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MONGOLIA

Silent Steppe: The Illegal Wildlife Trade Crisis

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THE WORLD BANK

WILDLIFE CONSERVATION SOCIETY

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Environment and social development issues are an integral part of the development challenge in the East Asia and Pacific (EAP) Region. The World Bank's Environment and Social Development Strategy for the region provides the conceptual framework for setting priorities, strengthening the policy and institutional frameworks for sustainable development, and addressing key environmental and social development challenges through projects, programs, policy dialogue, non-lending services, and partnerships. The EASES Discussion Paper series provides a forum for discussion on good practices and policy issues within the development community and with client countries.

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Foreword

Illegal wildlife trade is emerging as a serious development issue which threatens the East Asia region's remarkable biodiversity and the welfare of people who rely upon it. The region is a key consumer of wildlife as derivatives such as food and medicines, pets or live collections, as well as trophies or decorations. In addition, East Asian countries supply the international market with both legal and illegal goods.

Silent Steppe is the latest product of the Environment and Social Development unit in the East Asia and Pacific region of the World Bank in a series of activities by the Bank and our development partners to understand the driving forces of wildlife trade, its scale and operation, and to identify successful solutions to address illegal trade. A previous publication—Going, Going … Gone: The Illegal Trade in Wildlife in East and Southeast Asia—summarized key concerns in the region, and a recently launched sub-regional study—coordinated by TRAFFIC International—is exploring the economic and social drivers of illegal trade. More broadly, this work is linked with the World Bank's concern about the adverse impacts of weak governance on the management of natural resources, identified as a key issue in the Environment Strategy for the East Asia and Pacific Region.

In Mongolia, the World Bank is supporting the Government in its efforts to ensure sustainable exploitation of the country's considerable natural resources. In addition to this study on illegal wildlife trade, research is underway on the illegal timber trade, on the success of tree planting projects, and on other issues of concern. This report, as well as many other projects, has been supported through the Netherlands-Mongolia Trust Fund for Environmental Reform (NEMO), a wide-reaching initiative which has touched almost all aspects of environmental management in Mongolia in 2005–06.

Silent Steppe is a good example of exploring poverty-environment connections and the impacts of weak natural resources management on poor people's livelihoods. Since the economic dislocation of the post-Soviet era, hundreds of thousands of Mongolians turned to hunting wildlife as one of the few alternative income generating activities available. Expanding illegal wildlife trade, however, is becoming unsustainable, providing less and less support to livelihoods while contributing to the extinction of rare species. Addressing this problem—providing alternative livelihoods and incentives for protecting rather than destroying a valuable resource base—will require a concerted effort by Government, civil society, and the development community.

In cooperation with several other NGOs, Wildlife Conservation Society (WCS) took the lead in conducting this in-depth study based on their global experience and strong local presence in Mongolia. We encourage those in government and civil society to read this report and to consider its recommendations.

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Foreword

The single greatest threat facing many species of wildlife across the world today is hunting for commercial wildlife trade. Such trade is escalating in scale across the globe, from the vast, multimillion-dollar trade in animals or their parts across Asia for their meat, skins, as pets, and as medicines, to the notorious "bushmeat trade" across Africa. The rise in the trade is due to a wide range of factors, including growing access to increasingly small and fragmented natural habitats, a change from traditional to efficient modern hunting technologies, loss of traditional hunting controls, and the addition of big business into what had been predominantly a local-scale subsistence activity. The loss is accelerated by demand from a growing middle class in urban areas with the cash to buy wildlife and wildlife products, and globalization that facilitates long-distance international trade, even if illegal. Many wildlife products used for food, medicine or clothing have crossed the boundary between "tradition" and "fashion," so demand is high and growing.

Examples of the scale of global wildlife trade are numerous: 25 tons of turtles exported every week in 2000 from Sumatra to China; 1,500 restaurants in Ho Chi Minh City, Vietnam selling wildlife meat; 90,000 wild mammals sold per year for meat in a single market in North Sulawesi; 1.5 million live birds per year sold in one Javan market; and on any one occasion, more than 90,000 snakes and 24,000 turtles being sold in markets in Guangzhou and Shenzhen in southern China. In Malabo, Equatorial Guinea, about 13,000 wild mammal carcasses are sold every year; and in Gabon, about 12,000 tons of wild meat is sold annually. The problem is not confined to developing nations; between 1992 and 2002, United States trade in wildlife and wildlife products increased by 75 percent, and in 2002, legally declared shipments of live wild animals into the U.S. included more than 38,000 mammals, 365,000 birds, 2 million reptiles, and 49 million amphibians.

Increased hunting, primarily for commercial wildlife trade, is causing species declines, local extinctions, and threatening global extinctions across the tropics. In Vietnam, 12 species of large animals have become extinct, or virtually extinct, in the past 50 years, mainly due to hunting. Every major protected area in Southeast Asia has lost at least one species of large mammal due to hunting, and most have lost many more. In Bioko, Equatorial Guinea, hunting has reduced primate populations by 90 percent in

Commercially harvested gazelle field dressed and ready for transport to market. Image: Henry Mix / Nature Conservation International.

Head of a taimen, a large salmonid which is under pressure from sports fishing for trophies and can also be found on sale in Ulaanbaatar's restaurants. Image: K. Olson.

some areas and caused local extinction in others, and in Kilum-Ijim, Cameroon, hunting has wiped out chimpanzees, elephants, sitatunga, and many other species. As populations of a desired species in one area decline, markets seek their supplies from other species or other areas, causing ever-increasing circles of loss.

The problem of vast and unsustainable trade in wildlife is a global one, but it is most acute in Asia. Asia has, on average, higher human population densities and less remaining forest than other parts of the tropics. It also has a long tradition of consuming wildlife products for medicinal use, and has some of the most rapidly growing economies in the world. Domestic trade is significant across the region, but a major proportion of the trade is international, with massive demands for wildlife from the core consuming nations of East Asia.

In recent years, the core focus of conservation concern has been the devastating impacts of commercial wildlife trade on tropical forest wildlife. Productivity of tropical forests for wildlife is extremely low, so species here are especially vulnerable to any commercial levels of hunting. In such habitats, a further problem is that forest peoples still depend on wildlife as a vital source of protein and income. Loss of wildlife to markets tens or hundreds of kilometers away means that a vital resource is lost. Remote rural peoples who have few or no alternatives are driven even further into poverty.

The current study in Mongolia is truly groundbreaking, in that it shows that the problem of commercial wildlife trade is also vast, unsustainable, and a major threat to wildlife populations in other areas. This trade is not coming from tropical forests, but temperate steppes and woodlands; it is not heading north into the core consuming nations, but south. It is not linked to the tropical timber trade, but to a wide range of other factors, from Mongolia's recent sociopolitical history to its geographical position in the world. The effect of commercial trade on wildlife populations is dramatic, however, and a cause for major conservation concern. The data presented here by Jim Wingard, Peter Zahler and their colleagues is eye-opening because it shows us that we need to think much more widely about the problem of wildlife trade: that it affects countries sometimes off the radar of the global conservation community, and it is doing so at a dramatic scale. Of most immediate importance, this study is a major step in addressing the wildlife trade in and from Mongolia, and in seeking solutions to conserve Mongolia's unique and wonderful wildlife community, as well as ensuring that rural livelihoods are sustainable for people in the long term, rather than being tied to a dwindling resource base.

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Acronyms

a.s.l.	Above sea level
CBNRM	Community-based natural resource management
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CMS	Convention on Migratory Species
CR	Critically Endangered (IUCN Red List category)
DD	Data Deficient (IUCN Red List category)
EN	Endangered (IUCN Red List category)
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information Systems
GOM	Governement of Mongolia
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation)
IUCN	The World Conservation Union (The International Union for the Conservation of Nature and Natural Resources)
LC	Least Concern (IUCN Red List category)
LR	Lower Risk (old IUCN Red List category)
MLF	Mongolian Law on Fauna
MLH	Mongolian Law on Hunting
MNE	Ministry of Nature and the Environment
MNT	Mongolian tugrik
MOSTEC	Ministry of Science, Technology, Education and Culture
NGO	Non-governmental organization
NE	Not Evaluated (IUCN Red List category)
NT	Near Threatened (IUCN Red List category)
NSO	National Statistical Office of Mongolia
PPP	Purchasing Power Parity
SPA	Strictly Protected Area
SPSS	Statistical Package for the Social Sciences
SSIA	State Specialized Inspection Agency
TCM	Traditional Chinese Medicine
UNDP	United Nations Development Program
UNEP-WCMC	United Nations Environment Program—World Conservation Monitoring Centre
USSR	Union of Soviet Socialist Republics
VU	Vulnerable (IUCN Red List category)
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

Notes:
All dollars are U.S. dollars; all tons are metric tons

Aimag (= province) is the largest sub-national administrative unit; below the aimag is the soum (= district), which is divided into bag (= sub-district). In the capital city districts are called duureg and sub-districts khoroo.

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Every study must recognize the various individuals that have contributed to its success, for no study is the result of one person's efforts. However, the authors would be remiss if they did not express a special thank you to a particular group of researchers. Much of the information contained in this report represents nothing less than their sheer determination and persistence. Given the task of interviewing thousands of people spread across one of the largest and least populated countries in the world, in a single summer, they did not (as they easily could have) buckle under the enormity of the job. Day after day, for weeks on end, they grabbed their stacks of interview sheets and headed out the door to endure endless drives across hot and dusty landscapes, reaching in the end virtually all corners of Mongolia. This acknowledgment is in large part dedicated to all of them, especially: B. Arunbileg, S. Oronchimeg, E. Sodmaa, D. Monkhbayar, M. Norjmaa, Ts. Munkhjargal, Ts. Tsogtsolmaa, M. Azjargal, S. Altantsetseg, C. Purevsuren, B. Ankhtsetseg, N. Ankhtsetseg, Kh. Otgondorj, S. Buyandelger, T. Chingel, Ts. Altangerel, Ts Basanjargal, Tsogtjargal, Ch. Ariunzaya, and D. Oyuntuya. We were also fortunate enough to have two tough characters to lead our more challenging market surveys, J. Ochirkhuyag and Otgontumur. Not to be forgotten in this list is a young foreign exchange student from the United States, Luke Distelhorst, whose constant presence, Mongolian language skills, and dedication to the effort contributed in uncountable ways to the final product. The final analysis came into focus with help from Charles Yackulic, a master's student at Columbia University in wildlife biology, who helped wade through the mountains of data and make sense of it all.

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Finally, great thanks are due to the thousands of participants in this study for their candor and patience in answering more questions in one sitting than any interviewee should have to endure. The results contained in these pages belong to them.

Executive Summary

Although never a part of the Soviet Union, Mongolia's long status as a satellite state guaranteed that it would suffer from the collapse of that world power. Along with many other countries, and seemingly overnight, Mongolia was cut adrift from the government that had dominated its political and economic life for almost 70 years. Mongolia was understandably unprepared to negotiate the forced transition which happened when its level of development was substantial compared to what it was in the 1920s, but it was still very much a dependent nation, living in large part off Soviet subsidies. Investment in the country by its former mentor had given Mongolia a well-regulated capacity to harvest, but little ability to produce or add value to its resources; and wildlife trade was always a part of what it supplied. From 1926 to 1985, Mongolia delivered to its northern neighbor a total of 119 million furs, 13 million kilograms of game meat, and 1.5 million tons of elk antlers, trading as many as 3.5 million animals in a single year. Recently, the opening of borders with China, with its dominant economy and enormous capacity to absorb resources, has resulted in a shift in trade routes but a rapid re-escalation in wildlife trade, with concomitant declines in economically important wildlife species.

Five examples highlight the recent, rapid decline in economically important species in Mongolia.

