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Lower Kunovat River Small Mammals: Communities Diversity and Sustainability

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Abstract. Small mammal communities are sensitive to the environment health and, hence, are considered to be environment condition indicators. In our research, we make use of this property and monitor environment condition at the nesting range of critically endangered Siberian white crane in June (beginning of small mammals breeding season) and August (end thereof, around the time when the white crane is off for its wintering grounds). It is established that the highest plot of the area is most beneficial for small mammals' breeding and may be considered key for further research and conservation. The investigated ecosystems are deemed relatively normal, affected by local wildfires and floods. It is recommended to both continue the study of the area's small mammals, and research its vegetation, birds and invertebrates.
Keywords: small mammals, fauna, community structure, diversity indices, sustainability indices, Kunovat Reserve, Yamal-Nenets Autonomous District.
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Introduction

At the Kunovat River area of the Kunovat Nature Reserve (Shuryshkarsky Region, Yamal-Nenets Autonomous District, Russia), close to the Kunovat River flood plain area, at its lower reaches, there is a White Crane field research station (55.75°N, 35.61667°E). Since 1991 is has been the place for research, recruitment, and conservation of the critically endangered Siberian white crane (*Leucogeranus leucogeranus* Pallas, 1773) Ob population. The biological mission of the Nature Reserve, as well as one of its highest priorities is complex investigation of the territory's ecosystems health, i.e. its ecological monitoring [1]. Having diverse relationships in biological communities, considerable aggregate biomass, quick succession of generations, and, consequently, a generous share in the ecosystem cycle of matter, small terrestrial rodents and insectivores, collectively called micromammals (Micromammalia), are the most important component of natural ecosystems. Due to their significance for biological communities, as well as due to their high sensitivity to environment change and rapid response thereto, small mammals are widely used as indicator animals to evaluate ecosystems health and detect various disruptions, more over they are recommended to be censused at protected areas as a part of ecological minitoring [2-4].

In the Kunoval Nature Reserve, up to 2021 no micromammal censuses were held. As a result, the purpose of this study is to investigate the small mammal population structure and status to evaluate general ecosystem health of the White Crane research station area.

Materials and Methods

From June 8 to June 20, 2021 and from August 17 to August 21, 2021, field studies were held in the northern taiga forest outliers enclosed by dwarf-birch-thicket-and-shrub shpagnum muskegs and vast quaking equisetum-sedge-grass bogs (Fig.1).

The Tyumen Region zoological geography refers the study area to the flood plain complex of the Nadym-Pur province of the northern taiga subzone [5].

The animals were captured in the forest patches with steel spring traps arranged in trapping lines of 25-75 traps, one trapping line per homogeneous habitat (biotope) [6]. The habitats were described in terms of plant association dominants of each layer [7]. In these descriptions, the dominant species of a layer are hyphenated, while layers are space-separated. In formulae representing Latin species names of such descriptions, the former are listed through a plus sign, and a minus sign is followed by the first species of a new layer. In August, 2021 in the birch-spruce-Siberian-pine dwarf-shrub green-moss forest, a pitfall trap with 6 cylinders was set. The steel spring traps were baited with pieces of bread soaked in crude sunflower oil. The traps were checked daily and relocated to a new habitat

Figure 1. A forest plot around the White Crane reseach station at the border with a quaking bog, the so-called white crane bog (by R. Ilyasov, 2021). A – a small temporary aviary for white cranes

every 2-4 days. In some cases, the traps were removed the next day after being mounted. The pitfall trap was checked daily.

In total, there were 1,250 trap days and 174 cylinder days. The trap and cylinder days split across biotopes as follows:

