



THE SPECKLED GROUND SQUIRREL (*SPERMOPHILUS SUSLICUS*) IN BELARUS: NEW LOCALITIES, OLD THREATS, AND PROSPECTS OF CONSERVATION

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Abstract

The study was carried out as part of the project "Superrodent" and is devoted to the description of new records of the spotted ground squirrel (*Spermophilus suslicus* s.l.) discovered during 2019–2020. It is one of the rarest species of rodents and mammals in the fauna of Belarus in general. This species suffers from anthropogenic changes in the environment and its agricultural development and to ensure its protection it is listed in a number of 'red lists', including the IUCN Red List and the Red Book of the Republic of Belarus (since 2015). The search for ground squirrel habitats was carried out in two stages. The first included the analysis of the literature on already known localities and biotope preferences, including cartographic data to identify promising areas to search for. The second stage provides a direct survey of prospective sites, their photo documentation and a detailed description. In total, nine new habitats of the species were identified within four administrative districts of Minsk Oblast: Nesvizh Raion (4), Stowbtsy Raion (1), Baranivka Raion (1) and Kopyl Raion (2). In addition, an inspection of the sites previously identified by the authors revealed that some of them have already disappeared or are in critical state, the reason for which is primarily the land ploughing. In fact, today there are only six viable suslik settlements in Belarus. All of them are confined to elevated areas of the Kopyl ridge, which is located in the northern part of the Continental biogeographic region. Most of the surviving colonies are not large and consist of a few dozen to 150 living burrows. The number of the only large colony (Yushevichi) is estimated at 10 to 11 thousand individuals. All other inhabited colonies are located at a distance as far as 6 km from the Yushevichi colony. In other regions of Belarus, despite searches, ground squirrels are currently not found. The key threats to the species' existence are the ploughing of colonies and the overgrowth of tall grasses and trees and shrubs. In our opinion, for the long-term preservation of the species in the country, it is necessary to establish an appropriate protection regime (management), as well as the implementation of comprehensive monitoring: monitoring of threats, successions of plant communities, and the state of ground squirrel populations. Suggestions for protection and further monitoring of locations are given. Among other initiatives, the authors sent proposals to local authorities on granting protection status to areas with settlements of ground squirrels.

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THE SPECKLED GROUND SQUIRREL (*SPERMOPHILUS SUSLICUS*) IN BELARUS: NEW LOCALITIES, OLD THREATS, AND PROSPECTS OF CONSERVATION

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The speckled ground squirrel (*Spermophilus suslicus*) in Belarus: new localities, old threats, and prospects of conservation. — A. Abramchuk, S. Shokalo, Yu. Yankevich. — The study was carried out as part of the project "Superrodent" and is devoted to the description of new records of the spotted ground squirrel (*Spermophilus suslicus* s.l.) discovered during 2019–2020. It is one of the rarest species of rodents and mammals in the fauna of Belarus in general. This species suffers from anthropogenic changes in the environment and its agricultural development and to ensure its protection it is listed in a number of 'red lists', including the IUCN Red List and the Red Book of the Republic of Belarus (since 2015). The search for ground squirrel habitats was carried out in two stages. The first included the analysis of the literature on already known localities and biotope preferences, including cartographic data to identify promising areas to search for. The second stage provides a direct survey of prospective sites, their photo documentation and a detailed description. In total, nine new habitats of the species were identified within four administrative districts of Minsk Oblast: Nesvizh Raion (4), Stowbtsy Raion (1), Baranivka Raion (1) and Kapyl Raion (2). In addition, an inspection of the sites previously identified by the authors revealed that some of them have already disappeared or are in critical state, the reason for which is primarily the land ploughing. In fact, today there are only six viable suslik settlements in Belarus. All of them are confined to elevated areas of the Kopyl ridge, which is located in the northern part of the Continental biogeographic region. Most of the surviving colonies are not large and consist of a few dozen to 150 living burrows. The number of the only large colony (Yushevichi) is estimated at 10 to 11 thousand individuals. All other inhabited colonies are located at a distance as far as 6 km from the Yushevichi colony. In other regions of Belarus, despite searches, ground squirrels are currently not found. The key threats to the species' existence are the ploughing of colonies and the overgrowth of tall grasses and trees and shrubs. In our opinion, for the long-term preservation of the species in the country, it is necessary to establish an appropriate protection regime (management), as well as the implementation of comprehensive monitoring: monitoring of threats, successions of plant communities, and the state of ground squirrel populations. Suggestions for protection and further monitoring of locations are given. Among other initiatives, the authors sent proposals to local authorities on granting protection status to areas with settlements of ground squirrels.

