NO LICENCE TO KILL:

THE POPULATION AND HARVEST OF MUSK DEER AND TRADE IN MUSK IN THE RUSSIAN FEDERATION AND MONGOLIA

Edited by
VOLKER HOMES

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Aerial view of typical musk deer habitat in the Russian Far East (Markus Stecher);
Inset, from top downwards:
Musk deer browsing (Richard P. Reading);
Female Siberian Musk Deer caught in a snare in the Russian Far East (Volker Homes/TRAFFIC).

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Credit: Richard P. Reading

Male Siberian Musk Deer in Mongolia

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EXECUTIVE SUMMARY

This study attempts to clarify the status of populations of Siberian Musk Deer *Moschus moschiferus* in the Russian Federation and Mongolia. It also investigates hunting (including poaching) of the deer in those countries and the associated trade in musk. The Siberian Musk Deer is a Vulnerable species, according to the IUCN Red List, and is listed in Appendix II of CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). Recent reports of declines in musk deer populations and high demand for the musk produced by the male deer prompted research for this study. To complement the findings from the Russian Federation and Mongolia, the principal areas of research, a brief review of musk use and trade in the Republic of Korea (South Korea) is included to provide a snapshot of the consumer end of the trade in musk. South Korea is a country known to use musk in traditional medicine and known to trade musk internationally. It is hoped that the results of this study will fill gaps in information necessary to place musk deer conservation on a firm footing for the future.

Research was undertaken in the winters of 2001-2002 and 2002-2003 (population surveys in the Russian Federation); in 1998-2002 (poaching/musk trade survey in the Russian Federation); in the winter of 2001-2002 (Mongolian research); and in 2001-2002 (Korean research).

Surveys of musk deer populations in the Russian Federation were conducted using model plots in various habitat types in musk deer range in the Russian Far East and the Altai-Sayan region. The results of these model surveys were extrapolated to provide estimates of the musk deer population in wider areas of such habitats in those regions. An assessment of the levels of hunting (including poaching) of musk deer and the associated trade in musk in the Russian Federation and Mongolia was made by questioning stakeholders, for example, hunters, rangers, illegal traders and enforcement agents. Members of South Korea's associations of doctors and pharmacists of Korean medicine provided information on the demand for musk in that country. CITES data were used for assessments of international trade in musk in the Russian Federation and South Korea - such trade is banned in Mongolia.

The population surveys in the **Russian Federation** for this study resulted in estimates of substantially larger numbers of musk deer than official Russian Government figures show, especially for the Russian Far East (about 140 000, as opposed to 40 000 deer). Owing to the limitations of the methodology used, it is emphasized, however, that the results of the surveys conducted for this study cannot be considered as an accurate reckoning of the number of musk deer in the areas selected, but as an estimate only.

Despite the results indicating larger musk deer populations than are recorded by official surveys in the Russian Federation, population surveys for this study nonetheless found densities of musk deer to be low in the Altai-Sayan region, and it was reported to researchers that the musk deer population in the region had decreased, as a result of poaching, for musk. Reproduction of the musk deer was estimated to have been affected in 50% of their habitats in the Altai-Sayan region. Musk deer in the Altai-Sayan region were said to be systematically targeted by poachers and the trade in musk to be monopolized by three dealers. Moreover, the average weight of a

musk gland in the region was found to have decreased (from 23-25 g to 17 g) in the past few years - a likely indication of high hunting pressure. In the Russian Far East, musk deer populations are stable, according to results of this study. Although the animals are still the target of poachers, this region is less densely populated by humans and less well served by roads than the Altai-Sayan region. Overall, over 80% of all musk deer killed in the Russian Federation, 1999-2000, were estimated to have been poached. This scale of poaching not only raises the question of how long musk deer populations can sustain this rate of harvest, but also highlights a clear enforcement problem. Although there is a quota for the legal hunting of musk deer in the Russian Federation, the illegal alternative is apparently widely preferred, as there is little incentive, including from a financial perspective, for musk deer hunters to operate within the law.

It is almost exclusively for their musk glands that musk deer are poached in the Russian Federation. An estimated 400-450 kg of raw musk from Russian musk deer were traded illegally, annually, 1999-2000, corresponding to about 17 000 to 20 000 male musk deer, assuming the weight of one musk gland to be 23 g. This is about five times the amount calculated to have been traded legally during the same period (72 kg). The musk harvested in the Russian Federation is almost without exception for export. Both legal and illegal exports were reported to be overwhelmingly to East Asian destinations, for use in traditional forms of health care. China (including Hong Kong) and South Korea are particularly notable as consumers of Russian musk.

There are no estimates based on up-to-date surveys for the size of the population of musk deer in **Mongolia**. Research for this study ascertained that an upsurge in hunting the deer at the beginning of the 1990s was in response to the opportunity to trade with China in the wake of changes in Mongolia's political regime. The hunting of musk deer is banned in Mongolia, but from market surveys in Mongolia in 2001 and 2002, it is calculated that, during the period 1996-2001, a minimum annual average of 2000 male musk deer were poached. As in the Russian Federation, therefore, musk deer poaching in Mongolia represents an enforcement problem on a significant scale. This level of poaching is likely to have a deleterious effect on Mongolia's musk deer populations, estimated to have numbered no more than 44 000 in the 1970s. Numbers of musk deer in some of the few areas of Mongolia surveyed recently by scientists indicate that some populations are barely viable. Trading musk in Mongolia is illegal, but this appears to be virtually academic and the fact that musk was traded in and from Mongolia was widely acknowledged during surveys. University students were notable as a group involved in transporting musk from poaching regions to market in Mongolia. Onward trade from Mongolia over the border to China, the sole reported destination for musk from Mongolia, is seemingly largely unimpeded by enforcement authorities.

Musk for traditional Korean medicine was found to be considered indispensable by about one-third of traditional health care professionals responding to the survey undertaken in **South Korea**. Approximately 24% of survey respondents were using musk, 1998-2001, although almost 50% said their use of musk had decreased since 1994. Musk trade is legal according to South Korean law, providing the musk has been obtained legally. The retail price of musk in

South Korea was reported to be the equivalent of approximately USD24-36/g and the import price about USD12/g, at least four times the stated price per gramme received by hunters in the Russian Federation and Mongolia. All recorded musk imports to South Korea since 1997 have been from the Russian Federation, with the exception of three kilogrammes from China. Additionally, reports of illegal trade in musk to South Korea from the Russian Federation were received during research. Reports of illegally traded musk to South Korea are supported by the fact that records of Customs authorities there show several seizures of musk, 1997-2002.

What this study shows is that lack of effective enforcement of domestic laws for musk deer hunting in the Russian Federation and for the total protection of musk deer in Mongolia, coupled with demand for musk in traditional East Asian medicine, is likely to have been to the detriment of musk deer populations in those source countries. Although the sizes of the musk deer populations of the Russian Federation and Mongolia are not known with any degree of certainty, extraction of musk deer from the wild in the two countries has been unrestrained and musk deer populations have been reported to be adversely impacted by poaching. In the Altai-Sayan region, it was alleged that musk deer populations had been reduced to a quarter or one-fifth of their levels in the 1970s and 1980s and, in Mongolia, experts believe that poaching is inevitably threatening populations of musk deer, a species classed as "very rare" in Mongolian national legislation. Disproportionately low ratios of male to female musk deer were reported from parts of Mongolia and the use of indiscriminate snares, the common form of catching musk deer illegally in the Russian Federation, is likely to be causing the death of three to five musk deer for each male obtained with a large enough musk gland in that country.

Although enforcement of the law in relation to musk deer hunting and musk trade is weak in the Russian Federation and Mongolia, stepping up enforcement pressure alone would not be likely to reduce poaching sufficiently, nor would it always be practicable in the Russian Federation and Mongolia, both countries where the musk deer range extends into remote and sparsely populated regions. Poverty was a stated cause for musk deer poaching and, rather than focus on applying disincentives for illegal practice, financial benefits could be linked to legal hunting of musk deer and trade in musk in the Russian Federation, and alternative forms of income explored for musk dealers in Mongolia. Meanwhile, in consumer countries, where demand for musk so clearly still exists, if South Korea is representative of this, much can still be done to improve regulation of the trade, alongside efforts to research medicinal alternatives for musk and to promote awareness of the detrimental effect that illegal musk trade is having on musk deer populations.

Recommendations

These recommendations for remedial action on behalf of musk deer conservation are based on the findings of this study. In the case of the Russian Federation, some recommendations are based on those emerging from the workshop attended by numerous specialists in aspects of musk deer conservation from governmental and non-governmental organizations, held in July 2003 specifically to discuss the findings of this study (see **Annex**).

To the Governments of the Russian Federation and Mongolia

Population surveys

Population surveys of musk deer are urgently required to improve knowledge of the status of musk deer in the Russian Federation, and especially Mongolia, where no national surveys of the musk deer population have been conducted for over 30 years.

- The Government of the Russian Federation should change the way in which musk deer populations are estimated, in order to arrive at a more accurate approximation of the number of musk deer in the country, which would provide a more credible basis for the construction of legal hunting quotas. To this end, population surveys of musk deer should be carried out separately to those of other ungulates and of fur-bearing mammals and a methodology for estimating musk deer populations, which is designed specifically for the species, should be developed. Approval of this methodology from game management agencies, both at regional and federal level, should be sought.

- The Government of Mongolia should undertake surveys of the country's musk deer populations. Pending wider surveys, key range areas, at least, should be surveyed. Any methodology for surveying musk deer populations researched and developed in the Russian Federation could be used as a model.

- International aid agencies, intergovernmental organizations and non-governmental organizations should be requested to offer relevant assistance to the Governments of the Russian Federation and Mongolia in conducting research into methodologies for population surveys.

Other research

- Techniques for targeting male musk deer selectively should be investigated. The selective targeting of male musk deer should significantly reduce the incidental catch of female and young musk deer.

- Research should be set in motion to investigate the practicability of the use of live-traps for musk deer. These allow live capture so that musk may be extracted from male deer, which can then be released. This should minimize gender imbalance in musk deer populations.

Legislation

The Russian Federation and Mongolia already have strict regulations for musk deer protection and minimal legislative changes are proposed here.

- The Government of the Russian Federation should amend legislation to outlaw non-selective means of catching musk deer, especially in order to reduce incidental killing of

female and juvenile musk deer. The amended regulations should be applied in all parts of the Russian Federation where musk deer occur.

Management of musk deer populations, including by means of economic incentives for the legal trade of musk, in the Russian Federation

- The system for legal hunting of musk deer in the Russian Federation is currently open to abuse and would benefit from methods that would improve its structure.

- Hunting quotas for musk deer in the Russian Federation should be based on musk deer population estimates which are as accurate as possible, derived from regularly repeated surveys, designed especially for musk deer. In this way, being careful to take into account the number of musk deer which may be lost to poachers, the quotas can be set at levels which are not detrimental to musk deer populations, but which yet allow a sustainable offtake.

- CITES *Decision 11.57* calls for musk-exporting Parties to reduce their export quota for musk, if biologically appropriate. In the Russian Federation, it is recommended that a reduction of the legal quota for musk exports would not be beneficial, as it is believed this would imbalance still further the ratio of legal to illegal trade.

- The means of selling musk from legally hunted deer at approved auctions, where only legally obtained musk could be offered, should be devised and the system set up in the Russian Federation. A considerable share of the money so obtained should go to the legal hunters, in order that they view musk deer as a valuable resource, which needs protection. The St. Petersburg fur auction could be used as a preliminary model for any musk auction.

- Hunters in the Russian Federation should be provided with incentives to bring legally acquired musk to any auctions set up, *inter alia* through advance orders and the corresponding funding of musk deer hunters before the hunting season starts, and through the use of long-term leases (at least 10 years) for hunting sites.

- Long-term contracts between hunters, their associations, and traders for bringing musk to any auctions established should be promoted in the Russian Federation. This should foster credibility for sustainable musk deer hunting.

Enforcement

Although the Russian Federation and Mongolia have strict regulations for musk deer protection, these are poorly enforced and the following recommendations are proposed to improve observance of the national laws relating to musk deer in these countries.

- The fines for poaching musk deer and for illegal trade in musk in the Russian Federation should be raised and the Government of Mongolia should consider raising fines for the same, in order to provide greater deterrents.

- The existing bans on hunting musk deer in Mongolia and in the Russian Federation where populations of the species are reported to be depleted or rare, for example in the Altai-Sayan region and on Sakhalin Island, should be maintained and strictly enforced. The use of special anti-poaching units in such key range areas is recommended.

- Appropriate training and equipment for enforcement agents is recommended. Agents should be trained in the identification of musk and musk-based products. Particularly at international border crossings and airports, the assistance of dogs trained to detect musk is recommended, the success of which has been demonstrated by South Korean Customs.

- A workshop for musk deer range States, in particular the Russian Federation, China and Mongolia, should be convened, to focus efforts on the conservation of musk deer and attention on trade in musk, and to agree upon realistic yet effective solutions to threats to the species. This would provide an opportunity for stakeholders to discuss musk deer management and enforcement challenges.

Awareness

- In Mongolia, since university students constitute a major group of musk traders, alternative ways of funding their education should be explored and awareness regarding the status of musk deer populations in the country should be raised.

- The Mongolian Government should raise awareness of existing penalties for musk deer poaching and musk trading and should consider increasing the penalties, since they are clearly not acting as a deterrent.

To the Government of South Korea

Research

- Regular surveys should be conducted in South Korea to monitor the trade in musk and musk-based products, in order to gain long-term knowledge of the demand for imported musk, relative to the available, legal supply from musk range States.

Enforcement

- South Korean authorities should examine ways to monitor and control imports of musk more effectively, as there is much anecdotal evidence to suggest that CITES regulations relating to trade in musk deer specimens have been flouted.

Labelling

- Pending the development of a universal system for labelling musk-based products (see **At international level**), these, and products purporting to contain musk, should be labelled to

specify whether genuine or synthetic musk is contained and the quantity. This will assist in enforcing laws relating to the trade of musk in South Korea and also help to quantify the amount of musk in trade, and so potentially assist in identifying the impact of such use on wild musk deer populations.

Awareness

- Health and conservation authorities in South Korea should ensure that issues surrounding the conservation of musk deer are incorporated into the formal teaching curriculum for traditional Korean medicine and should provide appropriate teaching materials to support this.

At international level, including CITES-specific recommendations

- Musk deer experts should clarify the taxonomy of the various musk deer species, using the latest scientific techniques. This is particularly relevant for musk deer conservation at the international level, for example, within the CITES forum, where recommendations for musk deer sometimes refer to actions at species level.

- Given reports of depleted populations of musk deer in some regions of the Russian Federation and Mongolia and, given the enforcement problems identified in this report, it is strongly recommended that trade in musk deer from these countries be closely monitored under the CITES Review of Significant Trade. This mechanism helps guide remedial action when there is reason to believe that trade in Appendix-II species may be detrimental.

- CITES Parties should be encouraged to report all seizures and confiscations of musk to the CITES Secretariat, as requested in their report on the implementation of *Decision 11.149* at CoP12. This will help Parties to gain a better understanding of illegal trade dynamics which may assist in targeting enforcement strategies.

- The current method of documenting quantities of musk medicines in international trade as “tablets”, “pills” or “boxes of medicine”, etc., makes it impossible accurately to assess the actual volume of natural musk - whether orignially from the Russian Federation, Mongolia, or elsewhere - in trade. In turn, this makes it impossible to assess the potential impact of the trade on wild musk deer populations. Standardized methods and units of measurement for documenting the precise quantity of musk contained in derivatives in international trade need to be developed and applied.

- Since large volumes of illegal musk are supplying the demand for medicinal musk, and pending improved regulation of musk deer hunting and of musk trade, steps should be taken to explore substitutes for musk which would be acceptable in traditional forms of East Asian medicine.

INTRODUCTION

During the past decade, owing to reports of declining musk deer populations and of high demand for musk, TRAFFIC conducted surveys of musk deer status and trade in musk in some key musk deer range States and in some consumer countries. The main aim of this report is to compile existing information with results from original research, in an attempt to clarify contradictory reports on the status of musk deer populations and trade in musk in the Russian Federation and Mongolia. The report aims to assess the amount of legal versus illegal trade in musk in the countries considered.

The Russian Federation, Mongolia and China have the largest populations of musk deer and all are the source of various reports of declining populations of the deer as a result of hunting and poaching. Of these three countries, the Russian Federation and Mongolia were chosen as survey locations for this report as:

i) China has recently been the subject of studies on the use and trade in musk in *Musk Deer Farming as a Conservation Tool in China* (Parry-Jones and Wu, 2001) and in a report of the Endangered Species Scientific Commission of the People´s Republic of China, in March 2002. The Chinese Government is currently undertaking a population survey of musk deer in China.

ii) Research by TRAFFIC Europe-Russia between 1994 and 1999 found that musk deer were hunted throughout their range in the Russian Federation for musk. Furthermore, it is well reported in the Russian Federation that poaching for musk deer is widespread, especially in areas not far from settlements and towns (Chestin, 1998; Vaisman *et al*., 1999; Vaisman and Gorbatovsky, 2000). By the end of the 1990s, a significant, and in some regions catastrophic, decline in musk deer poulations had been reported in parts of the Russian Federation (Prikhod'ko, 1997, Prikhod'ko and Ovsiannikov, 1998). These data were at odds with the official figures for musk deer populations, which did not reveal any population declines. Non-selective means of hunting musk deer in the Russian Federation - snares - was a further cause for concern. As these snares do not distinguish between males, females or young, it has been reported that three to five musk deer may be killed for each male with a sufficiently large musk gland (Green, 1986, Jackson, 1979, Prikhod'ko, 1997).

iii) Information on the status of the Mongolian musk deer population size is sparse and the trade in musk in the country is not well documented.

Research for this study had the following main aims:

- to assess the size of the musk deer population in selected areas within the species's range in the Russian Federation

and

- to assess hunting (including poaching) of musk deer and the legal and illegal trade in musk from the deer in selected main range areas for the species in the Russian Federation and in Mongolia.

A review of the use and trade of musk in the Republic of Korea (South Korea) is included in this report as a case study of the demand for musk in a consumer country. South Korea is involved in the international trade and consumption of musk and is known to use musk in traditional Korean medicine. The survey of musk use in South Korea is drawn from *A Question of Attitude: South Korea's Traditional Medicine Practitioners and Wildlife Conservation* (Kang and Phipps, 2003) and a brief synopsis of recorded international trade in musk in South Korea is also provided. This investigation builds on and complements previous TRAFFIC reports relating to the use of musk in consumer countries - see *On the Scent: Conserving Musk Deer - the Uses of Musk and Europe's Role in its Trade* (Homes, 1999) and *Musk Deer Farming as a Conservation Tool in China* (Parry-Jones and Wu, 2001).

Following a background section on musk deer, this report has country sections on:

- musk deer in the Russian Federation - population, harvest and trade in the Russian Far East and Altai-Sayan region of the Russian Federation
- musk trade in Mongolia
- use and trade of musk in South Korea

Following presentation of the main conclusions of the report, recommendations are made for the conservation and sustainable use of musk deer, based on the findings of this study.

BACKGROUND

This chapter provides background information relating to musk deer in general.

Taxonomy and appearance of musk deer

Musk deer (*Moschus* spp.) are small ungulates of the family Moschidae. The taxonomy of the family is under debate. Formerly musk deer were classified in the family Cervidae, but the majority of ungulate taxonomists now include the genus *Moschus* in the separate family, Moschidae (Vislobokova, 1990; Danilkin, 1999; Prokhod'ko, 2001; Sokolov, 1990). Some taxonomists classify all known forms of musk deer as one species, with five to seven subspecies. Other experts consider there to be at least four distinct species:

- the Himalayan or Alpine Musk Deer *Moschus chrysogaster*;
- the Black Musk Deer *M. fuscus*;
- the Forest Musk Deer *M. berezovskii*; and
- the Siberian Musk Deer *M. moschiferus*.

Global distribution of musk deer

Musk deer occur globally in at least 13 countries, in South Asia, East Asia, South-east Asia and the eastern part of the Russian Federation (Wemmer, 1998a) (see **Table 1**). The distribution of musk deer extends from the Arctic Circle in Siberia, through the forested mountains of eastern Asia, to the north-eastern edge of Mongolia and further east, to the Korean peninsula, south across China, to Viet Nam and Myanmar, continuing as far as the southern Himalayas in India, Pakistan and Afghanistan. Distribution in the Democratic People's Republic of Korea (North Korea) was reported to have been widespread in 2000, but restricted to forests in hilly areas (O. Myong Sok, pers. comm. to J. W. Duckworth, 2000, cited in Anon., 2003a). In South Korea, musk deer were widespread in wooded and mountainous parts but, by the 1960s, they had been almost extirpated from their former range. Although a small number is still thought to exist in South Korea (in the Taebak Mountains), the population was thought to be under 40 in 1981 (Won and Smith, 1999, cited in Anon., 2003a). In Kazakhstan, musk deer only occur in the southern Altai region. Within this zone, the species has a fragmented distribution: in the Boukhtarma River basin and on the northern slopes of the Narymsky range (Baydavletov, 1980). As mentioned in the **Introduction**, the Russian Federation, Mongolia and China have the largest populations of musk deer.

Table 1

Distribution of *Mochus* spp.

Scientific name	English common name	Distribution
M. berezovskii	Forest Musk Deer	China and Viet Nam
M. chrysogaster	Himalayan Musk deer	Afghanistan, China, India, Nepal and Pakistan
M. fuscus	Black Musk Deer	Bhutan, China, India, Myanmar and Nepal
M. moschiferus	Siberian Musk Deer	Russian Federation, Kazakhstan, China, Korea (N. and S.) and Mongolia

Sources: Wemmer, 1998a and Anon., 2003a.

For distribution of Siberian Musk Deer in the Russian Federation and Mongolia, see separate accounts in the country chapters.

Conservation of musk deer

National legislation and protective measures

Many countries have protected musk deer in their national legislation. Wemmer (1998a) and Green and Kattel (1997) summarized the status of musk deer protection in different range States and this, and additional information, is included in the following overview.

Afghanistan: Musk deer are not legally protected.

Bhutan: Musk deer are totally protected by royal decree. Poachers may legally be shot on sight.

China: Musk deer are protected under the *Wild Animal Protection Law 2003* as a Category I key species. Such Category I species are protected from hunting. In 1988, the Qinghai Provincial Government promulgated a special emergency notice under its regional wildlife protection laws to draw attention to the threat posed to musk deer species and to strengthen protection of the species. Efforts to establish a network of protected areas to conserve the Giant Panda *Ailuropoda melanoleuca* have indirectly contributed to the protection of Forest Musk Deer *Moschus berezovskii*, since both species occur in the same habitat.

India: Musk deer have been fully protected since 1972 under the federal *Wildlife (Protection) Act* and cannot legally be hunted.

Kazakhstan: There are no provisions protecting musk deer (Krever *et al.*, 1998).

Mongolia: The Government of Mongolia ranked the musk deer as a "strictly protected" species under the *Law on Hunting* (1953), which prohibited hunting of the animal. Since then, the musk deer has been ranked as a "very rare" species under the *Law on Hunting* (1996) and *Law on Fauna* (2000), which means that hunting or trapping are prohibited and carry a penalty of MNT520 000 (USD460), twice the registered value of a musk deer. The *Law on Fauna* also prohibits trade in musk deer and their products, which incurs a fine of MNT35 000-50 000 (USD30-45)/person and MNT150 000-250 000 (USD130-230)/company and the illegally traded products are confiscated (Onon Yo, Species Officer, WWF Mongolia, *in litt*. to TRAFFIC International, 6 April 2004). The musk deer has been listed in the Red Data Books of Mongolia (1987 and 1997) (Anon., 2003f).

Myanmar: Musk deer have been protected since 1994 under the *Nature and Wildlife Law*.

Nepal: Musk deer have been totally protected since 1973 under the *National Parks and Wildlife Conservation Act*.

North Korea: No information.

Pakistan: There are no provisions protecting musk deer.

Russian Federation: All hoofed mammals (Ungulata) fall within the scope of the *Federal Wildlife Act*, which in part also regulates hunting (A. Vaisman, TRAFFIC Europe, pers. comm., June 1998). Musk deer in general are classified as hunting species and are hunted under licence, (see also **Hunting of musk deer in Russia**), but regulations vary regionally (i.e., between *oblasts*, *krays* and republics). In some areas there are harvest quotas for musk deer and in others a prohibition on hunting the deer. Regulations can also vary from one year to another. In the Altai-Sayan region, hunting of musk deer has been banned since the hunting season of 1999-2000, with the exception of Krasnoyarskiy Kray, where hunting is still permitted and regulated with a quota system allowing harvest of 300 musk deer a year. In the Russian Far East, hunting of musk deer is banned in Amurskaya Oblast and the Jewish Autonomous Oblast.

The Sakhalin Musk Deer *Moschus moschiferus sachalinensis*, a rare subspecies, has been included in the Red Book of the Russian Federation. This is intended to constitute a list of endangered and rare species afforded the highest level of legal protection in the country and hunting or harvest of these species is prohibited.

South Korea: The Siberian Musk Deer, Korea's only musk deer species, was designated a highly endangered species by Presidential Decree under the *Nature Environment Preservation Law* (NEPL) of 1997. Anyone who catches animals protected by the Presidential Decree is subject to imprisonment of up to five years or fines of up to KRW30 million (USD236 000 at 2001 rates). Further, imports or exports of Siberian Musk Deer require permission from the government, as stipulated in the *Law Concerning the Protection of Wildlife and Game* (Kang and Phipps, 2003). Trade in musk within South Korea is regulated by the *Pharmaceutical Affairs Law*, administered by the Ministry of Health and Welfare, but there are no provisions relating specifically to the sale, storage, or display for commercial purposes, of musk or musk medicines under this law (as there are, for example, for rhinoceros horn and Tiger bone). Where musk has been illegally obtained, however, its acquisition, possession, transfer or storage are prohibited (Kang and Phipps, 2003).

Viet Nam: Musk deer have been protected by law since 1963 and any exploitation is prohibited.

Musk deer and CITES

Concern over the high levels of international trade in parts and products derived from musk deer saw all musk deer species *Moschus* spp. included in the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1979, with the purpose of regulating and monitoring control of international trade in musk deer, so that such trade did not threaten the survival of these species. Populations of musk deer in Afghanistan, Bhutan, India, Myanmar, Nepal and Pakistan were included in Appendix I in 1983, with the effect that international commercial trade in wild specimens from these populations was prohibited. All other musk deer species were listed in Appendix II, which means that international trade is allowed, but is strictly regulated, according to the provisions of the Convention (see **Table 2**).

Table 2

CITES listing of *Moschus* spp.

Genus	Range State	CITES Appendix
Moschus spp.	Afghanistan, Bhutan, India, Myanmar, Nepal and Pakistan	I
"	China, Kazakhstan, Korea (N. and S.), Mongolia, Russian Federation, Viet Nam	II

Sources: Wemmer, 1998a and Anon., 2003a.

Various other provisions have been made within CITES for musk deer conservation and the most recent measures are described here.

All musk deer species were included in the CITES **Review of Significant Trade** in 1991 and 1993 and re-entered the process again in December 2000, owing to continued concern (Anon., 2003a). The Review of Significant Trade is the guiding mechanism for remedial action when there is reason to believe that Appendix-II species are being traded at significant levels without adequate implementation of Article IV of the Convention (CITES). Article IV requires that no export permits be issued for species included in Appendix II of CITES unless the Scientific Authority of the exporting State advises that the trade will not be detrimental to the survival of the species. Correct implementation of the provisions of Article IV is essential for the effectiveness of CITES and the Review of Significant Trade can lead to measures being introduced to ensure that export volumes are kept within safe levels.

In April 2000, at the 11th meeting of the Conference of the Parties to CITES (CoP11), ***Resolution Conf. 11.7 - Conservation of and Trade in Musk Deer*** was adopted. This urges all CITES Parties to "take immediate action in order to reduce demonstrably the illegal trade in musk". The Resolution calls on Parties to do this by:

- introducing innovative enforcement methods and strengthening enforcement in key border regions;
- developing a labelling system to identify products containing musk;
- developing and using forensic tests to detect the presence of (genuine) musk in products;
- encouraging musk deer range States and consumer States not Parties to CITES to accede to the Convention;
- working with musk consumers to develop alternatives to musk, to reduce demand for the product, while encouraging the safe and effective use of techniques to collect musk from live deer;
- developing bilateral and regional agreements for improving musk deer conservation and management, strengthening legislation and enforcement efforts.