- Within five years, the population of Mongolia's subspecies of saiga antelope (*Saiga tatarica mongolicus*) catastrophically declined from over 5,000 to less than 800, an 85 percent drop (WWF 2004). The decline in Mongolia follows shortly after a similar collapse in the major populations of saiga in Kazakhstan and Russia, where populations have crashed from over 1 million in the early 1990s to perhaps as low as 31,000 in recent years; the driver in this collapse is the lucrative Chinese medicinal market for saiga horn (Millner-Gulland et al. 2001, Flora and Fauna International 2004).
- Red deer (*Cervus elaphus*) have also declined catastrophically across Mongolia. According to a 1986 government assessment, the population size at that time was approximately 130,000 deer inhabiting 115,000 square km. The most recent population assessment in 2004 showed that only about 8,000 to 10,000 red deer now inhabit 15 aimags (provinces) of Mongolia. This is a 92 percent decline in only 18 years.
- Government figures estimated 50,000 argali (*Ovis ammon*) in Mongolia in 1975, but only 13,000 to 15,000 in 2001 (Amgalanbaatar et al. 2002). This is a 75 percent decline in just 16 years.
- Marmot (*Marmota sibirica*) once numbered more than 40 million, dropping to around 20 million by 1990 and were last tallied in 2002 at around 5 million; a decline of 75 percent in only 12 years (Batbold 2002).
- Finally, saker falcons (*Falco cherrug*) have started a similarly precipitous decline, dropping from an estimated 3,000 breeding pairs in 1999 to 2,200 pairs, losing 30 percent of the population in just 5 years (Shagdarsuren 2001).

Anecdotal evidence suggests the same is happening to other wildlife species for which either limited or no direct population data are available. This is a trend that, however unstudied, is fully acknowledged by Mongolians across the country. During the course of this survey, hunters frequently commented that red squirrels have all but disappeared from many forests. They complained that red and corsac fox are becoming harder to find, and roe deer, brown bear, moose, black-tailed gazelle, and musk deer are all vanishing, leaving only silence in a landscape once filled with the sights and sounds of wildlife. When asked to characterize the wildlife resource, both hunters and non-hunters expressed concern that unbridled hunting around the country is creating an empty landscape.

Wildlife trade in Mongolia

Trading millions of animals every year, Mongolia's overall wildlife trade economy is estimated by this study at more than $100 million annually. This is a conservative estimate that relies primarily on fur trade values and to a lesser degree on medicinal and game meat trade.

Six species comprise the core of Mongolia's wildlife trade. In order of importance, they are 1) Siberian marmot, 2) corsac fox, 3) red fox, 4) Mongolian gazelle, 5) roe deer, and 6) red squirrel. Although low in value compared to some traded species (e.g., snow leopard), these species are all hunted in large volumes by thousands of hunters across the country. By comparison, species with the highest domestic values represent significant income levels only for trophy hunting operators and a few hunters/traders. In other words, the least valuable are in fact the most valuable.

The gray wolf also figures prominently in Mongolia's trade equation because of the high number of hunters, moderately high market values, and harvest levels all combining to make it one of the more lucrative trade species. However, exaggerated harvest figures made it difficult to accurately estimate total trade.

Much of Mongolia's wildlife trade is for the international fur market, but a growing international and domestic market for wild game and medicinal parts plays a significant role that should not be ignored.

Fur trade

The largest portion of wildlife trade, both in terms of volume and value, consists of furs sold on the international market, primarily to China, with some trade going to Russia and a limited amount sold on the domestic market.

The primary fur trade targets are Siberian and Altai marmot (*Marmota sibirica and M. altaica*), wolf (*Canis lupus*), red fox (*Vulpes vulpes*), corsac fox (V*ulpes corsac*), red squirrel (*Sciurus vulgarus*), snow leopard (*Uncia uncia*), brown bear (*Ursus arctos*), lynx (*Lynx lynx*), and Pallas' cat (*Otocolobus manul*). Limited fur trade exists for sable (*Martes zibellina*), badger (*Meles meles*), mink (*Mustela vison*), weasels (*Mustela altaica and M. erminea*), steppe polecat (*Mustela eversmanni*), hare (*Lepus* spp.), muskrat (*Odontra zibethicus*), pika (*Ochotona* spp.), chipmunk (*Tamias sibiricus*), and roe deer (*Capreolus pygargus*) skins.

The single largest volume of fur trade is for Siberian marmot. An estimated 3 million animals were harvested in 2004 alone, at an estimated market value of $30 to $40 million.

Although not traded in large volumes, rare and highly threatened species such as snow leopard are also traded. This trade is extremely difficult to track and quantify. Project investigators discovered 13 fresh snow leopard skins in a small western border town in China during this study, reportedly poached in Mongolia. Also during the same summer of 2005, Russian border guards confiscated another 15 Mongolian snow leopard skins on Mongolia's northwestern border.

Medicinal trade

Trade in medicinal products has increased both on the domestic and international market. The primary trading partner is China, but several interviewees reported selling large volumes to Koreans as well.

International buyers are looking primarily for brown bear gall bladder, saiga antelope horns, wolf parts of all types (including tongue, spleen, ankle bones, and teeth), musk deer (*Moschus moschiferus*) glands, red deer shed and blood antlers, genitals, tails, and fetuses, and snow leopard bones.

The domestic medicinal market includes marmot, wolf, corsac fox, badger, sable, brown bear, muskrat, roe deer, musk deer, snow leopard, Pallas' cat, Daurian hedgehog, Daurian partridge, Altai snowcock, and northern raven.

Game Meat Trade

Trade in game meat, other than fish, appears to be limited to the domestic market for the moment. Mongolian gazelle (*Procapra gutturosa*) meat was once traded to China, but that trade has apparently stopped with the recent banning of commercial harvests in Mongolia and the closure of game processing plants in China.

Mongolia also supplied large quantities of fish to markets in Russia in the early 1990s, but a change in supply routes and higher prices paid in China have caused trade to shift primarily to China, although trade continues to some degree with Russia.

Even though international game meat trade has slowed or even stopped, the domestic market is thriving and by itself represents a significant and continuing threat to wildlife populations. The domestic market therefore deserves serious management and regulatory attention. Game meat available in local markets includes Siberian and Altai marmot, Mongolian gazelle, roe deer, moose (*Alces alces*), Altai snowcock (*Tetraogallus altaicus*), several species of fish, and, in some areas, Asiatic wild ass (*Equus hemionus*).

A number of restaurants in Ulaanbaatar and around the country have started to offer fresh fish on the menu. Species include the endangered taimen (*Hucho taimen*), lenok (*Brachymystax lenok*), river perch (*Perca fluviatilis*), northern pike (*Esox lucius*), Siberian grayling (*Thymallus arcticus*), Siberian whitefish (*Coregonus* spp.), Potanin's osman (*Oreoleuciscus potanini*), the (introduced) common wild carp (*Cyprinus carpio*), catfish (*Silurus asotus*), and a species of lamprey (*Lethenteron reissneri*).

Trophy and Sport Hunting

Trophy and sport hunting have become increasingly popular in Mongolia and have the potential to contribute to wildlife management by providing much needed funding. Many large mammals, some raptors, and one fish found in Mongolia are advertised by hunting companies around the globe. These include gray wolf, brown bear, red deer, Siberian ibex (*Capra sibirica*), argali (*Ovis ammon*), wild boar (*Sus scrofa*), Mongolian gazelle, black-tailed gazelle (*Gazella subgutturosa*), Ussurian and Yakut moose (*Alces alces cameloides* and *A. a. pfizenmayeri*), and roe deer.

The Ministry of Nature and Environment actively promotes trophy hunting and has set special rates ranging from $100 for red fox to as much as $25,000 for Altai argali. Reinvesting a percentage of these fees in the conservation of the resource (required by the Law on Reinvestment of Natural Resource Use Fees) has the potential to provide significant funding for wildlife management.

However, government finance regulations and a lack of community benefit from trophy hunting prevent this market from achieving the desired outcome of supporting hunting management and local economies. As a result, trophy hunting represents yet another competing use of a dwindling resource.

Trade Chains and Markets

This study identified five different wildlife trade chains active in Mongolia: (1) hunters to domestic end users; (2) hunters to domestic markets; (3) hunters to domestic processors; (4) hunters to cross-border markets, and (5) hunters to international trade chains.

In general, Mongolia's wildlife trade chains involve individual hunters, both professionals and amateurs, harvesting wildlife in remote areas and bringing it to collecting points in urban centers and settlements located throughout the country. Almost every soum center has at least one individual acting as a collection point, making this a truly national problem.

Products not sold locally are typically transported to a larger market such as Ulaanbaatar, sold to an international buyer, packaged, and shipped across the border, typically concealed under other goods, usually heavy items such as scrap metal. Once across the border, the products disperse quickly to processors and finally to

the end users, at which point the product and its origin are virtually untraceable.

Mongolia's three largest trade centers are located in or near Ulaanbaatar. They include the Tsaiz market (in Ulaanbaatar), Emeelt market (45 km west), and Nalaikh (45 km east). Another three markets inside Ulaanbaatar's city limits (Naraan Tuul, Khuchit Shonkhor, and Kharhorin) play a lesser role in wildlife trade, for the most part selling to the domestic market and international tourists.

Other major trade centers are located in Choibalsan (near Mongolia's eastern border with China), Baganuur, Tunkhel, Govi-Altai, Mongonmort, and Erdentsant. Each of these markets represents a major collecting point from which products travel directly to the border with some potential for additional transfer to the Ulaanbaatar markets.

Although exact amounts are difficult to verify, all indications are that volumes of wildlife passing through these markets have been high. One trader at the Tsaiz market reported total sales in 2004 of 500,000 to 600,000 marmot skins, 50,000 wolf skins, and 50,000 each for red and corsac fox skins. He also admitted trade in small quantities of medicinal products without estimating total volumes. We were unable to verify these statements with independent, objective data, but the volumes for all but wolf appear plausible. We suspect wolf trade may be exaggerated or reflect trade moving through Mongolia from Siberia.

Wildlife markets and collecting points in Mongolia are relatively susceptible to enforcement. For the most part, they are open, easily accessible, and wildlife products are sometimes openly displayed and advertised. The exceptions are small, highly valuable trade items associated with medicinal trade such as bear gall bladder or musk deer pods, or with illegal fur trade such as snow leopard skins. Given the difficulties with patrolling vast hunting areas or trying to track goods in transit, enforcement is best focused on the trade markets and collection points.

Trade Sustainability

There is near unanimous agreement among hunters, traders, and biologists in Mongolia that continued wildlife trade at the volumes reported is unsustainable. While the causes of decline have been attributed to several factors—including infrastructure development, conversion of habitat for agriculture, overgrazing, competition for forage, and mining—the most serious and immediate threat is overhunting, most of it illegal.

In Mongolia, infrastructure development is still limited to a few urban areas where wildlife habitat is not a concern. The reported increases in agricultural land use are an unlikely culprit in species declines—Mongolia is an arid country with less than 1 percent of the entire country suitable for agriculture,[1] most of which is centered in the Selenge River basin. Even if all appropriate land had been converted to agricultural production, the increases would not have affected significant percentages of wildlife habitat for any species occurring in Mongolia, and would not adequately explain the recent 50 to 90 percent declines documented for some species.

The increase in livestock over the last 15 years is certainly a cause for concern, but few studies have assessed the degree to which either overgrazing or competition for forage are affecting wildlife. Two studies hint strongly at the potential impact of competition for forage; however, neither has concluded that this would have any significant impact on wild ungulate numbers.

A strong indicator of decreasing populations and increasing demand is the increase in prices for wildlife products. Prices have increased for wolf, red and corsac fox, red deer parts, saiga antelope horns, and marmot skins and meat. Also reacting to price increases and decreasing supplies, border markets in China sell a number of imitation products for all types of wild animal skins, saiga horns, and other parts.

Impacts of Wildlife Trade on Biodiversity Conservation

The rapid decline in wildlife is likely to have a cascade effect across Mongolia's ecosystems.

Hunting pressure has occurred on a monumental scale, and species declines are likely to have

[1] The Area Handbook for Mongolia, U.S. Country Studies reports Mongolia having 0.77 percent arable land.

unintended large-scale effects on non-target species, including predators, competitors, symbiotes (species with close ecological relationships, e.g., species that utilize marmot burrows for dens), and even vegetation composition.