- 275 trap days, 24 cylinder days in the spruce-birch-Siberian-pine dwarf-shrub green-moss forest (*Pínus sibírica + Betula sp. + Pícea obováta – Lédum palústre + Vaccínium vítis-idaéa + Vaccinium uliginosum – Pleurozium schreberi + Ptílium crísta-castrénsis* (Ps+B+Po–Lp+Vv+Vu–Ps+Pc), study plot one (SP_1));
- 300 trap days in the birch-Siberian-pine dwarf-shrub green-moss forest (*Pínus sibírica + Betula sp. – Vaccínium vítis-idaéa + Lédum palústre – Pleurozium schreberi + Ptílium crísta-castrénsis* (Ps+B–Vv+Lp–Ps+Pc), study plot two (SP_2));
- 400 trap days in the spruce-birch-Siberian-pine dwarf-shrub-and-white-and-green-moss forest (*Pínus sibírica + Pícea obováta + Betula sp. – Vaccínium vítis-idaéa + Rubus chamaemorus + Lédum palústre – Sphágnum sp. + Pleurozium schreberi + Ptílium crísta-castrénsis* (Ps+Po+B–Vv+Rc+Lp–S+Ps+Pc), study plot three (SP_3));
- 100 trap days in the birch-Siberian-pine dwarf-shrub-white-moss-and-lichen open forest (*Pínus sibírica + Betula sp. – Betula nana – Lédum palústre + Vaccínium vítis-idaéa – Sphágnum sp. + Cladonia sp.* (Ps+B–Bn–Lp+Vv–S+C), study plot four (SP_4));
- 25 trap days in the birch-spruce-Siberian-pine equisetum-and-quackgrass forest (*Pínus sibírica + Betula sp. + Pícea obováta – Elytrígia sp. + Equisétum sp.* (Ps+B+Po–E+E), study plot five (SP_5));

- 75 trap days, 150 cylinder days on the dwarf-birch-thicket dwarf-shrub sphagnum muskeg (*Bétula nána + Betula sp. – Vaccinium oxycoccos + Vaccinium uliginosum – Sphágnum sp*. (Bn+B–Vo+Vu–S));
- 75 trap days on the birch-equisetum-and-buckbean bog (*Betula sp. + Bétula nána – Menyanthes trifoliáta + Equisétum fluviatil*e (B+Bn–Mt+Ef)).

The small mammal abundance (relative abundance) was calculated in specimens per 100 trap days or 100 cylinder days (hereinafter "sp./100 tr.days" and "sp./100 cyl.days", respectively).

According to the normalized share in the total small mammal catch, the species were devided into the following groups: dominants (10% and more), common (3.0-9.9%), rare (1-2.9%), and occasional (less than 1%) [8].

The animals were identified to species by the peculiarities of their built, their teeth and skull characteristics [9-11]. The relative age was determined by thymus gland presence/absence, dental wear, cranial crest sizes. The current work uses the genus name *Clethrionomys* although it was considered a junior synonym to *Myodes* in the last decade, but a recent article by B. Kryštufek et.al [12] advocated the use of the former as it is the oldest valid unambiguous name for red-backed voles.

Integral indices of small mammal communities served as ecosystems' condition indicators.

All the trapped animals were studied as described by the morphophysiological indicators method [13-14]. During the laboratory study, we determined each animal's sex, then in females – the number of embryos, including reabsorbed embryos, the number of dark placental scars or corpora lutea in uterine horns. These data served the basis for calculating the share of pregnant females (UBS); number of embryos per pregnant female (EMS); the share of reabsorbed embryos (URE) and the integral index of reproductive success (URZ). The latter is calculated as the percentage of the litter size that 100 females could produce in one generation in comparable conditions [15]::

$$URZ = \frac{UBS \times 100(EMS \times 100(100 - URE \times 100))/100}{EMS \times 100} \times 100$$

The index of community conservativeness (IKV) was calculated by summing the shares of females and overwintered animals. The "conservativeness" of females lies in their territoriality, and "conservativeness" of overwintered individuals is connected with their higher chances as compared to yearlings to have their own home range [15].

