Mongolian Journal of Biological Sciences 2004 Vol. 2(2): 51-55

[Short Communications]

The Management of Brandt's Vole in Mongolia: Toward an Ecologically Based Means of Control

Peter Zahler[1], L. Dolgormaa[2], Lyn A. Hinds[3] and Andrew T. Smith[4]

[1] Wildlife Conservation Society, P.O. Box 485, Ulaanbaatar 211238, Mongolia e-mail: pzahler@wcs.org
[2] WWF-Mongolia, Hydrometeorological and Environmental Monitoring Agency, Building Room 303, Ulaanbaatar-46, Mongolia e-mail: mpo-toxic@wwf.mn
[3] CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia e-mail: Lyn.Hinds@csiro.au
[4] School of Life Sciences, Box 874501, Arizona State University, Tempe, AZ 85287-4501, USA e-mail: a.smith@asu.edu

Introduction

The Brandt's vole (*Lasiopodomys* [=*Microtus*] *brandti*) inhabits much of the Mongolian steppe and adjacent grasslands in China and Russia. This small rodent has a high reproductive capacity, and local populations may increase in numbers and reach periodic peaks, or outbreaks, that occur in cycles of between 3-14 years. Brandt's voles live in family groups, store plant material for over-winter consumption, and show an annual cycle of abundance. The density and height of vegetation influence their habitat selection, with their preference being for areas where the grass is short, between 30-130 mm (Zhong *et al*. 1999). There is an over-winter decline in numbers of voles that is density-dependent, i.e., populations at a high autumn density decrease at a faster rate over winter than populations at low autumn density. During the breeding season, the rate of increase in the population is not density dependent; the rate of increase is a non-linear response to the height and cover of grass. Population growth rates are lowest in conditions of very short, sparse grass that provides insufficient food, and in tall, dense grass that probably disrupts social interactions and interferes with detection of predators (Zhang *et al*., 2003).

Brandt's voles are an eruptive species with outbreaks occurring episodically – for example there have been 17 severe outbreaks in Inner Mongolia in the last 50 years (Zhang *et al.* 2003). They have been considered a pest species because they compete with livestock, contribute to soil disturbance through their burrowing activities (and can therefore potentially influence grassland desertification), and are reservoirs for diseases such as bubonic plague.

At high population densities, voles can negatively affect grasslands through their grazing. However, recent scientific studies have shown that Brandt's voles are short-grass specialists, and that vole outbreaks are more likely if areas are overgrazed. The frequency of outbreaks has increased in the last 20 years compared to the previous 20 years, and this has coincided with an approximate 5-fold increase in livestock numbers (Zhang *et al*. 2003). At the same time, Brandt's voles are a critical part of the steppe ecosystem, and may qualify as a "keystone species" – e.g., their occurrence may have a greater effect on ecosystem processes and general biodiversity than their numbers alone might suggest (Kotliar *et al*., 1999; Smith and Foggin, 1999; Lai and Smith, 2003). Brandt's voles cycle and aerate soil through their burrowing efforts, and they affect vegetation around their colonies that can (during non-outbreak years) encourage a landscape mosaic of successional plant diversity (Samjaa *et al*., 2000). Brandt's voles are also an important prey species for a wide range of carnivores, from foxes, polecats and Pallas' cats to saker falcons, upland buzzards, and steppe eagles (Samjaa *et al*., 2000).

Management Issues: Bromadiolone

In recent years the Mongolian Government has been spending between about US$300,000-$800,000 each year on poisoning campaigns against Brandt's voles. The main rodenticide used in this campaign over the last few years is Bromadiolone. Unfortunately, this poisoning campaign has had little long-term effect on the target species, but it has had a serious negative effect on mammalian predators, raptors, cranes, various passerines, livestock, and even human health (Tseveenmyadag & Batbayar 2002). According to a report from the Ministry for Food and Agriculture in 2002, at least

http://dx.doi.org/10.22353/mjbs.2004.02.17