Unfortunately, almost nothing is known about the significant ecological roles performed by the species that are heavily hunted. While many studies have been done by national and international biologists over the past fifteen years for certain species (e.g., argali, snow leopards, marmots, Mongolian gazelle, black-tailed gazelle, saiga antelope, corsac fox, gray wolf, red deer, musk deer, Asiatic wild ass, taimen, saker falcon), they are not enough to fill the knowledge gap for several reasons:

- Many of these studies still focus only on population surveys, which are useful in documenting declines, but cannot by themselves conclusively explain the reasons for those declines.
- Only a few have looked at specific questions of ecology (e.g., feeding ecology, dietary overlap, migratory patterns, etc.).
- None have assessed the impact of hunting.
- Several species directly impacted by hunting and wildlife trade have not been studied at all within the Mongolian context (e.g., red squirrel, roe deer, brown bear, moose, ibex, wild boar, lynx, beaver, red fox, badger, muskrat, Daurian hedgehog, Altai snowcock, great bustard, Eurasian eagle owl, black grouse, white ptarmigan, greylag goose, gadwall, arctic loon, Dalmatian pelican, Daurian partridge, Pallas' sandgrouse).
- Non-game species have received almost no attention, leaving biologists and managers guessing at the possible chain reactions that severe decreases in certain game species will cause.

With this knowledge base, we can only postulate that some of these may be keystone species (e.g., Siberian and Altai marmots) for biodiversity and even ecosystem engineers. If true, they contribute positively to the sustainability of the grasslands and therefore the long-term livelihoods of pastoralists.

In addition to ongoing studies, Mongolia urgently needs to develop studies designed to assess the impact of hunting on target and non-target species, as well as biodiversity conservation.

Impacts of Trade on Rural Livelihoods

Local hunters have gained from wildlife trade, but at the present rate of consumption, those gains will be short-lived. Of the total trade economy of about $100 million in 2004, we estimate that individual hunters throughout the country garnered roughly half of the profits. On a per capita basis for the total number of hunters (≈ 250,000), this represents average yearly earnings of $200 per hunter—an amount equal to roughly four to five months salary for rural residents.

Actual earnings among hunters varied significantly. For many hunters, wildlife trade is a subsistence activity with only a few animals or parts sold each year. For a few, hunting for wildlife trade is a full-time activity with annual sales of hundreds, even thousands of animals.

The other half of wildlife trade profits went to traders located in Mongolia's small and large collection centers, outdoor markets, and restaurants. With no more than 10,000 full-time traders in the country, we estimate per capita earnings of $5,000/yr; approximately 10 times an average annual salary for rural residents and almost three times the annual per capita GDP of $1,800 (2003 est.).

Harvests over the last decade have clearly outstripped the capacity of the resource to recover. Population surveys and anecdotal information such as increasing hunter effort all point to severe declines for several species and hint at the potential for their economic and local, if not complete, extinction. Saiga antelope may have already crossed into economic extinction at least for organized hunts that specifically target this species.

The loss of species, whether for trade or individual consumption, will send ripple effects throughout the economy and Mongolia's culture. On an individual level, herders will be forced to either purchase meat on the local market or consume their own livestock to replace the protein previously obtained from wild game. Purchasing meat at market means cash out of pocket that many people, especially in Mongolia's countryside, do not have.

Using livestock has even greater implications, as it will cost not only the market value of the animal but also

the continuing values of dairy products, wool and/or hair, and other products (including the production of young) obtained from the animal during its life.

Because of the varying levels of use and wide-ranging economic status of hunters, it is not possible to quantify the impact the loss of wildlife will have on individual budgets. Taken together, Mongolia's economy will sustain large, long-term losses as the earning capacity from wildlife trade dwindles.

Given the magnitude of the wildlife trade, the costs of policy neglect are having serious negative impacts to the present value and future earning potential of the country.

Enabling Wildlife Management

The single most important institutional constraint to wildlife management is the lack of any agency at the national or local level with adequate capacity and full authority to assume the task.

Established in 1989, the Ministry of Nature and Environment has never created an agency dedicated to wildlife management. Instead, Mongolia's wildlife-related laws delegate managing authority to local governments that do not have the training or funding to implement effective management.

The Academy of Sciences' Institute of Biology has only 15 biologists to survey at least 59 species directly targeted by wildlife trade. Even if the institute had the capacity, its work would still only result in recommendations to the Ministry of Nature and Environment, rather than actual quotas.

The Ministry, however, has no personnel with the expertise to adequately review and make such decisions. In addition, the Ministry's interest in increasing revenue coupled with the power to make these decisions presents a clear conflict of interest that has led to harvest quotas in excess of those recommended by the Institute of Biology.

Recommendations to correct these institutional deficits will not work if funds are not available to support these individuals and their activities.The system already provides at least a portion of the needed funds. Earning a reported $4.1 million in 2003 (trophy hunting and saker falcon sales), wildlife trade was the third highest natural resource earner behind mining licenses and land fees.

Following the Law on Reinvestment of Natural Resource Use Fees, which requires that 50 percent of hunting fees be reinvested, should have resulted in at least $2 million being made available for wildlife management in 2004. Instead, only $545,000 was dedicated to conservation and rehabilitation activities for all resources, including wildlife, water, forests, land, and natural plants.

Four major constraints exist to adequate funding: (1) the Ministry of Nature and Environment's is the least-funded ministry in the country; (2) the ministry has no specific budget allocated for wildlife; (3) the law requiring investment in the resource is not followed; and (4) the Public Sector Management and Finance Law nullifies funding opportunities for local governments.

Numerous regulatory constraints also make it difficult to adequately manage wildlife. Some of the more critical gaps include the lack of any law or regulation directed at wildlife trade; decision-making procedures that prevent a science-based approach to quota setting, a problem that constitutes a violation of Mongolia's CITES obligations; population survey requirements that are too infrequent to inform management decisions and are not adaptable to emerging needs; the absence of any tagging or registration system for hunting and trade; the existence of statutorily defined seasons that deny wildlife managers the needed flexibility to adjust seasons annually or even mid-season if necessary; the lack of any defined season for certain trophy species; the absence of sex-based regulations and size limits; civil fines and penalties that have no deterrent value because they are only a fraction of the market value; and no incentives or rights to support community-based alternatives to national management and enforcement.

Management Recommendations

After completing surveys and conducting preliminary analyses, this project held a working conference with over 100 participants from government, civil society,

international experts, donors, and relevant parts of the private sector to review the findings of the study and explore the most effective possible means of controlling the trade, as well as suggesting initiatives for the sustainable management of certain of these valuable natural resources. Conference participants cited numerous gaps and conflicts in law, management structures, implementation practices and enforcement capacity that have allowed the overuse of Mongolia's wildlife resources for more than a decade. Among the main themes are:

- The lack of any legislation directed specifically at wildlife trade.
- Offtake levels that are not scientifically based.
- Inadequate training and capacity to enforce existing hunting and trade restrictions.
- Inadequate use of economic incentives and disincentives in hunting legislation.
- A lack of incentive and legal basis for effective community participation.
- A failure to capture revenue from the system for the benefit of the resource.
- A lack of systematic knowledge on hunting and wildlife resources.
- A lack of inter-agency cooperation and sharing of enforcement data.
- Corruption at all management levels.

As a final product of the conference, the conference participants submitted a number of recommendations directed at five management areas: (1) international trade enforcement, (2) domestic trade enforcement, (3) hunting management, (4) trophy and sport hunting management, and (5) community-based approaches to management.

Supplementing these main themes, working groups at the conference offered several crosscutting and sector-based recommendations, which the reader will find outlined in the section entitled "Recommendations for Priority Actions." To the extent possible, recommendations have been prioritized and reference likely implementation authorities. Ultimately, responsibility for implementation rests with the Mongolian Government and its people. Central to effective trade management will be the following:

- The Mongolian Academy of Sciences should set scientifically based, sustainable offtake levels for all targeted species and monitor populations.
- The Ministry of Nature and Environment should take a lead role in designing needed legislation, procedural mechanisms, and enforcement protocols for both national and local management actions.
- The State Specialized Inspection Agency should assume primary enforcement responsibility and coordinate overlapping tasks with other key authorities.
- The State Border Defense Agency should engage in monitoring and enforcement of cross-border trade within the country.
- The Mongolia Central Customs Authority should develop new methods of detecting trade and establish effective cross-border cooperation with China and Russia.
- The State Police should control the influx of weapons and ammunition into the country and enforce relevant laws in local areas.

Introduction

At the outset, it is important to place this study within the context of the country of Mongolia, its wildlife, and its cultural heritage. Although officially open to the western world for more than a decade, Mongolia is still relatively unknown. Among the uninitiated, Mongolia is a country of mystery whose borders lie somewhere just off the map of the known world. Mention of the name often evokes singular images of the wild and strange and, considering its history, sometimes strong emotions. For some, it is hordes of marauding horsemen galloping across the steppe; for others, grasslands that extend as far as the eye can see, nomads living a life unchanged for centuries, or the haunting melody of throat singers. What few realize, but more are learning, is that Mongolia is also one of Central Asia's last wildlife refuges—a place where herds of Mongolian gazelle, thousands strong, still migrate across a vast unbroken steppe; where seeing a wolf in the wild is almost commonplace; and where freshwater salmon grow to sizes that stretch the imagination.

Perched in the Central Asian highlands far from the moderating influence of any ocean, Mongolia is a land of climatic and geographic extremes that shape both the natural world and the people that live there. Temperatures differences as much as 85°C (154°F) between summer and winter challenge the hardiest to survive; summer highs reach 40°C (104°F) and winter lows -45°C (-50°F). In the southern Gobi, scarce and unpredictable precipitation defines the fragile, sparsely vegetated environment of the world's northernmost desert; making this region one of the least populated in the world outside the polar ice caps. In the north, rain falls often enough to support the world's southernmost reaches of taiga (northern coniferous) forest and some of Mongolia's richest grasslands. While the south thirsts for water, the north contains some 3,000 rivers stretching over 67,000 km (41,200 miles). Nestled against Mongolia's northern border with Russia, Mongolia's Lake Khuvsgul is estimated to contain 2 percent of the world's freshwater. Most of Mongolia's 2.5 million people live in and around these resources.

The landscape is similarly severe. Averaging over 1,580 m a.s.l. (5,180 ft), the ground descends over 3,850 m (12,600 ft) in elevation from the towering Altai Mountains in the west (highest peak is Khuiten Mountain in Bayan Ulgii Province at 4,375 m (14,350 ft)) to the steppe and deserts of the south and east (lowest elevation is Khukh Nuur in Dornod Province at 518 m (1,699 ft)).

Gobi lynx. Image: Dr. Richard Reading.

These extremes have helped shape a natural world full of strange encounters and unique assemblages of plants and animals. This sparsely populated country is situated just north of the most populous, China, and harbors Asia's largest tracts of intact grassland. These grasslands have supported teeming populations of Mongolian gazelle, which are today virtually extinct in neighboring China, as well as millions of Siberian marmot and large numbers of corsac fox, red fox, and wolf. Where the last stands of taiga forest approach the sands of the Gobi Desert, the habitats of wild Bactrian camels and musk deer nearly merge. Where the western mountains descend to the plains, saiga antelope occasionally mingle with wild mountain sheep. Where the forests give way to grass and sand, Eurasian lynx leave their forest home to roam the steppe and the desert's northern reaches. In the far south, an unlikely population of brown bear (Mongolia's Gobi bear) can be found hunting the mountains and plains of the Gobi.

For centuries, Mongolians have carved an existence adapted to the extremes of this land. The most obvious adaptation is the nomadic lifestyle dictated in large part by scarce precipitation and marginal resources. Nomadism is one reason Mongolians historically established few permanent settlements compared to their southern and northern neighbors. The advent of Soviet rule brought with it a partial settling of the culture, but even here, the forces of development remained isolated and changed traditional nomadic practices only by restricting movement, but not eliminating it. Today, infrastructure development is even more concentrated, primarily in Ulaanbaatar and a few major cities.

The harsh climate and lack of resources have played a role in keeping the population low. Despite the impressive size of the former Mongol empire, there have never been very many Mongolians. In the early 1900s, records indicate a total population of only 600,000—less than 0.5 persons per square kilometer. Government-sponsored programs over the last 80 years have helped to increase this number to 2.5 million—four times as many, but still just 1.5 persons/ km^2. Traditional knowledge—born of long experience with a fragile environment, reinforced by Buddhist tradition—has taught Mongols to respect nature and

Wolf skin displayed by hunter in Mongolia's Gobi-Altai Province (Shargiyn Gobi). Image: Henry Mix/Nature Conservation International.

avoid disturbing the earth and water. Consequently, the country's landscape remains largely untouched and unspoiled even in modern times. Compared to neighboring countries, wildlife in Mongolia thrived in a culture that left their habitat intact and gave them the space to survive.

