

Reconstruction of marmot resources in Orenburgskaya oblast of Russia

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We recommend that conservation activities in the steppe zone of Russia focus first of all on key biological subjects of which the baibac is one. The virgin state of a steppe plot should be protected, but biological resources produced by the environment should be controlled and used. New forms to conserve key steppe biological subjects within a territory are proposed. Natural objects, where these forms could be realized, are pointed out. In Orenburgskaya oblast, there is some experience of nongovernmental protection of steppe ecosystems. A public organization leased a plot of 16,000 ha, where the baibac population is successfully recovering. We consider the steppe baibac restoration to be one of the important components of the long term Orenburgskaya oblast development strategy.

KEY WORDS: marmot resource, steppe, key biological subjects, nongovernmental steppe ecosystems protection.

INTRODUCTION

This study is concerned with populations of the steppe baibac (*Marmota bobac* Müller 1776), that inhabit the Orenburgskaya oblast of Russia. This oblast is the central steppe region in Russia of 12.4 million ha situated south of the Urals (Figs 1-2).

This research explores the landscape, ecological features, habitat preferences, limiting factors, and the potential for expansion of the territories of the steppe baibac as well as its resource and history in Orenburgskaya oblast.

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Fig. 1. — Orenburgskaya oblast in Russia.

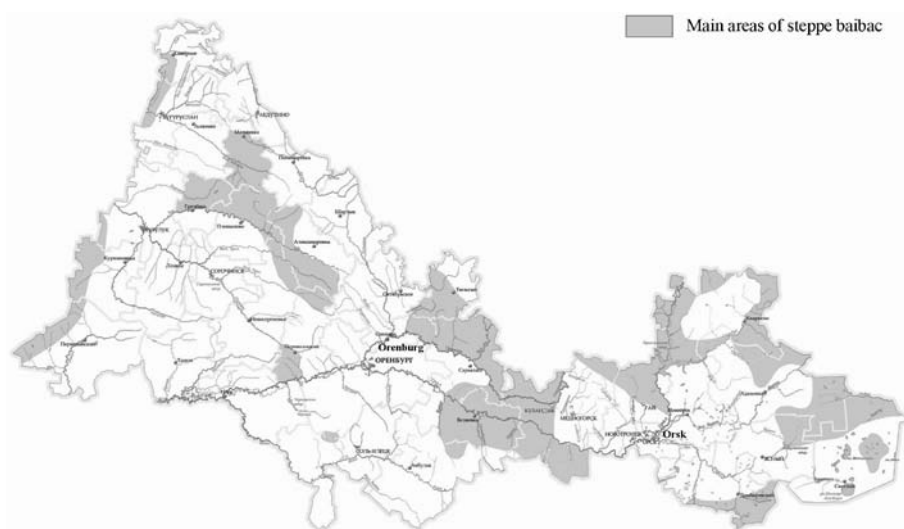


Fig. 2. — Main areas inhabited by the steppe baibac in Orenburgskaya oblast.

METHODS

We applied historical methods and methods of game resource assessment developed by the B.M. Zhitkov Russian Research Institute of Hunting Management and Animal Breeding (GLUSHKOV et al. 2003).

The following four criteria of habitat suitability for baibac are substantiated by soil scientists, steppe scientists, and our own expert assessments. Favorable and unfavorable factors were determined (Table 1).

1. Number of low-yield ploughed lands, which is converted or will be converted in the near future into pastures and hayfields. These lands will provide living space for colonies. There are at least 1,3 million ha of such lands in Orenburgskaya oblast, that are reflected by Table 1.

2. Mechanical properties of soils and grounds. Baibac does not inhabit plots of saline and sandy soils as well as residual soils and basement rocks outlets. Such lands are considered unsatisfactory for baibac.

3. Depth of ground waters levels. All territories where ground waters are too close to the surface are considered to not be potential territory for baibac.

4. Biological productivity of vegetation of virgin and fallow lands, fodder resources to support estimated numbers of baibac.

In addition, we developed new forms of conservation for key steppe biological objects (in preparation).

Table 1.

Criteria of habitat suitability for baibac, favorable and unfavorable factors.

