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Mass migrants

Loons *Gavia*.

In Vyborgskiy Gulf loons are represented by two species Black-throated (*Gavia arctica*) and Red-throated Loon (*G. stellata*). The Yellow-billed Loon (*Gavia adamsii*), in contrast to the rest of the regions in the Gulf of Finland, was not registered in Vyborgskiy Gulf. The first loons arrived from the west (in April – only Black-throated; concentrated on Vyborgskiy Gulf at two sites: on the extensive “polynia” (unfrozen patch of water in the midst of ice) in Klyuchevskaya Bucht (Bay)(different individuals – from the moment of its forming at the beginning of the third decade of April; at the beginning of May, when “polynia” reached area of 3-4 sq km, up to 200 loons and 500 grebes concentrated here) and on the plots of fairway free from ice (different individuals in April and up to hundred specimens from the middle of the first decade of May).

It is believed, that loons that migrate along northern and partly southern coast of the Gulf of Finland arrive in the spring in Vyborgskiy Gulf (Leivo et al., 1994). The number of loons, passing through a certain point on the southern shore of Finland, remained approximately the same during last 25 years, for example, over Archipelago Sederskar at the end of 1960's in the spring 15-20 thousands have passed, and in the spring of 1993 – 15,000 individuals were recorded (Saurola, 1970; Leivo et al., 1994). In Vyborgskiy Gulf the results of my counts in 1998 are different from the results of Finnish ornithologists in 1993-1994: 2.5 and 2.4 thousand specimens, correspondingly, - though my observations covered the whole period, while our Finnish colleagues – only a part of the loon migration period. Reasons for that observation are considered in “Discussion”.

Seasonal rhythm of loon migration in Vyborgskiy Gulf (Fig.1) does not coincide with the one for Seskar Island (Buzun, 1998a), even taking into account its annual variations (see: Jogi, 1970). The short migration peak in the first decade of May, observed near Vyborg indicates that in the spring a part of Black-throated Loons reach eastern regions of the Gulf of Finland quite early, where they, probably, make a long stop-over (Kishchinskiy, 1978; Flint, 1982). The existence of two waves in passage in the Baltic area, is considered as migration of North-European and North-Eastern populations of the species (Schutz, 1974), here is not observed. Judging by sharp increase in altitudes (see below), the beginning of the distant migration spurt of the Black-throated Loon in north-eastern direction occurs on 3 May.

Fig.1. Intensity of the spring migration of loons (*Gavia arctica* and *G.stellata*) over Vyborg Gulf in spring 1998.

Along axis of ordinates – average number of passed loons per hour, calculated based on observations during 4 morning and 2 evening hours or the whole day.

The size of loon flocks is considerably distinct from the ones counted flying westwards above open sea to assumed stop-over sites (average size of flocks in the Seskar region was 3.1 birds; S.E.=0.21; moda = 1; lim 1-21; strongly asymmetric distributions; U-criterion Wilckokson-Mann-Whitney; $z=-3.71$; $P<0.0002$). However the sizes of loon flocks flying along Finnish shore are unknown to me.

Loon migration over Vyborg Gulf should be characterized as high (done at great altitude). In the spring over the open sea (Seskar Island) loons fly at an average height of 15 m (S.E.=0.96; moda=1; lim 1=100). On hand there are more than 15 times differences with high level of significance (U-criterion: $z=-18.75$; $P=0.0000$). Probably, the average height of migration in Vyborgskiy Gulf was higher, which follows from Table 3. Many migrants (which flew at serious height) were detected only by means of vocalizations (due to white coloration of lower side loons are not visible in the background of clear sky even at the height of 1.5-2 km).

Undoubtedly, loons climb in elevation over Vyborgskiy Gulf, in order to cross the Karelian Isthmus. However, judging by determined length of their one-day migration (over 300 km, see: Jogi, 1970), during one migration spurt they can reach not only Ladoga Lake, but Onega Lake as well. It is suggested, that they even can do an entire passage from Vyborgskiy Gulf to the White Sea (Flint, 1982).

