds regularly moult in the vicinity of the Puhtu Ornithological Station, in Käina Bay, on the lakes of the Vooremaa district and on the delta of the River Emajõgi, likewise at many other places on Estonian lakes.

Scaup *Aythya marlia*

This breeds in small numbers on western Saaremaa, in sounds of western Estonia as well as in the region of the islands lying in the Gulf of Finland. It is met within groups of up

to 50 individuals in summer. In August and September sometimes hundreds or thousands congregate in the Great Sound.

Goldeneye *Bucephala clangula*

Fewer than a hundred pairs breed in Estonia. Although groups of Goldeneye can be seen on many inland lakes in June (Onno 1957), they do not moult there but fly to the open sea at the beginning of July. Stoll (1909) met with moulting flocks of males at the end of June running into several hundreds which were moulting in the sea off the southern coast of Saaremaa. Since there is a great difference between the numbers breeding in Estonia and moulting here there is no doubt that the majority arrive from outside the Republic. A considerable transit of drakes certainly occurs in Karelia between the middle of June and the end of July.

The main moulting place of Goldeneye in Estonia is the Great Sound. According to the observations of Paakspuu (1969) and Jôgi (1970a, 1970b, 1971), the gathering there starts at the beginning of June and in July large flocks of drakes arrive. The overwhelming majority are adult males, non-breeding females and juveniles of the previous year occur in small numbers. The flocks may contain up to a thousand birds and the population moulting in these straits may amount to 10,000. A large number of flightless birds remain on the shoals situated in the middle of the Great Sound. These are rather sterile with regard to vegetation but rich in bottom fauna. In this region Härms (1928) met numerous Goldeneye at the beginning of July 1925. In July 1971 Viksne (*in litt.*) detected Goldeneye moulting in three sections of the southern part of the Gulf of Riga, to a total of about 5,000 birds. Large numbers moult in the bays of northern Estonia and of Saaremaa Island. According to Jepsen (1973), 12,000 to 14,000 moult in Denmark, the majority of them (9,000) in the Limfjord, which is the second important moulting area within the Baltic.

Long-tailed Duck *Clangula hyemalis*

Throughout the summer single individuals and small groups (mostly drakes) are found off the coast of Estonia (less in inland waters). In recent years, a few small groups have been observed in the Great Sound in July and August, that is about the same time when the drakes (according to Bauer & Glutz 1969) are flightless. It is unknown if a new permanent moulting-place is being developed or if there are occasional irregular moulting birds.

Common Scoter *Melanitta nigra*

In July and August these pass in large numbers across Estonia to moulting places in the west. On most occasions the transit proceeds nonstop; no moulting-place has been detected in Estonia waters. Its major gatherings for moult in the eastern part of the North Sea and of the Kattegat were discovered not until the 1960s (Joensen 1965, 1976).

Chiefly males and immature juveniles participate in this migration, while females follow later, in autumn. Visual and radar observations (Jôgi 1970a, 1970b, 1971, 1972, 1975; Jacoby & Jôgi 1972; Viksne & Baumanis 1977; Zhalakiavicius 1976) have shown that passage proceeds chiefly along the Gulf of Finland and round the western archipelago of Estonia, only a small part moves across the western straits of Estonia into the Gulf of Riga. All this is valid during the daytime when flight is at a height of less than 100 m. During the night when flight proceeds at a great height (1,500 to 2,000 m, sometimes up to 4,500 m), transit proceeds in three chief streams diagonally across the Estonian mainland and islands. During moult migration in July and August hundreds of thousands of Common Scoters fly across Estonia. The speed of flight is about 80 km per hour.

It is worth pointing out that in case of daytime low flight (1 or 2 m above the water) birds follow the seashore; when flight exceeds a height of 1,000 m its guiding effect is lost (Veroman 1976). Koch (1911) pointed out the surroundings of Narva as a place from which part of large crowds of Common Scoters make their way towards L. Peipsi. This was later confirmed by Rootsmäe (1961) who noticed how birds left the lake in a western or south-western direction.

It may be assumed that the three migration streams across Estonia established by radar observations continue partly into Lithuania (Zhalakviavicius 1976) and from there move to the cental part of the Baltic Sea. Because of this the species passes through Poland and the GDR only in small numbers (Tomialojc 1976; Klafs & Stübs 1977).

Velvet Scoter *Melanitta fusca*

Though in some other part of the Baltic Sea the moulters of this species gather in tens of thousands as in Denmark (Joensen 1976), only small groups have been noticed in Estonian waters; most of them are obviously local representatives of this species (Onno 1957; Paakspuu 1969). Such groups consist mostly of 20 to 50 males (seldom up to 200) and are active chiefly in the coastal waters of the West Estonian mainland and in the vicinity of the western islands from the end of June onward.

Common Eider *Somateria mollissima*

The exchange of the body plumage of the drakes starts in June, the shedding of flight feathers in July (Bauer & Glutz 1969). While females are starting hatching, the males gather in Finland, Sweden and Estonia in large flocks at the end of May (Almkvist & Andersson 1972; Soikkeli 1976) and a great part of them migrate into Danish waters, where hundreds of thousands of drakes of common eiders moult (Joensen 1965, 1976).

According to earlier published data the drakes moulted in Estonian waters; their moult migration is not mentioned by anybody. Thus, Russow (1880) saw large groups of moulters in the second half of May and in the first half of June in the vicinity of the sea islands Prangli and Pakri; he caught two flightless individuals there. Thousands were met with between the islands of Pakri and Osmussaare in June (v. Middendorff 1890). Koch (1911) reports about the moult of drakes of this species in the sea far from the coast. A great number of local publications note the moult of drakes in large groups off the coast of western Saaremaa and in the surroundings of the sea islands of North Estonia.

In the last 30 years the numbers of the Common Eider as a breeding bird in Estonian waters have rapidly grown (as elsewhere in the Baltic Sea), to over 5,000 pairs (Onno 1972; Renno 1972). We do not know how many drakes fly along with Finnish and Swedish drakes to the western part of the Baltic to moult there (Soikkeli 1976). Nevertheless, a fairly big part of them apparently remain to moult in the sea adjacent to their nesting places. The most important moulting area is the coastal sea off the northwestern part of Saaremaa. According to Aumees (1968) drakes gather in large flocks of up to 500 individuals off remote islands. On 24 May 1977, Soots (*in litt.*) counted over 2,000 in groups of 200 to 300 (90% were adult drakes). From the middle of June onward the majority of these birds disappear in an unknown direction. It must be noted that in late summer (August) Common Eiders may be quite regularly seen on the territory of the Vilsandi Nature Reserve.

Another important moulting area is the shallow sea of Väinameri to the north-west of the Great Sound. According to Onno (1968), Jôgi (1968, 1970b) and Paakspuu (1969), drakes gather there are the end of May while their moulting flocks (up to 150 individuals) remain on shoals and in the neighbourhood of inlets in June and later. The situation is the same near the islands in the Gulf of Finland.

Goosander *Mergus merganser*

In all coastal waters, particularly in the regions of NW Saaremaa, the Great Sound and the Gulf of Finland, and partly also on Lake Peipsi groups of moulting birds (up to 100) are formed at the end of May and move to islets in the open sea to moult.

Red-breasted Merganser *Mergus serrator*

Similar behaviour to that of the Goosander, is observed. Its groups of moulting birds are smaller in size.

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Summary

The numbers and distribution in Estonia of moulting birds of the various species of swan, geese and ducks over the last hundred years is described.

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