The communities' structure was assessed with the help of diversity indices [15]. Our assessment also made use of such indices as those of resistant, resilient, and overall sustainability. They are calculated with the help of diversity and other indices capturing physical and geographical peculiarities of the nature zone and ecosystem's succession stage. Following Gashev [15], we understand resistant sustainability as a thermodynamic property of a system to counteract outer forces changing it; resilient sustainability as an ability of a system to return to the original state after outer forces stop their influence upon it; overall sustainability (U) as a sum of the resistant and resilient sustainabilities: U=0.09e(D(2G+3T)/G)+0.9D(1+K/R), where the first summand is resilient sustainability, and the second one is resistant sustainability; *e*=2.718 – the base of the natural logarithm, D=1-Σ(n_i/N) – Simpson's diversity index, R= (V-1)/lgN – Margalef species richness index, V – number of species, N – total number of individuals, T – ecosystem's succession stage (at 0<T<0.2 it is a pioneer community, at 0.2<T<0.3 – a young community, at 0.3<T<0.5 – an intermediate community, at 0.5<T<0.9 – a mature community, and a climax community at T=1), K – an environment 'viscosity' index, G – an environment "elasticity" index (the values of two latter indices for the Northern taiga subzone are K=4.0 and G=0.7) [15-16].

For an integral assessment of community condition, the index of general well-being (SSS) was used. This index is calculated by summing up indices of overall sustainability (U), conservativeness (IKV), indices of community anthropogenic adaptation (IAA) and reproductive success (URZ):

$$SSS = U + 0.1IKV + 0.01IAA + 0.01URZ.$$

The index of anthropogenic adaptation (IAA) is an integral characteristic of a community showing a ratio between this community's ecological groups as related to man. Gashev [15] describes this index in detail.

Simpson's and Shannon's diversity and evenness indices were used as axes in star icon plots [17].

We used standard biometric methods to statistically process the results of our research [18].

Results and Discussion

Over the investigation period, six micromammal species from insectivores (Eulipotyphla) and rodents (Rodentia) orders were caught in different biotopes around the White Crane research station (Table 1). All these species spread across wide ranges and are typical for the northern taiga.

Table 1. Abundance of Small Mammals Inhabiting the White Crane Scientific Station Area, the Kunovat River Flood Plane, Kunoval Nature Reserve in 2021

No.	Species	June				August			
		N	M	Lim	D, %	N	M	Lim	D, %
Trap lines, sp./100 tr.days									
	Rodentia								
1	*Clethrionomys rutilus* Pallas, 1779	37	6.13 ±1.52	3.67–12.0	74.0	15	4.41±0.57	3.0–5.33	30.6

Continuation of Table 1

No.	Species	June				August			
		N	M	Lim	D, %	N	M	Lim	D, %
2	*Microtus oeconomus* Pallas, 1776	4	1.78 ± 1.13	0.33–4.0	8.0	13	4.56 ±0.99	2.67–6.0	26.5
3	*Microtus agrestis* L., 1761	2	0.67	–	4.0	8	3.33 ±0.67	2.0–4.0	16.3
4	*Myopus schisticolor* Lilljeborg, 1844	–	–	–	–	–	–	–	–
	Eulipotyphla								
5	*Sorex araneus* L., 1758	2	2.25±1.75	0.5–4.0	4.0	6	3.0±0	–	12.2
6	*Sorex caecutiens* Laxmann, 1788	5	1.25±0.75	0.5–2.0	10.0	7	2.67±0.67	2.0–4.0	14.3
	Total:	50	–	–	100,0		–	–	100,0
	Rodentia								
1	*Cl. rutilus*	–	–	–	–	1	4.17	–	7.6
2	*M. schisticolor*	–	–	–	–	2	8.33	–	15.4
	Eulipotyphla								
3	*S. caecutiens*	–	–	–	–	10	41.67	–	76.9
	Total:								

Note: N – sample size; M – mean species abundance across different biotopes; Lim – abundance index range; D – dominance index.

On the whole, steel spring trap catches in June showed absolute numerical dominance of *Cl. rutilus* and subdominance of *S. caecutiens*. The share of the other species (*M. oeconomus, M. agrestis, S. araneus*) in the total catch ranks them to be common (Table 1). In August, the dominance structure changed. *Cl. rutilus* was still a dominant, with *M. oeconomus* as a close subdominant. All the other species fell in the group of dominants as well. *S. caecutiens*. kept its leading position in insectivores. The change in the dominance stucture at the end of the vegetation season is well accounted for by different population cycle phases in certain species. Only three species were caught in pitfall traps, with *S. caecutiens* being an absolute dominant, *M. schisticolor* subdominating, and *Cl. rutilus* being common. The discrepancies in pitfall trap and trapping line data are driven by the catching methods' selectiveness [6]. An in-depth study of the biotope distribution and abundance of spieces across biotopes may be found in our previous work [19]. On the whole, the territory under study exibits poor species composition. Our findings concerning species composition and correlation, indices of total abundance and certain species abundance are congruent with research of other scholars studying north taiga ecosystems [15; 20-23].