Additionally, at the same meeting, Parties decided on the adoption of four decisions relating to musk deer, of which only ***Decision 11.57*** remains in force.

- *Decision 11.57* states that Parties that authorise export of raw musk should consider reductions in their export quotas, if biologically appropriate, until the Animals Committee has completed its consideration of musk deer in the Review of Significant Trade.

- *Decision 11.83* stated that the Standing Committee should undertake a review of actions taken by key musk deer range, transit and consumer States – particularly China, France, Germany, India, Japan, Kazakhstan, Malaysia, Mongolia, Nepal, Singapore, the Republic of Korea and the Russian Federation – to improve enforcement (especially in key border areas), implement trade controls and conserve and protect musk deer populations, and that it should report at the 12th meeting of the Conference of the Parties to CITES (CoP12).

  Acting on this Decision, the Standing Committee wrote to the countries identified and China, Germany, Japan, Mongolia and the Russian Federation responded (by CoP12). Their responses were reported in the Standing Committee's report to CoP12 (Anon., 2003b). In the context of this report, the responses of Mongolia and the Russian Federation are particularly relevant. Mongolia emphasized that hunting of musk deer was illegal in its territory

and the Russian Federation stressed that hunting was licensed and that it had export quotas in force for musk, while acknowledging that smuggled musk glands could be very difficult to detect (Anon., 2003b). This report from the Standing Committee, as required by *Decision 11.83,* was accepted by CoP12 (Anon., 2003c).

- *Decision 11.92* stated that the Animals Committee should consider the trade in musk deer, raw musk, and products containing musk in the context of the Review of Significant Trade and present proposals for remedial actions to the Standing Committee prior to CoP12.

  In its report on implementation of this Decision to CoP12 (Anon., 2003b), the Animals Committee stated that it had initiated its Review of Significant Trade in *Moschus* spp. at its 16th meeting, in December 2000. It had categorized *Moschus moschiferus* as a "category 1 species" ('species of urgent concern') and identified possible problems concerning implementation of Article IV of CITES (relating to the regulation of trade in specimens of species included in Appendix II) in China and the Russian Federation. Recommendations for the rectification of these problems were made to the Russian Federation and China in March 2001. It was agreed at CoP12 that the requirements of *Decision 11.92* had therefore been met and this Decision was repealed, accordingly (Anon., 2003c).

- *Decision 11.149* stated that the Secretariat should conduct an analysis of the use of musk in perfume industries and in traditional medicines in Asia and in Asian communities outside Asia, in order to identify the level of demand, trends, and user groups, and that it should report at CoP12.

  Acting on this Decision, the Secretariat commissioned a small study of musk availability in Chinese markets but lack of funds prevented any significant further work on this subject. The Secretariat's report on their actions pursuant to *Decision 11.149* was accepted by CoP12, as was their recommendation that implementation of the Review of Significant Trade concerning *Moschus* spp. should continue (Anon., 2003c).

At the time of writing, musk deer trade from the Russian Federation is no longer subject to recommendations under the Review of Significant Trade. The response from the Russian Federation to a number of specific recommendations of the Animals Committee for improving its management of musk deer was evaluated during 2002 and 2003 and found to be adequate (T. De Meulenaer, CITES Secretariat, *in litt.* to TRAFFIC International, 10 June 2004).

Musk deer and the Red List

All species of musk deer are listed in the IUCN Red List of Threatened Species (Anon, 2003d). The IUCN Red List is an inventory of the global conservation status of plants and animals, which uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. There are nine Categories of Threat in the IUCN Red List system: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient and Not Evaluated. The Siberian Musk Deer is classified as Vulnerable, while the Himalayan Musk Deer, Forest Musk Deer and Black Musk Deer are all listed as Lower Risk/near threatened (a 1994 Red List Category).

Musk and its uses

Musk refers to the secretion from the scent gland of the male musk deer, the odour of which comes mainly from "muscone" – a component first isolated in 1906 (Homes, 1999). It is for their musk, above all else, that musk deer are hunted and trapped (Green and Kattel, 1997). The history of musk use is more than 5000 years old and its high value is renowned and has been compared to that of gold, jewels and pearls.

Medicine

Musk is mainly used in traditional East Asian medicine and this is the main reason for the hunting and poaching of the deer (Parry-Jones and Wu, 2001; Homes, 1999; Green and Kattel, 1997). Musk has been used in this way for hundreds of years, to treat a variety of ailments, particularly in Chinese and Korean traditional medicine (Gaski and Johnson, 1994; S. Hu, Institute of Chinese Materia Medica, Beijing Academy of TCM, *in litt*. to TRAFFIC East Asia, September 1998). In East Asia, it is used predominantly as a sedative or a stimulant. Lee (1995) reported that musk was used for a variety of ailments in traditional Korean medicine, including those that impair consciousness, while in the Russian Federation musk has been used as an aphrodisiac and as a medicine to treat a variety of ailments, such as convulsions, asthma, abscesses and bruises, and also as an effective contraceptive.

Credit: Markus Stecher

Traditional East Asian medicines purporting to contain musk

Perfume

Musk is known for its use in perfumes in Europe. Besides having its own odour, musk is a good fixative of other scents and was widely used by the European perfume industry in the 19th century. In the late 1990s, natural musk was reported still to be used in a few of the most expensive perfumes (Homes, 1999). In the late 1980s, these perfumes included *Chanel's No. 5, Desprez's Bal a Versailles, Guerlain's L'Heure Bleu, Rochasa, Madame Rochas* (Green and Taylor, 1986).

POPULATION AND HARVEST OF MUSK DEER IN THE RUSSIAN FAR EAST AND THE ALTAI-SAYAN REGION, 2001-2003, AND TRADE IN MUSK IN THE RUSSIAN FEDERATION, 1998-2002

by Alexey Vaisman and Pavel Fomenko

Background

Siberian Musk Deer - appearance

Siberian Musk Deer *Moschus moschiferus* is the only species of musk deer that occurs in the Russian Federation. The deer generally move with rather large, extremely easy, soft elastic jumps and a lowered head and the structure of the skeleton is adapted for jumping (Flerov and Sopin, 1980). The buck has long, thin and very sharp, tusk-like, canine teeth protruding from the mouth, which reach 70 or even 100 mm in length and grow throughout the animal's life. Female "tusks" are not visible from the outside (Flerov and Sopin, 1980; Ustinov, 1978). Most of the body is covered with long (65 to 95 mm in length), rough and elastic hairs that are relatively fragile. The fur of the adult musk deer is dark brown, and the head is grey with some brown at the top (Flerov, 1952; Ustinov, 1978). Siberian Musk Deer grow and mature quickly and a two-year-old animal is the same size as a fully mature adult. There are no apparent sexual distinctions in the sizes

Credit: Richard P. Reading

Siberian Musk Deer *Moschus moschiferus*

and weight. A new-born Siberian Musk Deer weighs 300-500 g and an adult weighs about 15-17 kg. Total body length is about 86-100 cm and height about 56-67 cm, occasionally, but seldom, 80 cm (Flerov, 1952). Hind legs are long with strong muscles, while the front legs are comparatively short and thin. Caudal glands are situated on the top surface of the tail and contain a secretion with a goat-like smell. Only male musk deer have musk glands, which are located between the genitals and the umbilicus. The musk gland of an adult male is about three centimetres wide and four to five centimetres deep (Sokolov, 1979). According to Sokolov and Prokhod'ko (1989), its secretion, musk, stimulates the onset of oestrus.

Population and habitat of musk deer in the Russian Federation

Habitat

In the Russian Federation, Siberian Musk Deer are distributed mainly in the mountain taiga and are rarely seen over 1600 m (Gueptner *et al.*, 1961), though in some areas they can move higher, for example in the Altay Mountains (Sobansky 1992; Poyarkov, 2002, pers. comm.), where musk deer can live at heights of 1900-2600 m in woodlands (Shvetsov, 1980).

Especially in winter, musk deer tend to live near steep slopes covered with coniferous trees (Siberian Cedar or Stone Pine *Pinus cembra* in the Altai-Sayan region, Korean Pine *Pinus koraiensis* in the Russian Far East and firs *Abies* spp., but less often Larch *Larix decidua* or other pine species *Pinus* spp.). Their favourite habitats have areas of rock, where they can rest and find refuge from predators (Gueptner *et al*., 1961; Ustinov, 1976; Baidavletov, 1980). Preferred places are north slopes in the shade, where there is more tree lichen (Gueptner *et al*., 1961; Astafiev, Zaytsev, 1975. See ***Diet*** below). In summer, part of the day is spent in forest river valleys and near mountain springs, in sites with grassy vegetation, where the coniferous taiga alternates with deciduous mixed forest. Musk deer avoid boggy woods.

In the **Russian Far East**, musk deer habitats are mainly restricted to mountains and dark coniferous forests. In Larch-forested areas of the Amur, the deer occupy narrow strips of forest near rivers and headwaters. High forests, modified by fire, with moss, on the western slopes of the Sikhote-Alin region, on the coast of the Tatarski Strait, are reported to provide particularly suitable habitat (Kutcherenko, 1975). In March 1975, 20 musk deer per kilometre of survey paths were reported here (Astafiev and Zaytsev, 1975) and a population density of up to 30 musk deer per 1000 ha in the Sikhote-Alin region was reported by Zaytsev (1991). Musk deer in this region were reported rarely to descend to wide valleys, but in summer they move more widely and have been found seven or eight kilometres from coniferous forests (Astafiev and Zaytsev, 1975). For musk deer in the Sikhote-Alin region, the availability of rocks is not an obligatory condition of habitat (Zaytsev, 1991).

On average, in **eastern Siberia**, the density of musk deer is up to 14-25 animals per 1000 ha (Ustinov, 1976). According to Lobanov (1975), in the **eastern Sayan region**, the range of musk deer is fragmented. There are two different types of musk deer habitat, one consisting of slopes covered with open woodland of pine, Aspen *Populus tremula*, Silver Birch *Betula pendula*,

Downy Birch *B. pubescens*, Round-leaved Dwarf Birch *B. rotundifolia* and Larch. Here, there is little snow cover, plentiful rocky places and an abundance of grassy plants, creating good conditions for musk deer throughout the year. In this habitat, the density of the musk deer population can reach up to 85 animals per 1000 ha (Lobanov, 1975). The other type of habitat is located in watershed ranges. Siberian Cedar forests with pine and Larch dominate the forests in these locations and the mountains are covered with plenty of rocky areas, but these are often not suitable as resting places. The depth of the snow cover in winter here is about 65-200 cm. The density of the musk deer population can reach 40 animals per 1000 ha (Lobanov, 1975). This contrasts with a population density of two to four animals per 1000 ha in the **southern Altai region**, where excessive snow cover makes for low stocks of accessible lichen (Baidavletov, 1980).

Diet

Siberian Musk Deer feed on more than 130 species of plant (Sherbakov, 1953), although up to 20 species may be considered to constitute the principal source of food. Diet varies according to availability and local conditions - Himalayan Musk Deer are described as concentrate selectors, with an ability to adapt to poorer quality diets, for example in winter (Green, 1987).

Most of the year, lichen is of high importance for Siberian Musk Deer, especially tree lichens, such as those in the genera *Usnea* (Old Man's Beard), *Pazmelia* and *Evernia*, or others like *Cladonia* (branching lichens) and *Cetraria* (Gueptner *et al*., 1961). The value of lichen is particularly great in winter, when it constitutes up to 70% of musk deer food. On average, Siberian Musk Deer consume about 0.8 kg of lichen per day and rise on their hind legs to reach lichen up to 1.5 m above the ground. Shaposhnikov (1956) considered that in ideal musk deer habitats there were up to 100-120 kg of lichen per hectare and up to three kilogrammes of *Usnea barbata* per tree. Musk deer are particularly active at night time and feeding mainly occurs in the evening and in the morning.

The diet also consists of thin branches and young shoots, pine needles and bark, leaves, buds and occasionally small roots. Siberian Musk Deer feed on Mountain Ash *Sorbus aucuparia*, Aspen, maples *Acer* spp., willow *Salix* spp., Bird or Black Cherry *Prunus padus* (syn. *Padus avium*), honeysuckle *Lonicera* spp. and other leaved plants (Sherbakov, 1953; Shaposhnikov, 1956). In summer, the deer feed predominantly on grasses and leaves of Bilberry *Vaccinium myrtillus*, Wineberry *Rubus phoenicolasius* and some cereals, and the total weight in a deer's stomach may reach two kilogrammes (Sherbakov, 1953).

Population structure and reproduction of Siberian Musk Deer

There is little information on the structure of the musk deer population in the Russian Federation (Lobanov, 1975; Sokolov and Prikhod'ko, 1982; Zaytsev 1991). According to Lobanov (1975), the average age of a musk deer in the wild is three to four years. The ratio of males to females is approximately 53:47. Young musk deer born in any one year make up about 23 % of the total population. The proportion of adult males in a normal population is about one-third. Zaytsev

(1991) researched the gender and age structure of a population of musk deer in the Sikhote-Alin region (**Table 3**). As the table shows, the proportion of males in a population can be higher than 38%. (This type of finding is useful in calculating the total population of musk deer from extracted musk glands.)

Table 3

Gender and age structure of musk deer in parts of the Sikhote-Alin region

Sex / Age in years	m>3	m-2-3	m-1-2	f>2	f-1-2	y
Number of musk deer	10	3	9	25	4	6
%	17.5	5.3	15.8	43.9	7.0	10.5

Note: m = male, f = female, y = young.

Source: (Zaytsev, 1991).

Among all ungulates in the Russian Far East and the Russian Altai-Sayan, musk deer have the highest reproductive rate, with the exception of wild boar (**Table 4**) (Korelov and Dragan, 1983). The natural death rate of musk deer fawns is 10 to 20 %. As a result, the musk deer is often regarded as a species with populations which can sustain relatively high hunting pressure and still recover in a relatively short period of time (Green and Kattel, 1997).

Table 4

Level of reproduction of ungulates in the Russian Federation

Ungulate	% of new-born animals in autumn populations			% of new-born animals in spring populations		
	average	max.	min.	average	max.	min.
Red Deer *Cervus elaphus*	17	21	10	20	27	11
Sika Deer *Cervus nippon*	15	28	9	18	39	9,9
Reindeer *Rangifer tarandus*	24	28	20	32	38,9	25
Elk *Alces alces*	19	22	10	23	28	11,1
Wild Boar *Sus scrofa*	67	68	66	205	213	198
Roe *Capriolus capriolus*	27	35	20	37	53,8	25
Siberian Musk Deer *M. moschiferus*	32	46	22	46	87	29
Bighorn Sheep *Ovis nivicola*	22	25	19	28	39	25
Fallow Deer *Cervus dama*	25	38	14	34	47	16
Mountain sheep and goats	16	21	7	19	27	7.5

Source: Korelov and Dragan, 1983.

Natural factors limiting the size of musk deer populations

Snow cover: This is one of the most important limiting factors for the distribution and density of musk deer populations and can be the most important factor in places where ground-growing lichen is prominent in the diet of musk deer (Prikhod'ko, 2003). In places where the deer mostly feed on tree-growing lichen, snow cover is not so important a limiting factor. Despite wide hoofs, which help musk deer move on soft ground, in a period of deep snow musk deer move by vertical jumps that require the use of much energy.

Predators: The main predators are the Common Wolf *Canis lupus* and Lynx *Lynx lynx*, as well as Tiger *Panthera tigris* and Leopard *Panthera pardus orientalis* in the Sikhote-Alin region of the Russian Far East and the Black Mountains in Primorskiy Kray. The remnants of musk deer were found in 43% of 117 samples of Lynx droppings, gathered over three years, mainly in winter (Sherbakov, 1953). In the Russian Altai region, remnants of musk deer were found in four out of eight samples of Lynx droppings found in July to November. In spring, under conditions of deep snow, musk deer become easy prey for Indian Marten *Charronia flavigula*, Wolverine *Gulo gulo* and Sable *Martes zibellina*. Shaposhnikov (1956) observed Wolverines preying on musk deer in the Altai region. In much of the musk deer's Russian range, Wolverines successfully hunt musk deer by chasing them from rocky sites with little snow to broader valleys with more snow, where catching them is easier (Sobanski, 1992). Long-term surveys have proved that in places where the musk deer population is growing, the population of Wolverines is growing too. Wolves are predators for musk deer nearly all over the Altai region, in the Republics of Tyva and Khakassia and in the Trans-Baykal region. In Sakhalin, Fox *Vulpes vulpes* and Sable successfully hunt musk deer and in winters with deep snow, Foxes in the Chita Oblast can significantly reduce the population of musk deer. Kaplanov (1948) found dead musk deer being eaten by Tigers in the mountains of the Sikhote-Alin region.

In the Russian Far East, Sable can play a significant role as a musk deer predator (Yu Dunushenko, 2003, *in litt.* to TRAFFIC Europe-Russia), but in the central part of the Sikhote-Alin region and in other parts of the Russian Far East, Indian Martens are the main predator of musk deer, particularly in autumn and winter, when groups of Indian Martens hunt together. Astafiev and Zaytsev (1975) and Koucherenko (1980) considered that groups of Indian Martens were generally very successful in hunting musk deer and that the deer very rarely managed to escape. Indian Martens benefit from conditions of crusted snow, when the chase of musk deer is easier and martens can catch up with musk deer in the first kilometre of the chase. Even in stony places, where musk deer rest, Indian Martens can climb and prey on the deer (Kucherenko, 1980). In the winter of 1935-36, the remnants of 26 musk deer killed by Indian Martens were found on the ice of the Amur River (Gueptner *et al.*, 1961). Often Indian Marten prey on musk deer by driving them onto the ice of a river or spring (Astafiev and Zaytsev, 1975). In spring and summer the musk deer prey of Indian Martens are mainly juveniles.

Forest fires: are an important factor affecting the musk deer population. They reduce the availability of lichen, moss and branches that the deer feed on. Shrubs and mosses may recover

in a few years, but the recovery of lichen needs decades (Zaitzev, 1991, Prikhod'ko, 1999, 2001).

Diseases: Diseases of musk deer are not very well documented.

Distribution of Siberian Musk Deer in the Russian Federation

A comprehensive account is provided here, since scant literature on the distribution of the species in the Russian Federation is in English.

Figure 1

Distribution of Siberian Musk Deer in the Russian Federation

Note: Diagonally shaded area shows approximate area of musk deer distribution

The range of Siberian Musk Deer in the Russian Federation covers approximately half of the whole range of the genus *Moschus*, occupying its northern part. Within the species's range, distribution is fragmented and density of population varies according to ecological factors, such as vegetation. Broadly speaking, the range for musk deer in the Russian Federation extends from south-central Siberia, through eastern Siberia to the Russian Far East (except for the far north-east of that region) (Gueptner *et al*., 1961) (see map - **Figure 1**). The Yenisey River, which flows through central Siberia, more or less marks the western boundary of the range, while the eastern boundary runs along the east of the Kolymskiy mountain range, south to the Sea of Okhotsk. The southern boundary of the species's range in the Russian Federation is nearly coincident with the southern border of the former USSR and in the north the species has been recorded to extend into the Arctic Circle - up to the Syverma Mountains (Middendorf, 1867, cited in Gueptner *et al.*, 1961), the Putoran plateau and Lake Yessey, up to 69° North.

The following account of the distribution of Siberian Musk Deer in the Russian Federation describes the range (roughly speaking) from west to east. It makes reference to administrative divisions within the Russian Federation, which is divided into 89 such divisions, or "subjects", of which there are different types: republics; autonomous *okrugs* (districts); *krays* (territories); *oblasts*; federal cities and one autonomous *oblast*.

In the westernmost part of the range, Siberian Musk Deer are widespread **in the Altai region** of the Russian Federation, where the borders of Kazakhstan, Mongolia and the Russian Federation meet. In the south-west of this area, musk deer have been found in the Kortchumski and Narymski ranges and near the headwaters of the Bukhtarma River (Nickolsky, 1883; Kuznetsov, 1948; Antipin, 1941, cited in Gueptner *et al*., 1961). Their presence has also been reported from the Altai region in the Katunski range; the Koksa River basin; the Kholzu and Koksinski ranges, around the headwaters of the River Charysh (near the village of Ust-Kan), for example, probably in the Terektinskiy range; near Cherga (just south of Gorno-Altaysk, the capital of the Altai Republic), for example, in the Cherginskiy and Syomenski ranges: the musk deer's range does not extend as far north as Gorno-Altaysk, itself.

Information on the distribution of musk deer in the other parts of Siberia is poorly documented. According to Moskvitin and Smirnov (1975), the animals were present in East Sayan; Khamar-Daban; Ulan-Burgasy; Dzhydynskoye; Malkhanskoye; Barguzinskoye; Ikatskoye; Tsagan - Kherteye; Vitimskoye plateau; Stanovoye and the Severo-Baykal uplands. Just east of the Altai region, musk deer are found in the Abakanskiy range, at least in its southern part, in the area of Teletskoye Lake, the biggest lake in the Russian Altai Mountains (Kashenko, 1899; Flerov, 1936; Nickolsky, 1899; Yourgenson, 1938, cited in Gueptner *et al.*, 1961). The deer are also reported from the Kuznetsk Alatau mountain range, east of the city of Novosibirsk, and the Sayan Mountains. Apparently, musk deer are absent in the Salair Mountains (which stretch between Novosibirsk and the Kuznetsk Alatau Mountains).

Distribution of musk deer in the vast territory from Khatanga (in Taymyrskiy Autonomous Okrug) to the Sea of Okhotsk is effectively unknown. Within this region, musk deer have been reported from around the Khatanga, Lena, Olenek and Omoloy Rivers. At low parts of the Yana River, musk deer have been recorded 460 km north of the town of Verkhoyansk (Tougarinov, Smirnov, Ivanov, 1934 cited in Gueptner *et al*., 1961). Further east, the distribution of musk deer in the basins of the Indigirka and Kolyma Rivers, while unclear, is thought to occur along the left bank of the Indigirka River, in the area of its divide with the Yana River, probably up to approximately 70° North, up to the northern extremity of the Cherski range. Further east still, in the Magadan Oblast, musk deer prefer valleys of tributaries (Zheleznov, 1990) and hardly go north of 67° North. The Kolyma River probably forms the boundary of musk deer territory as it bends around the Kolyma lowlands. The animals are reported from along the tributary of the Kolyma River, the Korkodon River and from the upper part of the Omolon River (64° North). During recent decades, musk deer are reported to have disappeared from a number of areas in the Kolyma uplands (Magadan Oblast) (Chernyavsky, 1989). The eastern boundary of the musk deer range continues south along the eastern side of the Kolymskiy mountain range, down to the coast at Penzhinskaya inlet. Beyond this, the easternmost edge of the range is formed by

the coastal mountains by the Sea of Okhotsk (Abramov, 1954). In the lowlands of the Amur River estuary (on the mainland west of Sakhalin Island) musk deer are reportedly not present (Bromley and Kutcherenko, 1983). Further to the south, in the Sikhote-Alin region, musk deer are present as far south as the coast in all mountainous areas. The Sikhote-Alin population of musk deer is isolated from the main area of distribution in this region.

Musk deer are present on Sakhalin Island, both in the north and south, but are absent from the Shantarskiye Islands (north-west of Sakhalin) and Kamchatka.

Legislation relating to musk deer

For an account of national legislation for the protection of musk deer in the Russian Federation, see page 4 (**Conservation of musk deer**).

Methodologies used for research components in the Russian Federation

Musk deer population surveys in the Russian Federation

The musk deer population survey undertaken for this study took place in the Russian Far East (in Amurskaya Oblast, the Jewish Autonomous Oblast, Primorskiy Kray and Khabarovskiy Kray) and in the Russian Altai-Sayan region (in the southern part of Krasnoyarskiy Kray and districts of the Republics of Khakassia and Tyva and the Altai Republic), mainly from September 2001 to March 2002 and from September 2002 to March 2003. The Russian Far East and Altai-Sayan region are the two regions with the largest musk deer populations in the Russian Federation.

The development of the methodology for the musk deer population assessments and the analysis of the survey data were based on consultations with Russian experts on ungulates, available scientific literature and an assessment of the official government methods of measuring musk deer populations in the Russian Federation. The adaptation of the methodology was discussed, but not officially agreed upon, with Mr I. K. Lomanov, the deputy head of the State agency responsible for "control, information and analysis of hunting animals, their environment and habitat" (hereafter referred to as *GU Centrokhotcontrol*) - in other words, the government authority responsible for assessing game stock in the Russian Federation.

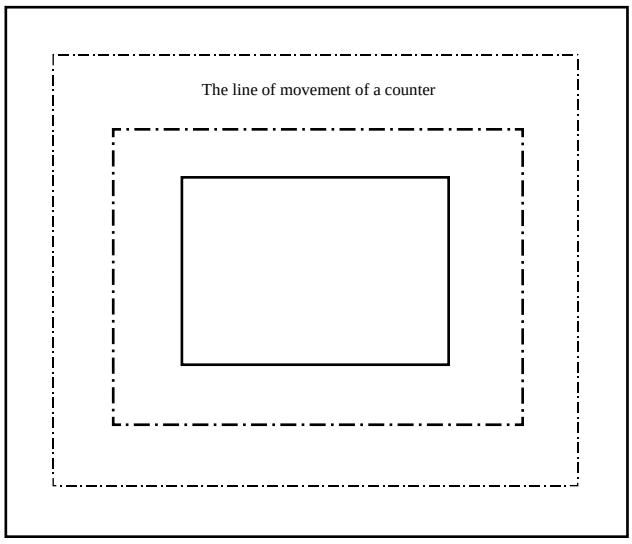
During a test field survey, the methodology was refined and adapted to take into account the nature of the selected survey areas (see below) and the biological characteristics of musk deer. The limited budget available and the vast area of the musk deer range clearly indicated in advance some of the limitations of the results of such an assessment. Therefore, the results can be used as an estimation, only, of the musk deer population in parts of the Russian Federation and, furthermore, this estimation can only be confirmed or otherwise by regularly repeated population surveys using the same methodology.

Some key points relating to the methodology used are as follows:

- The population survey was conducted during winter, from November to January, after fresh snowfall.
- A similar methodology was used both in the Russian Far East and the Russian Altai-Sayan region.
- Using maps, survey areas were selected in typical habitat in the musk deer's range.
- Each survey area was 1000 ha and therefore the densities of musk deer populations recorded are given per 1000 ha (and not, for example, per km^2).
- Every survey area consisted of three plots, measuring 3.3km^2 each.
- Altogether, 31 survey areas were chosen in the Russian Far East (six in Primorskiy Kray, 16 in Khabarovskiy Kray, seven in Amurskaya Oblast and two in Jewish Autonomous Oblast) and 74 survey areas in the Altai-Sayan region (22 in Krasnoyarskiy Kray, 17 in the Republic of Khakassia, 17 in the Republic of Tyva and 18 in the Altai Republic) (see **Annexes**).
- The survey areas were not chosen using random sampling in large and varied areas (for example, Khabarovskiy Kray), owing to the difficulty and cost of access to remote areas where musk deer occur.
- Survey areas representing different types of musk deer habitat were selected as far as possible, for example on south-facing slopes, on north-facing slopes, in flood plains, with firs, or cedars/pines and deciduous trees.
- To minimze possible double-counting of animals, the distance between the plots was about three to five kilometres, but not less than three kilometres.
- The limits of the plots were chosen in accordance with natural boundaries (a valley side, mountain ridge, a spring, a forest edge, etc.) to minimize faults in the size of each plot.
- A pre-condition was that the counting in each survey area would not take longer than 24 hours.
- The surveys were conducted within a belt 200 m wide, within the limits of each plot. Two counters carried out the survey in each plot, each moving along a belt parallel to the other (**Figure 2**) at a distance of 50 m from the belt limits and at a distance of 100 m from each other. Thus, each counter overlooked an area of 100 m in width.
- During the survey, the counters whistled and shouted softly from time

Figure 2

Plan of a plot



to time for easier counting of fleeing deer. At the same time they counted musk deer tracks not older than one day and all musk deer either seen, heard or otherwise identified.

- Each counter received a map of the plot, in which he registered any deer tracks and the direction of movement of the animal.
- Before each survey, the starting point, direction of survey and geographical orientation were entered on the plot map.
- The results of the survey were tabulated per plot in each survey area (see **Figure 3**).