Key words: ground squirrel, rare species, distribution, colonies, protection, Belarus.

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Introduction

The speckled ground squirrel (*Spermophilus suslicus*) is a species mainly inhabiting the steppe and forest-steppe zones of Eurasia. The species has a number of high conservation statuses: it is included into the IUCN Red List (NT), Appendix II and Resolution No. 6 of the Bern Convention, the Red Data Book of the Republic of Belarus (Zagorodniuk *et al.* 2008; Red Book... 2015).

The main geographic range of this species extends across the south of Eastern Europe, from eastern Poland through eastern Moldova, central and southern Ukraine to the Central, Central Black Earth, Volga, and Volga-Vyatka regions of the Russian Federation (Zagorodniuk *et al.* 2008).

In Belarus, the species occurs beyond its main distribution range. In the middle of the twentieth century, the species was relatively widely distributed in the central part of the country. In Belarus, the speckled ground squirrel inhabited the territory of Słonim, Karelichy, Baranovichy, Pruzhany, Lyakhavichy, Nyasvizh, Slutsk, Kapyl, Kletsk, and Stowbtsy raions, as well as Dobrush Raion of Homiel Oblast in the south-east of the country (Red Data... 2004; Red Data... 2015).



Fig. 1. Ground squirrels near their burrows, vicinity of Yushevichi, June 2019; *a–c*, photo by Pavel Lychkovsky; *d*, photo by the authors.

Рис. 1. Ховрахи біля своїх нір в окол. с. Юшевичі, червень 2019 р.: *a–c*, фото Павла Личковського; *d*, фото авторів.

However, since the middle of the twentieth century, the species' abundance has declined catastrophically, by 90–98% (Red Data... 2015). For a long time, information on the species' occurrence in Belarus has not been reported in scientific publications. The only publication in the last ten years (until 2019) points out the finding of three colonial settlements of this species in 2010–2011 in the territory of Kareličy Raion of Grodno Oblast (Shakun & Maksimenkau 2013).

The main objective of our study was to identify the currently existing colonial settlements of the species, to assess the status of its population in Belarus, and to raise the issue of providing legal protection for the identified colonial settlements.

Material and Methods

The material for this publication is based on survey results carried out in 2019–2020. The search for ground squirrel habitats was carried out in two phases.

At the first stage, key parameters of the species' habitat requirements in the closest known habitats to the territory of Belarus, as well as the range previously occupied by the species in our country, were determined based on literature analysis. Then, using cartographic materials (large-scale topographic maps, Google Earth Pro), we remotely determined the local areas that potentially best met the requirements of the species, including the specifics of land use. In the second phase, these areas were surveyed directly by route counting and listening to vocal activity. Part of the obtained results was published in 2019 (Shakala 2019). In this paper, they are supplemented and refined.

Examples of photographic documentation of the findings are shown in Figs. 1–2, including photos of animals (Fig. 1) and photos of habitats and burrows (Fig. 2).

Given the variety of viewpoints on the taxonomy of the speckled ground squirrel, including the recognition of western races (inhabiting west of the Dnieper River) as a separate species (e.g. Zago-rodniuk & Fyadorchanka 1995), the authors follow the traditional view and refer to the studied pop-ulations as *S. suslicus* sensu lato: in articles devoted to ground squirrel of Belarus, they are referred to as *Spermophilus suslicus* (e.g. Shakun & Maksimenkau 2013; Shakala 2019).