Against this backdrop of natural beauty, abundant wildlife, and cultural heritage is a country struggling to find solid ground after 70 years of Soviet control and subsidy. As this report documents, wildlife has paid the price in this struggle. The question is, will it lose the battle?

The international community is wakening to the threat wildlife trade presents globally and in Asia. It has been reported that "[i]llegal commercial trade in wildlife, parts and products is second only to the illegal drug trade in overall dollar value, estimated to exceed $5 billion annually worldwide" (Jagodinski 2001). This crisis is particularly acute in Asia due in large part to a growing market for wildlife products used in traditional medicine and furs used in clothing. Numerous studies have looked at the issue in South-east Asia, but few have turned their attention north, to an area that contains some of the last remaining tracts of open wild land, including vast expanses of temperate forests and grasslands supporting large populations of wildlife. One of the countries for which there is a paucity of data, but which has an enormous open border with China, is Mongolia. This study was conceived to fill that knowledge void. It is a first for Mongolia and the region, and it documents a wildlife trade crisis with profound implications for the country, its ecology, economy, and culture.

Before the study began, the main principles underlying the growing crisis were already known. Mongolia's by now well-publicized move from communism to capitalism was in many respects extremely difficult. For long years, the economy in the country rested heavily on Soviet subsidies. In exchange, Mongolia fed its natural resources into the maw of Soviet production. When the socialist system collapsed, so did the subsidies and with them the economy, leaving this land-locked country with only marginal capacity to function, but a decided ability to extract natural resources. Almost without pause, individuals across the country learned that wildlife could become a new currency; and there was almost nothing to get in the way of accessing it. Funding cuts incapacitated wildlife enforcement personnel at all levels. The borders to China and Russia were suddenly open more than they had been in 70 years. Mongolians did not need visas to enter China, and the market was ready and willing to accept whatever anyone could supply. For fifteen years, Mongolia's wildlife was the target of increasing numbers of hunters who were taking ever larger numbers from this fragile resource. As time passed, Mongolia was joining the ranks of countries in Africa and Asia where habitat loss is no longer the sole concern for wildlife, but where uncontrolled wildlife trade has now become a global and local threat to biodiversity.

However, there was virtually no information about how much of what species were being traded, what the primary drivers were, or what impact trade was actually having on targeted species. Many people, ranging from scientific experts to local stakeholders, expressed their concern and some even studied a few species in a few areas, but overall a solid understanding of wildlife trade was missing. Nonetheless, from these early studies it was clear that wildlife provide numerous economic benefits to local people. These benefits include a source of protein, fur, and medicine as well as supplemental income from trade. For many people in Mongolia, the availability of wildlife is a cornerstone to economic and even physical survival. It provides food for the table, medicine for the sick, and furs to protect against the bitter winters of Central Asia. Moreover, it also means that livestock does not have to be slaughtered for consumption, instead providing years of benefits in the form of milk, wool, trade in these products for other crucial items, and a combination of savings, wealth, and insurance.

There is, therefore, a critical need to address the rapid loss of economically important wildlife species in Mongolia. However, before this can be done, it is essential to determine the types, extent, rate, trends, and impacts of unsustainable trade in wildlife. The goal of this project is to better understand the role of wildlife trade in Mongolia; the impacts on traded species; and, through a working conference, design recommendations for improved wildlife management. The results of the various activities and inquiries call attention to the overuse of many species in Mongolia and the known or probable impacts such use will have on Mongolia's culture, environment, and economy.

1. Wildlife Trade Survey Methods

Before beginning the survey, the project team identified and tested a suite of information sources and methods that would assist in determining wildlife trade types, volumes, values, and trends. These included direct observation and questioning in markets, random sampling of shops in urban areas, random sampling of individuals (hunters and consumers), and the collection and comparison of information from official government sources and other conservation projects. Over a three-month period—from June to August 2005—we completed 4,010 household surveys (0.65 percent of all households) in all 21 aimags in Mongolia, 1,100 market surveys at individual markets in major and minor urban centers across the country, and 100 market surveys in northern China along the border with Mongolia.

Official Data Sources

One of the ultimate goals of this study (along with documenting levels of wildlife trade) is to initiate discussions on improving management mechanisms for wildlife hunting and trade. Critical to this endeavor is an understanding of how official statistics are gathered, what they measure, and how the results of these statistics compare to other forms and sources of information. In other words, we wanted to know what the official baseline tells us, how accurate it is and, where necessary, what types of information or recording procedures would improve it.

Officials sources that we used in this study included customs trade data from China, Mongolia and Russia; enforcement records from the Mongolian State Border Defense Agency and the State Specialized Inspection Agency; official hunting quotas issued by the Ministry of Environment, aimag (province), and soum (county) governments; CITES export records from the management authority at the Ministry of Nature and Environment (MNE); and historical records for species population levels, recommended hunting quotas, and trade volumes from the Mongolian Academy of Sciences. Throughout the project, we were able to work well with the Mongolian Central Customs Authority and through them received some (although limited) information from Russian and Chinese authorities. The MNE provided CITES data from 2000 for comparison. Cooperation with the State Border Defense Agency was positive with important information made available.

Despite exceptional government cooperation, our efforts to review such data still met with several obstacles. First, some of the most important data we were looking for simply do not exist. Key to understanding the impact of current trade on any given species is an understanding of the animal's biology and ecology, distribution, and population trends. Very few species that are hunted in Mongolia have ever been studied in any detail, and even for these species, population surveys have been infrequent. This study compiled such data to the extent that they exist. Where data were not available (and purely for purposes

of comparison), we describe relevant information for the same or similar species in areas outside Mongolia.

Creating additional and probably permanent data gaps is the fragmented history of wildlife management in Mongolia. Since the beginning of official wildlife management in the 1930s, management authority has changed hands almost every 10 years, and at least six separate entities have been delegated some responsibility. These include the Ministry of Trade and Industry, Ministry of Foreign Trade, Ministry of Nature and Environment, Mongolian Central Customs Office, the Mongolian Hunter's Association, and the Mongolian Academy of Sciences. With the changing of hands, the format for data collection and reporting changed, and in some instances, data were lost. Fortunately, this was not true for wildlife trade records, for which we were able to review original documentation dating as far back as 1926.

For the information that does exist, we faced three additional obstacles—insufficient detail to allow more than rudimentary analysis, inconsistent record-keeping practices that prevented comparisons across areas and years, and the reluctance of at least one government agency to share available data. For the most part, there is no detailed accounting system for wildlife-related uses. Data reported typically come in the form of aggregate numbers; that is, total number of permits sold in a given year, total income from sales, total volume traded, or total enforcement volumes. Critical information—including demographics of license purchasers, amounts paid for each license, whether and where licenses sold have been filled, and virtually all details associated with enforcement—is either not collected, not compiled in a central database, or not published. Because data are not compiled centrally, the best source of wildlife licensing information is at the local government level. However, because of inconsistent record-keeping practices, obtaining information from this source yields a confusion of data that is all but unusable. Different inspectors keep records in different ways at different times, making it virtually impossible to track wildlife licensing information over time. In some instances, exiting inspectors take their data with them, leaving large gaps in the record. Especially frustrating was the reluctance of the State Specialized Inspection Agency to share enforcement records in anything other than highly aggregated form. Invoking the Law on State Secrets and perhaps unwilling to harm the reputation of companies that violated the law, this agency shared only the percentage of enforcement activity related to wildlife. As a result, we were unable to learn what species were involved, what volumes and values were associated with enforcement, the location of enforcement actions, or the outcome of any enforcement proceedings.

In this study, we therefore resolved to focus on trade volumes, the limited wildlife population data available, and a few reported enforcement statistics, realizing that much information critical to a full understanding of the situation is simply unavailable.

Household and Market Survey Methods

Given the size of the study area (countrywide), the short time-frame (3 months), and number of species potentially within the purview of the study, we devised separate survey methods for estimating current hunting and household consumption levels as well as trade volumes based on retrospective respondent recall.

There are advantages and disadvantages to this approach. Social science research often relies on "longitudinal" surveys where individual, families, or groups are monitored over a long period, often several years. The resulting time-series data allow studies of trends and transitions over time, and would be of particular use in measuring trends in wildlife use patterns. Such a study design was never an option for this particular endeavor, given the short time frame available. However, a recall survey is a cost-effective method that, when carefully applied, can be a surrogate for longer-term longitudinal survey methods.

To assist in the development and beta test of both market and household survey questionnaires, we used several survey test methods, including (1) cognitive interviews, (2) respondent interviews, and (3) analysis of non-responses.

To eliminate major problems with the questionnaire, cognitive interviews were used after initial development by a team of subject-matter experts on selected respondents who were asked to describe their thought processes when responding to the questions.

Following this, we used interviewer debriefing at various stages of field-testing—after each interviewer

had conducted 1–2 interviews under field conditions (10 interviews total), after each survey team completed one morning session under field conditions (approximately 5 interviews per group, 25 interviews total) and after each team completed two full days under field conditions (100 interviews total). Interviewer debriefings were conducted using group discussions with the entire survey team present. We collected information about the interviewers' perceptions of problems, prevalence of the problems, reasons for the problems, and suggested solutions to the problems. Interviewer debriefings continued periodically for three weeks after initiating field surveys in both group and individual settings, and contributed to adaptive redesign during the initial stages of the survey.

In addition, survey designers analyzed non-response rates from collected data to determine which questions were too difficult for respondents, which questions respondents refused to answer, and which questions were simply not applicable. Those questions that were too difficult or were refused by a majority of respondents were eliminated from the questionnaire. Non-responses due to non-applicability were retained for further analysis after data from other areas had been collected and compiled. If the question continued to receive no response, we eliminated it from the questionnaire. The final data set contains only those response columns that remained valid throughout the survey period.

We were able to devise and conduct a nationwide survey by using a base team of ten volunteer students and by outsourcing surveys to projects located throughout Mongolia. Assisting organizations included the WWF Mongolia Program Office, International Takhi Group, Taimen Conservation Fund, Mongolian Conservation Coalition, Community Conservation Network (CoCoNet), World Bank/GEF Khuvsgul Project, UNDP/GEF Eastern Steppe Biodiversity Project, UNDP/GEF Conservation of the Great Gobi and its Umbrella Species Project, Argali Project, and Denver Zoological Foundation. After beta testing, the base team and survey developers provided training on the use of the questionnaire to representatives of these organizations. Surveys were conducted during one season only and were therefore not repeated for any region or with any of the respondents. Each survey method and questionnaire is described in the sections that follow.

Household Consumption Surveys

Household consumption surveys were directed at individuals throughout the country. Through an approximately 20-minute interview, they identified the types and quantities of species hunted, the quantities later sold to markets, and the amounts and types purchased by individuals at such markets. The method was adapted from Starkey (2004), who examined bushmeat trade in Koulamoutou, Gabon. We completed 4,010 household surveys in all 21 aimags in Mongolia.

To quantify harvest volumes, we formulated questions looking at several components of an individual or family's wildlife harvests on a species-by-species basis. These included the names of the species harvested, amounts harvested for each species per hunting excursion, the number of hunting trips per year, estimated yearly harvest, harvest seasons and level of effort, trends in harvest amounts and species harvested, techniques used currently and any changes, and any observed changes in the quality or abundance of species harvested.

To quantify domestic sales volumes, we asked respondents to identify species parts and quantities of parts sold, prices of wildlife products sold by the hunter on the market, and trends in the commercial sale of wildlife products.

For wildlife use, we devised a similar set of questions to quantify any use and directed them to all respondents regardless of whether they also harvested the same species. Many hunters in Mongolia are not entirely reliant on their own harvests and therefore also factor into the market from the end-user side. Questions included the names of the species used, the parts, purposes, amounts, and market prices for each species used, the yearly average of use, market sources for each species, the amount of wild game meat consumed, the amount of meat (whether domestic or wild game) consumed on a daily basis, trends in use (amounts or types of species), trends in market values, and any observed changes in the quality, availability, or quantity.