Based on the analysis of the daily activity of loons the Finnish colleagues (Leivo et al., 1994; Kontiokorpi, Leivo, 1998) conclude on the existence of pre-start stopovers in the base of the Vyborg Gulf. According to their data "...s t r i c t e s t [spacing out by Author] early-morning peak of migration of loons..." takes place at "...4-7 o'clock in the morning...", while in the western parts of northern shore of the Gulf of Finland (Finland) peaks are considerably later. Authors suggest, that flying along northern shore of the Gulf of Finland loons reach Vyborgskiy Gulf by mid-day, rest here during the day and night and start in early morning. From their data we can make two important conclusions: 1) extensive stop-overs of loons exist, where all birds are gathering, migrating along northern coast of the Gulf of Finland; 2) these halts are situated in the base of Vyborgskiy Gulf. At the same time in the regional literature there are no data on the existence of the mass resting areas of loons here, that itself is not a rejection of above-mentioned statements. My data of 1998 give only partial confirmation.

First, my conclusions were made based on the following method. From data of Table 4 it follows, that on some days (3, 17, 18, 19, 22 May) in the early morning the beginning of the mass migration of loons took place, coincided with starts of the first birds, and on these days the weather was clear. On such days it is possible to speak about near start of loons from the water surface of Vyborgskiy Gulf and adjoining zones. On other days (24, 26 May and 1 June) the later start of migration and late mass migration coincided, and these days were either overcast, or just before stormy weather (1 June). They hardly can be treated the same as the days when nearest and far starts of loons took place. Finally, the majority of days (Table 4) had the beginning and peak of the morning migration scattered in time (at 55-85 min), these days were either clear or with rainy or foggy weather. In the last two situations the halt of loons' start due to bad weather conditions is not excluded.

Besides weather, other factors can affect the formation of daily waves of the mass loon migration. As it's seen in Figure 2, until the middle of May the migration peaks fall during later time, from 10 to 25 May at earlier time, and from 25 May to 3 June the intermediate situation was observed. Commenting that by materials, given in Fig.1, it is possible to note, that the 1st period is related to the beginning and to the first wave of migration, which was formed by Black-throated

Loons, 2nd and 3rd periods – with subsequent two migration waves, and also with appearance and active flight of the Red-throated Loons. Data of other kind are received as well.

On two observation points: on Seskar Island, situated to the west of the base of Vyborgskiy Gulf, and Lohaniemi Peninsula, - a similar pattern of the loons' day migration activity was observed (Fig.2).

Fig.2. Dynamics of the daily migration activity of loons *Gavia arctica* and *G.stellata* on Vyborgskiy Gulf in spring 1998 and Seskar archipelago in spring 1997 and seasonal dynamics of the morning migration activity of loons.

On Seskar observations for the day-time migration activity of loons were carried out only during the first half of day.

Thus, it is hardly possible to assess distances to the sites where loons start (migration) based on day-time migration activity of loons. Especially, considering that not all ornithologists share an opinion that loons are typical diurnal migrants (see: Jogi, 1970; Flint, 1982). If in spite of certain claims (in Fig.2 it's observed, that small number of loons undertakes migration at night), to accept an opinion of Jogi (ibidem) that the passage of loons depends on intensity of the daylight, so disagreements remain between our data and data collected by Finnish colleagues in previous years (Leivo, Kontiakorpi, 1998). Unfortunately, Finnish colleagues in their work only give the time of day (but not hours from the moment of sunrise). It should be taken into consideration that working in Russia, the Finnish colleagues used the local time and, like me, they did not take into account the summer time, introduced to this territory. There is a difference of 1.5-3 hours in one or another side of their summarized (generalized) data with my day-by-day time-studies of the mass morning migration of loons. My total (summarized) index (Fig.2) in this case is an evidence of the beginning of the mass morning migration is 1 h later and completion of it is 3 hours later than in the data, presented by Finnish researchers.

Additional data were received during more detailed consideration of the day-time migration rhythm. If to record by means of dictophone the time of passage over observation point of each flock of loons, thus during analysis it turned out, that in some days an intensity of passage had uneven pulses (Fig.3). During the morning movements the notes on passage of the separate flocks are grouped in thickening (condensation), divided by intervals, when birds didn't fly or flew by single specimens. Average duration of such waves of migration on 1 June was 10 min 36 sec (7-15 min); on average during each such period 60.0 birds passed. Average duration of inactive periods – 20 min 18 s (8-50 min), during that the average number of birds during the period – 2.5. Differences by indices of time are insignificant, by number of specimens – significant under $P=0.02$.