As per S.N. Gashev [15] classification, the trapped species fall into the following ecological groups in relation to man: synanthropes – *S. araneus*;

anthropophils – *M. agrestis*; neutrals – *Cl. rutilus*, *M. oeconomus*, *S. caecutiens*, anthropophobes – *M. schisticolor*. The latter species has the lowest index of anthropogenic adaptation (8.0) of 31 Tyumen Region small terrestrial rodent species, and its presence in the investigated small mammal population shows that the studied territories are not affected by human economic activities [15]. The latter is also corroborated by low values of integral indices of anthropogenic adaptation of both micromammal communities of certain biotopes, and of the territory under investigation on the whole (in all cases IAA=1.11). The IAA values are on the same level as those in small mammal communities of Western Siberia northern taiga (Shukhtungort ranger station, Little Sosva (Malaya Sosva) Nature Reserve, Khanty-Mansi Autonomous District, Russia), northern taiga and forest tundra of the Kamchatka Peninsula (Kronotsky Biosphere Reserve protected areas, Koryak Nature Reserve, Kamchatka Krai, Russia) [24-28].

Together with Micromammalia fauna composition and different species ratios, integral characteristics of communities are informative markers of ecosystem's condition, these characteristics reveal properties, dormant at organism and population levels, but emerging between interacting populations of different species and driven by a cumulative effect of habitat's physical factors. First of all, these are diversity and sustainability indices (Table 2).

Table 2. Diversity and sustainability indices of small mammals communities inhabiting the Kunovat Nature Reserve

Habitats									Combined sample		
SP_1		SP_2		SP_3		SP_4		SP_5			
June	August	June	August	June	August	June	August	June	June	August	total
Margalef species richness index (R)											
1.63	2.00	1.80	3.32	1.75	2.62	3.32	2.10	1.66	2.35	2.79	2.44/2.24±0.23
Shannon (H)/ Simpson's (D) diversity indices											
1.09 0.44	1.57 0.66	0.99 0.38	2.23 0.77	0.95 0.36	1.88 0.70	1.0 0.5	1.53 0.64	0.81 0.38	1.32 0.43	1.80 0.79	2.07/1.34±0.16 0.70/0.54±0.05
Shannon's (J)/ Simpson's (E) evenness indices											
0.69 0.75	0.99 0.51	0.63 0.88	0.96 0.26	0.60 0.93	0.94 0.36	1.0 1.0	0.97 0.52	0.81 1.33	0.57 0.46	0.91 0.21	0.80/0.84±0.05 0.24/0.73±0.11
Simpson's dominance index (C)											
0.56	0.34	0.62	0.23	0.64	0.30	0.5	0.36	0.63	0.57	0.21	0.30/0.46±0.05
Elastic sustainability (UU)/ resistant sustainability (UR) indices											
0.56 1.37	1.39 1.78	0.43 1.10	2.19 1.53	0.40 1.06	1.64 1.59	0.71 0.99	1.28 1.67	0.43 1.17	0.53 1.05	2.37 1.73	1.64/1.0±0.22 1.66/1.36±0.10
Overall sustainability (U)											
1.92	3.17	1.54	3.71	1.46	3.23	1.71	2.95	1.60	1.58	4.10	3.30/2.37±0.29

Note: After the slash, the last column shows arithmetic mean indices calculated over the sample indices from all biotopes for the whole season.

Small mammal communities of certain habitats and of the whole territory under study show low values of species diversity (species density) indices, Shannon's and Simpson's species diversity indices, elastic, resistant and overall sustainabilities. A small number of species comprising the researched communities, low and neighbouring (varying several fold) values of their abundance motivate average values of dominance index and high values of evenness index. Such an information structure of small mammal communities may well be accounted for by environmental conditions of the territory under study.