Figure 3

Standard form used for recording musk deer population for each survey area

Survey area no.	**(give brief description of the plot, its borders and co-ordinates)**			
Plots	**Description of plot (habitat)**	**Area of plot (ha)**	**No. of deer**	**Comments**
Plot No 1 (date)				
Plot No 2 (date)				
Plot No 3 (date)				
Counter's name:				

Mean musk deer population densities for different habitat types were estimated during surveys of the 31 survey areas in the Russian Far East and 74 survey areas in the Altai-Sayan region (see **Annexes 2** and **3**). Using these calculations, coupled with information on the area and distribution of these various habitat types elsewhere in the Far East and Altai-Sayan regions, estimated figures for the musk deer populations of Khabarovskiy Kray, Primorskiy Kray, the Jewish Autonomous Oblast, Amurskaya Oblast, the Altai Republic and various key districts of Krasnoyarksiy Kray, the Tyva Republic and the Republic of Khakassia were extrapolated. The information regarding area and distribution of the various habitat types in the Russian Far East was obtained from the Institute of Economic Research of the Russian Academy of Science (Sheingauz *et al*., 1996). In the Altai-Sayan region, such information was obtained from available literature and maps. To complete the calculations of numbers of musk deer, the total number reckoned for each area was halved, to take account of the finding of Zaytzev (1991) and Prikhod'ko (2000), who noted that, as a result of predators, deep snow, food availability and other factors, musk deer can only occupy, on average, about 50% of their typical forest habitat.

Discussion of the methodology for the population surveys

The methodology was tested in musk deer range in the taiga of Khabarovskiy Kray. Standardisation of survey techniques was attempted: counters were trained to avoid variations in methodology and to avoid double-counting of a particular musk deer in the same plot. Budgetary constraints and the vast area of musk deer range in the Russian Federation have already been mentioned as restrictions on the population surveys. It should also be stated, that

there are considerable difficulties inherent in any methods for counting small, cryptic, nocturnal, solitary, forest-dwelling mammals like musk deer. Moreover, musk deer frequently use the same tracks, they sometimes jump for several metres and they often use tracks of other animals (Novikov, 1975; Green and Kattel, 1997). In selecting the sample sites, researchers tried to be unbiased and to avoid sample sites where a high density of musk deer was expected. Despite these precautions, the following problems are likely to have compromised the accuracy of the results of the population surveys in the Russian Far East and in the Altai-Sayan region.

- As noted, sampling areas were not always chosen at random because of the difficulty and cost that access to remote areas would have presented. Therefore, there is a risk that the surveys cannot be used to estimate the true mean population density.
- A problem inherent in the method used is the so-called "boundary strip" problem. This occurs when musk deer counted within a plot are actually from a home range outside the plot, resulting in possible over-estimation of musk deer populations. By contrast, populations may also be underestimated when using this methodology, in cases where deer leave a plot before being detected by a counter.
- Once data from survey areas had been collected, the overall number of musk deer in a particular region was estimated by applying the average musk deer population density for a particular type of habitat to the overall area covered by this habitat type. A limitation of this approach is the lack of up-to-date information on the extent of habitat types. For example, information on forest cover in the Russian Far East dates from 15 to 20 years ago, when the last surveys assessing this took place. Since then, forest areas in the Russian Far East have been affected by clear-cutting and the regular occurrence of forest fires. Moreover, the methodology used did not calculate musk deer numbers for *all* typical musk deer habitat types and it is particularly difficult to estimate the average population size in areas not visited where musk deer numbers may have been particularly sharply reduced in recent years.
- A further caveat to be noted relates to the findings of Zaytzev (1991) and Prikhod'ko (2000), who noted that, as a result of predators, deep snow, food availability and other factors musk deer can only occupy, on average, about 50% of their typical forest habitat. Additionally, human-induced factors, like poaching and habitat destruction, influence the size of musk deer populations. Although these findings were taken into account when calculating the population survey results, by halving estimates of musk deer for each area, it is clear that this gives a very rough assessment of musk deer populations.

Analysis of the musk trade in and from the Russian Federation

Analysis of the musk trade in the Russian Federation was conducted between autumn 1998 and spring 2002. Research was focussed in the Russian Far East and in the Russian Altai-Sayan region and information about the hunting for musk deer and the volume of trade in musk was collected through interviews and/or through the distribution of questionnaires to various stakeholders linked with the commercial hunting for musk deer or trade in musk. These stakeholders comprised the following groups:

- Commercial hunters. They represent the main group involved with musk deer hunting in communities local to the deer. Legal and illegal hunting is primarily carried out at hunting sites, which are sub-leased to the hunters by major leaseholders (often forestry concerns) or hunting enterprises.
- Managers of protected areas
- Game specialists
- Rangers and managers of hunting and environmental authorities
- Managers of hunting enterprises
- Traders in wildlife products, including musk

Altogether, 300 anonymous questionnaires were distributed among professional hunters directly involved in both legal and illegal hunting for musk deer. About 183 completed questionnaires were returned. Eleven questionnaires were sent to directors of State nature reserves (*zapovedniks*) in the Russian Far East. Six of them responded. A summary of the surveys by questionnaire and/or interview is given below, according to stakeholder group, together with notes on how the responses of these various groups should be interpreted.

Commercial hunters: More than 100 professional hunters who sell musk glands and fur to State-run purchasing companies received questionnaires. During any interviews, no written notes were taken, as note-taking engendered immediate negative reactions in the hunters. During conversation, many of the hunters explained that, despite the anonymity assured respondents to the questionnaire, they were not telling the full truth about the numbers of musk deer killed and that actual figures may be 30 to 50% higher than stated.

Game specialists, rangers and managers: Researchers interviewed 28 game specialists and rangers from the Departments of Game Management in the *krays* and *oblasts* of the Russian Far East and deputy chief managers of all four Departments of Game Management in the region. In private conversations, all these specialists confirmed the volumes of illegal trade in musk from musk deer presented in this report.

Managers of hunting enterprises: Managers of hunting enterprises (leaseholders of hunting sites) were interviewed. These people confirmed the over-exploitation of musk deer. However, they tended not to reveal an accurate picture of illegal hunting of musk deer in their official reports, which they prepared and submitted to the Departments of Game Management. This is probably because users of hunting sites and hunting enterprises, in accordance with their lease-agreements, should prevent poaching and suppress illegal hunting for musk deer and trade in musk glands.

Illegal traders: Interviews with so-called “black-market” buyers of musk deer glands helped to reveal the most complete picture of the illegal turnover of deer musk in several hunting districts. In confidential conversations, these buyers provided specific figures in kilogrammes for the musk they purchased. Most analysis of the illegal musk in trade was based on oral reports with traders and hunters (see **Commercial hunters** above).

Others: Personnel at Departments of Environmental Conservation, staff of local branches of the State Game Inspections and heads of anti-poaching departments of the Nature Conservation Committees of the Federation of Administrative Regions in the Russian Far East were also interviewed.

In estimating the quantity of musk deer harvested, 23 g was used as the standard musk gland weight, based on the average weight of one musk gland in the Russian Far East and Altai-Sayan region. The weight of glands in trade is accordingly divided by 23, in order to arrive at a number of male musk deer killed to supply the glands. To then calculate the total number of musk deer killed, the number of male deer killed is multiplied, according to the knowledge that three to five musk deer are killed to obtain one male with a sufficiently large musk gland when indiscriminate trapping methods are used (and therefore female and young musk deer are also caught) (Green, 1986; Jackson, 1979; Prikhod'ko, 1997). Information from hunters in the Russian Far East and Russian Altai-Sayan region using non-selective methods to hunt musk deer confirmed this ratio.

The Solnetchny District of Khabarovskiy Kray in the Russian Far East was taken as an example of a typical district in the Russian Far East for hunting musk deer and trading in musk, in terms of size, number of hunters, lease-agreements, legal and illegal trade and in other respects. In Solnetchny District, 187 men on 90 hunting sites were officially engaged in the harvesting of furs, meat of wild ungulates and musk. Musk deer were distributed in approximately 50 of those hunting sites. The area of each hunting site was on average about 25 000 ha and on every hunting site, each year, about five to six male musk deer were harvested. These findings from Solnetchny District were used as a model for indications of form and scale of musk deer harvest and musk trade in the whole Russian Far East.

Researchers also used analysis of private advertisements for musk in the Russian Far East press as a means of gauging the scale of musk trade in the region. Five regional newspapers and periodicals with high ratings in Amurskaya Oblast, Primorskiy Kray and Khabarovskiy Kray were analysed to assess levels of demand for musk.

CITES import and export data for 1990-2002, as compiled by the UNEP-World Conservation Monitoring Centre, were analysed to extract information on the role of the Russian Federation in the international trade in musk.

Official government musk deer population surveys undertaken in the Russian Federation

The “winter inventory route” (ZMU) is the basis of the method used by the Russian State Service for Game Animal Censuses when assessing large populations and areas. Official musk deer population surveys in the Russian Federation are based on this methodology, developed for and common to other hunted species, such as large ungulates or Sable. However, these methodologies are not adapted to biological characteristics of musk deer that should be taken into account for reliable population assessments (A. Tikhonov, pers. comm., 1999; Lomanov, pers.

comm., 2001). The most important commercial hunting species for all hunters in the Russian Far East are Sable, squirrel *Sciurus vulgaris* and large ungulates. The population calculations for musk deer are usually recorded only incidentally, in other words, while assessing populations of these other species. The routes taken during population surveys are almost always linked to the traditional routes of hunters, who are focussed on these other species, the distribution of which is different from that of the musk deer. The routes for most hunted species in the Russian Federation lead along valley bottoms, while musk deer prefer the higher and sloping terrain. Moreover, the official censuses of game animals are traditionally conducted at the end of the hunting season, in February and at the beginning of March. During this season, the rocky and stony slopes favoured by musk deer are covered with deep snow and fallen trees and therefore relatively inaccessible for humans.

Russian experts note that the ZMU approach to counting musk deer is likely to result in a significant underestimate of the number of musk deer and will not present an accurate picture of the real status of the musk deer population size. Baidavletov (1980) gives an example of such deviant figures: during his own population assessment of musk deer in east Kazakhstan, the estimated musk deer population size was at least four times higher than the estimates made on the basis of a ZMU-style survey. The differences in the results received through different methodological approaches are also demonstrated from other investigations. Podolsky (1996) compared data from musk deer population assessments conducted by different organizations (**Table 5**). As the table shows, the results from surveys undertaken by a hunting society, the *zapovedniks* and the Commercial Game Enterprise differed considerably. In addition, large fluctuations in the data of the Commercial Game Enterprise, for example from 70 to 1430 animals during a period of just two years, make the results seem questionable.

Table 6 and **7** show the results of the official population assessments undertaken in different regions of the Russian musk deer range, 1961-1991 and 1998-2002, by the Russian State department *GU Centrokhotcontrol*.

Table 5

Results of musk deer population assessments undertaken in Amurskaya Oblast, in the Russian Far East, by different institutions using different methodologies

	1986	1987	1988	1989	1990	1991	1992	1993	1994
Commercial Game Enterprise	70		1430	1250	2000	4564			800
Hunting Society					42	90	38	25	40
Zapovedniks (nature reserves)		150-200	200-230	250-270	340-360	390-410	440-460	410-430	420-440

Source: Podolsky, 1996.

Table 6

Results of official government musk deer population assessments in regions of the Russian Federation, 1961-1991

Year	Primorskiy Kray	Khab. Kray	Chita Oblast	Amurskaya Oblast	Altaisky [1] Kray	Tyva Rep.	Ru. Fed. (total)
1961	5000	40 000	2500	10 000	2000	15 000	103 750
1962	3500	40 000	5500	10 000	2500	16 000	108 000
1963	4000	30 000	3000	10 000	2500	16 000	105 000
1964	4000	40 000	8500	10 000	2500	16 000	115 500
1965	2500	4000	8500	10 000	2500	17 000	76 500
1966	2500	4000	8500	10 000	3500	17 000	78 000
1967	2500	4000	8500	10 000	4500	17 000	102 800
1968	2500	4200	8500	10 000	4500	17 000	86 500
1969	2700	4200	8500	8000	5000	10 500	77 900
1970	2300	4200	12 500	8000	5000	10 000	82 400
1971	2700	4200	14 000	8000	5000	10 000	76 400
1972	1700	1500	16 500	8000	5000	10 000	68 300
1973	3200	4000	18 500	8000	5000	10 000	73 300
1974	4000	4000	18 500	No data	No data	10 000	77 600
1975	4000	4500	20 000	No data	No data	10 000	77 000
1976	3000	5500	19 000	No data	No data	10 000	80 000
1977	4500	5500	20 000	No data	No data	10 000	80 000
1978	5000	6000	18 500	No data	No data	10 000	106 000
1979	5000	23 500	18 500	No data	No data	10 000	No data
1980	5000	23 500	No data	No data	No data	No data	No data
1981	4000	30 000	No data	No data	No data	40 000	No data
1982	4500	30 000	No data	No data	No data	No data	No data
1983	No data	No data	No data	No data	No data	No data	No data
1984	8000	28 000	No data	5060	No data	No data	No data
1985	No data	No data	No data	No data	No data	No data	No data
1986	13 000	28 900	No data	4230	No data	No data	No data
1987	No data	No data	No data	No data	No data	No data	No data
1988	No data	No data	No data	No data	42-45 000[2]	No data	No data
1989	No data	No data	No data	No data	No data	No data	No data
1990	18 100	23 500	No data	3700	No data	No data	No data
1991	No data	No data	No data	No data	No data	No data	No data

Notes: "No data" means the absence of a survey. [1]Before the break-up of the USSR in 1991, Altaisky Kray included the territory of the Altai Republic, which is now a separate entity of the Federation. [2] Data from Prikhod'ko (1997).

Source: Centre of Control and Analysis of Information of Hunted Animals and their Habitat

Table 7

Results of official government musk deer population assessments in regions of the Russian Federation, 1998-2002

Region of the Russian Fed.	1998	1999	2000	2001	2002
Russian Fed. (total)	**150 400	**156 350	**129 000**	**126 860**	**126 580**
W. Siberia and Altai-Sayan subtotal	**No data**	**1780**	**2290**	**2220**	**2600**
Altaisky Kray		0280	0180	100	100
Altai Republic		1500	2110	2120	2500
East Siberia subtotal	**82 240**	**81 660**	**71 560**	**68 800**	**68 180**
Buryat Republic	17 290	12 620	12 910	11 610	11 390
Irkutsk Oblast	15 800	20 540	18 530	16 180	18 500
Tuva Republic	9200	10 490	6800	7070	3820
Krasnoyarskiy Kray	10 700	12 000	10 000	12 000	13 900
Republic of Khakassia	3860	2610	2460	2090	1860
Chita Oblast	25 000	22 900	20 000	19 190	18 210
Ust-Orda Buryat Autonomous Okrug	390	400	790	590	500
Aginsky Buryat Autonomous Okrug	No data	100	70	70	
Far East subtotal*	**68 500**	**72 410**	**55 150**	**55 840**	**55 800**
	(72 280)	**(77 270)**			
Yakutia (Sakha) Republic	No data	13.000	13 000	15 000	15 000
Primorskiy Kray	15 000	21 000	17 500	17 000	17 000
Khabarovskiy Kray	26 300-	24 040-	16 200	15 480	18 150
	***30 090	***28.900			
Jewish Autonomous Oblast	No data	260	250	150	100
Amurskaya Oblast	12 490	13 010	6500	6610	4150
Sakhalin Oblast	No data	1100	1700	1600	1400

Source: "Centre of Control and Analysis of Information of Hunted Animals and their Habitat" = *GU Centrokhotcontrol*; * The total size of the musk deer population in the Far East is larger than the sum of the figurers given, because not all territories of the Russian Far East region were included in the table; **According the data from the Main Hunting Management Department in 2000; *** According to the regional Directorate of the Protection and the Control of Hunting Resources, "No data" means the absence of a survey.

As the data in the two tables show, there are considerable differences between annual population estimates. For example, in **Table 6** no external influences or biological reasons can explain the ten-fold decrease in the population size in Khabarovskiy Kray within a single year (from 1964 to 1965) or the sudden increase of the population size from 6000 animals in 1978 to 23 500

animals in 1979. Such differences are most likely to be the result of changes in the survey methodologies and/or inaccurate extrapolation of the data when estimating the total population size, that do not take into account the biological characteristics of the species, such as its tendency to patchy distribution.

Musk deer population assessments have been carried out in more or less the same areas and on the same, though possibly inappropriate, methodology for several years (certainly for the years 1998-2002). This means that they may help to assess general population trends and dynamics, even if they do not allow reliable assessments of the numbers of musk deer and have left some areas of musk deer distribution in the Russian Federation completely unsurveyed.

Table 8

Comparison of the number of musk deer estimated by local hunting enterprises and by VNIIOZ (Research Institute of Game Management and Fur Farming for the Russian Federation) in Khabarovskiy Kray in the hunting season 2001-2002

Districts of Khabarovskiy Kray	No. of musk deer estimated by hunting enterprises				No. of musk deer estimated by VNIIOZ			
	Inhabited area of hunting sites (1000 ha)	Condition of the pop'n	Number of musk deer	Density per 1000 ha	Area in 1000 ha	No. of musk deer	Spring density per 1000 ha	Forecast no. for season 2002/03
Okhotski	3771	stable	45	0.01	2567	266	0.1	313
Ayano-Mayski	1510	stable	0	0	4000	155	0.04	183
Tuguro-Choumikanski	5246	stable	3197	0.61	5882	3618	0.62	4270
Nikolayevski	230	stable	0	0.00	430	50	0.12	59
Ulchski	783	stable	242	0.31	970	394	0.41	465
P.Osypenko	37 708	stable	420	0.00	749	503	0.67	927
Verhnebureinski	3122	growing	3053	0.98	3834	3463	0.90	4087
Solnechny	1128	stable	1140	1.01	1135	854	0.75	1008
Komsomolski	1459	stable	1520	1.04	1705	1520	0.89	1794
Amurski	200	stable	450	2.25	210	450	2.14	531
Vaninsky	764	stable	933	1.22	1319	1696	1.29	2002
Sovetsko-Gavanski	885	stable	1947	2.20	864	1947	2.25	2298
Khabarovski	1322	stable	4676	3.54	1250	3954	3.16	4666
Nanayski	879	stable	4707	5.35	1135	3585	3.16	4230
Laso	1468	grow	4217	2.87	2183	5551	2.54	6550
Vyasemski	244	stable	185	0.76	137	193	1.40	227
Bikinski	28	stable	0	0.00	44	30	1.00	35
Area sub-total	***59 794***		***24 041***	***0.40***	***27 217***	***27 334***	***1.00***	***32 173***
Protected areas	***395***		***745***	***1.89***	***478***	***895***	***1.87***	***1472***
Total	**60 189**		**24 786**	**0.41**	**27 695**	**28 229**	**1.02**	**33 645**

Generally, *GU Centrokhotcontrol*'s data are based on figures provided by the Regional Hunting Management Directorates. These in turn receive information from different local hunting enterprises within their region. Once the information has been provided to *GU Centrokhotcontrol* and the data compiled, this department then summarizes the data for the different geographical regions and for the Russian Federation as a whole. Therefore, the figures given by the *GU Centrokhotcontrol* are the sum of the results of the regional and local population surveys. However, as a comparison of the data in **Table 7** and **Table 8** shows, figures reported by regional bodies and those reported by *GU Centrokhotcontrol* differ in some instances. For example, the total estimated number of musk deer in Khabarovskiy Kray for 2002, based on the data provided by the VNIIOZ (Research Institute of Game Management and Fur Farming for the Russian Federation), was 28 229 (**Table 8**). Based on the figures published by the *GU Centrokhotcontrol*, however, there were only 18 150 animals in the same year (**Table 7**).

According to G. Sukhomirov of the Far Eastern branch of VNIIOZ (pers. comm. to TRAFFIC Europe-Russia, 2002), the estimated number of musk deer in spring in the Russian Far East was relatively stable during the four to five years preceding 2002: VNIIOZ estimated that the total population of musk deer in the Russian Far East was around 63 000 in 2002 (**Table 9**).

Table 9

Average number of musk deer in the Russian Far East, as estimated by VNIIOZ (Research Institute of Game Management and Fur Farming for the Russian Federation), 1998-2002

Region	Estimated number of musk deer
Primorskiy Kray	22 000
Khabarovskiy Kray	29 000
Amurskaya Oblast	11 000
Jewish Autonomous Oblast	1000
Total	**63 000**

In summary, assessment of the official means of estimating musk deer numbers in the Russian Federation gives reason to believe that the resulting population estimates for musk deer, as published by the *GU Centrokhotcontrol*, do not reflect the actual population size. Methodologies that have not been specifically designed to assess musk deer populations are used, there are inconsistencies in the use of these methodologies for certain regions, and contradictory data are provided by different authorities. Although the methods used do allow an assessment of the overall population trends, dissatisfaction with the official methods of surveying led to the undertaking of musk deer population surveys by TRAFFIC in the Altai-Sayan and the Russian Far East. These are described in the following section.

Results of population surveys undertaken for this study in the Russian Far East and Altai-Sayan region of the Russian Federation

Musk deer population surveys in the Russian Far East

As explained in **Methodologies used** … **in the Russian Federation**, 31 survey areas representing different habitat types were selected for survey in the Russian Far East (see **Annex 2**). In the Russian Far East, six survey areas were selected in Primorskiy Kray, 16 in Khabarovskiy Kray, seven in Amurskaya Oblast and two in Jewish Autonomous Oblast. **Table 10** shows different habitat types encountered, the number of survey areas surveyed for each of these habitat types, and the mean density of musk deer population per 1000 ha of each habitat type. The highest densities of musk deer (40.7 deer/1000 ha) were found in coniferous forest with Norway Spruce *Picea abies* and the lowest densities were recorded in broad-leafed forests (two deer/1000 ha).

Table 10

Musk deer population densities in different habitats in the Russian Far East, according to surveys conducted by TRAFFIC

Type of forest		No. of survey areas surveyed	Mean no. musk deer/1000 ha		
No.			**Flood-lands**	**Slope**	**Mean**
1	Norway Spruce mixed with Korean Pine	6	21	50.5	40.7
2	Norway Spruce	7	22.5	30	27.5
3	Norway Spruce-Larch, moss flood-lands	3	20	No data	20
4	Norway Spruce with old overgrown clear-cuts	4	13	16	15
5	Norway Spruce with old fire-sites	3	10	10	10
6	Korean Pine/broad-leafed	1	7	8	7.7
7	Fir/Korean Pine with a mixture of oak and birch*	3	7	7	7
8	Norway Spruce with swamps, covered by narrow-leafed bushes	1	4	4	4
9	Larch with birch admixture	1	4	2.5	3
10	Glades with Larch re-growth	1	3	3	3
11	Broad-leaved with a mixture of Grove Pine *Pinus funebris*	1	2	2	2
Total		**31**			

Note:* *Betula costata, B. prochorowii,* Schmidt's Birch *B. shmidtii, B. middendorfii*

As described in **Methodologies used...in the Russian Federation**, the population size of musk deer in Primorskiy Kray, Khabarovskiy Kray, Amurskaya Oblast and the Jewish Autonomous Oblast in the Russian Far East was estimated using the calculations of the mean number of musk deer per 1000 ha of a given habitat (as shown in **Table 10**), coupled with information on the size and distribution of these different habitat types in the Russian Far East. As also explained, this information was obtained from the Institute of Economic Research of the Russian Academy of Science (Sheingauz *et al*., 1996). Based on these two sources of information, an estimated figure for the musk deer population of the regions surveyed in the Russian Far East (Primorskiy Kray, Khabarovskiy Kray, Amurskaya Oblast and the Jewish Autonomous Oblast) was extrapolated (**Table 12**). Only typical musk deer habitat types, as presented in **Table 10**, were used in order to simplify the calculation and hence musk deer populations living in non-typical habitats were not included. Moreover, similar vegetation types (for example, all categories of Norway Spruce forest) mentioned in **Table 10** were combined and the mean density of musk deer populations in areas with these broader vegetation types (see **Table 11**) was used for the wider population calculations. Although a typical musk deer habitat, Larch forest was not taken into consideration in the wider population calculations for the Russian Far East, since musk deer population densities in this habitat type are low and no adequate data on the total size of area of this habitat type were received. In other words, the final assessment of musk deer population densities was made for "Norway Spruce forest" and for "pine forest", the two most important habitat types for musk deer. The results of the population estimates for the regions selected in the Russian Far East are shown in **Table 12**.

Table 11

Mean densities of musk deer populations for the three main vegetation types recorded in Table 10

Type of forest	Merged habitat categories from Table 10	Mean number of musk deer per 1000 ha
Norway Spruce forests	1, 2, 3, 4, 5, 8,	20
Pine forests with a mixture of deciduous species	6, 7	7.3
Larch forests with mixture of birch	9, 10, 11	3

It should be stressed again that the results of these population assessments can only be considered as basic estimates (see list of limitations of the methodology used on page 18). Taking these factors into account, and taking care not to overestimate the number of musk deer in Primorskiy Kray, Khabarovskiy Kray, Amurskaya Oblast and the Jewish Autonomous Oblast, it is estimated that there was a minimum of 140 000 musk deer in these parts of the Russian Federation at the time of surveys for this report. This estimate is significantly higher than the official estimate for 2002 of around 39 400 musk deer in these same regions (see **Table 7** and also **Tables 8** and **9**).

Table 12

Estimated number of musk deer (N) for the different habitat types in the regions surveyed in the Russian Far East, according to surveys undertaken by TRAFFIC

Territory	Pine forest		Norway Spruce forest		Total
	1000 ha	N	1000 ha	N	N
Primorskiy Kray	2192	16 000	3060	61 200	77 200
Khabarovskiy Kray	1663	12 140	8550	171 000	183 140
Amurskaya Oblast	702	5124	498	9960	15 084
Jewish AutonomousOblast	174	1270	235	4700	5970
Total	**4731**	**34 534**	**12 343**	**246 860**	***281 394**
Adjustment for habitat occupancy estimate					***x 0.5***
Estimated population					**ca. 140 000**

Note: * The total of 281 394 has been halved, based on the theory that, owing to predators, deep snow, food availability and other factors, musk deer can only occupy about 50% of their typical forest habitat, on average (Zaytzev, 1991 and Prikhod'ko, 2000).

The musk deer population in the Altai-Sayan region of the Russian Federation

Annex 3 shows the location of the 74 survey areas surveyed for musk deer in the Altai-Sayan region (22 in Krasnoyarskiy Kray, 17 in the Republic of Khakassia, 17 in the Republic of Tyva and 18 in the Altai Republic). A brief description of the habitat, conditions and musk deer populations is given for each of these regions, together with tabulated results of the musk deer population estimates.

Krasnoyarskiy Kray

In Krasnoyarskiy Kray, musk deer are only distributed in the south, in the Sayan Mountains. There are two separate populations of musk deer living in this part of Krasnoyarskiy Kray a) the west-Sayan and b) east-Sayan population. TRAFFIC Europe-Russia conducted population surveys of musk deer in west-Sayan (in the Yermakovsky and Shushensky Districts) and in the transition zone between west-Sayan and east-Sayan (in the Kurgansky and Karatuzsky Districts). The territory of the east-Sayan population was not surveyed because musk deer numbers are reported to be very low in this area. The west-Sayan populations are in contact with populations in the Republic of Tyva and the Republic of Khakassia. In total, 22 survey areas were surveyed in Krasnoyarskiy Kray.

In the Kurgansky and Karatuzsky Districts (i.e., in the transition zone between the west-Sayan and east-Sayan musk deer populations), a density of 0.2-15.4 musk deer/1000 ha was estimated. It is assumed that the deep snow cover that occurs in these districts in winter may affect the density of the musk deer population.

The Shushensky District is a large area of hunting territory in the Russian taiga, located in the basin of the Kanteguir River, on the southern and south-eastern slopes of the Kanteguirski range. It is remote and only rarely visited by hunters. The density of musk deer was found to be 40 animals/1000 ha in Siberian Cedar forests, but lower in cedar-fir taiga on steep slopes (the main areas for hunting). The lower musk deer densities found in cedar-fir taiga near settlements are typical for a) areas with high snow in winter in the southern part, b) areas that are easily accessible and located close to human settlements and roads. These areas are often under the highest poaching pressure.

Results of the survey of the (west-Sayan) population of musk deer in the districts of Krasnoyarskiy Kray shown in **Table 13** give an estimate of about 14 500 animals - with a downward population trend.