Criteria of suitability and favorable factors		Unfavorable factors	
Criteria of habitat suitability	Favorable factors	Natural	Anthropogenic
1. Gentle slopes, flatlands, upper gullies Drainage conditions.	1. Conservation measurements, conservation of steppe standards.	1. Ground waters near the surface. River floodplains, microdepressions, depressions near a lake.	1. Ploughing of virgin lands, old fallow lands, areas of perennial grass.
2. Deep level of ground waters.	2. Turning low-yield ploughed lands into pastures and hay fields.	2. Landscapes with soils of low drainage.	2. Formation of young fallow lands with their specific vegetation.
3. Loamy soil formatting rocks.	3. Cultivation of perennial grass.	3. Sandy soils.	3. Exposure to shepherd's and feral dogs.
4. Fodder, steppe vegetation covering over 50% of total vegetation.	4. Proper cattle pasturing.	4. Residual soils and exposed basement rocks, farewell rocks with steep slopes.	4. Breaking hunting rules.
5. Height of grass reaching 35-40 cm.	5. Horse economy development.	5. Large forest stands and belts, bushes.	5. Poaching.
		6. Climate anomalies and cataclysms.	6. Degradation of soil and vegetation under too intensive pasturing.
		7. Exposure to predators.	

Historical review

Over 1 million individuals of the steppe baibac inhabited the eastern part of the oblast before virgin land masses were ploughed (MORDKOVICH 1982, CHIBILYOV 1992, KOLESNIKOV 1997). The development of 1.8 million ha of virgin and fallow lands in 1954-1963 was the main cause of the decline in marmot resources because habitat was destroyed and marmots were directly exterminated (KIRIKOV 1980). In the 1970's, when the steppe baibac in the oblast was counted for the first time, its population was estimated to be 86,050 individuals (State Archive of Orenburgskaya oblast, list #6 in the unit of storage #201 from inventory #2 of the fund #P-1429). In order to recover baibac resources, six protected areas of 314,300 ha were established in the oblast for the species by the state authorities in 1975-1984 (SMETANIN & RUDI 1999). There are 2,600 baibac marmots in the "Orenburgskiy" reserve (zapovednik) established in 1989 (SOROKA 2002). The main baibac resource of the oblast, 43,000 of 57,000 specimens, inhabit agricultural lands (SOROKA 2002). In recent years baibac resources have tended to stabilize (SOROKA 2002).

After many years of prohibiting baibac hunting, sport-hunting was recently permitted. Several hundred specimens are bagged by legal hunting per year.

RESULTS AND CONCLUSIONS.

Our results suggest that there is an opportunity to greatly increase steppe baibac resources of the Orenburgskaya oblast. For the immediate future, there are plots of lands suitable for baibac (Table 2).

Recommendations

We recommend that the conservation activities in the steppe zone of Russia should focus first of all on key biological subjects, such as the steppe marmot, that are constituents of the natural steppe ecosystem.

The territories, where new forms of steppe landscape and biodiversity conservation and restoration could be realized, are: (1) disbanded military territories, (2) steppe plots on flat lands, which are under conservation as standards of rural appraisal, gene pool reserves for steppe ecosystem restoration, plots under scientific monitoring, (3) standards of virgin steppe soils listed

Table 2.
Land of various uses suitable for baibac.

Land use	Area (in millions ha)
Agricultural lands including steppe standard	0.5-0.6
Low-yield ploughed lands to be turned into pastures and hayfields	1.3
Non-agricultural lands including natural areas of preferential protection that are not state property	0.1-0.15

in regional and federal Red Data Books of Soils, (4) large steppe plots under steppe-adapted animal husbandry, and (5) lands allocated to soil fertility stabilization and restoration.

Steppe conservation should also focus on the virgin state of the steppe environment. Biological resources, both vegetation and wild animals, should be managed. The conservation based on such principles could be embodied in the following forms.

1. Biostation and park. The base area is a compact plot of steppe landscape of at least 10,000 ha. Both economic activity and scientific experiments are permitted. Any patterns of land ownership, including joint ones, are possible.

2. Land requiring soil-fertility stabilization and restoration. Degraded and rarely used arable lands should be placed in a soil reserves system. This type of land use should prescribe the moratorium pro-tempore on ploughing with permission of agricultural use. Implementing this system does not require any expenditures.