Because of the large geographic region and sparsely populated landscape, we used a multi-stage sampling method. To select survey areas, we created a cluster random sampling map divided along Mongolia's 21

provincial boundaries (aimags). We then overlaid this with rough distribution maps for species known to be hunted. Sampling areas were then selected from each provincial area that occurred inside and outside marked species distribution boundaries. Within each selected cluster area, specific urban and rural communities were selected based on a convenience sampling strategy that identified available survey staff and travel routes. To sample urban populations, we used a stratified sampling methodology that divided the urban population into non-overlapping districts using the district mapping available from the city or town's central administration office.

Urban areas were sampled using a simple random sampling method. For larger urban centers, such as Ulaanbaatar, we conducted an equal number of sidewalk interviews at randomly selected locations within each district. On site, survey staff designated a square on the sidewalk. After waiting one minute, the first person to enter the square was questioned. This process was repeated, with one minute waiting periods between interviews, until the desired number of interviews for the area had been completed. In smaller urban centers, aimag and soum centers, we conducted house interviews. To do this, researchers first numbered each of the streets in the district (typically less than 10). Surveyors were then instructed to pick a number from a bag with slips of numbered paper and conduct interviews on the corresponding street. To select the house at each street, researchers again selected a number from the bag and conducted one interview at the corresponding residence.

Outside urban areas, we conducted ger (house) interviews along pre-selected transects between urban areas within the sampling clusters. Transects were therefore both a function of convenience and cluster sampling methods. Because of the nomadic lifestyle of countryside residents, random sampling was entirely a function of interviewing people as researchers found them.

We placed significant energy and resources into this household effort for the following two reasons. First, there is just enough enforcement in the country to make wildlife traders wary of people who ask too many questions. This is especially true for those who trade in endangered species, but also for wolf and marmot traders where little or no enforcement is visible. The market is therefore the most difficult and most unreliable source of information. Second, the primary source of wildlife products for traders is individual hunters located throughout the country. In our experience, individual hunters were willing to discuss their activities with us in the context of one-on-one interviews. Only one project area located along the southern border east of Dalanzadgad reported any difficulty with reluctant interviewees. Apparently, enforcement in the area is somewhat more intense, with many interviewees recounting arrests and jail time for poaching.

Market Surveys

Market surveys followed roughly the same method for household surveys, with some exceptions. To get a better understanding of the overall market and to design the questionnaire, we first employed a "snow-ball" method by targeting known markets that actively sell wildlife products. In these locations, we conducted observational surveys and some unstructured direct questioning of shop owners posing alternately as tourists, hunters from the countryside, foreign traders interested in purchasing large volumes, and as student researchers. From this exercise we learned that the most difficult areas to sample would be the larger trading centers (referred to as "container shops" because of the dual use of railroad containers as storage units and sales locations) in and around Ulaanbaatar and using "student researchers" would be the least productive questioning technique for sampling trading centers. In the end, market surveys in the "container" shops were done posing as traders. For surveys in other stores, students posed simply as students. Interviewer debriefings and a review of returned questionnaires indicated that "students" in shops within the city did not meet with any more difficulties than other approaches. A single approach reduced complications and misunderstandings among the interviewers.

The resulting list of questions attempted to identify the types of species and products sold, purchase and sale prices, and quantities sold over time. The same method was used to assess the status of wildlife trade in restaurants, tourist shops, clothing stores, outdoor markets, grocery stores, wholesale markets, and container shops. Separate questionnaires were developed only for restaurants.

We then used essentially the same multi-stage sampling methodology using the previously developed cluster random sampling map to select general survey areas. Specific sampling areas were similarly selected from each provincial area that occurred inside and outside marked species distribution boundaries, but with an emphasis on areas known as staging centers for trade and areas assumed to be outside normal market chains. Convenience again dictated which communities would be sampled, typically coinciding with household consumption survey efforts. To sample individual shops, we stratified communities into non-overlapping districts on the same basis as household surveys. In smaller communities, particularly soum centers, we attempted to sample all shops in each district. For larger urban centers, such as Ulaanbaatar, we used randomly selected bus stops as center points and sampled all shops within approximately 100 meters.

In China, a survey team comprised of Chinese wildlife biology students, wildlife biologists, and a teacher from Inner Mongolia targeted only a narrow portion within Inner Mongolia running along the border with Mongolia. Cities visited by the survey team included Ereen Khot, Shiliin Khot, Hailar, Dong Wu, Xin Barga Baruun, Suni te zuo qi, Saikhan Tal, Khokh Khot, Tong Liao, Wu La Te, DaMao, Mandula, and Alashan Zuoqi. The intent was to identify border areas that were part of the trade routes and chains coming from Mongolia, the species traded, types of trade (medicinal, fur, trophies, etc.), and finally the volumes and values of Mongolia's wildlife trade with China. The questionnaire developed for use in Mongolia's markets was modified to sample all shops in the tourist districts and randomly sample other shops in cities along China's northern border, selected for convenience and as known or suspected trade routes. In China, tourist districts are known to sell wildlife products of all types. They are typically clustered in a single area and therefore may be sampled with minimal expenditure of time and effort. Although staff used a slightly modified questionnaire based on the template developed by the Mongolian team, they targeted the same questions and results. Shop owners were considerably less willing to talk to researchers due to stricter enforcement. As a result, researchers were unable to keep questionnaires with them and were forced to complete forms from memory. This may have led to some errors and omissions in the data, but staff felt confident that they were able to record a majority of the responses accurately.

A similar system was developed for sampling Russian shops in urban areas close to Mongolia's in Ulaan Ude and Naushk, but it was soon discovered that market surveys there would be much more difficult. Russian shop owners for the most part refused to respond to questions. Results are therefore anecdotal, but still instructive of general trends and some key aspects of enforcement and markets that affect wildlife trade.

Survey staff completed 1,100 market surveys in Mongolia and 100 market surveys in several cities in China.

Research staff conducting market survey in Ulaanbaatar. Image: J. Wingard, August 2005.

Data Analysis Methods

Analyzing survey data—and scaling up from samples to estimates across an entire country—always requires certain assumptions and is limited by several factors, including the sampling design, quantity, and quality of the data. Our efforts to draw inferences from the samples to obtain estimates for entire populations are no different. In the following description of our data analysis methods, we have attempted to be as transparent as possible, acknowledging assumptions and pointing out shortcomings of our survey design and

results. Despite these limitations, we are confident that our estimates are good approximations of wildlife offtake and trade in Mongolia. Our estimates agree with other studies conducted on individual species and the perspectives of those familiar with wildlife harvest in the country.

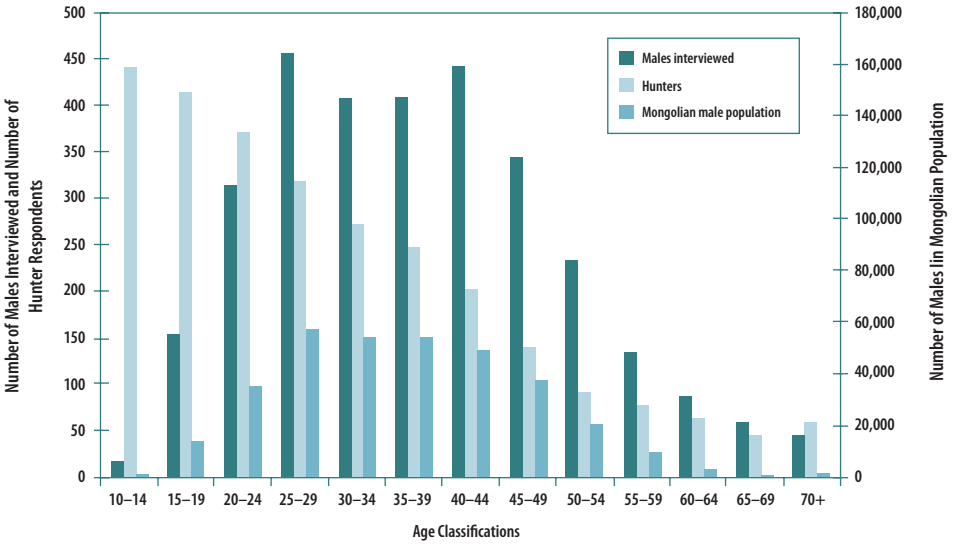
Although data were gathered on a number of parameters (income levels, knowledge of legal requirements, changes in resources), the analysis contained in this report is restricted primarily to quantitative analyses of certain responses only, e.g., numbers of hunters, number of animals harvested, value of species traded. Additional quantitative assessments were performed to determine the existence of significant relationships between certain variables within the data set. For example, paired t-tests were used to examine whether mean harvest levels of specific species per hunter depended on vehicle ownership. We performed similar tests looking at hunting prevalence and (1) age, (2) gun or trap ownership, and (3) hunter residency by region and by urban and rural classification. However, it was never the intention of this study to perform a complete analysis of all data collected; this was well beyond the scope of the inquiry and timetable of this report. Collected data will be further analyzed to more clearly identify relationships and elucidate trends across the spectrum of wildlife trade issues in Mongolia. The original data are available from the authors, dependent upon an agreement with the World Bank.

Assessment of Data

When reviewing the data and deciding on which calculations and method to use, we were careful to consider sample design, researcher bias, quantity and quality of the data, and internal consistency (e.g., were respondent income estimates compatible with vehicle ownership levels, was level of effort consistent with level of take, etc.). In our assessment, we feel that the accuracy of our results and our ability to draw inferences may have been affected by the following:

i. Our original sample design was intended to sample evenly from each of the 21 provinces within the country. This was not possible primarily due to the logistics of designing and implementing a survey of this magnitude in such a short period. Sample size therefore varied somewhat between aimags and was comparatively low in Dundgovi, Arkhangai, Khentii, Orkhon, and Darkhan Uul. For finer scale inquiries (e.g., number of marmot hunters in the region) these areas were excluded, resulting in lower overall hunter and harvest estimates.

Figure 1: Sampling results of males and hunters interviewed compared to Mongolian male population



Source: 2004 Wildlife Trade Study results and NSO-Mongolia. 2004. *Mongolian Statistical Yearbook 2003*. Ulaanbaatar, Mongolia: National Statistical Office of Mongolia.

ii. Second, our sample design resulted in an under-sampling of individuals between the ages of 10–24 and >70 years relative to sampling for all other age groups. Figure 1 compares our sampling of men by age category to the number of hunter respondents and the number of males in the population (it became clear during data collection that females were rarely directly involved in hunting). The left axis is the measure of males interviewed (maroon bars) and hunter respondents (orange bars), while the right axis measures the population of all males in the country (blue bars). The under-sampling of the younger age group in particular may have affected our overall hunter and harvest estimates. Both experience and survey results tell us that the younger age group (starting around age 15) can be important participants in wildlife harvests and trade.

iii. Because the study was outsourced to a number of cooperating organizations, the potential for researcher bias to affect results was larger than if it were centrally administered. Training was provided to one individual per organization with experience conducting resource use surveys in Mongolia's urban and rural areas. We were not able to supervise additional training given to all participants in the study. To achieve our target number of interviews and area within the existing timeframe, this risk was unavoidable. To reduce researcher bias entering the results, completed forms from each survey group were reviewed for errors and obvious bias before data entry. Any sheets with clearly incorrect responses were eliminated from the data pool.

iv. Respondent recall surveys have inherent limitations that cannot be avoided. Despite survey design elements used to prompt recall, we were concerned about respondents' ability to remember, and remember accurately, how many of what species they harvested, how many they sold, and for how much. There is no way to conclusively evaluate how well our survey population recalled without recourse to and comparison with detailed harvest and market records and wildlife population data, none of which exist. Therefore, we cannot know definitively whether some survey respondents were systematically under-reporting or over-reporting harvests. Both add error to our measure of hunting levels. In the end, there may be a bias in either direction, or they may neutralize each other when analyzed for general trends.