Table 13

Estimated density of musk deer in different districts in Krasnoyarskiy Kray

District and number of survey areas surveyed (in brackets)**	**Area in km² of habitat type**	**Habitat type**	**Musk deer density /1000 ha**	**Overall number of musk deer**
Kuraginsky and Karatuzsky (5)	27 000	Forest	0.2-15.4	1600
Shushensky (8)	3000	Cedar-fir forests;	40	
		Cedar-fir taiga near settlements	16	11 600
Yermakovsky (9)	10 000	Larch-pine mountain taiga;	54	
		Cedar-fir taiga and steep slopes;	9.2	15 800
		Cedar forest	2.4	
Total				*** 29 000**
Adjustment for habitat occupancy estimate				***x 0.5***
Estimated population				**ca. 14 500**

Notes: * The total of 29 000 has been halved, based on the theory that, owing to predators, deep snow, food availability and other factors, musk deer can only occupy about 50% of their typical forest habitat, on average (Zaytzev, 1991 and Prikhod'ko, 2000). ** Not all Districts of Krasnoyarskiy Kray were included in the survey.

Republic of Khakassia`

Musk deer inhabit only the southern part of the Republic of Khakassia, where 17 survey areas were surveyed. Most of the survey areas were in the Beiski and Tashtypskiy Districts, that border the western Sayan and Altai regions. The Beiski District borders the Shushensky District of Krasnoyarskiy Kray. There are 1800 km² of forests in Beiski District and 1200 km² are

covered with dark-coniferous taiga and old glades, which are considered typical habitat for musk deer. Three survey areas outside these two districts were in the Abakan Mountains, which converge with the Kuznetsk Alatau Mountains, in the Askizskiy and Ust-Abakanskiy Districts. The results of the surveys are shown in **Table 14**.

Table 14

Estimated density of musk deer in different districts in the Republic of Khakassia

District and number of survey areas surveyed (in brackets)	**Area in km² of habitat type**	**Habitat type**	**Musk deer density /1000 ha**	**Overall number of musk deer**
Beiski (Sayano-Shushenskoye) (3)	1200	Cedar-fir taiga of steep slopes	11.4	1400
Tashtypskiy, Karasuma	2000	Forests near settlements	15.4	3000
Tashtypskiy, Khakasski Reserve,	3000	Forest in mountains and steep slopes	18	5400
Bolshoi Abakan Tashtypskiy (11, in total, in Tashtypskiy)		Forests		**2000
Askizskiy and Ust-Abakanskiy (3)				**1600
Total				***13 400**
Adjustment for habitat occupancy estimate				***x 0.5***
Estimated population				**ca. 6700**

Notes: * The total of 13 400 has been halved, based on the theory that, owing to predators, deep snow, food availability and other factors, musk deer can only occupy about 50% of their typical forest habitat, on average (Zaytzev, 1991 and Prikhod'ko, 2000). ** TRAFFIC Europe-Russia's estimate on the basis of interviews with local hunters.

The poulation densities ranged between 11.4 and 18 musk deer/1000 ha. Although much of territory surveyed was considered good musk deer habitat, the survey areas were located in the Djoiski and Dzhebashski Mountains, which are poorly covered with snow in winter and hence are easily accessible for hunters. In these regions the illegal hunting pressure on musk deer is reported to be high and the musk deer population has perhaps decreased to a size that makes hunting economically unimportant at present.

Credit: Markus Stecher

In the taiga of the Russian Far East, some of the team surveying musk deer take a break with the district game manager.

In areas of steep slopes in the Djoiski and Kanteguirski bays of the Sayano-Shushenskoye Reservoir and in the area of the Orasug River, the density of the musk deer population was higher. In the Tashtypskiy District, the coniferous taiga occupies about 10 000 km^2 and, of these, around 6000 km^2 are populated by musk deer - in remaining parts of the District, musk deer are very rare and are reportedly not hunted there. The north-east part of the district is located to the east of the Ona River. The area is accessible to humans through the dense network of logging roads and owing to only light snow cover in winter. In the basin of the Urten and Karasuma Rivers of Tashtypskiy District, continuing over-exploitation of musk deer has reduced populations - there are estimated to be about 15.4 musk deer/1000 ha. Hunting also occurs in the areas neighbouring Shushensky District (Krasnoyarskiy Kray). The area between the Ona and Maly Abakan Rivers covers around 3000 km^2 of typical musk deer habitat. The area is characterized by low mountains and steep slopes in the Khansyn, Shaman and Choukchout ranges and by steeper slopes in Bolshoi and Maly Abakan. These areas are far from human settlements. The forested parts of the Khakasski State Reserve are located here. There is reportedly not a high population of musk deer in this area between the Bolshoi and Maly Abakan Rivers because of the high snow cover in winter. Musk deer are more numerous on steep slopes and on the southern slopes of the Abakan Mountains.

In Askizskiy and Ust-Abakanskiy Districts, musk deer were not estimated to exceed 1600 in number, again owing to high snow cover and the fact that this area is accessible to hunters.

The Republic of Tyva

In the Republic of Tyva, a total of 17 areas were selected for population surveys. The area is covered by high mountain ranges and the western and eastern Sayan, Tanny-Ola and Academician Obroutchev mountain ranges alternate with extensive deep valley areas: Ubsnur, Tuvinskaya and Todjinskaya. The total size of the Republic of Tyva is about 171 000 km², of which around 77 000 km² are covered with forests. Larch dominates the forests, making up approximately 47% of tree cover, while Siberian Cedars make up around 45%. The surveys were conducted in three of the 16 administrative districts of Tyva: Todzhinski, Mongun-Taiguinski and Tess-Khemski Districts. Additionally, one survey area was located in each of the Bai-Taiguinski, Dzun-Khemchikski and Tandinskiy Districts.

Table 15

Estimated density of musk deer in different districts in Republic of Tyva

District and number of survey areas surveyed (in brackets)**	**Area in km² of habitat type**	**Habitat type**	**Musk deer density /1000 ha**	**Overall number of musk deer**
Mongun-Taiginskiy (3)	2000	mountain rhodo-dendron with Larch	10.8	2000
Todzhinski (8)	10 000	Siberian Cedar with steep slopes and mountain rhododendron-Larch forests	9.6-11.6	10 600
Tandinski and Chedi-Khemski (6)		remote sites	11.4	4000
Remaining areas of the Republic				3400
Total				***20 000**
Adjustment for habitat occupancy estimate				***x 0.5***
Estimated population				**ca. 10 000**

Notes: * The total of 20 000 has been halved, based on the theory that, owing to predators, deep snow, food availability and other factors, musk deer can only occupy about 50% of their typical forest habitat, on average (Zaytzev, 1991 and Prikhod'ko, 2000). ** not all Districts of Republic of Tyva are included.

The Mongun-Taiguinski District of the Republic of Tyva, which borders Krasnoyarskiy Kray in the south and the Republic of Khakassia in the north, is covered with taiga forests on the southern slopes of the western Sayan mountain range. The northern part of the area is occupied by the Ubsunurskaya Kotlovina State Biosphere Reserve, which borders the Sayan-Shushenski

Biosphere Reserve. The total area of the Mongun-Taiguinski District is about 4400 km², with about 2000 km² considered as typical musk deer habitat. The average density of musk deer populations found in this district was 10.8 individuals/ 1000 ha (**Table 15**).

In the Todzhinski District, which has a total area of 44 800 km², approximately 15 000 km² are covered with Siberian Cedar forests and 11 000 km² with Larch taiga. The forests are dominated by cedar on steep slopes and by cedar and Larch in the higher mountains of Khormung-Taiga and in the basin of the right tributary of the Maly Yenisey River. Densities of musk deer populations found in the Todzhinski District ranged from 9.6-11.6 individuals/1000 ha.

The northern slopes of the Tannu-Ola Mountains in Tandinskiy District and Chedi-Khemski District can be considered to provide typical musk deer habitat, but the density of the musk deer population found in this area was relatively low at 11.4 animals/1000 ha. Musk deer populations in these areas are said to be affected by high hunting pressure. The terrain around the headwaters of the Republic's two main rivers, the Bol'shoy Yenisey and Maly Yenisey, is characterized by high snow in winter and has a naturally low density of musk deer populations.

The number of musk deer in the Republic of Tyva is estimated at not more than 10 000 (**Table 15**). Researchers were informed that musk deer populations in most parts of their range in the Republic of Tyva had been reduced by a several-fold increase in poaching.

Credit: WWF-Canon Grigori Mazmanyants

Siberian Musk Deer

Altai Republic

In the Altai Republic, 18 survey areas were selected. Forests in the Altai Republic cover about 35 000 km², of which around 10 000 km² are cedar forests and 3700 km² are fir groves. The Ust'-Koksinsky District was chosen as a model survey area which represents typical musk deer habitat, but with incidence of hunting and poaching. The density of musk deer populations in this district (7.2 animals/1000 ha) is said to have been affected by high levels of hunting and poaching. The number of musk deer in the Altai Republic was estimated to be around 4500 animals in total (**Table 16**).

Table 16

Estimated density of musk deer populations in different districts in the Altai Republic

District and number of survey areas surveyed (in brackets)	Area in km² of habitat type	Habitat type	Musk deer density /1000 ha	Overall number of musk deer
Ust'-Koksinsky (18)	2000	Dark coniferous and Larch taiga; some inaccessible sites	7.2	1400
Remaining areas in the Altai Republic				7600
Total				***9000**
Adjustment for habitat occupancy estimate				***x 0.5***
Estimated population				**ca. 4500**

Notes: * The total of 9000 has been halved, based on the theory that, owing to predators, deep snow, food availability and other factors, musk deer can only occupy about 50% of their typical forest habitat, on average (Zaytzev, 1991 and Prikhod'ko, 2000).

Based on the results of TRAFFIC's population surveys, the musk deer population of selected districts in Krasnoyarskiy Kray and the Republic of Khakassia and of the Republic of Tyva and the Altai Republic (as shown in **Tables 13-16**) is estimated to be at least 35 700 animals.

Summary results of population surveys in the Russian Far East and Altai-Sayan regions of the Russian Federation

Table 17 is a comparison of the results of the population surveys conducted by TRAFFIC and by the Russian Government (*GU Centrokhotcontrol*). It is recognized that the methodology on which the population estimates conducted for this study are based is far from perfect and the limitations of the methodology are fully acknowledged earlier in this report (**Methodologies used**....). However, the methodology does at least take into account the biology of the species

Table 17

Estimated number of musk deer, 2002, based on a) official surveys of the Russian Government and b) TRAFFIC surveys

Region	Number of musk deer	
	Official (2002)	**TRAFFIC**
Russian Far East Region	**39 400**	**140 700**
Primorskiy Kray	17 000	38 600
Khabarovskiy Kray	18 150	91 570
Amurskaya Oblast	4150	7542
Jewish Autonomous Oblast	100	2985
Altai-Sayan Region	**22 080**	**35 700**
Krasnoyarskiy Kray	13 900	(selected districts) 14 500
Republic of Khakassia	1860	(selected districts) 6700
Republic of Tyva	3820	10 000
Altai Republic	2500	4500

Sources: *GU Centrokhotcontrol* = Centre of Control and Analysis of Information of Hunted Animals and their Habitat (also see **Table 7**) and estimated number of musk deer based on the surveys undertaken by TRAFFIC, as shown in **Tables 12-16**.

and its habitat; something that the surveying methods used by the Russian authorities do not. It is difficult to provide a reliable figure for the total population of musk deer for such a vast area as the Russian Far East, or for the Russian Altai-Sayan region. The total area of musk deer range in the Russian Far East is about 1.4 million km^2 and in the Altay-Sayan is about one million km^2: the combined area is greater than two-thirds of the area occupied by the European Union (prior to its enlargement in May 2004). Despite the difficulties and limitations of the methods of population assessment used, what the comparison between the official Russian estimates and TRAFFIC's estimates of musk deer populations in these areas suggests is that the official government figures for musk deer populations in these regions may be substantial underestimations. TRAFFIC's musk deer population survey for Khabarovsky Kray, Primorskiy Kray, the Jewish Autonomous Oblast and Amurskaya Oblast resulted in substantially higher estimates than the corresponding official figures show and, although TRAFFIC's surveys in the Altai-Sayan region focussed only on certain areas of musk deer habitat within Krasnoyarskiy Kray, the Republic of Tyva, Republic of Khakassia and Altai Republic, they still resulted in a higher estimate of musk deer than official records show for the whole Altai-Sayan region.

A workshop focussed on the conservation and hunting of musk deer and trade in musk was held in July 2003, in the Russian Federation, specifically to discuss the findings of the musk deer population surveys undertaken in the Russian Federation for this study (see **Annex 1**). Members of the Russian Government present at the workshop acknowledged that official estimates of musk deer fell short of the real figure. Several participants at the workshop supported the population estimates made by this study, while others suggested they be used as interim estimates only, and used with caution, and one musk deer specialist disagreed with them.

While surveys conducted for this study indicate higher musk deer populations than government figures, they also indicate that the musk deer population of the Altai-Sayan region is depleted and appears to have decreased considerably, most likely as a result of over-harvest caused by intensive poaching. The density of musk deer populations in the Altai-Sayan region is reported to fluctuate from 0.3 to 85 animals per 1000 ha (Prikhod'ko, 2003) and the average natural density is believed to be 35-45 musk deer per 1000 ha. As **Tables 13** to **16** show, musk deer population densities recorded during survey work in the Altai-Sayan region for this study were consistently lower. The number of musk deer in the region is estimated to be about a third or even a quarter of its natural size, as a result of poaching, and in areas that are easily accessible to hunters and poachers, musk deer populations in 2002 were estimated to be a quarter or a fifth of their levels in the 1970s and 80s, according to a regional expert on musk deer (S. Lineitzev, pers. comm., 2002). Other sources interviewed for this study reported that:

- the population of musk deer had decreased significantly within the last five to six years;
- in almost 50% of typical musk deer habitat in the Altai-Sayan region, the number of musk deer was so reduced as to affect reproduction;
- in a further 30% of musk deer habitat, the population of deer had been significantly reduced;
- about 20% of musk deer habitats in Altai-Sayan region were remote and almost inaccessible for humans and musk deer populations in these areas remained close to the natural level.

In the Russian Far East, by contrast, despite reported poaching of musk deer on a large scale, the number of musk deer is reported to have been stable from about 1997 to 2001 (G. Sukhomirov, Far Eastern branch of VNIIOZ, pers. comm. to TRAFFIC Europe-Russia, 2002).

Hunting of musk deer in the Russian Federation

History of musk deer hunting

Demand for musk from musk deer has prompted hunting of the species for centuries, particularly in response to the sudden increase in demand for musk in the second half of the 19th century. Musk deer hunting or trapping was considered an easy and profitable business and provided a significant share of income to rural Siberian communities (Cherkasov, 1884). The majority of musk deer were caught using various traps – noose-traps, pre-aimed bows, and other devices – and only a small proportion of the animals was hunted with guns.

In the early 20th century, commercial musk deer harvesting was well developed in the southern Russian Far East. According to Derber and Sher (1927) and Bromley and Kucherenko (1983), 2000 to 2500 musk deer glands (46-57 kg) were harvested each year in the Primorskiy region of the Russian Far East at the beginning of the 20th century. In the mid-1930s, the border with China was closed and export of musk deer glands to China sharply decreased. Prices for musk deer glands were established by State agencies and were relatively low. In the 1960s, 1970s and 1980s, State and co-operative hunting enterprises continued to harvest musk deer for their musk, albeit not intensively. According to Bromley and Kucherenko (1983), in Primorskiy Kray in the mid-1980s, the number of musk deer harvested yielded 220 glands (about five kilogrammes) per

year, while the average population size of the species was estimated at 25 000 to 27 000 musk deer. At the end of the 1980s and beginning of 1990s, about 2000 musk deer were officially harvested in Russia, but the real number of harvested musk deer was much higher (Vaisman *et al.*, 1999 and Chestin, 1998).

The legal hunting of musk deer

Musk deer are harvested primarily for their musk, today, as formerly (Cherkasov, 1884; Green and Kattel, 1997), but indigenous tribes of the Russian Far East, such as the Nanaians, Udehes, Ulchies and Yakuts, also harvest musk deer for their hides and meat for human consumption. Otherwise, Russian hunters usually do not eat musk deer meat, as it is reported to have a poor taste. Therefore, musk deer carcasses are often discarded, fed to dogs, or used as bait for trapping fur-bearing animals. In rare instances, musk deer are harvested for their trophy value.

There are significant regional differences in the extent and intensity of the hunting (including poaching) pressure on musk deer populations in the Russian Federation. Many places where musk deer occur are inaccessible to hunters since they are remote from settlements and roads and transportation of hunters by helicopter is very expensive. Other places that are located near settlements may be difficult for hunters to access because of the terrain, for example if there are steep slopes, deep snow in winter and dense vegetation. Thus, in many areas, only some of the total population of musk deer can be hunted. Zyryanov and Kal'beshkov (2001) estimated from their research in Krasnoyarskiy Kray that only about 40% of a musk deer population could be hunted.

Regulation of musk deer hunting in the Russian Federation

Hunting for musk deer is mainly regulated through

- hunting rules adopted by each administrative region of the Russian Federation;
- the *Order Relating to Harvest of Wild Ungulates under Licence in the Territory of the RSFSR* (approved and entered into effect by *Order no. 316* of 22 August 1984, issued by GLAVOKHOTA, now the Department for the Protection and Control of Hunting Resources). (RSFSR is the abbreviation used for Russia when it was a republic of the USSR: at that time, all hunting regulations were at republic, not Union, level.)

The hunting season for musk deer is limited to the period from 1 September to 15 February. The actual terms of the hunting season may vary within this period, depending on specific conditions in the particular administrative region and on the year. The legal hunting of musk deer requires an official hunting licence. For the period during which this study took place, the cost of one musk deer licence was about USD17-51 for each deer. The cost varies between regions, but the range of fees is established by federal government.

Musk deer harvesting quotas and the number of licences are determined in accordance with the following procedure:

- Game resource users (for example, hunting organizations, associations and companies) submit information on the numbers of the musk deer in their region at the end of each hunting season via the district game manager to the Regional Game Managing Directorates.
- The Regional Game Managing Directorates submit the data on population and the possible hunting quotas for the next season to the Department for the Protection and Control of Hunting Resources, following assessment of the reports from game resource users by experts.
- The Department approves the provisional quotas submitted or partially reduces them, in accordance with its own considerations.

According to the *Order Relating to Harvest of Wild Ungulates under Licence in the Territory of the RSFSR,* quotas for musk deer harvest can be established by calculating:

10 to 15 % of the autumn population;
up to 20 % of the spring population.

Following establishment of the quotas, the Regional Game Managing Directorates publish the quotas and sell licences for trapping or hunting. Game resource users sell these licences to musk deer hunters. Licences are then stamped by the game resource users and eventually sent to the Regional Game Managing Directorates.

Assessment of the level of legal hunting of musk deer using records of issued licences

Hunters obtaining licences for musk deer are obliged to stamp the licence directly on the spot and on the day of the harvest. (This is in the field and can be very far from any town or city). After signing the licence, hunters have to submit it to the issuing organization within 10 days of the end of the hunting season. In theory, the number of licences issued should be the same as the number of musk deer taken, which was 585, on average, a year, in Primorskiy Kray and Khabarovskiy Kray, 1991-1999 (**Table 18**). Considering that these animals are almost certainly only males (because hunters target only male deer with guns, or because they only hand in a licence when a male deer is caught), then this number of deer corresponds to 13.5 kg of musk - the maximum average amount that could legally be harvested per year from these two *krays*, 1991-1999.

In the Altai-Sayan region, hunting of musk deer has been banned since the 1999-2000 hunting season, apart from in Krasnoyarskiy Kray, where hunting is regulated according to a quota of 300 musk deer per year. The ban on hunting musk deer was imposed by regional authorities following concerns that the musk deer populations in these parts of the Altai-Sayan region had decreased considerably as a result of hunting pressure (both legal and illegal).

Table 18

Number of musk deer hunting licences used in Primorskiy Kray and Khabarovskiy Kray, in the Russian Far East *

Year	Quota		Number of used licences	
	Primorskiy Kray	Khabarovskiy Kray	Primorskiy Kray	Khabarovskiy Kray
1989	1400	No data	677	No data
1990	1000	No data	545	No data
1991	1500	No data	600	347
1992	900	No data	635	347
1993	No data	No data	No data	119
1994	500	No data	40	119
1995	450	1000	75	356
1996	550	1000	193	354
1997	550	1000	69	357
1998	550	1000	148	666
1999	550	800	124	720
2000	500	600	No data	No data
2001	500	500	No data	No data
2002	500	500	No data	No data

Source: Regional Game Management Directorates of Primorskiy Kray and Khabarovskiy Kray. * In the Amurskaya Oblast and Jewish Autonomous Oblast in the Russian Far East, the hunting of musk deer is currently is banned.

Table 19

Quota for musk deer hunting, the reported number of musk deer hunted and the percentage fulfillment of the quota, in the Russian Federation

Hunting season	Hunting quota for musk deer	Number of deer legally harvested	Fulfillment of the quota (%)	Share of harvested* musk deer from total population (%)
1995-1996	4150	2000	48	no data
1996-1997	5830	1749	30	1.1
1997-1998	5383	3728	69	2.5
1998-1999	4875	2769	57	1.8
1999-2000	4326	3157	73	2.0

Note: * calculated by *GU Centrokhotcontrol*, based on official musk deer population census data and on the number of legally harvested musk deer (i.e. "closed" (used) licences). *Source*: *GU Centrokhotcontrol* (Centre of Control and Analysis of Information of Hunted Animals and their Habitat).

Recently (mid-1990s-2000), since only a proportion of the quota has been used, only about 1-2.5% of the total number of musk deer in the Russian Federation, as estimated by the government, has been legally hunted under quota each year (**Table 19**). Since the mid-1990s, only 30 to 70% of all available hunting licences for musk deer have been sold and used (see **Table 19**), although licences for other ungulate species are regularly all sold and used.

Authorized methods of musk deer hunting

As an example of authorized methods for hunting musk deer in the Russian Federation, the hunting regulations that apply in Khabarovskiy Kray, approved by *Resolution No. 129* of the Lesser Council of Khabarovsk Kray's Council of People's Deputies, 26 June 1993, are cited. According to Paragraph 21 of these regulations, the "*use of small rifles with side-fire ammunition for amateur and sport hunting, as well as for hunting of Brown Bear and ungulates"* is prohibited in Khabarovskiy Kray, except in the case of musk deer. The text of the regulation continues, "*...In areas of commercial hunting activities, hunters who have signed contracts to take fur-bearing animals may use trapping devices and small arms with side-fire ammunition, to hunt for hare, musk deer and forest game with amateur and commercial purposes*". Based on this, the hunting methods allowed for musk deer include almost all types of home-made trapping devices (such as fenced-off passages with snares), traps and the use of specially trained dogs, although automatic-firing bows and guns are not permitted. Hunting with dogs is the most widespread legal hunting method. In order to take only male musk deer, dogs chase the deer to high rocks were the musk deer can be shot after identifying the deer's sex.

Credit: Markus Stecher

Constructing a live trap for musk deer - this form of device is rarely, if ever used in the Russian Federation

Illegal hunting of musk deer - poaching

Assessment of the level of illegal hunting of musk deer

It is hard to assess the number of musk deer that are taken illegally by poachers, but an assessment of illegally harvested musk deer has been attempted. Musk deer are almost never taken for personal consumption in the Russian Federation and, if so, it is in negligible quantities (see page 38). Therefore, the volumes of illegally purchased musk should directly correlate with the volume of musk deer poached.

According to the data obtained from interviews with hunters it is estimated that, between 1998 and 2001, the Russian Far East was the centre of illegal trade in musk in the Russian Federation and nearly all musk harvested illegally in the country was traded and exported from there. The annual total volume of this musk, according to the results of interviews and questionnaires conducted for this study, was about 400-450 kg (raw musk), 1999-2000. This would correspond to the harvest of about 17 000-20 000 male musk deer, based on the assumption that each male provides about 23 g of raw musk. Taking into consideration that three or more musk deer may be killed before a male with a sufficiently large musk gland is caught (see **Introduction**), a minimum of 50 000-60 000 musk deer could be illegally killed annually in the Russian Federation to supply 400-450 kg of musk. Questionnaires and interviews revealed that approximately 20 to 30 % of the musk illegally on sale in, and exported from, the Russian Far East originated from other parts of the Russian Federation, mainly from the Altay-Sayan region, Yakutia and the Trans-Baykal area. (Technically, Yakutia is in the Russian Far East, but traditionally - and in this context - is considered as part of East Siberia.) In the Altai-Sayan region, a total of about 190 kg of musk was reported to have been traded annually, 1999-2000. This amount corresponds to about 8000 male musk deer.

According to **Table 19**, 3157 musk deer were legally harvested, 1999-2000, in the Russian Federation. This could equate to 72 kg of musk, (if all the musk deer were males - because hunters with licences usually only target male deer with guns, or because they only stamp a licence when a male deer is caught). If one compares this amount of musk with the annual amount traded illegally, 1999-2000, (400-450 kg) one can conclude that the amount of legally harvested musk in the Russian Federation that year was 16-18% of the estimated volume of illegally harvested musk. In other words, by this calculation, 82-84% of male musk deer killed by hunters in the Russian Federation, 1999-2000, were taken illegally.

Poaching of musk deer in its Russian range is widespread. In Tophalaria, a part of the Irkutsk Oblast bordering Altai-Sayan, a raid against poaching was conducted in 2001, when a brigade of the Irkutsk Regional Game Management Directorate confiscated musk and other parts of musk deer, such as hides and tusks, practically in every hunting cabin or village. In this case, the inspectors admitted that almost everyone in the region was poaching musk deer (Kez, 2001).

Methods of poaching musk deer

The period after freshly fallen snow is the most convenient time to trap musk deer, since the snow clearly shows a deer's movements. Musk deer often use the same paths and migrate once every three to four days, primarily at night. Poachers place their traps and snares on these paths (Kuznetzov *et al*., pers. comm., 2000). Ninety-five per cent of the legally licensed hunters work in the taiga during this period and it is reported that they are involved in poaching musk deer. It is claimed that most of the hunters who set traps have only two to four licences to take musk deer. Such hunters do not stamp their licences when taking a female musk deer; they hide the body or use it as bait for trapping fur-bearing animals. In most cases it is easy for hunters to carry musk deer glands home and store them there, because hunters frequently return to their to their houses during the hunting season.

The main device to capture musk deer illegally is the use of wire or cable enmeshed in vegetation. Metal cable, even telephone wire, is looped on musk deer tracks or hidden in artificial fences which musk deer pass through. Poachers construct these fences by cutting thick coniferous trees crossing the musk deer tracks. Often hundreds of loops cover large areas in the forest. For example, during investigations in the Altai Republic, about 5000 such loops and more than 600 poachers' traps were encountered (and removed) by researchers, despite the fact that hunting for musk deer in the Altai Republic has been prohibited since 2000.

Some experienced hunters occasionally set snares with a so-called "stopper" and deer caught in such traps stay alive until the hunter comes to check the trap. In this case, hunters can release female deer and young animals. However, even this technique does not provide a 100% guarantee that only male specimens are taken, since a trapped musk deer will be trying to escape and frequently breaks a leg or gets killed by other predators.

Credit: Markus Stecher

Female musk deer snared in a trap

Poaching of musk deer in the Russian Far East

The situation has changed over the last decade or so, so that musk deer poaching is not the lucrative business it was in this region. In 1990, the value of musk increased very fast and a hunter could reportedly exchange two or three musk deer glands for a Japanese video tape recorder worth USD180 to 200. During this time the price of one gramme of musk was as high as five or six US dollars on the first link in the trade chain, i.e., from hunter to trader. Researchers were made aware of a case where a hunter in Verkhne-Bureinsky District of Khabarovskiy Kray bought a car worth USD1500 for ten musk deer glands. The musk was of very high quality and originated from the Russian Altai Mountains.

In the late 1990s and the years thereafter, transportation costs to get hunters to hunting sites became significantly more expensive, owing to very high prices for vehicle fuel. At the same time, prices for various hunting supplies (food, rifles, ammunition, clothing, traps, etc.) has also increased. In Khabarovskiy Kray and adjacent regions of eastern Siberia, many professional hunters have apparently given up hunting and trapping in remote hunting sites, where they used to be transported by helicopters. Around the end of 2001, one hour's helicopter rental could cost as much as USD800. In Khabarovskiy Kray, for example, it can take about one to two-and-a-half hours to get to remote hunting sites by helicopter and, even if not returning by helicopter themselves, hunters have to pay for the round trip. Thus, hunting activities in remote sites are not necessarily profitable any more, despite the fact that these are the places with the highest population densities of musk deer.

