Small Mammals of the Southeast Tver Oblast.
Communication 1. The Fauna and Biotopic Distribution


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Abstract—The authors analyze the data of a 12-year monitoring of small mammal populations with live-catch cage traps, snap traps, and pitfall traps. Eighteen species were trapped. Biotopical distributions of the species are outlined. The study shows that snap-trapping and pitfall-trapping results are not in complete agreement. Capture-mark-recapture live-trapping results are consistent with averaged results obtained with snap traps and pitfalls, standardized to a unit of distance.

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The interest in such a ‘trivial’ subject as faunistic analysis of the region is propelled by the lack of faunistic data for central parts of Russia. Therefore, we cannot analyze the dynamics of small mammal communities under changing qualitative and quantitative human influence. Yet in the late 1990s a unique phenomenon occurred in Central Russia—forest natural regeneration began in the farmlands of the region.

Due to their size, small mammals have similarly small home ranges, 0.2 to 0.5 ha, and areas occupied by their local assemblages are close to those of plant communities. Small mammals can be easily monitored, so it will not take too long to collect data. Being warm-blooded, small mammals have high metabolism. They make a considerable contribution to the ecosystem dynamics and are grossly dependent on physical and biotic conditions of the habitat.

The above reasons stimulated us to summarize the data of a 12-year monitoring of a small mammal community in the southeast Tver oblast and analyze their diversity in a variety of habitats. Thus we had to answer the following questions: (1) Which of the trapping methods used yield the most representative data? (2) How variable is the structure of the community in different habitats and locations of the same region? (3) How do environmental fluctuations and man affect community structure?

MATERIAL AND METHODS

The permanent study area is located between the Staritskii and Zubtsovskii raions (56°18'N, 34°52'E) on the right-hand bank of the Volga River within the Smolensk–Moscow Province [1], at the contact of southern-taiga and mixed forests [2]. All forests in the Russian Plain are assumed to have been disturbed by man, with the greatest disturbance caused to the broad-leaved-spruce forests that had been growing on the most fertile soils and cleared for tilling [3, 4]. As all forests have been affected in some way, Rysin distinguishes a number of modified natural types [5]. The primary and modified natural forests in the region are various spruce and pine stands [6]. The study was conducted in a bilberry- and a wood-sorrel-pine forest. On watersheds the primary type is a dwarf-shrub–sphagnum-pine forest. Second growth patches of a yellow-archangel-spruce forest occur. There are solitary oak saplings up to 20 years of age. The second growth that forms on clearings and abandoned farmlands is composed of hygrophilous-forbs–birch forests, some of them dominated by the speckled alder. The second growth on old-burned sites is a bilberry-spruce-pine forest. A similar one forms on the edges of dwarf-shrub–sphagnum-spruce forests on watershed plateaus. All the forests have been logged to various extents. The most intact spruce forest is on the bedrock bank of the Volga River (VSF). As the forest is in the water protection zone, it appears to have not been logged. The forest is highly mosaic; a transect established there may cross bilberry–green-moss, bilberry–wood-sorrel, yellow-archangel–wood-sorrel, and bilberry–haircap-moss patches. There is an adjacent logged area where a dying deciduous forest, consisting mostly of alder, (AF) is being replaced by the overmature birch and some grass-forbs-covered glades. Other characteristics of the stand are the same as in the above mentioned one. There is a bracken-fern–bil-
bark and pine saplings. However, herbaceous plants with much dead grass. The stand consists of sparse formed under grazing pressure and has thick sod cover lands of various ages. The meadow (M) under study the land is covered with meadows, tillage, and fallow

The main body of material was collected on transects with live traps efficient in catching insectivores [7] and rodents [8]. The traps were set at 7.5 m intervals in lines. Trap lines are six times more efficient than grids, trapping effort being equal [9]. An accounting unit was a 375 m trap line of 50 traps [10]. During this study, the traps were checked more frequently than usual and were operative for only 3 hours. We checked the traps twice every 1.5 hours and then closed them, so that animals could move freely for most of the day. With this approach, animal mortality, especially that of shrews, was <0.1% per >20 000 recaptures. The traps were baited with oats mixed with unrefined sunflower oil. The comparison of rodent and insectivore trappability showed that trap efficiency is similar for different species [11].

When watching red-toothed shrews, we found that pitfalls trapped mainly nonresident animals [12]. This fact has been known of since the method was adopted [13]. A standard use of such traps involves a 50 m ditch with 5 pitfalls [13, 14]. We compared the efficiency of a standard 50 m ditch, a 50 m fence with 5 pitfalls, and five 10 m fences with 1 pitfall per fence. No differences were revealed [15]. Each trapping session for every method lasted 14 days. Live-catch cage traps with standard bait were used at a different site after pitfall- and capture-mark-recapture live-trapping the animals. The abundance measure is the number of animals trapped per 100 trap-days. For live traps we calculated the number of individuals captured in 100 traps per day on the average.

RESULTS AND DISCUSSION

Of 24 small mammal species expected to be trapped according to the data on their distribution [16], only 18 were captured (Table 1). The European mole (Talpa europaea L., 1758) and the weasel (Mustela nivalis L., 1766) were captured accidentally and were omitted from analysis. The following expected species were not trapped: the least shrew (Sorex minutissimus Zimmermann, 1780), the northern red-backed vole (Clethrionomys rutilus Pall., 1779), the pine vole (Microtus subterraneus Selys-Longchamps, 1838), Microtus rossiaemeridionalis Ognev, 1924, the house mouse (Mus musculus L., 1758), and the black rat (Rattus rattus L., 1758). The common rat (Rattus norvegicus Berkenhout, 1769) was trapped only when the farm in the Krutitsy Village was functioning (closed in 1999). Now it occurs in barns and adjacent farmlands only in the villages where farmers keep poultry or cattle. The species was not trapped on the transects.

While the decreased and sporadic range of the Rattus rattus can be explained by different type of farm buildings, the absence of the house mouse and common rat indicates that rural population and its farming activities decreased significantly. Interestingly, the species were partly replaced by the yellow-necked mouse (Sylvaemus flavicollos Melchior, 1834) in the attics, and the bank vole (Myodes glareolus Schreber, 1780), in the basements. The absence of the northern red-backed vole is probably due to the edge effect of the range. The nearest location the species is known from is the Central Forest Reserve. The absence of the pine vole in the trapping data appears to confirm the situation. The species is readily trappable with the traps that we use, easily detectable even at low numbers, and was found 160 km northwest. That Microtus rossiaemeridionalis was not trapped does not imply it is absent in the study area. Most likely, we encountered monospecific populations of the common vole (Microtus arvalis Pallas, 1778). We randomly karyotyped 9 individuals from different localities and all of them proved to be M. arvalis (2n = 46, NFe = 80). The least shrew occurs sporadically throughout the range. Of the common shrew (Sorex araneus L., 1758), the Moscow chromosome race with a characteristic karyotype occurs [17]. The closest chromosome race, Seliger, forms a hybrid zone with Moscow 160 km northeast [18]. The northern extremity of the range of the lesser white-toothed shrew (Crocidura suaveolens Pall., 1811) overlaps the study area. It usually occurs in houses and spreads with man beyond continuous populations of the species [19]. We did not find any such populations as not all villages neighboring the study area were studied: one lesser white-toothed shrew individual was trapped in the forest and one in the field.

Different traps show different population structure. The most inconsistent results were found between pitfall- and snap-trapping samples. Both methods are standard, but their efficiency is known to vary with species.