Along with rather low diversity and sustainability indices, there are micromammal communities with comparatively higher values. In June, 2021 these included assemblages of a birch-Siberian-pine dwarf-shrub white-moss-and-lichen open forest (Ps+B-Bn-Lp+Vv-S+C) (with comparatively higher values of species diversity (R), Simpson's diversity (D), Shannon's evenness (J), elastic sustainability (UU) indices and the lowest value of Simpson's dominance (C) index) and a spruce-birch-Siberian-pine dwarf-shrub green-moss forest (Ps+B+Po-Lp+Vv+Vu-Ps+Pc) (with comparatively higher values of Shannon's diversity (H), resistant sustainability (UR) and overall sustainability (U) indices). Despite a noticeable decrease (1.4 fold) of the dominant species *Cl.rutilus,* in August, 2021 the aforementioned communities included a birch-Siberian-pine dwarf-shrub green-moss forest (Ps+B-Vv+Lp-Ps+Pc) assemblage (with comparatively higher values of species diversity (R), Shannon's (H) and Simpson's (D) diversity, elastic (UU) and overall (U) sustainability indices, and the lowest values of Simpson's dominance (C) index). With a lower number of trapped species, the June sample shows that Simpson's evenness index (E) is higher than Shannon's evenness index (J) in all communities; the August sample shows an inverted pattern. In the whole season's combined sample, the Shannon's diversity index values are higher than those of Simpson's diversity index (Table 2). This is indicative of low-abundance species prevalence in the communities under investigation.

Judging by mean values of diversity and overall sustainability indices, the small mammal community around the White Crane scientific station is similar to associations from Western Siberia northern taiga (Little Sosva (Malaya Sosva) Nature Reserve), Kamchatka Peninsula northern taiga (Kronotsky Reserve, the Geysernaya River valley, Uzon volcano caldera) and forest tundra (Koryak Nature Reserve, the Ichiginnyvayam River flood-plain, and Lake Talovskoe shore) [24-28]. At the same time, the Simpson's species richness and species diversity indices of the studied community are almost one half as high, and its elastic and overall sustainability indices are manifold lower than those of micromammal communities from undisturbed forests in the suburbs of Novy Urengoi City (the forest tundra subzone) and Tyumen City (the taiga subzone) [16; 29]. This is coherent with what has been previously described in the literature, namely with a tendency for small mammal species number and certain species abundance to increase from the West to the East on a flatland territory [21] and from the North to the South down to the subtaiga-forest steppe zone [16]. It is accounted by the spatial redistribution of heat and moisture and vegetation cover structure [30-31].

Nevertheless unlike the above communities, the overall sustainability of micromammal assemblages around the White Crane research station is comprised mainly of the resistant sustainability, which is characteristic of disturbed and pioneer communities [15]. This may be attributable in part to the influence of recurrent local wild fires (as per a verbal message from Sergey A. Molchanov, Head of Shuryshkar subdivision of Yamal-Nenets Autonomous Orkug Biological Resources Conservation, Monitoring and Control Service, in the study area there were wild fires ca 2, 5, 10 years prior to the mentioned period), and partly to high natural instability of the studied ecosystems in the flood-plain landscape complex in the permafrost area.

The low sustainability of certain micromammal communities' habitats and the whole study area shows in star icon plots asymmetry. The plots' shape is considered to be a qualitative characteristic of a community and its habitat, based on the information indices (Fig.2) [17]. The star icon plots of all biotopes for June samples are vertically elongated, with higher values of Simpson's evenness index (E). Their shape is similar to an averaged star icon plot of a Western Siberia forest community as plotted by Y.N. Litvinov using long-term data from a vast territory [17]. This similarity may be explained by a low number of species and higher evenness of "common" and "rare" species, which are characteristic of forest communities. The star icon plots of all biotopes for August samples, as well as combined sample plots for June, August and the whole season are elongated along the diversity axis and have higher values of Shannon's diversity (H) index. Their shape is similar to an averaged icon plot for Western Siberia open communities [17]. Such an information structure of communities is accounted for by a bigger share of meadow voles (*Microtus*) compared to the beginning of summer. These voles are closely connected with open (muskegs and bogs) and half-open (open forests, forest edges) habitats.