However, for some responses, recall is not a significant issue. For example, asking whether or not an individual hunts does not require the respondent to remember any detail and thus we feel these responses can be interpreted with relative freedom. Other responses require an ability to recall details of events that have happened in the past and are therefore subject to a certain degree of uncertainty. To minimize the impact of this uncertainty, before extrapolating data, we first determined distribution and removed extreme outliers from harvest results.

v. The lack of detailed information on the age structure of the human population by region also presented some limitation to the accurate extrapolation of results. We relied upon the statistics generated by the Mongolian National Statistics Office to scale the number of hunter respondents on a regional basis. It is not known what, if any, bias this data gap may have introduced into the results.

vi. Finally, some degree of error is likely due to the timing of the survey (summer), when hunting and wildlife trade are minimal, and to the limitation of the survey to one season, when hunting and trade in Mongolia are highly seasonal events. The estimates provided by interviewees therefore may tend to reflect the survey season and not the entire year.

Estimating the Number of Hunters

It became clear during data collection that females were rarely directly involved in hunting. None of the 894 women sampled stated that they hunted. Therefore, our nationwide estimates assumed that the contribution of women to hunting was so negligible that we could estimate it as none. Hunter estimates are derived solely from the responses of men.

To estimate the total number of hunters in the country, we first determined the number of males interviewed in the course of our survey (m_a=3,119)

and the number that said they hunted (m_h=949). We then estimated the total population of hunters in the country using four separate calculations. For each of these calculations, we made the assumption, based on survey results and experience, that hunters younger than age 15 and older than age 60 are rare (see Table C4: Estimate of total number of hunters weighted by age class, p. 142). We therefore excluded these age groups from the pool of potential hunters using the age structure of Mongolian population from the State Statistics Annual Report 2003 (NSO 2003). The exclusion of these ages may introduce some negative bias into the overall estimates.

i. The first, and simplest, calculation estimated the total number of hunters using the formula:

$$(1) \quad N_h = N_m * \left(\frac{m_h}{m_a} \right) \quad ,$$

where N_h = estimated total number of hunters, N_m = number of males in Mongolia (>14 and <60 years of age, NSO 2003), m_h = the number of males surveyed that hunt, and m_a = the number of adult males surveyed. This estimate created a baseline for comparison with the results of weighted calculations in equations 2–4.

ii. In the second calculation, we weighted hunter estimates by age class using national age structure statistics (NSO 2003) to reflect population differences between age groups. This calculation aggregates the total number of hunters from separate estimates of each age group based on the relative percentage of hunters in the age class (e.g., 30 percent of all males ages 20-24) and the population of the age class (e.g., 100,000). Our hypothesis was that significant differences in hunter percentages and population levels would affect overall estimates. For example, a high percentage of hunters coming from an age class with a relatively low population level would result in lower overall estimates. To test if this was true in our study results, we used the following formula:

$$(2) \quad N_h = \sum_{i=1}^{12} \left(N_{mi} * \left[\frac{m_{hi}}{m_{ai}} \right] \right) \quad ,$$

where N_h = estimated total number of hunters, i = age class, N_{mi} = the number of males in the ith age class (NSO 2003), m_{hi} = the number of males surveyed in the ith age class that hunt, and m_{ai} = the number of males in the ith age class surveyed. Results are provided in Table C4, p. 142.

iii. Our third calculation weighted hunter estimates by aimag residency. Because the national statistics do not provide male-to-female ratios by age class for each aimag, this calculation assumes the same proportions provided in Table C4 (NSO 2003). We also assume the same proportion of hunters for each age class. The formula used is:

$$(3) \quad N_h = \sum_{j=1}^{21} \left(N_j * \left[\frac{N_m}{N_T} \right] * \left[\frac{m_{hj}}{m_{aj}} \right] \right) \quad ,$$

where N_h = estimated total number of hunters, j = aimag, N_j = number of people in the jth aimag (NSO 2003), N_m = the number of males in Mongolian population (ages 15-60) (NSO 2003), N_T is the total population in Mongolia (ages 15-60), m_{hj} = the number of males surveyed in the jth aimag that hunt, and m_{aj} = the number of males surveyed in the jth aimag. Results provided in Table C5, p. 142.

iv. Our fourth calculation weighted hunter estimates by urban/rural residency. For this calculation, we also assumed the same male-to-female ratios by age class for each as provided in Table C4 (NSO 2003) and the same proportion of hunters for each age class. The formula used is:

$$(4) \quad N_h = \sum_{r=1}^{21} \left(N_r * \left[\frac{N_m}{N_T} \right] * \left[\frac{m_{hr}}{m_{ar}} \right] \right) \quad ,$$

where N_h = estimated total number of hunters, r = residency classification, N_r = number of people in the rth residency classification (NSO 2003), N_m = the number of males in Mongolian population (ages 15-60) (NSO 2003), N_T is the total population in Mongolia (ages 15-60), m_{hr} = the number of males surveyed in the rth residency classification that hunt, and m_{ar} = the number of males surveyed in the rth residency classification. Results provided in Table C6, p. 143.

To arrive at a final estimate of hunters in the country, we used the results from the third calculation as the lowest estimate and a better fit for estimating harvest

levels that fluctuate regionally according to species distribution. In addition, we adjusted our result from this calculation downward to reflect the percentage of individuals that engage in hunting only as a hobby. These individuals do not hunt regularly or contribute to the overall harvests by subsistence and commercial hunters in the country, which was the primary concern of this study. The number of "hobby" hunters was calculated based on responses to Question #14, Purpose of Hunt, in the Household Consumption questionnaire, Appendix D: Household Consumption Survey, p. 145.

Estimating Wildlife Harvests

It is important to remember that the accuracy of the estimates provided in this report will likely differ from a complete census that might be achieved using official records on hunter licensing and success rates. Furthermore, sample survey estimates always have two types of errors, sampling and non-sampling, and final estimates are dependent on both of them. However, the full extent of non-sampling errors is unknown. Therefore, the potential for bias must be considered and caution exercised when interpreting the data.

To estimate wildlife harvests for individual species, we first reviewed all information reported by respondents for each species in the main data file to correct data entry mistakes and omissions. We then produced a separate data set containing the basic demographic parameters (age, residency, vehicle ownership, gun or trap ownership, and income) and harvest information (level of effort, numbers harvested per trip, total harvest per year). Using SPSS Base 12.0, we determined the distribution of the annual harvest levels and removed outliers.

In reviewing the data for some species (marmot, red squirrel, red fox, corsac fox), it became clear that reported harvests for virtually all respondents were general figures (200, 100, 50, etc.) with no reported numbers in between. We felt that respondents tended to round figures up to the nearest 10 or even 100. Without adjustment, this rounding up would result in substantially inflated mean harvest levels and grossly exaggerated total harvest estimates. Unfortunately, there is no way for us to know how much rounding up occurred. We therefore made the assumption that no one rounded up more than 50 percent and used the middle figure of 25 percent to adjust reported harvest levels of 10 or above, the lowest level at which we felt rounding was likely to occur.

In addition, some individuals reported harvesting numbers that experience told us would be unlikely for one individual and were probably harvested by a group of hunters, or simply a function of exaggeration by the respondent. To adjust for either case, we used our best judgment and reduced reported harvest levels for these individuals to the mean harvest calculated for the remaining respondents for the area and species in question.

In the final calculation of harvest estimates, we used the same method of weighting hunter estimates by aimag set out in the third calculation of hunter estimates, multiplied this by the proportion of hunters in the aimag that reported hunting the species analyzed, and again by the adjusted mean harvest level for species in the aimag. Thus:

$$(5)\quad N_a = \sum_{j=1}^{21}\left(N_j * \left[\frac{N_m}{N_T}\right] * \left[\frac{m_{sj}}{m_{aj}}\right] * H_j \right) ,$$

where all variables are the same as equation 3 with the addition of m_{sj} = the number of hunters in the jth aimag that hunt a given species, and H_j = the adjusted mean harvest level per hunter in the jth aimag. Results are provided in Table C8, p. 144.

2. History of Wildlife Trade in Mongolia

A brief look at historical wildlife take and trade is useful to understanding the present situation. The most important lesson is that today's heavy trading and declines in wildlife populations have happened before in Mongolia. Through a combination of strict measures, increased control, and refined management, Mongolia has twice in the past managed to slow trade and preserve its wild heritage. This section describes the historical trends in wildlife trade.

Hunting and at least some form of trade,—whether bartered, paid as tribute, or sold on the market—has always been a part of Mongolian culture. Many of the species that occur in the country provide a traditional source of protein, fur, and medicine. Marmots (*Marmota sibirica* and *M. baibacina*), for example, are especially important, providing meat, fur for clothing, medicinal oils high in natural cortisone, and other medicinal products. Marmot oil contains naturally high levels of corticosterone[2] and has several traditional uses in Mongolia, including as a leather conditioner, to treat burns, frostbite, anemia, tuberculosis, and as a dietary supplement for animals and children. Wolf (*Canis lupus*) meat, tongue, and spleen are used to treat all kinds of ailments from colds to asthma. Red fox (*Vulpes vulpes*), corsac fox (*Vulpes corsac*), and Pallas' cat (*Otocolobus manul*) furs have long protected Mongolians from the bitter winters. Wolf fur is considered the warmest of all and is especially prized. Wild boar (*Sus scrofa*), roe deer (*Capreolus pygargus*), Mongolian and black-tailed gazelle (*Procapra gutturosa* and *Gazella subgutturosa*), and Asiatic wild ass (*Equus hemionus*) are common sources of wild game meat.

Several birds have also been hunted for their meat and medicinal properties. Game birds include hazel grouse (*Tetrastes bonasia*), white ptarmigan (*Lagopus lagopus*), rock ptarmigan (*Lagopus mutus*), Daurian partridge (*Perdix dauuricae*), chukar partridge (*Alectoris chukar*),

2 Corticosterone (or cortisol) in marmot spp. is secreted by the adrenal cortex in response to stressors. It has a strong anti-inflammatory effect, increases mobilization of amino acids from muscle (increasing protein breakdown), increases mobilization of fatty acids (increasing lipid concentrations in the blood), and increases blood glucose concentration (Wingfield and Romero 2001).

Eagles are traditionally used in hunting in parts of Mongolia. This Kazakh man in Gobi-Altai, western Mongolia, is training a young bird to hunt marmot. Image: Pete Middleton, 2003

Commercially harvested gazelle ready for loading and transport to Choibalsan. Some 10,000 gazelle were harvested on this hunt for sale on the international market. Due to the poor condition of the meat, none of them were actually sold. Image: Henry Mix/Nature Conservation International.

Pallas' sandgrouse (*Syrrhaptes paradoxus*), black grouse (*Tetrao tetrix*), western capercaillie (*Tetrao urogallus*), black-billed capercaillie (*Tetrao parvirostris*), and bar-headed goose (*Anser indicus*). Birds used in traditional medicine include the Altai snowcock (*Tetraogallus altaicus*), common crow (*Corvus corax*), eagle owl (*Bubo bubo*), Daurian partridge, cinereous vulture (*Aegypius monachus*), greylag goose (*Anser anser*), black-eared kite (*Milvus lineatus*), ptarmigan, gadwall (*Anas strepera*), and arctic loon (*Gavia arctica*).

Given the degree of traditional use, it is not surprising that hunting rights were a concern long ago. The formal codification of hunting rights and practices began, as did all written law in Mongolia, with Chingis Khan's *Ikh Zasag* in 1206. This law, and the many that followed through the centuries, addressed several environmental concerns, among them the management of wildlife resources. Chingis Khan's directives established hunting grounds, defined access rights, specifically permitted and prohibited certain hunting practices, and set penalties (some severe) for violation of the law. However, formal trade in species and harvests that exceeded domestic consumption was never a subject of legal concern. It is this gap in Mongolia's legal and management framework that has more than once in Mongolia's history led to a wildlife crisis. At least as early as 1755, formal trade with the Manchu empire included furs from Mongolia (Scharf and Enkhbold 2002). Until Mongolia's first revolution in 1911, annual tribute to China was paid in the form of sable (*Martes zibellina*) furs or an equivalent number of substitute furs—1,352 sables or 4,066 lynx furs, 2,704 red fox furs, or 54,080 squirrel pelts.[3] At the beginning of the 20th century, increased Chinese presence and global demand for furs put heavy pressure on Mongolia's wildlife. Central to trade then, as now, was the Siberian marmot. Records from the turn of the century show trade levels that were among the highest ever recorded, averaging more than 2.5 million furs per annum in the years leading to Mongolia's first revolution in 1911 (Figure 2).