Fig. 2. Examples of ground squirrel habitats—biotopes and burrows: *a*) site of the largest ground squirrel colony in Belarus in the vicinity of the village Yushevichi, June 2019; *b*) overgrowth of woody-shrubby vegetation in the territory of the ground squirrel settlement near the urban settlement Mir, June 2017; *c-e*) residential ground squirrel burrows, a colonial settlement in the vicinity of Rimashi, June 2019; *d*) the ploughed and sowed area of the ground squirrel colonial settlement near the village Ralyevo (Korelichy Raion), June 2017. Photo by the authors.

Рис. 2. Приклади місць помешкання ховрахів — біотопи і нори: *a*) ділянка найбільшого в Білорусі колоніального поселення ховраха в околицях д. Юшевичі, червень 2019 р.; *b*) заростання деревно-чагарниковою рослинністю території колоніального поселення ховрахів біля смт Мир, червень 2017 р.; *c-e*) житлові нори ховраха, колоніальне поселення в околицях д. Римаші, червень 2019 р.; *d*) розорана і засіяна зерновими територія колоніального поселення ховраха біля с. Ральєво (Корелицький р-н), червень 2017 р. Фото авторів.

Results and Discussion

In 2019, the authors found at least nine ground squirrel colonies located in Niasviski (5 locations), Staŭpiecki (1), Baranavicki (1), and Kapylski (2) raions of Minsk Oblast. The locations of the identified colonies are shown in Fig. 3. Most of them are confined to the upland areas of the Kapyl Range, which is located in the northern part of the Continental Biogeographical Region of Europe. The nearest known settlements of the species (in Poland and Ukraine) are located at a distance of 300–350 km to the south and south-west of the colonies we discovered.