The studied Kunovat territory icon plots have similar shapes with the averaged icon plots of Western Siberia communities, but the former are more asymmetric and, consequently, show lower sustainability, but their dominance structure remains undisturbed [17]. On the whole, the diversity-evenness structure of micromammal communities of certain biotopes and the whole studied territory around the White Crane scientific station is largerly similar to our results of the Kamchatka Peninsula subarctic landscapes study [24].

On the whole, the integral indices of small mammal reproductive success in most biotopes under consideration decline from June to August, but due to intensified reproductive processes in certain biotopes (SP_3) at the end of summber as compared to its beginning, the mean values of reproductive success in the combined samples for June and for August are slightly different (1.1.-1.2 fold) from the value for the whole study period (Table 3).

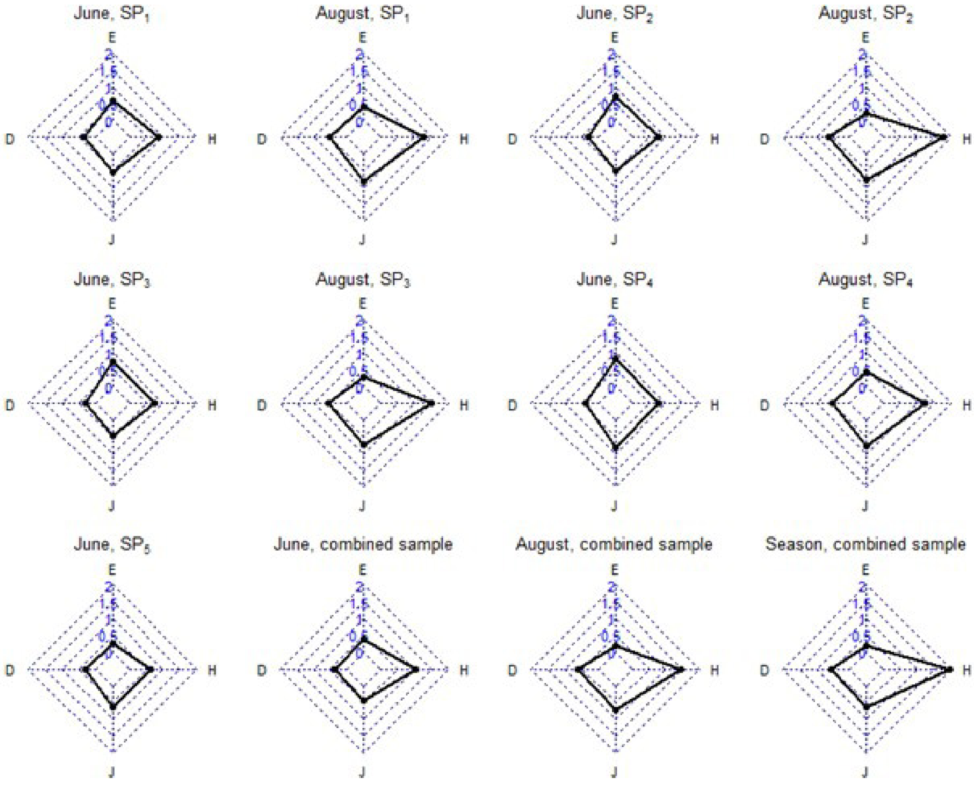

Figure 2. Icon plots showing information indices of small mammal communities inhabiting the studied areas of Kunovat Nature Reserve, Yamal-Nenets Autonomous District, Russia

The increase of community reproductive success index in a birch-spruce-Sibirian-pine dwarf-shrub white-and-green-moss forest (SP_3) by late summer is attributed to intensified breeding of *M. oeconomus* and *S. caecutiens* with a lower abundance then in other biotopes, of the dominant species, *Cl. rutilus,* in early summer, and to its greater decline at the end of summer, which caused a change of dominant species (Table 1). At the same time, the highest mean value of reproductive success is that of small mammal community of spruce-birch-Siberian-pine dwarf-shrub green-moss forest (SP_1); it is higher than the values of the combined samples for June and the whole season.