Mongolia's revolution in 1921 brought with it a fundamental shift in trade from south to north, but not necessarily a respite from extreme harvests. Immediately following the change in power, existing trading companies were dissolved and replaced with Soviet-controlled entities who obtained the exclusive right to harvest and trade in all raw materials, including wildlife (Scharf and Enkhbold 2002). Mongolia continued to sell marmot furs and, with the addition of new species to official trade (e.g., red and corsac fox, wolf, wild boar, Mongolian gazelle, and red squirrel), was again approaching historic volumes (3.2 million in 1910, 1 million in 1922, and 2.5 million in 1927).

World War II was a mixed blessing for wildlife, halting trade in some areas and causing sharp increases in others. In the east, the Japanese occupation of Manchuria in 1931 and Inner Mongolia in 1937 effectively stopped all wildlife trade with China. To the north, however, Mongolia began supplying the Russian army with as much game meat and furs as it could process. Wildlife trade more than doubled from the mid–1930s to the mid–1940s and record harvest levels were documented for a number of species. Among the hardest hit were Mongolian gazelles, Siberian marmots, and even wolves (Avirmed 1999). As a result, the sustained harvest volumes continued from the 1920s until the 1950s, again reaching more than 3 million animals traded in a single year in 1953.

Aware of the need to curb uncontrolled harvest and trade, the decades following the 1921 revolution witnessed a flurry of related legislative activity. A general mandate to conserve and sustainably use wildlife in 1924 was followed in 1925 by the establishment of hunting license requirements for domestic and trophy hunters, with further amendments in 1926. A

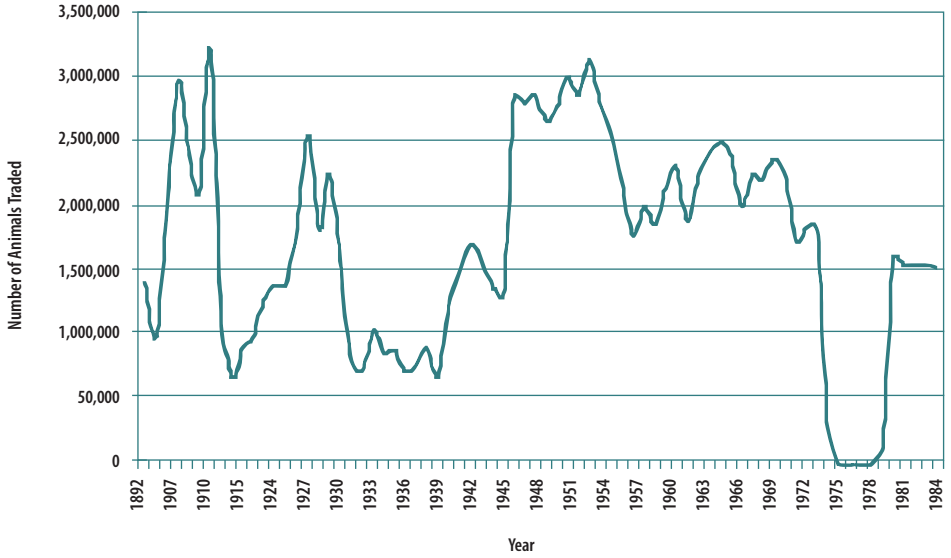
[3] Scharf and Enkhbold 2002, citing D. Avirmed, "Hunting and Wild Animal Conservation in the History of the Mongols" [Report], 1999.

year later, the rights to purchase and trade marmot furs were legally granted to a single cooperative, the Mongolian People's Commercial Cooperative. The 1930s saw prohibitions on the hunting of rare animals, fishing restrictions, and bans on the use of vehicles to chase antelope or use of military weapons for hunting.

However, not until the 1950s was Mongolia able to bring its wildlife harvest and trade within some form of nationwide management system. After a number of minor management shifts, hunters were eventually organized into brigades located in each soum and aimag center and managed by a Central Hunting Association. These brigades were fully vested with the power to harvest wildlife for official trade, as well as investigate and prosecute poaching incidents. Compared to today, they were impressively well-organized and outfitted. Khentii aimag alone boasted 12 hunting brigades with 604 members, 16 vehicles, and the funds to engage in hunting and enforcement patrols (Scharf and Enkhbold 2002). Official harvest levels dropped by almost 50 percent compared to the war years. For most species, the record harvests of the 1940s and 1950s were not to be seen again, at least until the 1990s. The exceptions were red fox, Mongolian gazelle, and wild boar, all of which either continued to climb or experienced substantial harvests even into the 1960s.

Ultimately, the long years of overhunting and uncontrolled trading forced the Mongolian government in the early 1970s to ban hunting of all species for international trade. Foreign experts were called in from Hungary and East Germany to assist with the study of wildlife populations and refinement of hunting management. In 1981, Parliament passed a long-needed piece of legislation requiring population surveys for all fish, birds, and mammals. For some species, official trade was never restarted. For others, the respite lasted five years, from 1975 to 1980. As relations between China and the Soviet Union softened, the opportunity to trade medicinal products to the south reopened, including red deer blood antlers and shed antlers, tails, genitals, and incisor teeth, and reindeer blood antlers (Scharf and Enkhbold 2002, citing data provided by the Central Hunting Association).

Figure 2: Total Annual Legal Wildlife Trade in Mongolia 1926–1985



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984; Adiya Ya., 2000.

Despite trade decreases for certain species and the hunting bans of the 1970s, wildlife trade continued to play a substantial role in the economy. Mongolia's trained, equipped, and organized hunting units diversified their activities, seeking out other species to exploit, while the Hunting Association found new markets to supply. Beginning in the late 1950s, Mongolia added roe deer, ground squirrel, lynx, Pallas' cat, mink, weasels, steppe polecat, tolai hare, pikas, and Mongolian gazelle to the official fur trade. Trading partnerships were established with Poland, Hungary, Bulgaria, and Romania. Efforts were even made to introduce certain wildlife populations; e.g., raccoon dogs (*Nyctereutes procyonoides*) in the eastern steppe and muskrat (*Ondatra zibethicus*) colonies along Mongolia's major rivers (Scharf and Enkhbold 2002). In 1981, fur exports accounted for 5 percent of Mongolia's foreign currency receipts, mostly from the sale of lynx, mink, muskrat, fox, and marmot (BBC 1982).

Unfortunately, Mongolia did not have the ability to extract full value from this resource. The country still had limited capacity to process furs and was thus forced to trade them at rates far below world market values. For example, marmot skins were traded for just 7 rubles, or $0.19 (Scharf and Enkhbold 2002). However, wildlife trade remained an economic force because of the sheer volume. In 68 years of recorded trading, Mongolia supplied its southern and northern neighbors with a total of 119 million pelts, 13 million kilograms of game meat, and 1.5 million tons of red deer antlers. Laid end to end, the furs would stretch some 34,000 km, easily circling the globe at the 45th parallel (Mongolia's latitude).

3. Wildlife Take and Trade Today

The collapse of the Soviet Union in 1990 and disbanding of the socialist trade network was the undoing of Mongolia's century-long effort to control wildlife trade. The economy halved, inflation skyrocketed, incomes fell to near zero, and store shelves emptied. Suddenly without funding or direction, Mongolia's biologists were no longer able to pursue the management objectives established only a few short years before, or conduct the research necessary to inform those activities. With no fuel, ammunition, or salaries, the erstwhile hunting brigades (Mongolia's only insurance against widespread poaching) fell apart. With no steady supply of furs and a wall of trade tariffs on the border with Russia, Mongolia's state-operated fur processing center was no longer able to function. In short order, the system Mongolia had worked long and hard to develop disintegrated.

Wildlife trade may have slowed as a result, but it did not stop. Virtually everyone was looking for a way out of sudden poverty and for many, wildlife—now unclaimed and unprotected—provided the answer. Small-scale traders started to fill the economic void, carrying easily concealed wildlife products south and north over the border. Red deer blood antlers and shed antlers, saiga antelope horns, marmot skins, squirrel skins—in short, anything that would fit in a bag or on a truck—started to leave the country. Ereen Khot, a remote and poorly connected border town in China, enjoyed a boom as Mongolian traders funneled into the city. Additional trading posts opened up all along the border to China, making it possible for the first time in 70 years for Mongolians across the country to trade conveniently with this enormous market. Relaxed gun ownership laws and rapidly increasing market values fueled a hunting spree that has continued to today. This study estimates that more than 250,000 Mongolians actively harvest wildlife for personal consumption, domestic, and international trade. More than 1 million Mongolians (38 percent of the total population) use wildlife in some form, either for personal consumption or trade. Wildlife trade has skyrocketed in volume and value; in 2004, it was worth as much as $100 million to the Mongolian economy.

The number of species affected by this growing trade has similarly increased. The list of Mongolia's

Red deer antlers transported by truck. Image: Michael Muhlenberg.

Mongolian truck returning to Mongolia from Ereen Khot, border town in northern China, after unloading trade goods. Image: Zhao Yao

endangered species targeted by this trade now includes snow leopard, brown bear, saiga antelope, taimen, wolf, musk deer, argali, Asiatic wild ass, saker falcon, Dalmation pelican (*Pelicanus crispus*), and great bustard (*Otis tarda*). The high harvest levels documented by this study also raise concerns for a host of other species. These include red deer, Siberian and Altai marmot, red fox, corsac fox, Mongolian gazelle, black-tailed gazelle, moose, roe deer, red squirrel, and Altai snowcock.

Changes in Management

Since the inception of the modern Mongolian state in 1921, management of wildlife harvests and trade changed hands a number of times. Incorporated as a component of state production, the Ministry of Trade and Industry had the responsibility for regulating harvests, with exports delegated to the Ministry of Foreign Trade. These responsibilities were later consolidated in the 1970s under the Ministry of Trade and Industry, and were later delegated to the Hunter's Association. This organization had responsibility until hunting management was moved the Ministry of Nature and Environment (MNE) in the late 1980s. Control over wildlife product exports became the domain of the Mongolian Central Customs Office. Through these shifts and reorganizations, wildlife management remained a recognized and important management exercise.

For the most part, institutional structures managing wildlife have changed little from their pre-1990 form. The MNE is still responsible for setting quotas pursuant to recommendations by the Academy of Sciences. Quotas are distributed to soum governments, which in turn are responsible for local implementation and enforcement. The Central Customs Authority and State Border Defense Agency control the borders and have the authority to confiscate illegal traffic. Joining the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) in 1996 has not changed this structure or the basic functions. The Academy of Sciences is the scientific authority and provides quota recommendations to the MNE, which has management authority.

However, there are important distinctions that make the present situation different from the past. In Mongolia's socialist period (1921 to 1991), hunting was an integral part of a managed system. Regular wildlife population surveys informed management; harvest numbers and trade values were well documented; gun ownership and ammunition supplies were tightly controlled; hunting management at the local level was well organized, equipped, and funded; and hunting quotas were strictly observed—including a total hunting ban in the early 1970s. Today, Mongolia's hunting law establishes general management principles, but it does little to regulate trade and is only marginally effective at controlling hunting. Funding constraints mean infrequent population surveys. Only a small percentage of actual harvest and trade values are recorded; Gun ownership records are admittedly inaccurate, ammunition is cheap and abundant, and current hunting bans have limited, if any, effect. For example, despite a total ban on marmot hunting, the State Border Defense Agency reports confiscating over 26,000 marmot skins by August 2005 (only three months into the post-hibernation period). In sum, while the former system did not ensure against

overhunting, it did effectively prevent the development of an uncontrolled market.

Becoming a member of CITES should have helped, at least for some species, but Mongolia's management practices either negate or fail to take advantage of benefits accruing from this convention. Fourteen species of wildlife occurring in the country are controlled by Appendix I of this convention, and another 47 species by Appendix II. Of these, 15 species from both appendices are actively traded on domestic and international markets. International trade in any of these species requires Mongolia to issue export permits subject to the harvest levels determined by the national scientific authority. Mongolia's CITES implementation regulation, however, is in contravention of the convention by granting the management body the authority to resolve disputes surrounding harvest quotas established by the scientific authority and effectively allowing the management authority to exceed harvest quotas. During this project, Academy of Science biologists and hunting companies both complained that quotas in recent years have been almost double the recommended levels.

