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BEST TIMES FOR QUANTITATIVE POPULATION ASSESSMENT OF NORTHERN POPULATIONS OF THE BOBAK (*MARMOTA BOBAK* MÜLL.)

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Abstract

From studying the terrestrial activity of bobak (*Marmota bobak*; also known as steppe marmot) from 2009 to 2010 in the Sokolovsky colony (Udmurt republic, Russia) we determined the optimal time for quantitative assessment at the northern edge of the species' distribution range. We recommend performing quantitative assessments of bobak populations during the second half of June in the morning and evening hours.

Estimation of population density is one of the most important tasks in marmot population studies and also has a great importance for managing marmot protection and rational use as a resource. The main methods for marmot quantitative assessment are based on the visual observation of animals during their periods terrestrial activity (Bibikov, 1989; Mashkin, 1997). To obtain more accurate data on population size, it is important to conduct surveys at times when the maximum number of animals are above ground.

To determine the best time for quantitative assessment of bobak at the northern limit of their distribution, we investigated trends in bobak terrestrial activity in the Sarapulsky district of Udmurtia, where bobak were introduced in 2001-2003. During the snowless period of 2009-2010, quantitative assessment of bobak in the Sokolovsky colony (56°16'53 "N, 54°03'10" E) were conducted. This colony is currently one of the northernmost outside the natural range of the species. Bobak were counted from the moment the first individual appeared on the surface in the morning until the last one entered its burrow in the evening. We used field binoculars for observations. Knowing the exact number of bobak in the observed families, we calculated the proportion of animals that were present on the surface together at any given time across the day. Observations took place every month for three to seven days

We found that the most active above ground period for post-hibernation bobak, before the young-of-year first appeared on the surface (which usually occurred by the end of May or beginning of June), was from 6 to 8 a.m. and 5 to 7 p.m. (Samara time, UTC+4). At the end of the first fortnight of Maya maximum of 56% of individuals were simultaneously on the surface, with bi-modal peaks of activity in morning and evening (Fig.1). Thus, in the spring a considerable underestimation of the total number of successfully overwintered individuals is possible.

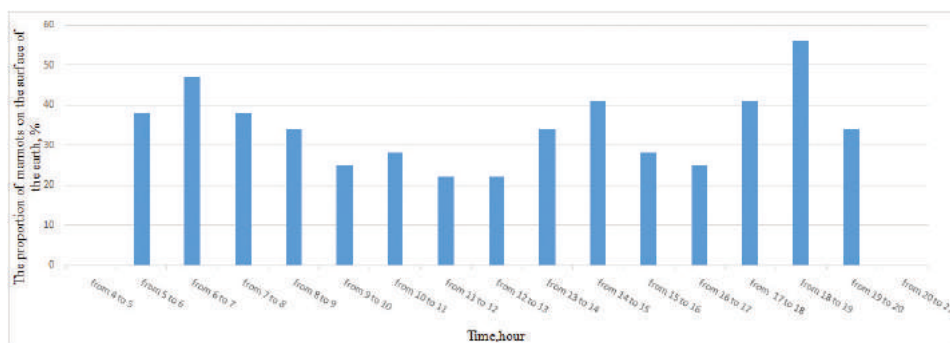


Fig. 1. The dynamics of terrestrial activity of overwintered bobak in May (showing observations from 08.05.2010).

In June, after young-of-year begin to appear above ground, the greatest proportion (75-80%) of bobak above ground at the same time occurred between 5 and 7 a.m. and between 7 and 9 p.m. At the end of the first fortnight of June, in the morning 100% of yearlings were observed above ground (Fig.2).

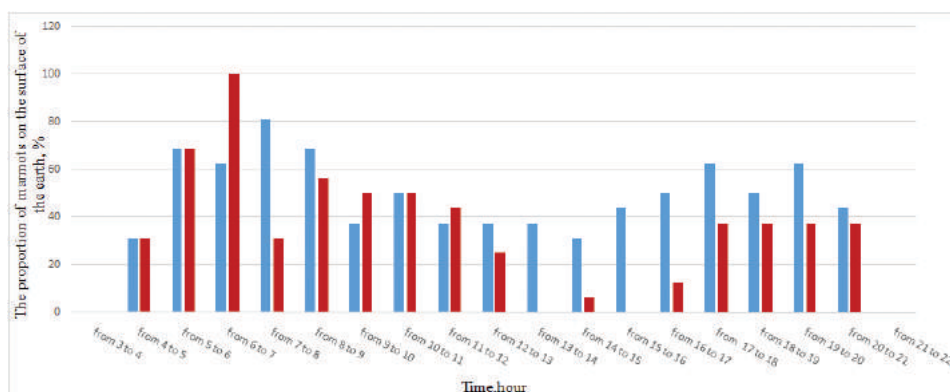


Fig. 2. The dynamics of terrestrial activity of adult (blue) and young (red) bobak in June (showing observations from 08.06.2010).

In July and August the maximum proportion of above ground bobak did not exceed 75%. In September, before hibernation, a single peak of above ground activity occurred in the afternoon, from 1 p.m. to 5 p.m. (Fig.3).

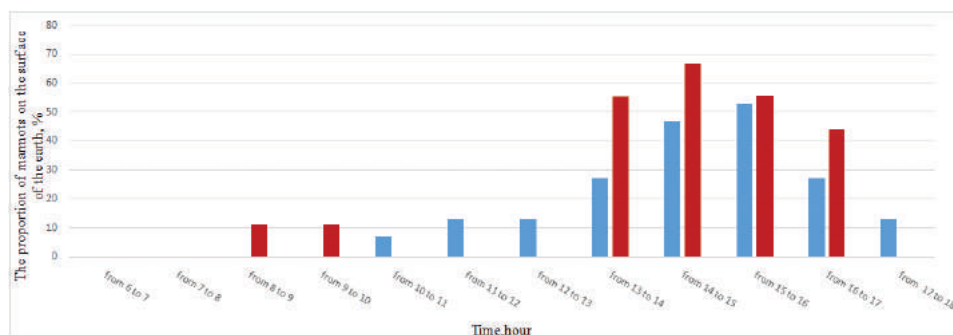


Fig. 3. The dynamics of terrestrial activity of adult (blue) and young (red) bobak in September (according to observations at 10.09.2010).

High air temperatures during the day and high levels of human activity near the bobak colony during strawberry gathering season both negatively affected the above ground activity of the bobak. During the strawberry gathering season, bobak peak activity shifted to a later time.

Thus, to maximize the accuracy of bobak population estimates in northern populations, we recommend conducting population counts in the second and third weeks of June, between 5 and 7 a.m. and between 7 and 9 p.m. Further, population counts are best performed on cool days with clear dry weather, as the most bobak tend to be above ground in those conditions.

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