The distribution of community conservativeness indices across biotopes is similar (Table.3). In most habitats, they decrease in the course of summer (except for birch-spruce-Siberian-pine dwarf-shrub green-moss forest (SP_3)) due to an increase in the young individuals' share. However the micromammal community of spruce-birch-Siberian-pine dwarf-shrub green-moss forest (SP_1) has the the maximum mean conservativeness index, that is higher than the same of the combined samples for June and the whole season. It also features highest values of composite index of community well-being for June and for the whole season in average. All the above facts and comparatively high diversity and sustainability indices make the spruce-birch-Siberian-pine dwarf-shrub green-moss forest a key habitat for research and conservation within the framewok of complex environmental monitoring.

Table 3. The demographic and intergal indices of small mammal communities inhabiting the studied areas of Kunovat Nature Reserve

Habitats									Combined sample		
SP_1		SP_2		SP_3		SP_4		SP_5			
June	August	June	August	June	August	June	August	June	June	August	total
Number of females											
8	6	5	8	7	6	0	3	1	21	23	44
Number of pregnant females											
6	2	3	0	6	1	0	1	1	16	4	20
Number of embryos											
54	12	19	0	42	7	0	5	8	123	24	147
Number of reabsorbed embryos											
0	0	0	0	1	0	0	0	0	1	0	1
Number of wintered animals											
16	5	12	2	14	2	2	1	3	47	10	57
Reproductive success index											
7499.9	3333.3	5999.9	0	1666.7	8367.4	0	3333.3	9999.9	7557.1	1666.67	4514.53
5416.6±2083.0		2999.95±2999.9		5017.1±3350.0		1666.7±1666.7		-	5.033.3± 1848.7	3758.5± 1725.0	4466.7± 1223.0
Conservativeness index											
1.41	1.10	1.31	0.63	0.57	1.5	1.00	0.44	1.00	1.36	0.67	1.02
1.26±0.16		0.97±0.34		1.04±0.5		0.72±0.28		-	1.06±0.16	0.92±0.24	1.0±0.13
Composite index of community well-being											
77.88	38.05	65.90	10.23	22.80	85.99	2.22	39.06	103.29	78.07	21.26	49.15
57.97±19.90		37.07±27.80		54.4±31.60		20.64±18.40		-	54.42± 18.43	43.33± 15.69	49.49± 11.8

Conclusions

1) At the lower Kunovat River, six species of small mammals from Rodentia (*Cl. rutilus*, *M. oeconomus*, *M. agrestis*, *M. schisticolor*) and Eulipotyphla (*S. caecutiens*, *S. araneus*) were registered in the north taiga forests around the White Crane research station located.

2) The micromammal species composition and population structure of the area under investigation are typical of the north taiga forests.

3) The presence of such an anthropophobic species as *M. schisticolor* in the small mammal community and low values of the integral index of micromammal communities anthropogenic adaptation for certain biotopes and the investigated area on the whole may evidence that there is no significant influence of human economic activities on the studied habitats.

4) Small mammal communities inhabiting certain habitats and the studied territory on the whole demonstrate low diversity indices, average dominance index, above-average evenness and low sustainability. Such a structure of micromammal communities is accounted for by harsh zone and climate conditions. The diversity-evenness structure of all communities is in congruence with that of natural habitats of Western Siberia northern taiga, forest tundra and northern taiga of the Kamchatka Peninsula.

5) The studied communities' resistant sustainability accounts for the better part of overall sustainability, which is characteristic of the disturbed or pioneer communities, and may be accounted for in part by local wild fires, and in part by high natural instability of the studied ecosystems being a part of flood-plain landscape complex.

6) A small mammal community of spruce-birch-Siberian-pine dwarf-shrub green-moss forest show maximum mean values of reproductive success and conservativeness indices, composite index of community well-being, comparatively high values of diversity and sustainability for the season. All these make this habitat key for research and conservation within the framewok of complex environmental monitoring.

On the whole, the preliminary study of micromammal populations and communities shows that ecosystems in the probable range and breeding area of the *L. leucogeranus* Ob population around the White Crane field research station may be considered to be conventionally normal. In order to confirm and supplement the findings about the ecosystem condition in this area, it is advisable to continue to monitor small mammal communities and launch a research into other ecosystems' elements (birds, vegetation, invertebrata).

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