A situation similar to that in Khabarovskiy Kray was found in Primorskiy Kray. In the early 1990s, when State boundaries were opened and the trade between the Russian Federation and neighbouring countries increased, the demand for musk deer glands grew significantly. Because of administrative problems at the border and poor Customs control, the flow of illegal musk was uncontrollable. The peak of such trade was in 1991 to 1993, when the price paid to hunters for one gramme of high-quality musk reached four to five US dollars - as opposed to two to three US dollars per gramme, 1999-2002. The market for wild musk deer glands became over-stocked, especially since the price for musk from musk deer breeding farms in China dropped abruptly (V. Aramilev, *in litt.* to TRAFFIC Europe-Russia, 1999). In order to protect the market for musk, State agencies practically had to stop purchasing wild musk deer glands (TRAFFIC Europe-Russia survey data, 2000).

In the Russian Far East, at the time of survey work for this study (2001-02), hunters allegedly took musk more as a by-product of hunting other game species than as a target product. Any targeted harvest was only carried out "to order" or when the sale was guaranteed. Musk gland harvesting could be profitable only in cases where a hunter could take at least 10-12 glands per season, in areas which were easy to reach and did not require high transportation costs (V. Aramilev *in litt*. to TRAFFIC Europe-Russia, 2000; Zhivogliadov, pers. comm, 2000).

Musk gland preparation process

Prior to marketing, musk from musk deer has to undergo primary processing. This processing consists of drying of the musk. The musk deer gland is cut out of the dead deer with the attached skin. Five- to seven-centimetre edges are left around the gland and spiked by small nails at each corner turning the interior side of the gland to the outside. The drying process lasts about three weeks until the moment when no more dark brown liquid appears from the opening of the gland when squeezed. Recently, Chinese traders have reportedly requested that musk glands be supplied with the genitals attached. The dried gland contains 85-90% musk, the remaining part being tissue.

Musk is often adulterated because of its high price. To increase the weight, the musk is sometimes supplemented with dried blood, liver, spleen or bark of certain trees (Green and Kattel, 1997). However, no counterfeit musk gland was encountered during investigations for this report in the Russian Federation, 1999-2002.

Poaching in the Altai-Sayan region

In the Altai-Sayan region, the situation differs significantly from that in the Far East. The hunting area in this region is smaller and easy to access by roads. In addition, the area is more populated by humans. As in the Russian Far East, the business of musk deer hunting and poaching in the region developed at the beginning of the 1990s. During investigations, harvesting of musk and its trade were found to be a well-organized business and to involve not only hunters that worked individually, but also larger groups of people, that were hired by traders. A client who wanted to buy musk engaged those groups of hunters, provided the transport and food and then bought the harvested musk.

According to recent reports from the regional Game Management Department and other governmental and non-governmental nature conservation organizations and scientific institutions, the musk deer populations of the Russian Altai-Sayan region are under high poaching pressure and are in dramatic decline. Based on the findings of this report, it is believed that, in areas that are easily accessible to hunters and poachers, musk deer populations in 2002 were at a quarter or a fifth of their levels in the 1970s and 80s (S. Lineitzev, Regional expert on musk deer, pers. comm., 2002). In addition, investigations revealed that the average weight of musk glands decreased between 1997 and 2001, from 23-25 g per gland to 17 g per gland. This is an indication of the high hunting pressure on musk deer in the region (see **Illegal trade in the Altai-Sayan**).

Anti-poaching activities

In the Russian Far East, several State-run agencies are involved in anti-poaching activities. The State Game Inspection, *Gosokhotnadzor*, is the most important among these agencies, but at the same time it is the smallest in terms of staff and the poorest in terms of equipment. However, this agency detects around 90% of all the violations of hunting rules detected in Khabarovskiy Kray.

Credit: Markus Stecher

Anti-poaching guard in the Russian Federation (left)

According to **Table 20**, the number of violations of musk deer hunting rules in Khabarovskiy Kray are very low compared to the number of violations of other hunting rules in the region. Only one to three per cent of all violations reported are related to musk deer hunting. Moreover, penalties for violations of musk deer hunting rules are arguably not sufficiently deterrent. According to the Administrative Code of the Russian Federation, a poacher has to pay a fine the equivalent of USD17-35 for illegal hunting and, additionally, compensation of about USD35 for each musk deer killed. Given that a licence to hunt legally would cost hunters little less (USD17-51), they clearly often judge it is worth the risk of hunting illegally and gaining larger profits.

In early 2000, musk traders interviewed revealed that an important musk deer trader, a resident of the town of Sovetskaya Gavan in Khabarovskiy Kray, was active in Sukpai village, in Lazo District of Khabarovskiy Kray. Researchers informed the State Game Inspection of Lazo District about this case, whereupon investigations resulted in the confiscation of 137 musk deer glands with total weight of approximately 2.8 kg. This was the largest volume of musk confiscated from a single trader in Khabarovskiy Kray by the State Game Inspection.

Table 20

Violations of musk deer hunting rules in proportion to the total number of violations of hunting rules in Khabarovsky Kray, 1995 to 1999

Years	Violations of hunting rules		
	All cases	**Musk deer cases**	**Percentage**
1995	893	9	1.0
1996	852	28	3.3
1997	842	1	0.1
1998	905	18	2.0
1999	907	2	0.2
2000	No data		
2001	1295	34	2.6
2002	820	25	3
2003*	168	5	2.9

Note: * for January-March.

Source: Khabarovsk Regional Game Management Directorate

Among the anti-poaching teams, the so-called "Tiger" groups, that are funded and supported by WWF and other NGOs, are the most effective. The control and inspection activities of the "Tiger" group under the Primorskiy Kray State Committee for Environmental Protection involved the following cases (during the period from April 1994 to December 2000):

- 85 illegally harvested musk deer glands confiscated in 1998;
- 44 musk deer glands confiscated in 1999;
- over three kilogrammes of musk from an illegal trader in the city of Ussuriysk, confiscated in early 2000. This musk was purchased in the Terneisky District of Primorskiy Kray (V. Abramov, Ussuriysky State Nature Reserve, *in litt*. to TRAFFIC Europe-Russia).

Trade in musk in the Russian Federation

The legal musk trade in (from) the Russian Federation

Domestic consumption of musk in the Russian Federation is reported to be negligible and most musk harvested is for export.

Documents needed for legal exports of musk

The following documentation and procedures are required to export musk deer glands legally from the Russian Federation:

- A licence to hunt musk deer from the relevant regional administration.
- A permit to sell musk deer glands, issued by the relevant regional department and authorized by the Committee for Protection of the Environment and Natural Resources of the regional administration.
- An export quota for musk deer glands from the relevant regional administration.
- A letter of confirmation from the relevant official game management department stating that the musk was legally obtained.
- An application must be made by the relevant regional department (for example, the regional department dealing with natural resources) to the Deputy Minister of the Ministry of Natural Resources of the Russian Federation, for allocation of the required export quota.
- A licence for the export of musk deer glands, which must be submitted to the regional representative of the Ministry of Foreign Economic Relations of the Russian Federation.
- A valid veterinary certificate.
- A CITES export permit.

Credit: Volker Homes/TRAFFIC

Musk gland with accompanying portion (*tallon*) of a musk deer licence. This *tallon* must be detached from the licence by the hunter just after taking a deer. This invalidates the licence for further use and authorizes legal trade of the gland. The *tallon* should accompany the gland through all stages of its trade in the Russian Federation in order to validate its legality. The wording on the *tallon* pictured translates as "*Tallon N^{o}1 of licence A N^{o} 0002867 for trade in musk deer pods. Hunting season of 1996-19__.*"

Companies involved in the legal trade in musk

Based on available information, only six to seven large companies working under the current quota system are involved in the legal trade in musk deer glands in the Russian Federation.

These following companies are reported to purchase musk in Yakutia, Chita Oblast, Irkutsk Oblast and Krasnoyarskiy Kray:

- *Krechet* Inter-regional Public Organization of the Society of Hunters and Fishermen (*IPO HFS Krechet*), with its headquarters in Khabarovsk
- *Vostok-Pushnina* Closed Joint-Stock Company (Khabarovsk)
- *Biotechnologies*, Vladivostok branch of a Moscow company
- *Mekha Sibiri* Joint-stock company (Irkutsk)
- *Sobol* (Khabarovsk)
- *Lesnoy Product Ltd* (Irkutsk)

IPO HFS Krechet purchases musk deer glands from leased hunting territories. This company orders musk from hunters and issues licences to take musk deer. The purchasing price depends on the weight of the musk gland and the quality of the dried product. The higher the moisture content, the lower the purchasing price. The price for properly dried musk deer glands with normal moisture content (of up to eight per cent) was USD3.5 per gramme at the time of investigations for this report. This rate applied only if a hunter had a detachable licence *tallon* accompanying the musk gland (see caption, page 48). *IPO HFS Krechet* also purchased musk deer glands that had been confiscated from poachers by game management departments in Khabarovskiy and Primorskiy Krays. In 2000, for instance, *IPO HFS Krechet* purchased 137

Table 21

Purchases by foreign companies of musk from Russian companies involved in the legal musk trade, 1997-2000

Date	Russian company	Foreign company	Quantity (g)	Price
(USD/g)				
1997	Unknown	South Korean company (name unknown)	unknown	unknown
1999	*IPO HFS Krechet*	Messrs. Fein & Co. Ltd. (Hong Kong)	2115	2.50
1999	*JSC Vostok-Pushnina*	Messrs. Fein & Co. Ltd. (Hong Kong)	4982 (246 glands)	4.00
2000	Unknown	Messrs. Fein & Co.Ltd. (Hong Kong)	6285 (357 glands)	unknown
2000	*IPO HFS Krechet*	Newhead International Ltd. (Hong Kong)	5000 (277 glands)	unknown

Source: TRAFFIC survey data

musk deer glands confiscated from a detained poacher (pers. comm. to TRAFFIC Europe-Russia). The company *JSC Vostok- Pushnina* reportedly used the same scheme of purchasing musk deer glands. The Moscow-based company *Biotechnologies* is the major partner of *IPO HFS Krechet*. This company works as an intermediary between *Krechet* and foreign customers.

The main buyer of musk from Russian companies involved in the musk trade in 1997 was a company in South Korea. Since then, companies from Hong Kong have dominated the market, dealing in large quantities of glands (see **Table 21**).

Advertisements for musk in the press in the Russian Far East

To assess levels of demand for and supply of musk, private advertisements placed in the five most important regional newspapers and periodicals in Amurskaya Oblast, Primorskiy Kray and

Table 22

Comparative analysis of advertisements for the sale and purchase of musk in the press in the Russian Far East, 1998-2002 (D = demand; S = supply)

Media	**1998**		**1999**		**2000**		**2001**		**2002**	
	D	**S**	**D**	**S**	**D**	**S**	**D**	**S**	**D**	**S**
Amurskaya Oblast										
Amurskaya Nedelya	5	6	3	4	5	7	7	7	8	6
Businesman	2	3	2	3	3	3	4	3	5	4
Dvazhdy Dva	1	3	2	2	2	2	3	2	3	3
Kaleidoskop	0	0	1	1	1	2	1	1	0	1
Total	**10**	**16**	**8**	**14**	**11**	**14**	**15**	**13**	**16**	**14**
Primorskiy Kray										
Dalpress	8	12	12	16	15	17	23	21	15	22
Vladivostok	no data	no data	5	8	5	6	8	7	6	6
Iz uk v ruki	4	4	3	5	4	6	7	8	4	7
Vestnik	1	2	0	1	1	0	1	1	2	1
Konkurent	1	3	2	3	2	3	3	2	2	4
Other (incl. local TV and radio channels)	3	6	2	5	5	7	9	7	6	8
Total	**17**	**27**	**24**	**38**	**27**	**36**	**51**	**46**	**35**	**48**
Khabarovskiy Kray										
*Iz ruk v ruk*i	11	16	18	36	21	34	37	35	19	31
Present	9	13	10	14	17	26	19	16	18	24
TOZ	7	11	8	12	10	16	16	17	11	13
Khabarovskiy Express	5	8	7	12	11	17	17	15	12	15
Priamurskiye Vedomosti	5	7	6	11	9	13	12	11	7	10
Other (incl. local TV and radio channels)	13	24	25	38	30	43	44	39	26	31
Total	**50**	**79**	**74**	**123**	**98**	**149**	**145**	**139**	**93**	**124**

Khabarovskiy Kray were analysed (**Table 22**). Bearing in mind that there may be similar advertisements in other newspapers, the total number of advertisements in each region of the Russian Far East may be much higher than **Table 22** shows.

On the basis of these advertisements, the following may be concluded:

- The number of advertisements for the sale and purchase of musk increased, particularly in Primorskiy Kray and Khabarovskiy Kray, for the period reviewed.
- From 1998 to 2000, offers of musk exceeded demand for musk by 60-75% in all three regions of the Russian Far East surveyed.

In the period 1998-2000, it was difficult to sell musk at a satisfying price since the market was over-supplied: during interviews undertaken for this report, middlemen repeatedly offered musk glands in amounts of about 2.5–3 kg.

In the Altai-Sayan region, musk trade is conducted only by three prominent, well-known traders. In this region, advertisements relating to musk trade in the printed media are rarely found. Many offers to trade in musk were found on the internet and 7874 requests to purchase musk and 204 offers to sell musk were noted from 2001 to mid-2002.

CITES-reported international trade in Russian musk

The Russian Federation is currently one of the few range countries which allow the export of musk from musk deer. (China and Mongolia have banned the export of musk from wild deer, but China allows the export of derivatives containing musk.)

Table 23

Russian musk in international trade, 1990-2001, as reported by the exporting country (the Russian Federation) and by the importers

Country	Reported export (kg) from Russian Federation	Reported import (kg)
China	50.59	0.05
Hong Kong	145.78	205.02
Singapore	53.26	31
South Korea	76.3	57
Japan	2.7	0
German	68.43	61.68
France	15	22.02
Switzerland	46.29	2
Total	**458.35**	**378.77**

Source: CITES trade statistics derived from the UNEP-WCMC CITES Trade Database, the UNEP-World Conservation Monitoring Centre.

Based on CITES annual report data obtained from UNEP-WCMC in 2003, the Russian Federation exported specimens of musk deer primarily to China, including Hong Kong, Singapore, South Korea, Japan, Germany, France and Switzerland, 1990-2001. As a result of considerable differences in the trade volumes reported by the Russian Federation and by the importing countries, it is difficult to assess actual trade volumes. Therefore, sets of both figures are provided in the following account. For the period 1990-2001, the Russian Federation reported the export of about 458 kg of musk (**Table 23**). Importing countries reported importing about 378 kg from the Russian Federation, during the same period (**Table 23**). The main importer of Russian musk, 1990-2001, was Hong Kong, which recorded importing 205 kg (**Table 23**), but which re-exported about 219 kg of musk of Russian origin during the same period, according to its own records - mainly to South Korea, Japan and France (**Table 24**).

Table 24

Musk of Russian origin re-exported, 1990-2001, as reported by the re-exporters and importers

Re-exporters	Reported re-exports (kg)	Reported imports (kg)	Main destinations
Hong Kong	219.5	147.28	South Korea, Japan, France
Singapore	82	63	South Korea, Hong Kong, Japan
South Korea	2.31	3.81	Japan
Japan	3.4	9	Hong Kong
Germany	58	50	Hong Kong, Singapore
France	7.43	10	Hong Kong
Switzerland	11	18	South Korea, France
Total	**383.64**	**301.09**	

Source: CITES trade statistics derived from the UNEP-WCMC CITES Trade Database, the UNEP-World Conservation Monitoring Centre.

The Russian Federation does not, according to CITES trade statistics, export derivatives containing musk, but exports mainly musk, live specimens and hunting trophies from musk deer. The Russian Federation is not reported to be a country of re-export, thus the Russian Federation is only exporting and not importing musk. Based on the Russian Federation's declared exports of musk, an average of just under 40 kg of musk was exported each year, 1990-2001, which corresponds to a harvest of approximately 1700 male musk deer, or just over 5000 musk deer, if non-selective hunting methods were used. It is assumed that Russian musk is used in traditional East Asian medicine in several countries and that these medicines may then often be exported and re-exported. The current method of documenting quantities of musk deer derivatives in international trade as "tablets", "pills" or "boxes of medicine", etc., makes it impossible accurately to assess the actual volume of natural musk in trade and, therefore, the

potential impact of this trade on wild musk deer populations. Standardized methods and units of measurement for documenting the precise quantity of musk contained in derivatives in international trade need to be developed and applied.

Since 1995, the Russian Federation has applied annual quotas to the export of musk (see **Table 25**). Such quotas are communicated to other CITES Parties by the CITES Secretariat in the form of notifications (**Table 25**).

Table 25

Russian export quotas for musk, as communicated to CITES Parties, 1995 to 2003

Year	Musk export quota	CITES notification number
1995	70 kg musk, including 50 kg from 6000 musk deer in 1995 and 20 kg from previous years	874
1996	40 kg musk	916
1997	40 kg musk	994
1998	35 kg musk	1998/36
1999	71.1 kg musk obtained in 1999 and 63.5 kg musk from previous years	1999/34
2000	83.255 kg obtained in 1999	2000/053
2001	76.2 kg obtained in 2001 and 20.6 kg registered stocks from previous years	2001/41
2002	65.5 kg obtained in 2001-2002 hunting season and registered*	
2003	84.2 kg musk obtained in 2002-2003 hunting season and registered stocks from previous years (34.5 kg)*	

Note: * approved quotas of the CITES Management Authority of the Russian Federation.

Source: CITES notifications

Russian export quotas have increased since 1995, but the amount of legally exported musk from the Russian Federation has decreased in the past three years and it is now considered to be only a small share of the estimated total amount of musk exported from the Russian Federation, i.e., including illegally exported musk. For example, in 2002 the amount of musk exported, according to the Russian CITES Management Authority, about 25 kg (see **Table 26**), amounted to only about six per cent of the total estimated to have been exported illegally, 1999-2000 (400-450 kg). The annual average amount of musk exported by the Russian Federation according to CITES data, 1990-2001 - just under 40 kg (**Table 23**) - indicates a slightly larger share of the market for legally traded musk (around 10%). This low ratio of legal trade to illegal trade is further supported by the fact that the apparent maximum amount of legal musk in trade in the Russian Federation, 1999-2000, was 72 kg (**Table 19**), 16-18% of the annual estimated volume of illegally harvested (and exported) musk (400 to 450 kg).

Table 26

Legally exported musk from the Russian Federation and its proportion of the estimated amount of musk exported illegally

Year	Quantity of musk exported legally		Legal trade as a percentage of estimated illegal trade*
	Kg	Musk glands	
2000	70.821	No data	17.5
2001	57.237	2406	14.25
2002	25.414	1019	6.25

Sources: CITES Management Authority in the Russian Federation and (*), based on TRAFFIC Europe-Russia survey data, the estimated amount of musk illegally exported annually from the Russian Federation, 1999-2000, was 400-450 kg. .

Illegal trade in musk in the Russian Federation

The various ways of trading musk illegally and other reported information relevant to the illegal trade in musk - the sum of which is estimated to have been 400-450 kg in the Russian Federation from 1999 to 2000 - is outlined below.

- Illegal trade in musk deer glands in the Russian Far East and the Altai-Sayan region was found commonly to occur through personal contacts, so that sellers and buyers knew each other. This seemed to be the most widespread means of illegal trade, emphasizing the importance of trust in a process where activities are illegal and sellers may risk losing money and merchandise, and punishment.
- In some cases, trade took place between dealers recommended by other traders, who knew those involved personnally, but again, close knowledge of the people involved was a factor.
- Interviews conducted with retailers and hunters revealed that hunters offered musk glands to East Asian middlemen at a local market level, but typically negotiated the sale of only one gland initially, while bargaining for a particular price. Having fixed the most appropriate deal, the hunter often then sold not only one gland, but several.
- There are historical channels for musk trade in the Russian Federation and those involved in the fur trade in the Russian Far East were reported to be familiar with prices for furs, bear bile and musk deer glands.
- Private advertisements in print media and the internet are sometimes used to trade musk illegally.

During interviews for this study, middlemen repeatedly offered musk for sale, in quantities of up to three kilogrammes, at a price of USD3.5/g. Both local musk and musk from Irkutsk Oblast and Altaiskiy Kray, was offered.

Social and economic role of musk trade to local communities

At the end of the 20th century, musk deer hunting was of some importance for the life of both musk hunters and traders, as in former times. According to Y. Dunishenko of the Far-Eastern branch of VNIIOZ, in Terneysky District of Primorskiy Kray, poachers harvested about 3000 musk deer per year. Some of these poachers killed up to 300 animals per hunting season. Hunting for musk deer became the basic source of income in some villages of this district and one of the poachers admitted that "only thanks to the use of musk deer we are still alive …".

As demand and prices for fur have dropped (and so trapping for fur has declined), hunters have switched to other, more profitable, quarry, such as musk deer. However, the majority of commercial hunters believed that high demand for musk would not last and, therefore, did not treat musk deer as an important game species. Hunting musk deer in the Russian Federation in any case has certain difficulties, as hunting tracks and winter cabins are built to hunt Sable, squirrel and other ungulate species, not musk deer, and the building of new hunting tracks would require significant labour resources. At the time of surveys for this report, the majority of traders offered a price of two to three US dollars per gramme of musk to hunters. Because of this relatively low price fetched by musk, it is rare to find hunters in the Russian Far East specializing in hunting musk deer only. However, it was reported that practically every hunter took five to six musk deer per season, on average, as by-product. The musk glands from these deer were reported to make up to 10-15% of a hunter's income, per hunting season, for a hunter working under a temporary contract, and five to seven per cent of income for a professional hunter. According to the data provided by a musk trader (S. Zhivoglyadov, Primorskiy Kray, pers. comm., 2000), some hunters earn up to USD800 per season from musk harvesting alone. Interviews with hunters and musk traders in the Komsomolsky District of Khabarovskiy Kray revealed that a musk trader earns, on average, USD0.5-1.0 on the re-sale of one gramme of musk and that an average trader resells at least 700-800 g per year.

The stated cause of musk deer poaching levels reported in the Altai-Sayan was the poverty of the local human population.

According to survey data received by researchers, the number of musk traders in the Russian Far East is increasing. This is connected with the lack of jobs and the presence of Chinese, Korean and other non-Russian wholesale buyers of musk deer glands in the capital cities of the region. These non-Russians usually cannot move freely around the territory of the Russian Far East, owing to Russian restrictions on such travel. Therefore, residents of towns and villages where musk deer hunters live, who often visit the regional capital cities, usually become the primary traders.

Illegal trade in the Russian Far East

Many respondents to the questionnaires sent out as part of the research for this report mentioned that the Russian Far East is the key region for the trade in musk obtained illegally from the region itself, from the Altay-Sayan region, Yakutia and the Trans-Baykal area.

Because of administrative problems at the border between the Russian Federation and its neighbouring countries in East Asia and because of poor Customs controls, the illegal export trade in musk from the Russian Federation appears not to be controllable. Illegal purchase of musk in the Russian Far East and its export from the Russian Federation is reported mainly to be conducted by nationals from North and South Korean and China. The Chinese community in the Russian Far East is comparably large and Chinese citizens can freely enter the Russian Federation. Journey-time from China to the Russian Federation (for example, to Khabarovsk) takes only one-and-a-half hours by ship and no visa is required to enter either country from the other. Since China is situated on the opposite bank of the Amur River from Russian territory, both Chinese and Russian frontier guards frequently arrest Chinese, and sometimes Russian, smugglers.

Credit: Markus Stecher

Musk deer taiga habitat in the Russian Far East

The purchase of musk glands by nationals of North and South Korea is reported to occur primarily at timber harvesting sites where Koreans work. According to different sources, poaching is widespread in areas where Northern Koreans, in particular, harvest timber: hunters among the Korean loggers use the taiga adjacent to the timber-harvesting sites to hunt for different kinds of wildlife species (Chereshnev, Senior Game Inspector of Verkhne-Bureinsky District in Khabarovskiy Kray, pers. comm., 2000).

One participant at the workshop in July 2003 (see **Annex 1**) estimated that 115 kg of musk was traded illegally, annually, in Khabarovskiy Kray, while another attested to "very high" levels of musk deer poaching and illegal trade in musk in Khabarovskiy Kray.

Illegal trade in the Altai-Sayan

According to reports made to researchers, the musk trade in the Altai-Sayan region, is conducted mainly by three large traders who control about 95% of all trade in musk in the region. These well-known traders purchase musk from local residents in the region. The Russian-Chinese border in the Altai-Sayan region is only about a hundred kilometres long and therefore the main trade flow of musk from the region is directed via the Russian Far East, where it is sold mainly to Chinese and Korean buyers. Researchers discovered that musk was also traded to China by cars and trucks, through Mongolia, but the volume of illegal trade by this route is unknown.

Interviews with the main musk traders and their staff in the Altai-Sayan region revealed the following:

- From 2000 to 2002, the three main buyers purchased around 30 kg of musk per year in the Republic of Khakassia. A smaller portion of this amount was harvested in adjacent territories.
- During the hunting season of 2001 to 2002, the illegal trade in musk was said to have decreased.
- In the period 1997-2000, up to 100 kg of musk were purchased illegally each year in the Republic of Tyva.
- 190 kg of musk, in total, was reported to have been traded annually, 1999-2000, in the Altai-Sayan region.

Such poaching was reported to be caused by the poverty of the local human population. During the investigation period (between 2000 and 2002), researchers detected a reduction in the volumes of musk reported purchased. In addition, a reduction in the average weight of musk glands purchased in the region was reported, the average dropping from 24 g in 1997, to 23 g in 1998, to 20 g in 1999, and to 17 g in 2001. This reduction could have been the effect of a decrease of mature males in the population, following over-harvesting. Potentially, this could lead to lower fertility in the musk deer populations of the Altai-Sayan region.

Information on illegal export and seizures of musk

Information obtained from the Russian Far East Customs authorities and other sources indicates that illegal export and attempted illegal export of musk deer glands has been persistent. State Customs authorities of Amurskaya Oblast, Primorskiy Kray and Khabarovskiy Kray have intercepted several attempts to smuggle musk deer glands (**Table 27**). From 1995 to 2003, the State Customs authorities of the Russian Far East confiscated 713 musk deer glands from smugglers. The 119 glands intercepted in 2000 corresponded to a weight of 2.75 kg, or 0.7% of the amount of musk estimated to have been illegally traded out of the Russian Federation that year (mostly via the Russian Far East). In all these cases (**Table 27**), there were no documents to confirm the legality of purchase or harvest of the musk deer glands.

Table 27

Instances of attempts to smuggle musk intercepted by State Customs authorities of Amurskaya Oblast, Primorskiy Kray and Khabarovskiy Kray

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003*	**Total**
No. glands	165	52	106	77	111	119	5	65	13	**713**

Note: * investigation period January to March

The means of smuggling musk deer glands or musk for export is very simple: foreign citizens (musk gland buyers) transport musk in their private hand baggage in small batches of 300-400 g. Since musk cannot be detected by x-ray machines, some traders just put it into their pockets, especially if their contraband consists of a few glands only. According to data from Customs authorities, approximately five to seven per cent of the total volume of smuggled musk gets confiscated.

From 1997 to the end of 1999, private businessmen and ship crew members reported several cases of batches of 10-30 kg of musk smuggled to South Korea (pers. comms to TRAFFIC Europe-Russia, 1999). Former crew members of the ships *Academician Korolev* and *Academician Shirshov*, who travelled from Vladivostok to Pusan, in South Korea, and from Nakhodka (the second-largest city in Primorskiiy Kray) to Pusan, reported that, in the period, 1994-1999, almost every shipment of cargo to Pusan contained large batches of illegally exported musk deer glands.

The veracity of this information is supported by a seizure of 71 musk deer glands from the *Academician Korolev*, which attempted to export these glands illegally on 20 January 1997, and by information submitted by the Russian branch of Interpol to the State Customs Committee of the Russian Federation, which stated that police and Customs authorities of South Korea had intercepted the illegal export of 50 kg of Russian musk deer glands and Brown Bear *Ursus*

arctos bile at the port of Pusan between 1997 and 1998. The confiscated batch of musk weighed as much as 20 kg. In an attempt to legalize this batch of musk, the traders had offered a counterfeit CITES certificate, which had supposedly been issued by the Primorskiy branch of the CITES Management Authority in the Russian Federation - which, in fact, does not exist.