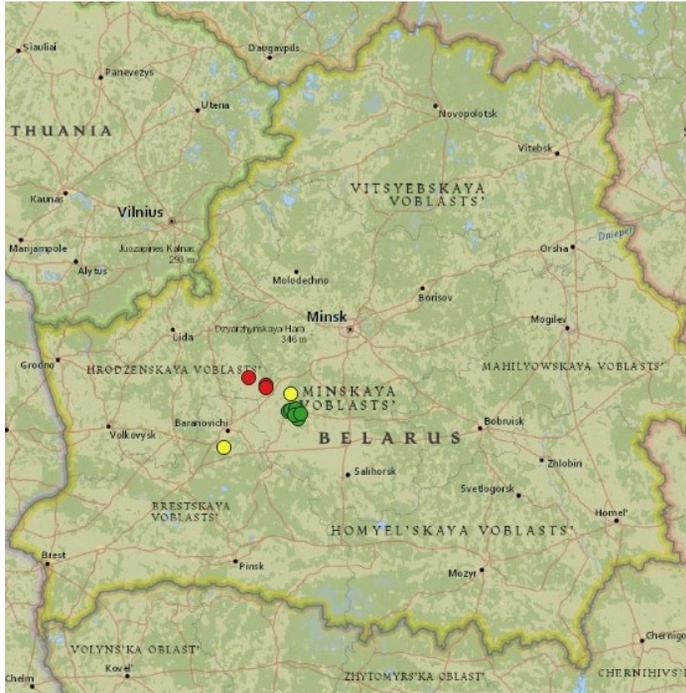
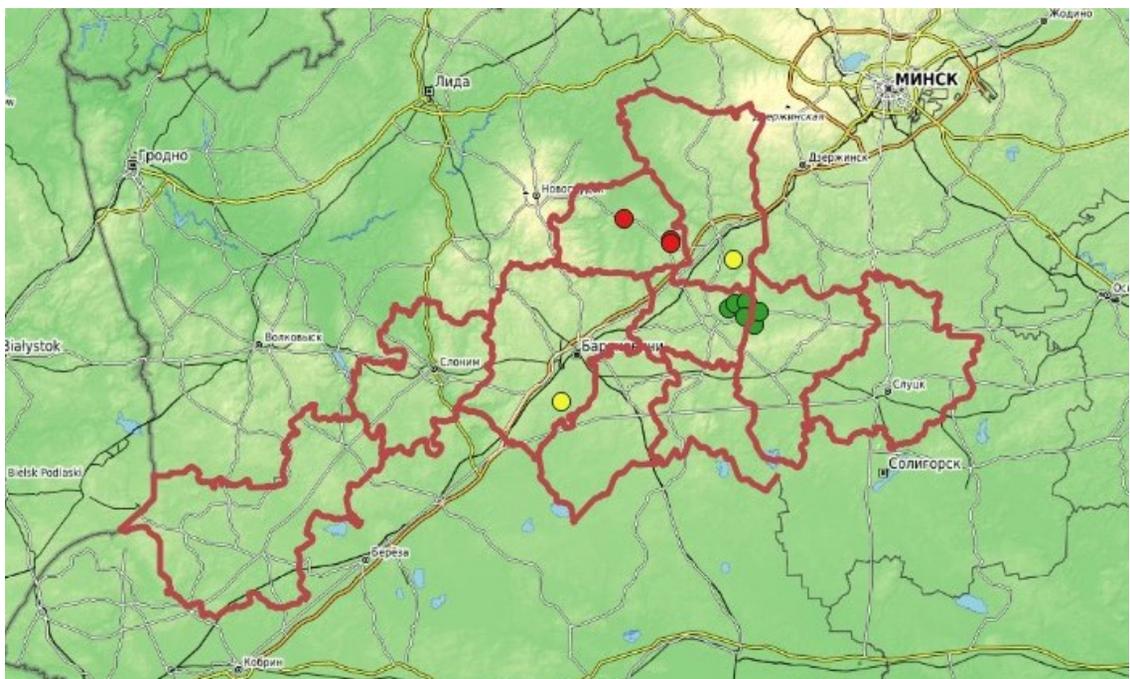


Fig. 2. Locations of ground squirrel settlements: *left*, overview within the contours of Belarus, *bottom*, close-up areas of the settlement. Legend: green—currently existing colonies identified by the authors (2021); yellow—colonies identified by the authors earlier, but not found in 2021; red—colonies identified in 2010–2011 (now disappeared); red outline—administrative districts (raions), in the territory of which ground squirrels occurred earlier (until 2000).

Рис. 2. Розташування місцезнаходжень ховрахів: *зліва* — огляд в межах контуру Білорусі, *внизу* — райони поселення крупним планом. Позначення: зелений — колонії, виявлені авторами й існуючі тепер (2021 р.); жовтим — колонії, виявлені авторами раніше, але зникли у 2021 р.; червоним — колонії, виявлені в 2010–2011 рр. (на сьогодні зникли); червоний контур — адмінрайони, на території яких ховрах жив раніше (до 2000 р).



Description of new locations

Kapyl Raion

Colony No. 1, Kapyl Raion, near the village Rymašy, coordinates: 53°15'29.82" N, 26°55'14.97" E (Hereafter the central points of areas recommended for protection to preserve the colonies are indicated). The colony is on a hayfield and pasture with perennial grasses. The population in June 2019 comprised at least 62 inhabited dens over an area of about 20 ha.

Colony No. 2, Kapyl Raion, near the village Kołasauščyna, coordinates: 53°13'10.5" N, 26°53'39.2" E. The colony is located on the sides of a gravel road along 1200 m. In spring 2019, the colony had about 100 inhabited dens (Shakala 2019), whereas in spring 2020 only 44 inhabited dens were found.