3. Horse and marmot farms for recreation and hunting. In Orenburgskaya oblast there is some experience of nongovernmental protection of steppe ecosystems. A public organization leased the steppe plot "Orlovskaya step" of 16,000 ha, where the baibac population is successfully recovering.

Considering optimal use of steppe land, we estimated the maximum tolerable number of baibac for various territories of the oblast. For pastures and hayfields (0.6 million ha), it is estimated as 200,000; for low-yield ploughed lands that must be converted to pastures and hay by phytomelioration, as 500-700 thousand; for other territories, as 50-100 thousand.

Considering all limiting factors, it is possible a priori to increase baibac numbers to more than 500 thousand, which is considerably more than recent estimates.

Because the steppe baibac is a key member of the natural steppe (LAVRENKO 1956), it has merit to be of high priority in the restoration of the steppe ecosystem. It should be especially noted that baibac can be sustained in pastures (ABELENTSEV et. al. 1961, BIBIKOV 1989).

Furthermore, this animal has some economic value, which for a population of 500 thousand is estimated as 10 million Euros. The bagging of trophy adults (10-13% of the population or 50-60 thousand marmots per year) can be considered the main component of a hunting economy on steppe agricultural lands. The value of such baibac quantity can be estimated as 1.2 million Euros.

We consider the restoration of the steppe baibac to be an important component of the long term development strategy for the Orenburgskaya oblast.

REFERENCES

- ABELENTSEV V.I., SAMOSH V.M. & MODIN G.V. 1961. The recent state of baibac colonies and the experiment of its reacclimatization in Ukraine. *Works of Central Asian Plague Institute* 7: 309-320 (in Russian).

- BIBIKOV D.I. 1989. Marmots. *Moscow: Agropromizdat* (in Russian).
- CHIBILYOV A.A. 1992. The ecological optimization of steppe landscapes. *Ekaterinburg: Nauka* (in Russian).
- GLUSHKOV V.M., GRAKOV N.N., GREVTSEV V.I., KARPUKHIN V.I., KOZLOVSKIY I.S., KOLESNIKOV V.V., MAKAROV V.A., MASHKIN V.I., PIMINOV V.N., SINITSYN A.A., SKUMATOV D.V. & SHILYAYEVA L.M. 2003. The game resource recent state and assessments. *Kirov: Russian Agricultural Akad., B.M. Zhitkov Russian Research Institute of Hunting Management and Animal Breeding* (in Russian).
- KIRIKOV S.V. 1980. The changes of baibac distribution in the period of XVII-XIX A.D. and in the early XX A.D., pp. 20-31. In: Marmots. Their role in biocenoses and economy. *Moscow: Nauka* (in Russian).
- KOLESNIKOV V.V. 1997. The baibac resource change under economical activity. (Author's abstract of dissertation). *Kirov: Russian Agricultural Akad., B.M. Zhitkov Russian Research Institute of Hunting Management and Animal Breeding* (in Russian).
- LAVRENKO YE.M. 1956. Steppes and agricultural lands in former steppes. Part 2. Series: The vegetation of USSR. *Moscow & Leningrad: USSR Academy of science* (in Russian).
- MORDKOVICH V.G. 1982. The steppe ecosystems. *Novosibirsk: Nauka* (in Russian).
- SMETANIN I.I. & RUDI V.N. 1999. The role of reserves established for one species ("vidovoy zakaznik") in the conservation of steppe marmot in Orenburgskaya oblast, pp. 91-92. In: Marmots of Palearctica: their biology and population management. Theses of the III International meeting on marmots of Russia and CIS in Buzuluk (Russia) 6-10 September 1999. *Moscow: Dialog-MSU* (in Russian).
- SOROKA O.V. 2002. The steppe marmot population state in the territory of the Governmental nature reserve (zapovednik) "Orenburgskiy", pp. 183-185. In: The role of nature areas of preferential protection in the conservation of threatened steppes of Eurasia. Materials of the II International Conference in Cheboksary (Russia) 7-10 June 2002. *Cheboksary: Commission on Marmots of RAS Mammal Society & Governmental Nature Reserve "Prisurskiy"* (in Russian).