According to information received in 1998 and 1999, Korean businessmen frequently tried to procure permits from the CITES Management Authority in South Korea to import large batches of musk deer glands from Primorskiy Kray and Khabarovskiy Kray. In their attempts to secure import permits, the businessmen produced counterfeit CITES export permits. In November 1999, during the *International Workshop of Enforcing Wildlife Trade Controls in the Russian Far East and Northern East Asia* in Vladivostok (Anon., 2000), representatives of the South Korean Customs agency reported on a confiscation of 21 kg of musk deer glands that was illegally imported to South Korea in 1998.

Research revealed no information specifically relating to seizures of illegally exported musk from the Altai-Sayan region (1995 to 2003) and, on the basis of available information, musk deer glands illegally obtained from poachers in the Russian Far East are being smuggled primarily to South Korea, North Korea and China. Of especial concern are reports of the illegal export musk glands of the subspecies Sakhalin Musk Deer - Customs authorities in Khabarovsk and Sakhalin continue to uncover attempts by residents of Sakhalin Oblast to smuggle musk deer glands (Customs authorities in Khabarovsk, pers. comms to TRAFFIC Europe-Russia, 2001).

In 1998, Customs in Vladivostok and Khasan (in south-west Primorskiy Kray, right on the border with North Korea) stopped an attempt to smuggle 30 frozen carcasses of male musk deer to South Korea by the ships *Vasya Kurka* and *Okean*. According to information received by researchers, Chinese traders purchased musk deer carcasses for USD120-150 each from poachers in the city of Ussuriysk (about 100 km from Vladivostock).

Conclusions

For conclusions relating to the survey of the population and harvest of musk deer in the Russian Far East and the Altai-Sayan region and musk trade in the Russian Federation, see the main **Conclusions** section of this report on page 79.

MUSK TRADE IN MONGOLIA, 1990-2001

Original research for this section of the report was carried out by Tsendjav Dashgenden (Ph. D) and Batbold D. Otgoid.

Background

Field work in Mongolia assessed poaching of musk deer and the trade in musk. The scope of the project did not allow population surveys to be conducted, as in the Russian Federation. Information on the population, habitat and other background information on musk deer in Mongolia has therefore been compiled from published literature and from musk deer experts in Mongolia.

Distribution, population and habitat of musk deer in Mongolia

Siberian Musk Deer, the sole species of musk deer in Mongolia, are distributed on the upper, northern slopes of the Hentiy and Hövsgöl Mountains and along the tops of the Hangay and Haanhöhiy mountain ranges (see map, **Figure 4**). Dulamtseren (1977) reported that the deer were widespread in the alpine forests of the Hentiy Mountains and relatively widespread throughout the Hangay Mountains, but that their preferred range areas were remote and separate from each other. Musk deer were reported to be distributed in the alpine forests of Hövsgöl by Sukhbat (1981) and Bazardorj and Sukhbat (1984), and in the Siberian Pine forests of the Haanhöhiy Mountains, according to the results of surveys and questionnaires in November 2001 carried out for this study.

Figure 4

Map showing areas of musk deer distribution in Mongolia and locations of the main markets for musk in Mongolia

Note: Hentiy, Hövsgöl, Hangay and Haanhöhiy mountains are alternatively referred to as Khentii, Khovsgol, Khangai and Khan Khokhii mountains. *Source*: after Dulamtseren *et al.* (1989).

The musk deer range in Mongolia falls within more than 40 districts of 11 *aymguud* (provinces) - Uvs, Arhangay, Övörhangay, Dzavhan, Bayanhongor, Bulgan, Hövsgöl, Darhan Uul, Selenge, Töv and Hentiy. According to Dulamtseren (1977), the Hentiy Mountains held the largest population of musk deer in Mongolia (see **Table 28**).

The preferred habitat of musk deer in Mongolia is dense forest or shrub-covered slopes in sub-alpine zones of the mountains (Dulamtseren *et al*., 1977; **Table 28**). Below the tree line, Mongolia's northern mountain slopes are covered with boreal taiga forest, mainly Siberian Larch *Larix sibirica* and Siberian Pine *Pinus sibirica,* and are rich in mosses and lichens (Anon., 2003e). Dulamtseren *et al*. (1975 and 1989) reported that musk deer were distributed throughout 27 000 km^2 of pine, larch and birch forests in the mountains of Mongolia, mostly at altitudes of 1000-4200 m.

Table 28

Historical population density of musk deer per 1000 ha and per 10 km-line transects in various habitats and different parts of Mongolia

Region in Mongolia	Density	Habitat	Area of unit
Hentiy Mountains			
Tukhliar, Delmiin zoo, Aravt and Shorootiin	21-35	alpine forest areas	1000 ha
Zuun Burkhiin Khunge River	4-6	headwaters of the river	1000 ha
Zuun Burkhiin Khunge River	1-2	along the middle stretch of river	1000 ha
Hangay Mountains		habitats patchily distributed, isolated	
Teeliin Ulaan Tsokhio	1-2	headwaters of Orhon River	l.t. 10 km
Untaa Mountain of South Terkh	12	Larch forests	1000 ha
Solongot Davaa of Tarvagatai range	1	alpine forest areas	1000 ha
Zart	2	headwaters of river	1000 ha
Erchim mountain range	7-8	not known	1000 ha
Oltiin Davaa	4	not known	l.t. 10 km
Mogoin Davaa	5	not known	l.t. 10 km
Uizen	6	not known	l.t. 10 km
Doloogiin Tolgod	4	not known	l.t. 10 km
Haanhöhiy Mountains	0.5-1	Larch-pine forested areas	1000 ha

Notes: Types of musk deer habitats referred to here may not equate with those where musk deer were counted in the Russian Federation; l.t. = line transect. *Source*: Dulamtseren *et al.* (1977).

Published information on the present-day status of the Mongolian musk deer population size is sparse, but the musk deer in Mongolia is a rare species (Tsendjav and Bujinkhand, 2000). Some historical data and some recent regional data are available but, until the mid-1960s, little was recorded of Mongolia's musk deer populations. Surveys of mammals were initiated from 1966

onwards by the Institute of Biology of the Mongolian Academy of Sciences in the Hentiy Mountains. A report from that institution, dated 1975, states that the Mongolian population of musk deer was 44 000 and that, of these, 43% were males (Anon., 1975). Such a proportion of males in the musk deer population indicated that the male to female ratio was close to 1:1 at that time, the assumed facilitator of breeding success, in view of the species's pair-bonding behaviour. Survey results on which the 1975 report was based clearly indicated that the musk deer population of Mongolia had increased since the species had been ranked as "strictly protected" and "very rare" under the *Law on Hunting* of 1953. The Mongolian Red Book (Anon., 2003f) cites a figure of 60 000-80 000 musk deer in Mongolia in the 1970s, but it is believed that this estimate is not reliable (S. Dulamtseren and D.Tsendjav, *in litt*. to N. Batnasan, March, 2004).

Credit: Richard P. Reading

Male Siberian Musk Deer. Mosses and tree lichens are among the principal foods of Siberian Musk Deer, particularly in winter.

More recent information, though not country-wide, is available from the detailed studies of musk deer carried out by Tsendjav and Bujinkhand (2000) for the period 1995-2000, in the alpine forests of the Hentiy Mountains. Their studies covered the following locations: Bugat, Yolt, Davaat, North Saikhan, Nerst, Getsel, the Bayan River, Khalzan, Khuandai, Deendii and Terelj, in the Gorkhi-Terelj National Park and Khan Khentii Strictly Protected Area (see **Table 29**). According to the survey results for 1995, the musk deer population density was four to five deer per 200-500 ha of Siberian Pine forest in Davaat, Yolt, Bugat, Terelj, South and North Saikhan. These results, although not directly comparable with densities of musk deer populations shown in **Table 28**, indicate a fall in musk deer populations in the Hentiy Mountains since the time of the surveys of Dulamtseren *et al.* (1977). The ratio of female to male deer was found to be 3:1, and sometimes 5:1 - about 20-25% of the musk deer population were males and 15-18% were calves. In 1995, the reproduction rate was poor, but in April and July 1996, 73% of females

captured gestated. The musk deer population was found to decrease yearly over the period of study.

Any decline in Mongolian musk deer populations is likely to have been caused by the deleterious effects of poaching (see **Poaching of musk deer in Mongolia**) and erosion of musk deer habitat since the early 1990s. By the end of the 20th century no more than eight per cent of Mongolia was estimated to be forested (Korotkov and Tsedendash, 1983) and musk deer habitats have changed drastically in some areas since 1995, owing to forest fires. In the areas surveyed by Tsendjav and Bujinkhand (1995-2000), such fires in June and July 1996 were estimated to be the cause of a musk deer population density of only 0.5-1 deer/200-500 ha. The places surveyed are remote and difficult for humans to reach, so interference from poachers would be minimal. Surveys of musk deer in areas unaffected by fire revealed a significantly higher number of musk deer per 1000 ha (**Table 29**).

Table 29

Population density of musk deer per 1000 ha in parts of the Hentiy Mountains unaffected by forest fire

Region in Mongolia	Density	Habitat
Khalzangiin Rashaan, Davaat, Khuandai and Bugat Mountain	4-20	not known
Getsel	20	not known
northern slopes of Khalzan	8	Siberian Pine forests
Rashaant and Davaat	6-15	not known
Khuandai	10	not known
Bugat	9-15	not known

Source: Tsendjav and Bujinkhand, 2000.

Habitat loss, however caused, and poaching are considered to be causing severe fragmentation of the musk deer population in Mongolia and, once again, the species in Mongolia is under threat (Tsendjav and Bujinkhand, 2000).

Legislation relating to musk deer in Mongolia

As described in the account of Mongolian legislation for the protection of musk deer, (see page 4, **Conservation of musk deer**), hunting of the species is only allowed for scientific purposes. Additionally, trade in musk deer and musk is prohibited in Mongolia and, according to the Mongolian Red Book (1997), this has been so since 1930 (Anon., 2003f). The penalty for hunting musk deer is about twice a musk deer's registered value of MNT260 000/USD230 and that for trading in musk deer products is a fine of MNT35 000-50 000 (USD30-45) for an individual, more for an organization, and the products are forfeit.

Methodologies used in Mongolia

Surveys of musk deer poaching and trade in musk in Mongolia for this study were undertaken from October 2001 to January 2002. The following activities were conducted:

- Twenty-six enquiries were addressed to the Ministry of Nature and the Environment (MNE) and the Environment Protection Agency (EPA), including to Mr Bolat, Vice Minister and Head of the CITES Management Authority, MNE; Mr Ganzorigt, CITES expert (MNE); Mr Ts. Banzragch, Director General, EPA and Mr Badam, EPA Senior Expert, to obtain information on human and other environmental factors that affect musk deer population size, on legal and illegal trade in musk and on musk deer poachers.

- Nine enquiries were addressed to the General Customs Department, Railroad Customs Office and Border Control Agency, to obtain information on seizures of musk in Mongolia.

- Twenty-three enquiries were addressed to local government authorities, environmental rangers and local herders in the Haanhöhiy, Hentiy and Hövsgöl Mountains - main areas of musk deer distribution in Mongolia - to identify the causes of the musk deer's increasing rarity, to obtain an estimate of the number of potential musk deer hunters/poachers and their locations, the number of musk deer poached, sources and destinations/markets of musk and to gather information regarding the organization of the musk trade;

- Twelve enquiries were addressed to managers of markets in the following locations:

  - **Tsaiz** and **Tavan Erdene** markets in Ulaanbaatar. These markets specialize in the sale of raw animal products, such as wool, cashmere and animal skins.
  - **Baga Nuur**, a small town located about 150 km east of Ulaanbaatar, relatively close to wild areas, in Töv Province;
  - **Dzuunmod**, a small town approximately 45 km to the south of Ulaanbaatar, in Töv Province; and
  - **Mörön**, the main market place for wildlife products in Mongolia besides Ulaanbaatar, located about 600 km away from the Ulaanbaatar, in Hövsgöl Province (see **Figure 4**).

  The enquiries aimed to gather information on those engaged in the musk business, to discover sources and destinations of musk, who the buyers and sellers were, how the musk trade was financed, the price and weight per musk gland and to gather information on smuggled musk;

- Twenty enquiries were addressed to wildlife product traders of Tsaiz and Tavan Erdene markets, Baga Nuur market, Dzuunmod market and Mörön market, to gather additional information on musk trade and visual surveys of the markets were carried out.

More than 200 responses to questionnaires and interviews and relevant pieces of literature were collected.

Rates for conversion of the Mongolian tugrik to the US dollar were USD1=MNT1000 (for 2001, 2000 and 1999) and USD1=MNT840 (1998) (Anon., 2003g). The relationship between the two currencies was unofficial until the mid-1990s, when the banking system in Mongolia became linked with the international market.

Poaching of musk deer in Mongolia

Hunting of musk deer in Mongolia has not been legal since 1953, when the Government of Mongolia outlawed hunting of the animals (Anon., 2003f). Earlier in the 20th century, hunting of musk deer for musk, using traps and crossbows, was said to have been practised in all seasons and in unlimited numbers and populations of the deer decreased sharply in the 1920s and 1930s as a result (Anon., 2003e).

Responses to questionnaires circulated during winter 2001/2002 revealed that poaching of musk deer in Mongolia was thought to occur in most of the species's range and that residents local to musk deer habitat in the remote forests of the Hangay, Hentiy and Hövsgöl Mountains were the main poachers of musk deer. According to results from interviews, musk deer are poached all year round, although musk deer poachers are reported to find the quality of musk higher in winter and autumn and some 75% of all musk deer poached each year in Mongolia were reported to be taken in these seasons. Guns were reported by Tsendjav and Bujinkhand (2000) to be the main means of hunting musk deer in the areas they surveyed, 1995-2000.

From responses to interviews, it is estimated that, in the area of Mörön, about 1000 to 1500 musk deer were illegally killed each year, 1991-1998 and 120 to 150, 1999-2001. An indication of the number of musk deer poached can be gained from reports of numbers of musk deer glands on sale in Mongolia. If the information obtained during research for this study is accurate, then based on the number of musk glands reportedly sold at Ulaanbaatar, Mörön, Baga Nuur and Dzuunmod markets, 1996-2001, a minimum average of about 2000 male musk deer were poached annually (see **Tables 30-34**). Musk was probably also traded in Arhangay, Dzavhan, Darhan-Uul, Övörhangay and Orhon Provinces and, since a substantial proportion of glands harvested reportedly by-passes markets in Mongolia and is traded direct to China (see **Structure of the trade and trade routes)**, the actual average number of male musk deer killed annually in Mongolia during that period was presumably considerably greater than 2000. This level of poaching would have made a significant impact on a national population of some 44 000 musk deer (see **Background**), especially if some female and juvenile deer were also killed.

At the high point of musk trade in the 1990s (1998) (see **Trade in musk in Mongolia**), 3255 musk glands were estimated to have been traded altogether in Ulaanbaatar, Mörön, Baga Nuur and Dzuunmod markets, while in 2001, 1137 glands were estimated to have been traded from the same markets, which may indicate that fewer male musk deer were killed in Mongolia that year than in 1998.

Trade in musk in Mongolia

Reasons for the trade and changes in the trade, 1990-2001

From the investigations undertaken for this study, and according to Tsendjav (2002), it is clear that poaching of musk deer in Mongolia is driven by the profit to be made from trade in musk. Since the political changes in Mongolia from 1990 brought about a liberalization of trade with its neighbours, trade in musk became a lucrative business in a new climate of private enterprise in Mongolia. China, the sole reported destination of Mongolian musk during research for this report, appeared to provide a ready market for any musk Mongolian poachers and traders could supply. Chinese traders allegedly encouraged Mongolians to trade in musk and, although official advertisement of musk trade is not allowed in Mongolia, news can travel quickly by word of mouth in a country where one-third of the population (about 800 000) is concentrated in the capital, Ulaanbaatar (Anon., 2003g and h). Mongolian law enforcement authorities are seemingly not well prepared to combat illegal trade in musk, neither in the interior of Mongolia, nor at its borders. This statement is supported by the fact that only 14 musk pods were recorded to have been seized by Mongolian Customs officials between 1997 and 2001. As mentioned (see **Legislation relating to musk deer in Mongolia**), the penalty for poaching musk deer is officially a fine of twice the animal's value and, for trading in musk, some tens of thousands of tugriks but, whether because lower fines are sometimes imposed, as has been suggested (Batbold

Table 30

Number of traders at Tsaiz market, Ulanbaatar, the average number of musk glands purchased by each, and the price (thousand tugriks) per gland, 1994-2001

Year	No. of traders	Price per musk gland	Average no. glands per trader	Estimated total no. glands bought
1990	?	?	8	?
1991	?	?	10	?
1992	?	?	12	?
1993	?	?	15	?
1994	5	40	22	110
1995	12	50	25	300
1996	15	95	36	540
1997	32	150	42	1344
1998	38	200	45	1710
1999	38	230	45	1710
2000	40	230	22	880
2001	40	240	16	640
Estimated total number of glands traded in Tsaiz, 1994-2001				**7234**

Table 31

Number of traders at Tavan Erdene market, Ulanbaatar, the average number of musk glands purchased by each, and the price (thousand tugriks) per gland, 1994-2001

Year	No. of traders	Price per musk gland	Average no. glands per trader	Estimated total no. glands bought
1994	4	40	?	?
1995	4	50	17	68
1996	5	95	29	145
1997	7	150	37	259
1998	10	200	41	410
1999	10	230	24	240
2000	10	230	14	140
2001	11	240	9	99
Estimated total number of glands traded in Tavan Erdene, 1994-2001				**1361**

Table 32

Number of traders at Mörön market, the average number of musk glands purchased by each and the price (thousand tugriks) per gland, 1994-2001

Year	No. of traders	Price per musk gland	Average no. of glands per trader	Estimated total no. of glands bought
1994	8	16	80	640
1995	3	18	35	105
1996	5	20	35	175
1997	5	23	25	125
1998	6	28	20	120
1999	7	38	20	140
2000	7	48	15	105
2001	2	80	10	20
Estimated total number of glands traded in Mörön, 1994-2001				**1430**

Table 33

Number of musk traders at Baga Nuur market and the average number of musk glands purchased per trader, 1994-2001

Year	No. of traders	Average no. of glands per trader	Estimated total no. of glands bought
1990	?	3	?
1991	?	4	?
1992	?	4	?
1993	?	5	?
1994	4	5	20
1995	6	10	60
1996	9	15	135
1997	10	17	170
1998	10	24	240
1999	10	14	140
2000	10	10	100
2001	11	7	77
Estimated total number of glands traded in Baga Nuur, 1994-2001			**942**

Table 34

Number of musk traders at Dzuunmod market and the average number of musk glands purchased per trader, 1994-2001

Year	No. of traders	Average no. of glands per trader	Estimated total no. of glands bought
1990	?	4	?
1991	?	5	?
1992	?	6	?
1993	?	7	?
1994	5	9	45
1995	12	17	204
1996	20	23	460
1997	20	37	740
1998	25	31	775
1999	25	22	550
2000	29	19	551
2001	30	10	300
Estimated total number of glands traded in Dzuunmod, 1994-2001			**3625**

D. Otgoid, pers. comm. to V. Homes, 2003), or whether because the official fines are too low or simply not imposed, there is clearly insufficient discouragement for anyone seeking to profit from trading in musk illegally. The stimulation of the trade in Mongolian musk from the early 1990s is discernable in figures for reported trade at markets in the country (see **Tables 30** to **34**).

At Tsaiz market, a market known for illegal musk trade, and also at Dzuunmod market, the number of musk traders increased rapidly from 1994 to 2001 (see **Tables 30** and **34**). For instance, at Tsaiz market, the number of permanent musk traders was reported to have increased from five, in 1994, to 40, in 2001 (see **Table 30**). Not only the number of traders, but the volume of musk traded by each increased at most markets surveyed: the number of musk glands purchased per trader reached a peak around 1998, following a steep rise in the mid-1990s, in Dzuunmod, Baga Nuur, Tsaiz and Tavan Erdene markets (see **Tables 30**, **31**, **33** and **34**). The number of musk glands purchased per trader in Mörön, 1994-2001, however, shows a trend in the opposite direction, i.e., each trader purchased more in 1994 than in 2001 (**Table 32**). This decline may have been the result of a diminishing musk deer population in the region (see page 65), or could indicate that glands from locally poached deer were increasingly taken to other markets.

Prices for musk in Mongolia

The peak in volume of trade around 1998 was matched by a peak in prices. From 1996 to 1998 in Ulaanbaatar markets, for example, the price doubled, from MNT95 000 to MNT200 000 (USD240), per musk gland (**Tables 30** and **31**). In Mörön also, the price for a musk gland nearly doubled from MNT16 000 in 1994 to its 1998 level but, in contrast to prices in Ulaanbaatar, the price per gland in Mörön continued to rise steeply after 1998, reaching MNT80 000 (USD80) in 2001, almost three times its 1998 level (**Table 32**), although this was less than half the price of a gland in Ulaanbaatar in 2001 (MNT240 000). **Table 35** shows prices recorded for musk glands at Ulaanbaatar's markets, 1990-2001. However, it should be noted that it is difficult to relate Mongolian tugriks to US dollars until the mid-1990s, as it is only since then that the banking system in Mongolia became linked with the international market (and therefore transactions for selling and purchasing of goods could be expressed meaningfully in US dollars).

Table 35

Prices for musk in Mongolian tugriks (MNT) and US dollars (USD) at Ulaanbaatar markets, 1990 to 2001

Period	MNT/gland	USD/gland	MNT/g⁺ musk	USD/g⁺ musk
1990-1992	20 000-25 000	*	*	*
1993-1995	45 000-50 000	approx. 100	*	*
1996-2001	120 000-240 000	120-240		
2001				6-8

Note: ⁺ Survey results concluded that a musk gland weighed approximately 20-35 grammes; * = could not be calculated

Since the number of musk glands purchased per trader began to decrease at all markets after 1998 (**Tables 30-34**), yet the price of musk did not appear to rise in response to reduced supply in Ulaanbaatar (**Tables 30** and **31**), it may be possible - assuming that demand remained constant - that the demand for musk glands was being satisfied somewhere other than Ulaanbaatar.

All buyers of musk at the rural level were said to buy at "very low" prices, for onward sale to specialized traders of raw livestock products, who paid about MNT3800-4000 MNT (USD 3.8-4) per gramme of musk to suppliers in 2001. In turn, these market traders reported re-selling the musk to Chinese purchasers for the equivalent of USD6-8/g (**Table 35**), who trade the musk in Erlian and other Chinese cities for an alleged USD15-20/g.

Structure of the trade and trade routes

- According to survey results, musk is collected and traded in Mongolia at Tsaiz and Tavan Erdene markets, in **Ulaanbaatar**, and at the markets of **Baga Nuur**, **Dzuunmod** and **Mörön**. Such trade probably also occurs at markets in Arhangay, Dzavhan, Darhan-Uul, and Orhon Provinces, but these were not surveyed.
- Research results indicated that about 30% of all musk deer poached in the **Hentiy Mountains**, the area thought to have the largest population of musk deer in Mongolia, were to supply the musk trade at Dzuunmod, Ulaanbaatar or Baga Nuur markets. The remaining 70% of musk deer poached from the Hentiy Mountains were said to supply musk smuggled directly to China.
- About 65% of musk deer poached in alpine forest regions in **Hövsgöl Province** were reported to supply the musk trade at Mörön market, from where the musk was traded onward to China. Musk from the remaining musk deer from Hövsgöl Province was reportedly traded via Ulaanbaatar to China.
- Information from local residents suggested that most of the musk originating from deer in the **Hangay Mountains** goes to market in Ulaanbaatar and the rest to markets in Erdènèt, in Orhon Province, and Darhan, in Darhan-Uul Province, before being smuggled to China.
- Investigations revealed that musk deer were poached in the *aymguud* of **Bulgan**, **Selenge** and **Darhan Uul** and the main local markets for these provinces are in Erdènèt and Darhan. From there, the musk is reportedly traded to China.
- There is not much evidence that musk deer are hunted in Uvs Province.

Interviews with traders at the wildlife trade markets of Ulaanbaatar and other big cities revealed that Tsaiz market received musk glands from seven of the 11 *aymguud* (provinces) within the musk deer range (**Table 36**). The territory of these seven *aymguud* covers more than 60% of the total habitat of musk deer in Mongolia.

Three main groups were reported to be involved in transporting musk from poaching areas to the towns, namely Mongolian university students (48%), so-called "trusted agents" (32%), and poachers themselves (20%). Students are presumably motivated by the need to acquire funds to pay for tuition and subsistence. Money for this purpose may be especially needed by those

Table 36

Musk trade flow from different *aymguud* to traders in Tsaiz market, Ulaanbaatar, as reported in 2001-02

***Aymag** (province) of Mongolia**	**Area**	**Number of musk glands traded to Tsaiz market[1]**	**% of musk traded at Tsaiz market from this area**
Arkhangay	Hangay Mountains	13	21%
Övörhangay	Hangay Mountains	8	13%
Dzavkhan	Hangay Mountains	4	6%
Bayanhongor	Hangay Mountains	2	3%
Bulgan	Hangay Mountains		
Uvs	Haanhöhiy Mountains		
Hövsgöl	Hövsgöl alpine forest area	15	24%
Darhan Uul	Hentiy Mountains		
Selenge	Hentiy Mountains		
Töv	Hentiy Mountains	17	27%
Hentiy	Hentiy Mountains	4	6%
Total		**63**	**100%**

Notes:* *Aymag* is the singular of *aymguud.* [1] The period over which these glands were traded is not known. Clearly, they represent only a fraction of the total number of glands reported to have been traded at Tsaiz market during 2001.

from rural areas, where cash is often in short supply. Musk glands offer a relatively easy way to obtain money, being in demand and easy to conceal. The chances of being caught in possession of illegally traded musk are, in any case, low in remote rural areas of Mongolia, where law enforcement is weak. Students may purchase musk themselves from herders, or relatives of students sometimes pay their fees using cash obtained from trading musk. The "trusted agents" were reported to conduct their trade through well-established channels, in use by Mongolian or Chinese middlemen in Mongolia even before the 1920s. Such trading routes for wildlife commodities have something of a permanent nature and these rural people are relied upon for supplies by traders in the urban markets. Not only musk, but other animal products, including bear gall bladders and Elk penises, antler velvet, bone, tails and embryos, draw Mongolian and Chinese traders to Mongolia's markets. Musk from markets in Mongolia is apparently destined exclusively for China. Mongolian traders sometimes cross the border into China to sell animal products in the border town of Erlian, where Chinese traders have reportedly encouraged Mongolian traders to expand the trade in animal products.

Conclusions

For conclusions relating to musk trade in Mongolia, 1990-2001, see the main **Conclusions** section of this report on page 79.

USE AND TRADE OF MUSK IN SOUTH KOREA: A CONSUMER COUNTRY CASE STUDY

by Sue Kang and Craig Kirkpatrick

Records of legal exports of musk from the Russian Federation show East Asian countries as the prime end destinations for the product. There are no such records for Mongolia, where trade in musk is banned. While records of legal musk exports from the Russian Federation are indicative of the demand for musk in East Asian countries, no meaningful assessment of the volume traded can be gained from such records, as illegal exports of musk from the Russian Federation outstrip legal exports by 10 times, according to research findings from this study. An appreciation of the illegal trade in the Russian Federation and Mongolia is therefore key to estimating the quantity of musk carried from these source countries to end destinations in East Asian consumer countries. Findings from investigations in Mongolia pointed to China as the main destination for Mongolian musk (and, unaccountably, South Korean import statistics record one import of Mongolian musk in 1995). Likewise, in the Russian Federation, reports of illegally exported musk named China as an end-consumer, and also North and South Korea.

In view of the clear demand for musk in East Asian countries demonstrated by active poaching and illegal musk trading in the Russian Federation and Mongolia, the following review of the use and trade of musk in South Korea is intended as a case study of the current level of demand for musk at the consumer end of the trade. South Korea is a country known to use traditional East Asian medicine (Kang and Phipps, 2003) and known to be a trader and consumer of musk (for example, as shown by CITES data). The survey focussed on availability of musk and musk-based products with doctors and pharmacists and CITES annual report data were consulted to provide an insight into sources and volumes of musk traded, 1990-2001.

Background

Siberian Musk Deer are distributed in South Korea, but there are thought to be fewer than 40 and the species is protected in South Korea (see page 5). South Korea does not produce musk domestically (Kang and Phipps, 2003). As indicated by **Tables 21**, **23** and **24** and by the reports of musk trafficking from the Russian Federation to South Korea (**Illegal trade in musk in the Russian Federation**), the country is a net consumer of musk.