To all probability, an agglomeration of flocks in time means that independent groups of loons migrate. In the morning the flocks and single birds simultaneously start from the region of one migration rest area. Groups, starting from different sites, get closer in the region of Vyborg, during passage of some groups still don't overlap. A similar scheme assumes the presence of small (from 10 to 200) scattered halts of loons that was confirmed by reconnaissance observations. I could not observe the morning movements of loons in Klyuchevskaya Bucht (Bay), in the region of Tranzunskie reids, to north-east of Bolshoi Vysotskiy Island and sometimes even on the narrow plot of Gulf near Severnoe Kop'ye Cape, bordering directly with Vyborg road.

The numbers of *G. stellata* in the general flow of loons gradually increased (Table 1) from the full absence at the end of April to a fraction of percent at the beginning of May and to 18% in the third decade of May – beginning of June. The total ratio of the passing over the Gulf *G.arctica* and *G.stellata* – 87.7% and 12.2%.

Since it is difficult to distinguish jointly flying Black-throated Loons and Red-throated loons, their migrations usually are considered in the aggregate (Jogi, 1970; Leivo, Kapanen, 1995).

Nevertheless, any attempts of identification of quantitative ratio of these species in the total flow can be useful for fixation of courses of different migration flows. So, if in the central-latitudinal part of the Gulf of Finland *G.stellata* made up only 1-2% of the spring migration flow of loons, so in Vyborgskiy Gulf their numbers (weight) is increasing up to 12 %. In Estonia the ratio of the Red-throated and Black-throated Loons is 2:1 (Jogi, 1960; Jogi, 1970), at certain points even 4:1 (Puhtu, see Leivo et al., 1994), while in Finland (Southern Archipelago) the RTLOs already yield in numbers to the Black-throated Loons (6-25%); during that the general indices of passage in Finland are approximately lower by a factor of 2. In Vyborg the ratio of the RTLO and BTLO was determined in 1993 as 32% and 68%; south of Vyborg, in the region of Repino, this ratio gives already 81% and 19% (Saurola, 1970; Leivo et al., 1994).

Probably, in spring *G. stellata* rushes by a narrow flow (they are absent already on Seskar) along the southern coast of the Gulf of Finland and are drawn into its eastern appendix. Question remains open (see "Discussion"). In autumn in Vyborgskiy Gulf *G.arctica* dominates (Moskalev, 1975). A portion of this species population in the region of Repino, probably, is overestimated, because Finnish colleagues conducted observations there during 5 days only (1-2 and 10-12 May) and came up with the numbers based not on the relationship of all migrating loons, but on 2 selections valid for one occasion only (see Leivo et al., 1994), and as it was shown above, the ratio of two loon species during spring migration is changing.

Fig.3. Rhythm of the migratory activity of loons 1 June 1998.

Aggregation of flocks is sufficient (visible) from 6h07min to 6h38min, from 7h01min to 7h10min, probably, from 7h40min to 7h56min and from 8h42min to 8h49min. Concentrations, starting separately, were the following large flocks at 7h01min, 7h40min and 7h46min. However, big flocks are ahead of migratory groups that conform to the picture of start.

Discussion.

The question on migration pathways of the Black-throated and Red-throated Loons remains open in the eastern part of the Gulf of Finland. Finnish ornithologists suggest that in the spring one part of *G.stellata* population increases, while a part of *G.arctica* decreases in direction from northern to southern coasts of the Gulf of Finland. Does the huge mass of loons pass through Nevskaya Guba and somewhat northwards? Regular observations of the spring migrations of birds were carried out on the southern bank many times (Gaginskaya 1967; Bublichenko, Kozlov, 1998; Rezvyi, pers. comm.) and do not confirm this conclusion, and it is not confirmed by numerous patchy data for previous ten-year periods (see: Mal'chevskiy, Pukinskiy, 1983). In autumn 1997 (25 September – 13 November) the numbers of *G.stellata* on the Kurgalskiy Reef made up at least 2 % (Buzun, 1998b).