Nyasvizh Raion

Colony No. 3, Nyasvizh Raion, near the village Juševičy, coordinates: 53°14'50.51" N, 26°51'7.02" E. The colony is on a pasture and hayfield with perennial grasses. Taking into account an average density of 120 dens per ha, the estimated number of dens for the entire area populated by ground squirrels is not less than 10–11 thousand. The dens are located in various densities in an area of about 95 ha (Shakala 2019).

Colony No. 4, Nyasvizh Raion, near the village Zaturja, coordinates: 53°17'24.18" N, 26°51'35.81" E. The colony is on pasture with perennial grasses. During the summer and spring of 2019–2020, 67 and 41 inhabited burrows were counted, respectively. The burrows are located in groups over an area of about 11.6 ha (Shakala 2019). In summer 2020, after tillage and ploughing by the land user, only three inhabited burrows were found.

Colony No. 5, Nyasvizh Raion, near the village Cahielnia, coordinates: 53°16'58.89" N, 26°52'8.10" E. The colony is on a pasture with perennial grasses. In April 2020, at least 40 inhabited dens were counted in the colony, sparsely distributed across the colony's area.

Colony No. 6, Nyasvizh Raion, near the village Siajłovičy, coordinates: 53°16'51.44" N, 26°48'17.89" E. The colony is on a pasture with perennial grasses. In April 2020, at least 150 dwellings were counted in this colony, spread over an area of about 12 ha.

Colony No. 7, Nyasvizh Raion, near the village Siajłovičy, coordinates: 53°16'15.37" N, 26°46'15.50" E. The colony is on a hayfield and pasture with perennial grasses. The colony is in a depressed condition. In April 2020, at least 12 inhabited dens were counted.

Stowbtsy and Baranovichy raions

Colony No. 8, Stowbtsy Raion, near the village Šachnouščyna, coordinates: 53°24'38.04" N, 26°47'35.19" E. The colony is on a pasture with perennial grasses. The estimated size of the colony is at least 10 inhabited dens sparsely distributed over the colony's area. The settlement was ploughed by the land user in 2020.

Colony No. 9, Baranovichy Raion, near the village Bahušy, found in 2017, coordinates: 52°59'51.8" N, 25°56'51.8" E. The colony is located on a hilly area in the floodplain of the Myšanka River. In April 2019, 40 dens were found in the colony. In spring (April 2020), 8 dens were found. In July 2021, no visited dens were found.

In 2016–2017, the authors also surveyed the ground squirrel settlements that were discovered in 2010–2011 in Karelichy Raion, Grodno Oblast (Shakun & Maksimenkau 2013). In 2016, about 10 ground squirrel burrows were found in one of the three settlements, located on the slope of the Miranka river valley, northeast of Mir. In 2017, however, no burrows were found at this location. All three settlements have now disappeared. The main reason for their disappearance is ploughing, which is how one of the colonies was destroyed. The second reason is the overgrowth of habitats with tall grasses and bushes. The other two colonies apparently disappeared due to this factor. In 2019, surveys of the territory of Dobrush Raion of Gomel Oblast were conducted. The species currently is not confirmed to occur there either.

The main threats

In Belarus, the main threats to the existence of the species, at present, are the ploughing of colonial settlements with subsequent intensive land use for crop production, as well as the complete absence of grazing and mowing.

The main threat leading to the almost immediate destruction of any colony is the regular ploughing of colony sites. At present, in Belarus, it is expected to happen sooner or later, as all areas with colonies are valuable fertile lands and they are needed for agriculture. After ploughing ground squirrels have a chance to survive only if the ploughing was not too deep, was conducted in late summer or early autumn, and only in a part of the habitat. Then, part of the animals may survive and move to another site or to the surviving part of the colony. If, however, the colony is ploughed in autumn, in winter, or in early spring when ground squirrels hibernate, the animals have almost no chance to survive. According to both the observations of the authors and the information about the pre-existing colonies obtained by interviewing local residents, regular plowing of areas with ground squirrel colonies is the only factor that leads to the colony's destruction in the vast majority of cases.