Methodology of the survey

Information on musk trade in South Korea was compiled during April 2002. The sources of information used were:

- **published records**
  - CITES annual reports (1995-2001) from the Korean CITES Management Authority
  - *Maeyong Newspaper* (web site)

- *Joongang Daily Newspaper* (web site)
- www.empas.com (Korean language information portal)

➢ **informal interviews by telephone and email of:**
- staff of the Korean CITES Management Authority (Ministry of Environment)
- staff of the Korean CITES Scientific Authority (Korean Food & Drug Administration)
- Korean Customs agents
- members of the Korean Pharmaceutical Traders Association
- members of the Association of Korean Oriental Medicine
- members of the Korean Oriental Drug Association

➢ **a survey of practitioners of traditional Korean medicine**.

Surveys of members of the Association of Korean Oriental Medicine (AKOM) and the Korea Oriental Drug Association (KODA), which cover almost all of South Korea's traditional Korean medicine doctors and pharmacists, were carried out from July to September 2001. The full results of these surveys were published in *A Question of Attitude: South Korea's Traditional Medicine Practitioners and Wildlife Conservation* (Kang and Phipps, 2003). The survey was conducted by post and 256 members of the above-mentioned organizations responded - 84% of these were doctors of traditional Korean medicine and 16% were pharmacists licensed to prepare prescriptions for traditional Korean medicine.

The exchange rate used for this report (USD1=KRW1298.7) was that of the time of the research (April 2002).

Use of musk in South Korea, based on surveys in 2001

AKOM has a membership of about 10 000 doctors, who are allowed to diagnose, prescribe and treat patients with traditional Korean medicine. About 7000 of these members were reported to be in active practice in 2001 (Kang and Phipps, 2003). KODA's membership comprises some 2000 Oriental pharmacists, authorized to prepare prescriptions listed in the traditional Korean medicine pharmacopaeia (Kang and Phipps, 2003). According to the surveys carried out in 2001, medical practitioners in South Korea prescribe musk. Such use is regulated in South Korea by the *Pharmaceutical Affairs Law*, administered by the Ministry of Health and Welfare, but there are no provisions relating specifically to the sale, storage or display for commercial purposes of musk or musk medicines under this law (see page 5; Kang and Phipps, 2003). Both doctors of traditional medicine and pharmacists can prescribe musk.

The surveys of traditional medical practitioners undertaken in 2001 found that approximately 19% of the 256 respondents had last used musk before 1994 and almost 50% said their use of musk had decreased since 1994, but approximately 24 % were still using musk during the period 1998-2001. In 2001, just over 13% of the 256 surveyed said they held musk in stock at that

time (see **Table 37**). About 58% said that trade restrictions on musk had affected their ability to treat patients (South Korea withdrew its reservation on CITES Appendix II-listed musk deer in 1996) and about 32% of respondents considered musk indispensable - though 30% thought that substitutes were available, although were less efficacious than musk. A survey on possession of musk conducted by the Korean Ministry of Health and Welfare in May 1997 found that 129 traditional Korean medicine clinics were in possession of 486 kg of musk (Anon., 1997). In 2001, the average amount of musk stocked by each of a group of 32 doctors and pharmacists of traditional Korean medicine was 132 g (Kang and Phipps, 2003). If the same percentage of practitioners nation-wide possessed the same average quantity of musk, then 1224 practitioners would have 132g each, or 161 kg altogether.

Table 37

Estimated percentage of all doctors and pharmacists of traditional Korean medicine in active practice who owned musk in 2001

	Total no. of practising doctors and pharmacists in South Korea	% of 256 practising doctors and pharmacists owning musk in 2001	Approximate no. of total owning musk
Doctors	7000	12.6%	882
Pharmacists	2000	17.1%	342
Sum (all practitioners)	9000	13.3%	1224

Source: Kang and Phipps (2003).

Kang and Phipps (2003) concluded that the demographics of South Korea's population were shifting towards an increasingly elderly population. Mirroring this, health care needs were shifting from acute to chronic conditions and these are conditions that traditional Korean medicine is well adapted to treat. Kang and Phipps therefore expected the demand for traditional Korean medicine to increase. They also found that 67% of those surveyed were aware of trade restrictions applying to musk, but that such awareness was higher among more experienced practitioners. While recognizing the possible negative impacts of trade in endangered species, most practitioners surveyed (over 60%) stated that there was no effective substitute for musk.

The retail price for musk in South Korea fluctuates greatly, but was reported often to be two to three times the legal price at import - which was about USD12/g in 1999-2001 (see below) - i.e., about USD24-36/g. This compares with a price of USD57/g in Hong Kong, in 2001 (pers. comm. of a pharmacist to TRAFFIC Europe-Russia researcher, May 2001) and with an average price of USD30/g at retail level in Singapore and Malaysia (Ng, 2003). Prices for musk were USD30-50/g in the markets of Europe, Hong-Kong and Japan in the 1990s (Homes, 1999).

International trade of musk to and from South Korea

As South Korea is not self-sufficient in musk deer, it must import musk supplies. As South Korea is a Party to CITES (since 1993), its musk imports should be in compliance with the requirements for trade in specimens of musk deer, as a CITES-listed species. According to Kang and Phipps (2003), South Korea has no specific CITES-implementing legislation (see also page 5). Since 1997, all legally imported musk has been reported to originate from the Russian Federation, with the exception of three kilogrammes imported from China in 2001 (**Tables 38** and **39**). The 133 kg imported from the Russian Federation, 1999-2001, had a legal import value of USD1.6 million (USD12.14/g), according to the Korean Pharmaceutical Traders Association (KPTA) (**Table 39**). **Table 38** shows 152 kg musk imported by South Korea from the Russian Federation, 1990-2001, whereas **Table 23** shows 57 kg. This may be explained by the fact that **Table 38** includes records of the Korean Pharmaceutical Traders Association, which reported that South Korea imported 1196 kg of musk, in total, from 1995 to

Credit: Markus Stecher

The manager of a Russian company involved in the legal trade of musk to East Asia examines musk glands before export

2001 (Korean Pharmaceutical Traders Association official, pers. comm. to S. Kang, TRAFFIC East Asia, May 2002) - a figure which correlates with **Table 38**. The incidence of 250 kg of musk recorded as imported from Mongolia in 1995 is puzzling, since all trade in musk is banned from that country. Although three times as much musk was reported imported in 2000 as in 2001, KPTA still believes the general trend for musk imports is rising.

Table 38

Records for all musk imports into South Korea, 1995-2001

Year	RU	CN	HK	SG	TW	KH	MN	UZ	KG	Total (kg)	Total (boxes)	Total (balls)
1995	0	0.5 kg + 20 000 balls[1]	1 kg[2]	10 kg[2]	15 000[3] boxes	298 kg[4]	250 kg	75.3 kg	125 kg	**760**	**15 000**	**20 000**
1996	20 kg	0	16 000[1] boxes	0	45 000 boxes	250 kg	0	0	0	**270**	**61 000**	**0**
1997	0	7 kg[2]	26 kg[2]	0	0	0	0	0	0	**33**	**0**	**0**
1998	0	0	1 kg[2]	5 kg[2]	0	0	0	0	0	**6**	**0**	**0**
1999	32 kg[5]	0	0	0	0	0	0	0	0	**32**	**0**	**0**
2000	73 kg	0	0	0	0	0	0	0	0	**73**	**0**	**0**
2001	27 kg	3 kg	0	0	0	0	0	0	0	**30**	**0**	**0**
Total	**152 kg**	**>10.5 kg**	**>28 kg**	**15 kg**	**60 000 boxes**	**548 kg**	**250 kg**	**75.3 kg**	**125 kg**	**1204 kg**	**76 000 boxes**	**20 000 balls**

Notes: [1] China listed as "Country of Origin."; [2] the Russian Federation listed as "Country of Origin."; [3] Taiwan listed as "Country of Origin"; [4] Cambodia listed as "Country of Origin.". N.B. Cambodia and Taiwan are not within the range for musk deer. [5] Official CITES reports list 32 kg, while records for KPTA list only nine kilogrammes of imports. RU = the Russian Federation; CN = China; HK = Hong Kong; SG = Singapore; TW = Taiwan; KH = Cambodia; MN = Mongolia; UZ = Uzbekistan; KG = Kyrgyzstan..
Sources: CITES annual reports and records of the Korean Pharmaceutical Traders Association

Table 39

Volume and value of legal imports of musk of Russian origin to South Korea, 1999-2001

Year	Volume (kg)	Value (USD)	Value (USD/g)
1999	32[1]	384 000	12
2000	74	877 000	11.85
2001	27	342 000	12.67

Note: [1] Official CITES reports list 32 kg, while interviews with KPTA revealed that their records list only nine kilogrammes of imports. CITES records and KPTA records are the same for 2000 and 2001. The reason for the discrepancy in 1999 is unknown.
Source for volume: CITES annual reports.
Source for value: annual, official import prices, obtained from interviews with KPTA.

In addition to recorded legal imports of musk, there is evidence from South Korea of attempted illegal imports of musk (in addition to that mentioned on pages 58-59). In the past five years, most confiscations of musk have involved attempted imports from China. Seizures of musk made by Korean Customs, 1997-2001, are shown in **Table 40**. All seized musk was claimed to have been destroyed.

Table 40

Seizures of musk at South Korea's borders, 1997-2001, as recorded by the Customs Service

Date	Origin	Quantity seized	Action
1997 July 17	(No record)	54 ea	Prosecution
1997 Aug 06	(No record)	0.05 kg	Prosecution
1997 Aug 06	China	21 kg	Prosecution
1999 Jan 11	Russian Fed.	0.39 kg	Notification
1999 Feb 05	China	56 ea	Notification
1999 Dec 21	China	30 ea	Notification
2000 Feb 17	China	4 kg	Prosecution
2000 Apr 03	China	1 ea	Prosecution
2000 Feb 23	China	5 ea	Notification
2000 Apr 28	China	2 ea	Notification
2000 Apr 30	Hong Kong	9 ea	Notification
2000 Nov 16	China	51 ea	Notification
2000 Nov 10	China	0.03 kg	Notification
2001 Jan 09	China	0.85 kg	Notification
2001 Jan 09	China	50 ea	Notification
2001 Mar 03	China	0.8 kg	Prosecution
2001 Mar 03	China	30 bottles	Prosecution
2001 Mar 05	China	50 bottles	Prosecution
2001 Sep 07	China	5 ea	Prosecution
2002 Feb 01	China	1 ea	Notification
2002 Feb 01	China	0.02 kg	Notification
2002 Feb 01	China	0.02 kg	Notification
2002 Feb 01	China	0.02 kg	Notification
2002 Mar 04	China	1 ea	Notification
2002 Apr 18	China	8 ea	Notification
2002 Apr 18	China	10 ea	Notification
2002 Apr 18	China	4 ea	Notification

Notes: The term "ea" is used in Korean Customs records to refer to musk glands.
The action of "notification" means that the musk was confiscated and the smugglers were reprimanded, but not prosecuted.
Source: Information from interviews with the Korean Customs Service.

The information in **Table 40** does not include seizures that might have occurred by agencies other than the Korean Customs Service, but a search of Korean-language internet sites found only one reference to any musk seizure by an agency other than the Customs Service. Seizures made by the Customs Service since 2000 using detective dogs are presented in **Table 41**.

Table 41

Seizures of musk deer imports by the Detective Dog Programme of the Animals Asia Foundation and Korean Customs Service, since establishment of the programme in April 2000

Date		Specimens seized
2000	**April**	113 g deer musk
	August	200 g deer musk
2001	**February**	one kilogramme of goods containing deer musk
	June	Goods containing deer musk
	July	one case of deer musk
	September	10 patches which includes deer musk
		one case of patches containing deer musk
	October	one case of deer musk and various goods containing deer musk
	November	10 patches containing deer musk ingredient
		five patches containing deer musk ingredient
	December	14 patches containing deer musk ingredients
		nine unguents containing deer musk ingredients
2002	**January**	four deer musk patches
		41 deer musk patches

Source: Jill Robinson, Animals Asia Foundation, *in litt*. to TRAFFIC East Asia, 25 February 2002

The *Maekyung Daily* noted on 25 April 2002 that the police had recently arrested 22 people who traded in smuggled musk. The article does not mention the weight of musk confiscated, but states that the musk was bought in the Russian Federation for a total of KRW100 000 (approximately USD77). This small amount of money suggests either that the smuggled amount was only a few grammes, or that it was "fake" musk. In support of this opinion, the article from the *Maekyung Daily* stated that, upon testing, the confiscated musk from the Russian Federation contained no muscone. The musk, whether fake or not, was on the market in Korea for two to three times the amount the smugglers had paid.

Conclusions relating to the use and trade of musk in traditional Korean medicine in South Korea at the beginning of the 21st century are included in the main **Conclusions** section of this report, which follows.

CONCLUSIONS

The Siberian Musk Deer, the species of musk deer inhabiting the Russian Federation and Mongolia, is a threatened species. It is hunted above all for the musk secreted by the males, used primarily medicinally nowadays, chiefly in traditional East Asian medicine. Its status is acknowledged to be of global conservation concern and it is the most endangered species of musk deer, according to the IUCN Red List of Threatened Species. It is listed in Appendix II of CITES and was classed as a "species of urgent concern" under the CITES Review of Significant Trade. At national level also, the conservation of the Siberian Musk Deer has been the subject of concern. In the Russian Federation, hunting of the species is regulated, but the exact restrictions applying vary regionally. Hunting of the rare subspecies, the Sakhalin Musk Deer, is prohibited completely (according to its current status in the Red Book of the Russian Federation). In Mongolia, hunting of musk deer has been prohibited since 1953. While the Russian Federation and Mongolia have relatively large populations of musk deer, the population status in Mongolia is not well-documented and musk deer population assessments in the Russian Federation are not designed to take account of the biological characteristics and distribution of the species and are made incidentally to surveys of other types of game animals. Both the Russian Federation and Mongolia have been the subject of reports of declining populations of musk deer as a result of poaching.

This report has set out to compile information for the purpose of clarifying the status of musk deer populations and trade in musk in the Russian Federation and Mongolia. On the basis of the information contained in the report, it is clear that there is continuing cause for concern for the conservation of musk deer populations in the Russian Federation and Mongolia. Further, there is the concern that CITES is not being fully implemented in Mongolia and the Russian Federation with respect to musk deer. Conclusions regarding the status of musk deer populations in the Russian Federation and Mongolia, the hunting of musk deer and the trade in musk in and from these two countries are presented by country below. Conclusions from the survey of musk use and trade in South Korea follow.

Russian Federation

Owing to the unreliability of official assessments of musk deer populations in the Russian Federation, on which hunting quotas are then based, research for this report included the design and undertaking of independent surveys of the musk deer populations in the Russian Far East and the Russian Altai-Sayan region. These surveys (conducted 2001-03) concluded that the number of musk deer in the Russian Far East (in Primorskiy Kray, Khabarovskiy Kray, Amurskaya Oblast and the Jewish Autonomous Oblast) was at least 140 000, several times greater than the official count of around 40 000 musk deer for the same regions, in 2002. In the Altai-Sayan region (in southern parts of Krasnoyarskiy Kray, the Republics of Khakassia and Tyva and the Altai Republic), the musk deer population was estimated by this study to be at least 35 700, one-and-a-half times the number calculated by the Russian Government for the whole of these four regions in 2002.

It should be stressed that TRAFFIC's musk deer population surveys are subject to inaccuracies and inherent limitations, as described in the discussion of the methodologies used for the surveys. Participants at the workshop of Russian government officials and musk deer specialists held in Moscow in July 2003 (see **Annex 1**) were divided in their opinions regarding these population surveys, but most supported use of the resulting estimates, especially if used cautiously, with full knowledge of the possible inaccuracies. It is believed that they may give a clearer indication of the number of musk deer in the Russian Far East and Altai-Sayan region than Russian Government estimates.

Despite the fact that musk deer population surveys for this study resulted in higher calculations than their official counterparts, this should not be a cause for complacency about the status of musk deer populations in the Russian Federation. The situation in most of the Altai-Sayan region presents a concerning case. Although investigations revealed that about 20% of musk deer habitats in Altai-Sayan region are remote and that, in these places, musk deer populations remained close to the natural level, the number of musk deer overall in the region was reported during research (2001-03) to be an estimated one-third, or even a quarter, of its natural size. In areas that are easily accessible to hunters and poachers, the decline was reported to be even more marked, so that populations were at a quarter or a fifth of their levels in the 1970s and early 1980s. Populations were thought to be affected in almost 50% of habitat in the Altai-Sayan region, to the point where normal reproduction was compromised and declines in populations had been noted, relative to the mid-1990s. In all territories in the Altai-Sayan region, hunting pressure was reported as the prime cause of musk deer population depletions. Moreover, interviews with hunters revealed that the average weight of musk glands had decreased from 1997 to 2001 (from 23-25 g/gland to 17 g/gland) and this was believed to be an indication of high hunting pressure. It points to a significant reduction in the population of adult males, with associated negative implications for breeding potential. The indiscriminate method of trapping generally used for hunting musk deer illegally is particularly inappropriate in areas such as these with depleted populations of the animals.

In contrast to the situation reported from the Altai-Sayan region, musk deer populations in the Russian Far East were reported to be stable - despite poaching on a large scale. However, poaching in remote areas, which have the highest densities of musk deer populations, was reported to have fallen off, in line with a decline in the price of musk. Demand for musk reached a peak around 1991-93, with prices of around five US dollars a gramme paid to hunters for the product, in comparison to the two or three US dollars a gramme, at the time of surveys for this report.

The Russian Federation is one of only a few musk deer range countries which still allow hunting of the deer and exports of musk, although hunting of musk deer is banned at a regional level in some territories. This is the case in the Altai-Sayan region, with the exception of Krasnoyarskiy Kray, and in the Jewish Autonomous Oblast and Amurskaya Oblast, in the Russian Far East. Otherwise, musk deer hunting is regulated in the Russian Federation by a limited season and a quota system, according to which licences are issued. The official hunting quota can be set at up to 20% of the official number of musk deer in spring, i.e. after reproduction has taken place.

In 2002, the population of musk deer in the Russian Federation was officially estimated at 126 500. Several methods of hunting musk deer are legal in the Russian Federation, including the non-selective means of snares, but hunting with dogs is the most widespread legal method and male deer can be targeted this way. Comparison of the hunting quota for musk deer with the number of used licences for musk deer hunting reveals that, on average, only just over 50% of the quota was used, 1995-2000. This meant that, on average, only about two per cent a year of the official Russian population of musk deer was legally hunted during this period. It is assumed that this was because adequate supplies of musk were available from illegal harvest of musk deer (see below).

Poaching of musk deer outstrips legal harvest for various inter-related reasons. Firstly, enforcement of the law relating to musk deer hunting and to trade in musk appears to be lacking. Research for this study found that there were few instances of policing violations of regulations for hunting musk deer - the incidence of reported crimes of this nature is low in relation to reported violations of other hunting regulations (about two per cent, 1995-2002). Moreover, musk - the main object of hunting the musk deer - can easily be concealed and therefore eventually smuggled, especially as controls at border crossing points from the Russian Federation to its neighbouring countries are reported to be insufficient. A contributory reason for poaching musk deer is reported to be hunters' casual attitude towards hunting the deer in the Russian Far East. In this region, hunters no longer consider musk deer sufficiently valuable, on the whole, to target them. Whereas musk trading was a thriving business in the early 1990s, prices for musk dropped off towards the end of the 1990s, so that musk deer are now usually taken incidentally, while hunting other species, but not usually targeted, unless to fill a specific order. As a result, hunters may obtain only a few licences for hunting musk deer, but take more deer than they have licences for, as the opportunities arise. This is in contrast to the situation in the Altai-Sayan region, where poaching of musk deer is characterized as a well-organized business, involving groups of hunters hired by traders. Unregulated hunting of musk deer was certainly reported to be widespread during research for this report. It was reported that, in parts bordering the Altai-Sayan region, almost everyone had admitted poaching musk deer during a raid in 2001 and much evidence of this was found in hunters' homes.

The musk, for which musk deer in the Russian Federation are above all hunted, is in demand primarily for traditional East Asian medicine. There is minimal demand for the musk (or for any musk deer product) within the Russian Federation and, therefore, virtually all musk is destined for export. According to CITES data, the Russian Federation exports raw musk and occasionally live musk deer or trophies, but no processed musk derivatives, and it does not import musk. The Russian Federation allows exports of musk within the limit of an annual quota. Russian records of legal export trade, 1990-2001, show that, in order of priority, Hong Kong, South Korea, Germany, Singapore, China, Switzerland, France and Japan were the principal destinations for exports of musk from the Russian Federation. All these destinations, apart from China, also re-exported quantities of Russian musk, but again this was primarily to East Asian destinations. The recorded exports of Russian musk fall well within the Russian Federation's own export quotas for musk. Legal exports are not only small, relative to the suspected volumes of illegal exports, but declined over the period 2000-02. Advertisements for

musk in the local press in the Russian Far East were also fewer in 2002, than in 2001, having generally risen in number up to that point. However, there are no reasons to believe that the demand for musk in East Asia will diminish, given the potential growth in the number of consumers using musk in traditional medicine, and their growing economic power. If the legal share of musk exports continues to reduce, the illegal share may be expected to increase, filling the space in the market left by a shrinking legal trade.

Based on information gathered during this study, it is concluded that the average amount of illegally harvested raw musk traded in the Russian Federation was 400-450 kg, annually, 1999-2000. This amount of illegally harvested musk corresponds to about 17 000-20 000 male musk deer, or at least 50 000 poached musk deer, as non-selective snares are the main means of catching musk deer illegally, which means that three to five deer are taken before a male with a sufficiently large musk gland is trapped. The majority of the illegally obtained musk in the Russian Federation was estimated to have originated from the Russian Far East, but approximately 20 to 30 % was from other parts, mainly the Altay-Sayan region, Yakutia and the Trans-Baykal area. Two participants at the workshop held in July 2003 (see **Annex 1**) testified that the level of illegal musk trade in in Khabarovskiy Kray was "very high" - a figure of 115 kg of musk traded illegally, annually, was given. In the Altai-Sayan region, a total of about 190 kg of musk was reported to have been traded annually, 1999-2000, an amount which corresponds to about 8000 male musk deer - or an estimated minimum of 24 000 musk deer in total. Comparison of the amount of musk that could be harvested from the 3157 legally hunted deer in the Russian Federation, 1999-2000, (72 kg, if all were males) with the estimated average amount of illegally traded musk in the Russian Federation, 1999-2000 (400-450 kg), indicates that the legal musk harvest for the whole country may amount to only 16-18% of the illegal harvest. If one compares the amount of musk legally exported from the Russian Federation (and almost all musk harvested in the country is for export), then the difference between amounts of legally and illegally harvested musk is even greater. Just under 40 kg of musk was recorded as exported by the Russian Federation, on average, each year, 1990-2001 - a tenth or less of the 400-450 kg of musk estimated to have been traded and exported illegally, annually, from the Russian Federation, 1999-2000. Adulteration of natural musk, which should always be a consideration when evaluating and comparing such statistics, was not found or reported during this study.

As with legally obtained musk, nearly all the illegally harvested musk in the Russian Federation is exported, via the Russian Far East, to East Asian countries and territories, reportedly mainly to China, including Hong Kong, Singapore, Japan and North and South Korea. The purchase of illegal musk from Russian hunters by middlemen from China and North and South Korea was said to be common and part of a structured business. Several reports were received of shipments of illegal musk smuggled to South Korea on board ships from the Russian Far East: quantities of musk were between 10 and 30 kg. In smaller quantities (300-400 g), glands are transported across the Russian border in hand luggage. The proportion of smuggled musk intercepted is apparently very small - apparently as small as 0.7%, in 2000. East Asians visiting or working in the Russian Far East are reported to be the main purchasers and eventual smugglers of illegal musk. Personal contacts were favoured by illegal traders of musk, but

advertisements were sometimes used to offer illegal musk. In the Altai-Sayan, the trade appears to be in the hands of three prominent traders, who direct musk for export via the Russian Far East or, allegedly, sometimes through Mongolia to China.

It is not possible to discern a trend in the musk trade from the Russian Federation with any certainty. During the 2001-02 hunting season, illegal trade in musk was reported to have dropped in the Altai-Sayan and, from 2000 to 2002, researchers working on this study noticed a decline in the volumes of musk reported purchased in the region. At the same time, advertisements for musk in the press were fewer in 2002 than in the previous year and legal exports dipped. Assuredly, the climate is different from that at the beginning of the 1990s, when the value of musk increased very fast and it was reported that a hunter could exchange two or three glands for a video recorder, but demand for musk is sufficient to motivate systematic hunting and poaching, if not the aggressive pursuit of musk.

The problem of poaching and related illegal trade in musk cannot be solved through enforcement measures only, especially given the vastness of areas where musk deer may be poached and the ease with which musk can be concealed to evade law enforcement agents. The current bans on hunting musk deer, in the Altai-Sayan region and in parts of the Russian Far East are not preventing poaching from occurring, the incidence of punishments for violations of musk deer hunting rules is seemingly low and the penalty for such violations - USD17-35, plus USD35 for each deer killed - is not a sufficient deterrent. The support of greater economic incentives is needed to reduce illegal trade and this means shifting a larger part of the profits from musk trade to hunters and middlemen in the Russian Federation. In 1999-2002, the price paid to hunters in the Russian Federation for both legal and illegal musk was usually two to three US dollars per gramme, depending on demand on the international market, the legality of the musk and the personal relationship between the seller and the buyer. Chinese and Korean middlemen were reported to buy musk at around four or five US dollars per gramme, while in consumer countries musk can fetch USD20-30 and even USD57/g. It is obvious from these prices that the lion's share of the profit is made abroad. It is also obvious that there is little incentive for hunters to trade in legally acquired musk, when the price is the same for illegally obtained musk - only without the need to pay USD17-51 for a licence to hunt each deer. As a fraction of total household income, revenue from poached musk deer may not be large, but it can provide significant additional income for people in the Russian Far East and Altai-Sayan region. Even if the price fetched by musk may not be sufficiently high for hunters to invest in musk deer hunting, the average five or six deer taken as a by-product of hunting other game in the Russian Far East, per hunter, per year, can reportedly provide up to 10-15% of a hunter's income, per season. As long as the hunters do not see musk deer as sufficiently valuable to be used sustainably, with a corresponding collective will for stricter enforcement of poaching and investment in a legal system, musk deer will continue to be taken for incidental or organized profit in an unregulated way in the Russian Federation.

Judging from assessments of the musk deer population in the Russian Far East made during this study, the species, which has a high reproductive rate, could sustain properly managed hunting. Promotion of a controlled, legal trade in musk on a commercial scale should therefore be

considered as a means to reduce the illegal sector and its associated low prices at the supply end of the trade chain, and as a means to better monitor the real level of musk deer populations and exploitation, through official data. Discussions with musk traders in the Russian Far East supported the idea of an auction of musk as a means of boosting the economic benefits from musk trade. According to businessmen, the price for musk at such an auction could fetch up to USD25/g, which could mean a share of USD8-10/g for the hunter. It was suggested at the workshop on the conservation and hunting of musk deer in Moscow, July 2003, that the St. Petersburg fur auction could be used as a preliminary model for any musk auction.

In conclusion, TRAFFIC does not believe that the existing system of hunting quotas for musk deer - based on unreliable population assessments - is adequate to manage populations of the species in the Russian Federation. The hunting quotas are widely ignored and enforcement of musk deer hunting violations and the subsequent illegal trade is lacking. Even if enforcement occurs, penalties are low. This flawed system has meant that populations of musk deer in the Altai-Sayan region have been hunted to a point where some are in significant decline; it has allowed a flourishing illegal trade in musk, contrary to Russian and international laws; and it has been responsible for the loss of revenue for the Russian economy, in the form of an estimated USD2.5 million in illegal exports of musk, annually. A boosting of the legal trade is urged, in order to manage the country's musk deer accountably, sustainably and profitably, with the attendant benefits that this would bring for the conservation of the species.

Mongolia

Two major conclusions stand out from research for this study into the status of musk deer in Mongolia and the trade in musk in that country: the current population of the species is unknown and hunting of musk deer and trade in musk are conducted more or less unhindered, despite being against the law. Not since the 1970s was the last count of musk deer attempted in Mongolia and, while the national musk deer population in the 1970s was estimated at 44 000 with a female to male ratio of about 1:1, by 1995-2000, studies of musk deer in some areas were revealing that the population was decreasing yearly and the female to male deer ratio was as unbalanced as 5:1 in some places.

Although loss and degradation of habitat is a factor influencing musk deer populations adversely, poaching of the deer for their musk has had the most significant negative impact. In 1990, Mongolia abandoned its Soviet-style one-party State in favour of political and economic reforms, which ushered in a new climate of private enterprise, against a backdrop of poverty, following the withdrawal of Soviet support. In the early 1990s, this provided a fertile ground for poaching musk deer, for the profit to be made from the newly-flourishing trade in musk to China.

Responses to questionnaires circulated October 2001-January 2002 revealed that poaching of musk deer in Mongolia occurs in most of the species's range, all year round, although principally in the winter, according to some sources. Poaching of the deer appears to have risen steadily from 1990, reaching a peak in 1998, and it is estimated that over 3000 male musk deer

were killed in Mongolia that year. An annual take of thousands of male musk deer, from a national population which is believed to be fragmented and which, at best, may number a few tens of thousands, is suspected be the prime cause of reports of depleted populations of the species.

The demand for - and supply of - musk was such that the number of musk traders and the volumes of musk traded at most of the markets surveyed in Mongolia grew year upon year from 1994, until 1998. The main market for musk trade in Mongolia was reported to be Tsaiz market, in Ulaanbaatar. Tavan Erdene market, also in Ulaanbaatar, and markets in Dzuunmod, Baga Nuur and Mörön also had permanent musk traders and it is suspected that musk trade occurs at markets in other provinces, not surveyed. Markets were reported to be supplied with musk from local musk deer, although musk deer from several areas in Mongolia supplied Ulaanbaatar's markets and China, the prime destination for Mongolia's musk. After 1998, volumes traded began to drop, although the number of traders, 1998-2002, remained steady. The reason for the fall in the number of musk glands on sale at Mongolia's markets - from roughly 1998 onwards in most cases - is not known, but it could certainly indicate a decline in availability as a result of over-harvesting local musk deer populations. The price paid by a market trader to a supplier for one gramme of musk was the equivalent of about USD4 in 2001, possibly lower in remote rural areas, roughly equating to the price at the same level of trade in the Russian Federation. University students, trusted go-betweens and poachers were named as the three main groups bringing musk to market, often using trading connections that have been in use for decades. Mongolian law enforcement authorities are not well positioned to counter this illegal trade and appear to be intercepting an exiguous fraction of the musk smuggled over the border to China.

In summary, Mongolia's forested mountain slopes are the range for an unknown number of musk deer, which appear to have been the subject of unbridled poaching in recent years, to provide income from trade in their musk, the demand for which doubled and re-doubled in Mongolia during the period from 1994 to 2001.

South Korea: a consumer country case study

The findings of the survey in South Korea act as testimony to the strong demand for raw musk that persists in traditional East Asian medicine, that motivates the poacher in the mountains of Mongolia and the Russian Federation to break the law and kill musk deer.

Although only a small percentage (just over 13%) of the traditional medicine practitioners questioned in 2001 in South Korea said they owned a supply of musk, demand for the product in South Korea was sufficient, 1999-2001, to stimulate annual imports of musk worth hundreds of thousands of US dollars and at least several attempts a year to smuggle musk into the country. Moreover, use of traditional Korean medicine in South Korea is predicted to increase. Almost all recorded musk imports to South Korea, 1990-2001, were from the Russian Federation and a significant share of illegally exported Russian musk is also allegedly bound for South Korea. Only a small fraction (2.3 kg) of the Russian musk exported to South Korea, 1990-2001, was re-exported, according to South Korea's own records, indicating that South Korea is an end-user

of most of its musk imports. The importation of 250 kg of musk from Mongolia in 1995 was recorded in South Korean statistics and the basis for this trade is not known, but trade in musk from Mongolia is banned. Only one reported seizure of musk, in 1999, recorded the Russian Federation as the country of origin, which indicates that most musk smuggled from the Russian Federation to South Korea is unintercepted. In view of this, and given the number of musk seizures made by Korean Customs agents that were not followed by prosecutions, it would seem that convincing deterrents for illegal imports of musk are lacking in South Korea.

Retail prices for musk on sale in South Korea in 2002 were reported to range from USD24-36/g. Similar, or slightly higher prices (at face value), were quoted in the retail markets of Europe, Hong-Kong and Japan during the 1990s.

In summary, musk is a valued component in traditional Korean medicine, as testified to by its current use in South Korea. Recorded international trade in musk shows the expected direction of flow from the Russian Federation, the recorded source of almost all South Korea's musk imports, to supply demand in the latter country. Quantities of smuggled musk from the Russian Federation and Mongolia to East Asian destinations are understood to overshadow any such offically-recorded trade, however - and the affect of this trade on some musk deer populations is reported to have been calamitous.

RECOMMENDATIONS

These recommendations for remedial action on behalf of musk deer conservation are based on the findings of this study. In the case of the Russian Federation, some recommendations are based on those emerging from the workshop attended by numerous specialists in aspects of musk deer conservation from governmental and non-governmental organizations, held in July 2003, specifically to discuss the findings of this study (see **Annex 1**).

To the Governments of the Russian Federation and Mongolia

Population surveys

Population surveys of musk deer are urgently required to improve knowledge of the status of musk deer in the Russian Federation, and especially Mongolia, where no national surveys of the musk deer population have been conducted for over 30 years.

- The Government of the Russian Federation should change the way in which musk deer populations are estimated, in order to arrive at a more accurate approximation of the number of musk deer in the country, which would provide a more credible basis for the construction of legal hunting quotas. To this end, population surveys of musk deer should be carried out separately to those of other ungulates and of fur-bearing mammals and a methodology for estimating musk deer populations, which is designed specifically for the species, should be developed. Approval of this methodology from game management agencies, both at regional and federal level, should be sought.

- The Government of Mongolia should undertake surveys of the country's musk deer populations. Pending wider surveys, key range areas, at least, should be surveyed. Any methodology for surveying musk deer populations researched and developed in the Russian Federation could be used as a model.

- International aid agencies, intergovernmental organizations and non-governmental organizations should be requested to offer relevant assistance to the Governments of the Russian Federation and Mongolia in conducting research into methodologies for population surveys.

Other research

- Techniques for targeting male musk deer selectively should be investigated. The selective targeting of male musk deer should significantly reduce the incidental catch of female and young musk deer.

- Research should be set in motion to investigate the practicability of the use of live-traps for musk deer. These allow live capture so that musk may be extracted from male deer, which can then be released. This should minimize gender imbalance in musk deer populations.

Legislation

The Russian Federation and Mongolia already have strict regulations for musk deer protection and minimal legislative changes are proposed here.

- The Government of the Russian Federation should amend legislation to outlaw non-selective means of catching musk deer, especially in order to reduce incidental killing of female and juvenile musk deer. The amended regulations should be applied in all parts of the Russian Federation where musk deer occur.

Management of musk deer populations, including by means of economic incentives for the legal trade of musk, in the Russian Federation

- The system for legal hunting of musk deer in the Russian Federation is currently open to abuse and would benefit from methods that would improve its structure.

- Hunting quotas for musk deer in the Russian Federation should be based on musk deer population estimates which are as accurate as possible, derived from regularly repeated surveys, designed especially for musk deer. In this way, being careful to take into account the number of musk deer which may be lost to poachers, the quotas can be set at levels which are not detrimental to musk deer populations, but which yet allow a sustainable offtake.

- CITES *Decision 11.57* calls for musk-exporting Parties to reduce their export quota for musk, if biologically appropriate. In the Russian Federation, it is recommended that a reduction of the legal quota for musk exports would not be beneficial, however, as it is believed this would imbalance still further the ratio of legal to illegal trade.

- The means of selling musk from legally hunted deer at approved auctions, where only legally obtained musk could be offered, should be devised and the system set up in the Russian Federation. A considerable share of the money so obtained should go to the legal hunters, in order that they view musk deer as a valuable resource, which needs protection. The St. Petersburg fur auction could be used as a preliminary model for any musk auction.

- Hunters in the Russian Federation should be provided with incentives to bring legally acquired musk to any auctions set up, *inter alia* through advance orders and the corresponding funding of musk deer hunters before the hunting season starts, and through the use of long-term leases (at least 10 years) for hunting sites.

- Long-term contracts between hunters, their associations, and traders for bringing musk to any auctions established should be promoted in the Russian Federation. This should foster credibility for sustainable musk deer hunting.

Enforcement

Although the Russian Federation and Mongolia have strict regulations for musk deer protection, these are poorly enforced and the following recommendations are proposed to improve observance of the national laws relating to musk deer in these countries.

- The fines for poaching musk deer and for illegal trade in musk in the Russian Federation should be raised and the Government of Mongolia should consider raising fines for the same, as current penalties are not sufficiently deterrent. A fine the equivalent of up to 50% more than the auction/sale value of any seized musk is recommended in the Russian Federation.

- The existing bans on hunting musk deer in Mongolia and in the Russian Federation where populations of the species are reported to be depleted or rare, for example in the Altai-Sayan region and on Sakhalin Island, should be maintained and strictly enforced. The use of special anti-poaching units in such key range areas is recommended.

- Appropriate training and equipment for enforcement agents is recommended. Agents should be trained in the identification of musk and musk-based products. Particularly at international border crossings and airports, the assistance of dogs trained to detect musk is recommended, the success of which has been demonstrated by South Korean Customs.

- A workshop for musk deer range States, in particular the Russian Federation, China and Mongolia, should be convened, to focus efforts on the conservation of musk deer and

attention on trade in musk, and to agree upon realistic yet effective solutions to threats to the species. This would provide an opportunity for stakeholders to discuss musk deer management and enforcement challenges.

Awareness

- In Mongolia, since university students constitute a major group of musk traders, alternative ways of funding their education should be explored and awareness regarding the status of musk deer populations in the country should be raised.

- The Mongolian Government should raise awareness of existing penalties for musk deer poaching and musk trading, since they are clearly not acting as a deterrent.

To the Government of South Korea

Research

- Regular surveys should be conducted in South Korea to monitor the trade in musk and musk-based products, in order to gain long-term knowledge of the demand for imported musk, relative to the available, legal supply from musk range States.

Enforcement

- South Korean authorities should examine ways to monitor and control imports of musk more effectively, as there is much anecdotal evidence to suggest that CITES regulations relating to trade in musk deer specimens have been flouted.

Labelling

- Pending the development of a universal system for labelling musk-based products (see **At international level**), these, and products purporting to contain musk, should be labelled to specify whether genuine or synthetic musk is contained and the quantity. This will assist in enforcing laws relating to the trade of musk in South Korea and also help to quantify the amount of musk in trade, and so potentially assist in identifying the impact of such use on wild musk deer populations.

Awareness

- Health and conservation authorities in South Korea should ensure that issues surrounding the conservation of musk deer are incorporated into the formal teaching curriculum for traditional Korean medicine and should provide appropriate teaching materials to support this.

At international level, including CITES-specific recommendations

- Musk deer experts should clarify the taxonomy of the various musk deer species, using the latest scientific techniques. This is particularly relevant for musk deer conservation at the international level, for example, within the CITES forum, where recommendations for musk deer sometimes refer to actions at species level.

- Given reports of depleted populations of musk deer in some regions of the Russian Federation and Mongolia and, given the enforcement problems identified in this report, it is strongly recommended that trade in musk deer from these countries be closely monitored under the CITES Review of Significant Trade. This mechanism helps guide remedial action when there is reason to believe that trade in Appendix-II species may be detrimental.

- CITES Parties should be encouraged to report all seizures and confiscations of musk to the CITES Secretariat, as requested in their report on the implementation of *Decision 11.149* at CoP12. This will help Parties to gain a better understanding of illegal trade dynamics which may assist in targeting enforcement strategies.

- The current method of documenting quantities of musk medicines in international trade as "tablets", "pills" or "boxes of medicine", etc., makes it impossible accurately to assess the actual volume of natural musk - whether orignially from the Russian Federation, Mongolia, or elsewhere - in trade. In turn, this makes it impossible to assess the potential impact of the trade on wild musk deer populations. Standardized methods and units of measurement for documenting the precise quantity of musk contained in derivatives in international trade need to be developed and applied.

- Since large volumes of illegal musk are supplying the demand for medicinal musk, and pending improved regulation of musk deer hunting and of musk trade, steps should be taken to explore substitutes for musk which would be acceptable in traditional forms of East Asian medicine.

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ANNEX 1

Minutes of a workshop on the conservation and hunting of musk deer and trade in musk in the Russian Federation, 21 July 2003, Moscow.

This workshop was held on 21 July in Moscow. It had two main aims:

1) to discuss the methodology, results and recommendations of the Russian section of this study;
2) to decide on the future strategy for musk deer conservation and sustainable use of musk in the Russian Federation.

Participants in the workshop are listed below. These notes from the workshop are reproduced here in their original form, as they were received.

1) Discussion of the methodology, results and recommendations of the Russian section of this study

- ***Yu. Gubar'*** *(Centre of Control and Analysis of Information of Hunted Animals and Their Habitat) suggested to take the methodology, which was used for this report, to count musk deer, as a basis for an estimation for the musk deer population size in Russia. Mr. Gubar added that, even a large-scale census in the Russian Federation, over vast territories, can only be an estimation of the population size of musk deer, based on statistics. Such a census needs to take into account advice from experts on musk deer. He was satisfied with the methodology used in this study to evaluate the status of the musk deer population in the Russian Far East and Altai-Sayan. He also confirmed that the ZMU (the "winter inventory route" and the official statistical basis of the Game Animal Census State Service) is not a musk deer-specific counting methodology, but can be used to monitor the dynamics and trends of the population size. Mr Gubar' acknowledged that results of the ZMU severely underestimated the possible population size of musk deer in the Russian Federation. Experts of the Centre estimated the overall number of musk deer in the Russian Federation to be about 250 000-300 000.*
- ***N. Chelintzev*** *(A. N. Severtzov Institute of Ecology and Evolution of the Russian Academy of Science) reviewed the methodology of the musk deer population surveys. His main conclusion was that the mathematical basis for results of the counting was not entirely clear and that it would be difficult to estimate the total size of the musk deer population for a larger area like the total Russian Far East using the methodology chosen.*
- ***G. Sukhomirov*** *(Institute of Economic Research, Far-eastern branch of Russian Academy of Science) recommended to take the results of the population assessment used in this study as an estimate and not as a calculation or census of the real population size. In his opinion, the population size given in this report does over-estimate the real population size of musk deer in the Russian Federation. The Institute of Economic Research estimates the population size of musk deer in Khabarovsky Kray to be about 60 000 animals, whereas TRAFFIC estimated a population size of 90 000 animals in the same region.*
- ***O. Gunin*** *(Khabarovsk Regional Game Management Directorate) said that, based on his knowledge, he could confirm the basic results and conclusions on the population size of musk deer and the extent of musk deer poaching and musk smuggling documented in this report. He confirmed that poaching and illegal trade in musk in the region of Khabarovsky Kray is very high and, according to him, the number of musk deer in Khabarovsky Kray may be 60 000-70 000.*

- ***G. Kolonin*** *(Ministry of Natural Resources, Dept. of Permits and Ecological Audit) emphasised that the results of this report will be published and widely disseminated and thus need to be as accurate as possible since they will be used by an international community with regard to regulations in CITES.*
- ***A. D. Poyarkov*** *(A. N. Severtzov Institute of Ecology and Evolution of the Russian Academy of Science) supported the model population surveys conducted during this project. He basically agreed with the results of the surveys and underlined the need to establish a monitoring programme for musk deer population sizes and to improve the management of the species in the Russian Federation.*
- ***A. Tikhonov*** *(Department for the Protection and Development of Game Resources) admitted that his Department was aware of the fact that the musk deer population size in the Russian Federation was under-estimated. TRAFFIC had tried to estimate the real population size for the first time, using a methodology different to the official one (ZMU). He underlined, however, that, according to Russian regulations, only government assessments based on an officially recognised methodology could be considered as a formal census providing official figures. Results of any other surveys could only be treated as estimates and could not be used by government agencies as a basis for decision-making. He noted that improved legislation for the management of musk deer populations would be required in the Russian Federation. He also agreed that the official statistics on musk deer populations could be viewed as providing a minimum population level, which at the same time reflected population dynamics.*
- ***S. Pakhno*** *(*Krechet *Hunting Society) agreed in general with the results of TRAFFIC´s report and estimated the volume of illegal trade in musk in Khabarovsky Kray to be about 115 kg, annually.*
- ***O. Pereladova*** *(WWF Senior Project Officer/IUCN ungulate expert) said that the methodology used here could be taken to provide an estimate of the musk deer population sizes in the survey areas. She underlined that the official information under-estimated the real population size, but that the official figures could be used to show population dynamics. She believed that, in general, the population size was currently stable in the Russian Federation and that harvest in many regions was non-detrimental for the species. She concluded that there was no reason to list the musk deer populations of the Russian Federation in Appendix I of CITES. Mrs. Pereladova agreed with the estimates of the amount of illegal musk in trade in the Russian Federation and supported the recommendations to improve the rules for the sustainable hunting of musk deer based on quotas. She underlined that all recommendations had to be implemented at the same time, otherwise it could be detrimental to the musk deer species.*
- ***S. Lineytzev*** *(Association of Reserves and National Parks of the Altai-Sayan Region) supported the basic estimates of the musk deer population size and recommended preparation of a strategy for the conservation and management of musk deer in the Russian Federation. He also agreed that the reduction of the illegal trade in musk is needed and that economic measures can foster this goal.*
- ***V. Prikhod'ko*** *(musk deer expert, Russian Academy of Sciences) did not attend the workshop. Alexey Vaisman read a report from Dr. Prikhod´ko for all participants of the workshop. Dr. Prikhod'ko disagreed totally with the results of this study, which contradict his own published findings.*

2) Decisions on the future strategy for musk deer conservation and sustainable use of musk in the Russian Federation.

All participants agreed on the need for two major steps*:*

- the establishment of a **special expert group on musk deer** with participation from representatives of State agencies, the scientific community, the private sector and NGOs with expertise in this topic;

- the commencement of work on a *Strategy for Musk Deer Conservation and Management* which could be submitted to the Ministry of Agriculture and Ministry of Natural Resources for consideration as a basis for a potential national action plan for musk deer.

Participants discussed and agreed on basic principles and actions which would need to be reflected in the *Strategy* and which could also be incorporated into the Recommendations chapter of this report. These basic principles and actions are outlined below.

1. Improve methodology for estimating the population size of musk deer and conservation measures

- *A methodology has to be developed and officially approved for monitoring the size of musk deer populations in model areas. The methodology must be take musk deer biology and habitat into consideration.*
- *Musk deer must be included in the list of animals to be counted in the ZMU, the official system for counting game species.*
- *A working group of musk deer specialists should be established.*
- *The ban on hunting musk deer in large parts of the Russian Altai-Sayan region and on Sakalin Island should be maintained, to allow recovery of the depleted musk deer populations there.*

2. Further development of legislation

- *Improved and practicable hunting regulations for the selective (males-only) harvest of musk deer need to be developed to ensure sustainable use of the species.*
- *Personal, leased hunting plots need to be allocated for long-term use, since this will be an incentive to hunt sustainably.*
- *A bonus system should be introduced for hunting inspectors, to stimulate stricter control and a rise in the incidence of identification of offences.*
- *Establishment of regional departments of the Russian CITES Management Authority with the empowerment to issue CITES permits should be considered for Siberia, the Russian Far East and the Altai-Sayan region.*
- *The legal hunting quota for musk deer and associated CITES export quota for musk deer products must be based on the actual size of musk deer populations. A rise in the quotas is conceivable, but only if population sizes allow and if strict control of poaching is in place.*

3. Enforcement

- *New and efficient border control measures have to be implemented to identify musk and other wild musk deer derivatives, for example, the use of sniffer dogs, which can detect musk at key border crossing points.*
- *Penalties for the illegal harvest of musk deer and for the illicit trade in musk should be raised and strictly enforced.*

4. Technical measures

- *Techniques for hunting male musk deer selectively and reducing significantly the catch of female and young musk deer should be developed and promoted Also, the existing method of harvest musk by extracting it without killing the male animal should be promoted..*

5. Economic issues

- *Regular monitoring of key wildlife trade markets in the Russian Federation should be established to estimate the illegal trade in musk.*

- *Methods to improve the infrastructure for the harvest of musk deer and subsequent sale of musk through an auction have to be developed. Only legally obtained musk should be allowed to be traded at these auctions. Auctions like the one for fur-trading based in St. Petersburg can be used as a model.*
- *Hunters have to reap the economic benefits of any such auction for musk. In this way, they will see musk deer as a valuable resource which needs protection.*

Participants at the workshop:

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Olga S. Chuvina	Ministry of Natural Resources, Dept. of Permits and Ecological Audit (Russian CITES Management Authority)
Gennady V. Kolonin	Ministry of Natural Resources, Dept. of Permits and Ecological Audit (Russian CITES Management Authority)
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Olga B. Pereladova	WWF Russian Programme Office
Natalia A. Dronova	TRAFFIC Europe-Russia
Alexander S. Shestakov	WWF/TRAFFIC Europe-Russia .
Alexey L. Vaisman	TRAFFIC Europe-Russia
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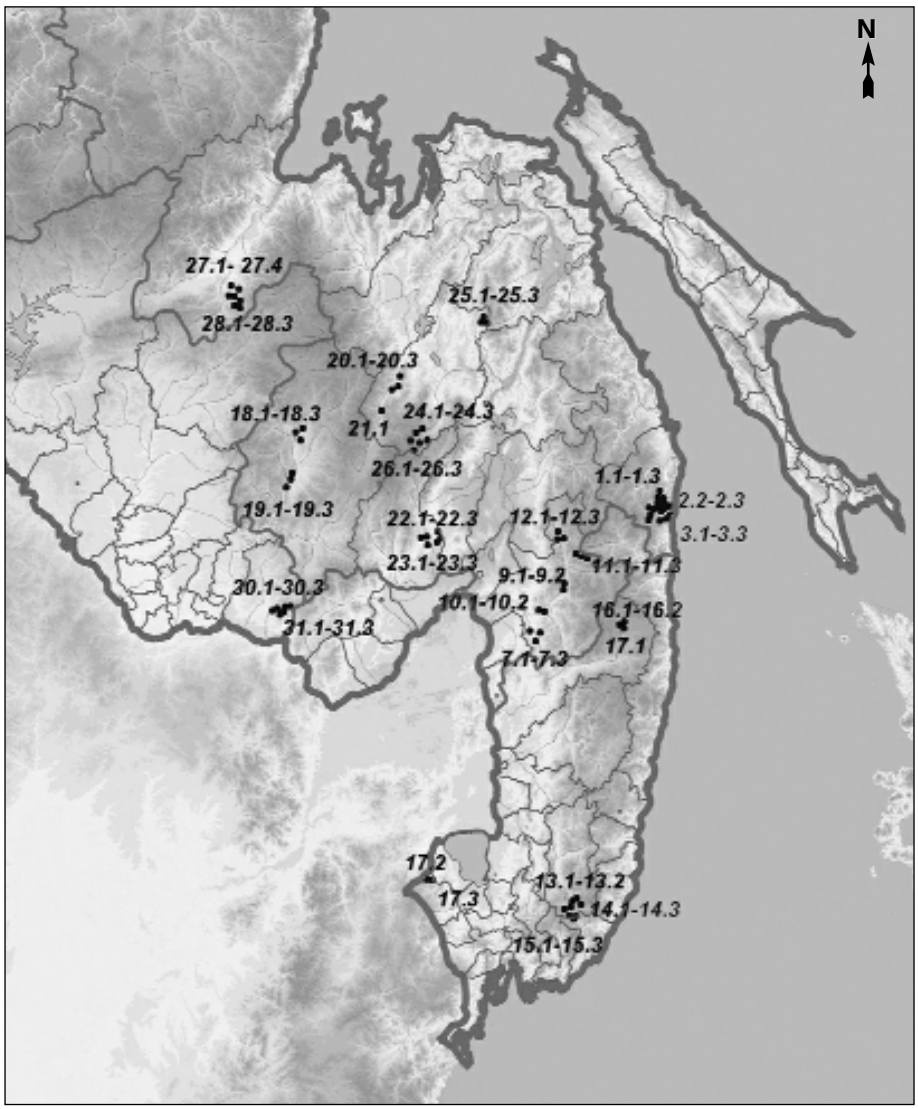
Grigory I. Sukhomirov	Institute of Economic Research, Far-Eastern branch of Russian Academy of Science
Sergey N. Lineytzev	Association of Reserves and National Parks of Altai-Sayan Region
Oleg A. Gunin	Ministry of Agriculture, Khabarovsk Regional Game Management Directorate
Sergey P. Pakhno	Hunting Society *Krechet* (Khabarovskiy Kray)
Gennagy V. Khakhin	All-Russian Institute for Nature Protection (Russian CITES Scientific Authority)
Ludmila K. Danilova	IFAW

ANNEX 2

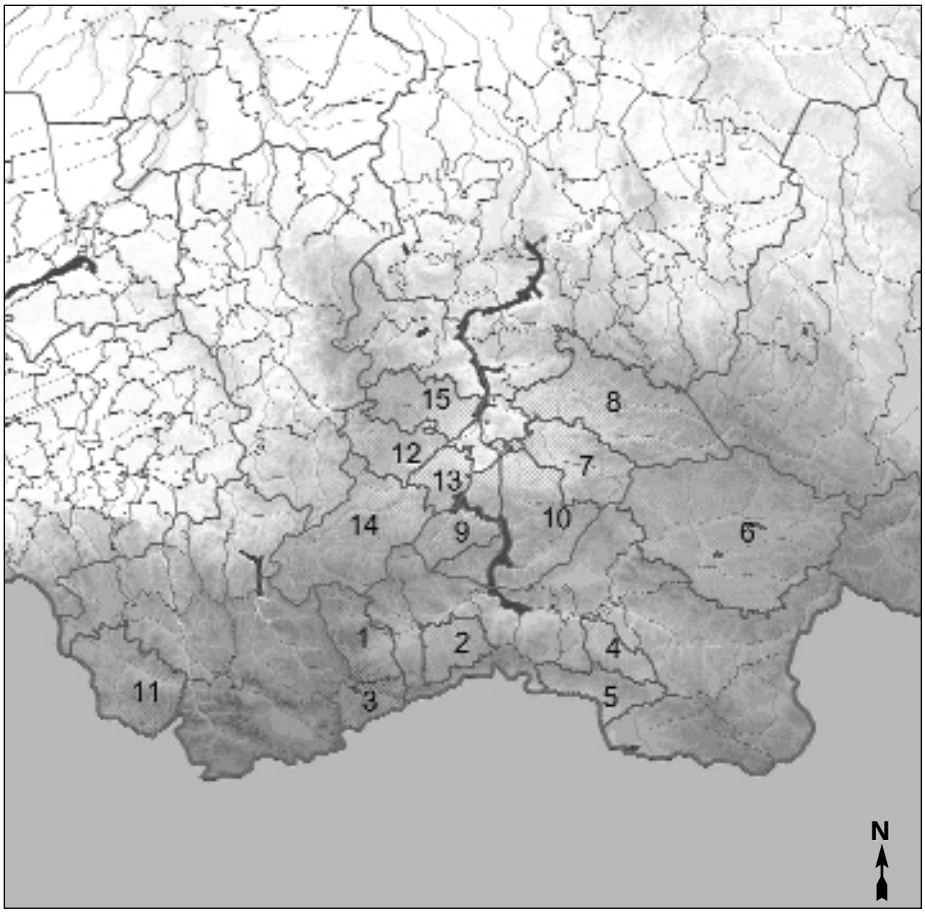
Map to show the musk deer population survey areas in the Russian Far East



Scale: 1 cm:8 000 000 cm

ANNEX 3

Map to show the location of the musk deer population survey areas in the Altai-Sayan region of the Russian Federation



Scale: 1 cm:8 000 000 cm

Key:

Krasnoyarskiy Kray

7 Karatuzsky
8 Kuraginsky
9 Shushensky
10 Yermakovsky

Republic of Khakassia

12 Askizskiy
13 Beiski
14 Tashtypskiy
15 Ust-Abakanskiy

Republic of Tyva

3 Mogun-Taiginsky
6 Todzhinsky
4 Tandinskiy
5 Tes-Khemski
1 Buy-Taiginsky
2 Dzun-Khemchinsky

Altai Republic

11 Ust'-Koksinsky

TRAFFIC, the wildlife trade monitoring network, works to ensure that trade in wild plants and animals is not a threat to the conservation of nature. It has offices covering most parts of the world and works in close co-operation with the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

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