Another significant but less acute threat is the complete abandonment of agricultural activities, in particular grazing and mowing. This is due to the fact that optimal habitats for the ground squirrel are grass meadows with low, but rich herbaceous vegetation. In Belarus, such meadows, in most cases, are secondary and may exist only under conditions of extensive cattle grazing and/or periodic mowing. In the absence of grazing or mowing, meadows get overgrown relatively quickly with dense tall grasses and subsequently with woods and shrub, which is equally destructive for the species.

Other notable threats for the species in Belarus are predators, including domestic cats and dogs, as well as foxes and birds of prey. The latter, however, are natural threats and are not critical for the species. Predation can have a significant impact only as an additional factor in case of an unfavourable colonial settlement under the influence of the first two factors (ploughing or overgrowth).

Proposals for protection and monitoring

To preserve the existing ground squirrel colonies in Belarus, based on our observations, it is necessary to establish a special regime for their protection and use. This regime should combine extensive agricultural activities, in particular grazing and mowing, with a number of prohibitions and restrictions. In the areas where the species settles, ploughing should be prohibited, as well as the application of all kinds of fertilisers.

Grazing should be carried out at low density and intensity in order to prevent the trampling and impoverishment of the vegetation cover and to prevent intensive overgrowth. Mowing should be carried out depending on the degree of overgrowth and grass height in July to September, with the biomass removed or shredded.

Hunting should also be prohibited in the species' habitat. In some cases, regulation of domestic predators (stray cats and dogs) as well as wild predators (foxes) is necessary.

Based on our experience, monitoring of the condition of the species' habitats and population should be carried out in three directions: threat monitoring, vegetation succession monitoring, and monitoring of the state of the species' population (colony).

Threat monitoring is primarily the monitoring of compliance with protection regime and use of colonial settlement sites. In particular, compliance with prohibitions on ploughing, fertilisation, grazing intensity, mowing, and others. This type of monitoring is necessary to prevent direct destruction of the species' colonies as well as to preserve conditions for the species' existence in the medium term.

Another focus of monitoring should be to assess the condition of plant communities and to determine the direction of successional processes. This type of monitoring is necessary to assess the conditions of the species in the medium and long term, as well as to make decisions on active man-

agement (use) of the colonial settlement areas. In particular, grazing intensity, timing and frequency of mowing, etc.

A third type of monitoring, monitoring of the state of the species' population (colony), in particular assessing abundance, densities etc., is necessary to ensure the conservation of the species in the long term, and to assess the effectiveness of established restrictions and protective measures for active management (use) of the colonial settlement areas.

In our opinion, only the combined implementation of all three types of monitoring with the establishment of an appropriate conservation (management) regime can ensure the long-term conservation of this species in Belarus.

Conclusion

As of the late 2021, at least seven inhabited colonies of the speckled ground squirrel (*Spermophilus suslicus*) are reliably known in Belarus. All currently inhabited colonies are located in Nyasvizh, Kapyl, and Stowbtsy raions and are confined to upland areas of the Kapyl range, which is part of the larger Belarusian ridge stretching across the country from the southwest to the northeast. These colonial settlements are located at a distance of 300–350 km from the nearest known ground squirrel colonies (to the south-west and south) in the territory of Poland and Ukraine.

Two more colonies found in 2019 either were destroyed in 2019–2020 or are in critical condition, and currently (as of 2021) no ground squirrels have been found there. Reliable information on ground squirrel colonies in other parts of Belarus has not been reported despite intense field surveys.

Most of the existing colonies are not large having a few dozen to 150 inhabited burrows. The only large colony (Juševičy) comprises an estimated population of 10 000 to 11 000 individuals. All other currently inhabited colonies are located within 6 km of the Juševičy colony.

For all of the settlements identified in 2019, the authors have prepared protection certificates, which were sent to the responsible District Inspectorates of the Ministry of Natural Resources and Environmental Protection. Some of the settlements, including the largest colony in Juševičy, have now been passed over for protection to land users.

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