Moreover, the benefits of using Appendix III of the treaty have gone unused. Appendix III is a list where individual countries can place a species if it has concerns about trade within or from its own country, regardless of its status in other countries. Trade in an Appendix III species requires a certificate of origin to assure other CITES members that the species did not originate in the listing country. Although CITES does not regulate domestic trade, member countries must observe CITES trade restrictions when participating in international trade of listed species. Appendix III listings would be appropriate for a number of species listed in the Mongolian Law on Fauna as "very rare" or "rare," but which otherwise have no status in CITES. These include Siberian ibex (*Capra [ibex] sibirica*), Ussurian (*A. a. cameloides*) and Yakut moose (*A. a. pfizenmayeri*), black-tailed gazelle, wild boar, Daurian hedgehog (*Mesechinus dauuricus*), Altai snowcock, and taimen. Appendix III might also be used to control trade in species experiencing rapid declines as a direct result of international trade. This list might include Siberian and Altai marmot, gray wolf, red fox, and corsac fox.

Without the necessary legal structure, and an increase in funds and personnel to monitor and control this market, Mongolia's wildlife managers have been fighting an impossible battle. The rapid population declines documented for several species across Mongolia are the inevitable result.

Changes in Take

The relaxation of gun ownership laws in 1995 and increasing supply of cheap ammunition have allowed far more individuals to harvest wildlife and in larger quantities than were ever imagined under the socialist system. In this study, more than 30 percent of all Mongolian males interviewed (949 of 3,119) claim to hunt wildlife. Weighted by age class, residency population statistics, and respondent residency, an estimated 245,000 Mongolians actively hunt today. This compares to the 25,000 envisioned under the Soviet-style hunting brigade system. This number translates into 1 out of every 10 citizens hunting, giving Mongolia a high hunter/non-hunter ratio relative to other countries (Table C7, p. 143). Almost 96 percent of hunter

Hunter in southern Tov aimag hunting Mongolian marmot despite the current ban. Image: J. Wingard

respondents said they own a gun (911 of 949), which extrapolates to 240,000 gun owners. Official gun ownership records from the State Police, based on tax receipts, document only around 30,000 gun owners nationwide. Over 70,000 people own traps, although there are no official data on the number and types of traps owned or used by hunters in Mongolia. The overwhelming majority of today's Mongolian hunters use a rifle; only 8 percent are trappers.

Hunter age quartiles show that almost half (44 percent) of all hunters are between the ages of 15 and 28, 30 percent are between ages 29 and 42, and 26 percent are 43 and older. Many hunters take multiple species (36 percent take two or more species, with a maximum of 12). For the most commonly hunted species, the number of hunters break down as follows: a majority of all hunters (61 percent; 139,000) target Siberian marmots; 40 percent (75,000) hunt gray wolf; 28 percent (44,000) hunt red fox; 24 percent (34,000) hunt Mongolian gazelle; 16 percent (29,000) hunt wild boar; 15 percent (25,000) hunt corsac fox; 12 percent (29,000) hunt roe deer; and 15 percent (>20,000) harvest fish (mostly taimen, lenok, arctic grayling, and whitefish). For the remaining species, the number of hunters drops off sharply—10 percent hunt tolai hare; only 5 percent harvest Altai marmots; 4 percent take red squirrel; 2 percent hunt red deer; less than 2 percent hunt wild ass, ibex, and brown bear; and less than 1 percent hunt argali. The smaller number of hunters, however, does not necessarily mean that their activities and harvests are unimportant —these hunters are often focusing on species that are already rare or endangered.

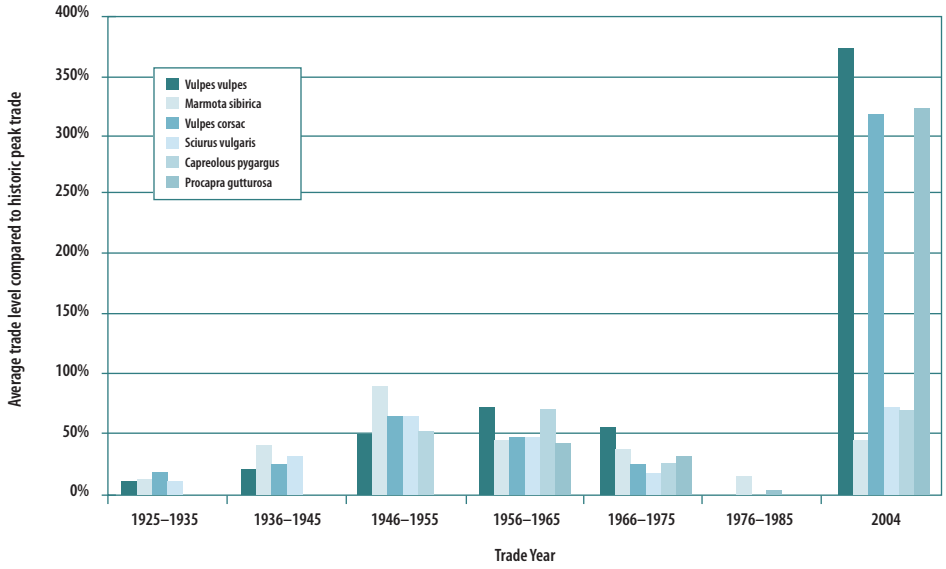
Using the estimated number of hunters and a mean harvest per hunter, we were able to calculate overall harvest volumes for most species recorded by the survey. The highest volumes were recorded for Siberian marmot. Despite a total harvest quota (commercial and subsistence) of only 100,000 for marmots in 2004, average harvests were approximately 53 Siberian marmots and 46 Altai marmots per hunter, with a maximum harvest of 1,000 claimed by one interviewee. Such large numbers were not included in our overall estimates of species offtake because they represent outliers. We estimate total marmot harvest volumes for both species in 2004 at over 3 million. This compares to an estimated harvest of 1 to 1.5 million in 1999 (ESBP 1999). Harvest volumes for other species were similarly astonishing. Red fox harvests averaged 4.7 per hunter and totaled more than 185,000 for 2004. Although targeted by fewer hunters, corsac fox averages were higher than red fox (likely due to higher market values for skins) at over 10 per hunter and a total harvest exceeding 200,000. Mongolian gazelle harvests were 6.5 per hunter, totaling more than 250,000 on the year. This compares well with an estimate of 8.3 per hunting family, 150,000 to 200,000 total from a previous WCS gazelle hunting survey on the Eastern Steppe performed in 2004 (K. Olson *pers. comm.*), and an estimate of 4.8 per hunter from a 1998 study by Reading et al. in the same area. Red squirrel harvests averaged 27.2 per hunter, with a maximum of 150 for one hunter and a total harvest volume of more than 170,000.

Comparing these results to historical trade volumes for certain species shows that current trade is equal to, and often orders of magnitude greater than, historic highs. The highest trade in red fox skins occurred in 1965 at 49,487; average trade volumes by decade never exceeded 75 percent of the maximum. This survey estimates that 2004 trade exceeded the historic trade volume peak by 270 percent. Corsac fox numbers are similar, with a past maximum trade level of 62,926 recorded in 1947, average trade was close to 50 percent of the high, and the 2004 estimate was more than 220 percent of the historic upper limit. Mongolian gazelle harvests peaked at 77,700 in 1962, averaging only 13 percent of the maximum trade volume in 13 years of recorded trade. Our 2004 estimates show Mongolian gazelle harvests exceeding 200 percent of the 1962 high. The following table compares historic averages for each decade from 1926 to 1985 with our harvest estimates for 2004 for selected species (Figure 3).

This study did not reveal any dramatic changes in the primary method of take for any species. The rifle has been and remains the preferred method for most mammals and birds, with some trapping of marmots (roughly 50 percent for *M. baibacina* but only 14 percent for *M. sibirica*), muskrat (40 percent), corsac fox (37 percent), red fox (18 percent), badger (10 percent), wolf (7 percent), and Mongolian gazelle (5 percent). We believe that at least some trapping occurs for both snow leopards and ground squirrel, but none of the survey respondents claimed to use this method.

Vehicle ownership (including motorcycles) is likely having an impact on hunter mobility and therefore

Figure 3: Average trade levels for selected species relative to historic peak trade volumes and compared to 2004 harvest estimates



Source: Mongolian Academy of Sciences, Institute of Biology, Historic Trade Records, and Wildlife Trade Study Survey Results

overall harvest levels, but the results vary depending on the species analyzed. For example, data analysis shows only a slightly higher mean take for wolf hunters that own a vehicle (5.63/hunter/yr) compared to those not owning a vehicle (4.67/hunter/yr).[4] Similarly, red fox hunters owning a vehicle had only marginally higher harvest levels (7.68/hunter/yr) than those with no vehicle (6.71/hunter/yr). For Mongolian gazelle, mean hunter harvests for vehicle owners was surprisingly lower (5.58/hunter) compared to non-owners (7.26/hunter/yr). This result probably reflects low vehicle ownership rates in the countryside and the sharing of transportation, rather than a difference in hunting methods. Mongolian gazelle are typically hunted from a vehicle or from the back of a motorcycle. For Siberian marmots, mean take was significantly higher in certain areas (particularly the eastern steppe region)—62.13/hunter/yr with a vehicle compared to 42.35/hunter/yr with no vehicle. Vehicle ownership also appeared to significantly affect harvest levels for corsac fox (15.93/hunter/yr with a vehicle vs. 10.93/hunter/yr with no vehicle) and brown bear (10.00/hunter/yr with a vehicle vs. 7.30/hunter/yr with no vehicle).

Changes in Trade

The opening of the wildlife trade market has translated Mongolia's collapse in management into an open season on all economically important wildlife in the country. The open and accessible market directly feeds an increased demand for wildlife products, as well as an increase in the types and values of the species traded, both domestically and internationally.

Recorded growth in Mongolia's international trade since 1990 has been strong, exceeding $600 million for the first time in 2003. Wildlife trade has been a part of this growth, even if the full volume has never been documented. Not surprisingly, China is Mongolia's largest international trading partner for all types of products and, with its population of 1.2 billion and an average economic growth of more than 8 percent per year, it simply dwarfs the demand and purchasing power of the former Soviet state. Individu-

[4] Mean take for wolf in this analysis was derived from hunter respondents and may not be accurate due to apparently inflated estimates given by hunter respondents to the survey.

Roadside stand in Emeelt Market advertising marmot, red fox, corsac fox, and wolf skins despite the ban on marmot hunting or lack of any legally issued quota for either fox species. Image: J. Wingard, August 2005

als queried in this survey indicated that most wildlife trade goes to China, with limited amounts going to Russia, Korea, and Japan.

The most visible change in Mongolia's international wildlife trade is the increase in the number of species traded. While still under the political control of the Soviet Union, trade focused on a limited number of species (24 species), primarily for fur (17 species); during and for a short while after World War II, game meat (4 species); and, with the easing of Sino-Soviet tensions, a few medicinal products (3 species). Today, however, Mongolia offers a larger wildlife menu of 34 species to the international community, including many that are globally endangered. These include 14 mammals for the fur trade—red squirrel, American mink, sable, stone marten (*Martes foina*), Eurasian otter, muskrat, Eurasian lynx, ground squirrel, Eurasian badger, red fox, corsac fox, Siberian marmot, Altai marmot, and snow leopard. Another three species are for the medicinal trade—saiga antelope, brown bear, and musk deer. Two species are primarily for trophy hunting—argali and Siberian ibex. Red deer and gray wolf both have multiple trade purposes. Red deer are sold to international trophy hunters and harvested for the medicinal properties of their antlers, genitalia, and tail. Wolf are sold stuffed as trophies, or their skins as decoration, and their teeth, ankle bones, and other parts are important to traditional medicine.

Driving the increase in trade volumes are the never-before-seen prices paid by traders. Marmot skins sold to Russia for $0.19 per pelt in the 1980s now sell for fifty times as much on the Chinese border. A good wolf skin can command as much as $250 compared to just $5 twenty years ago. Red fox skins have gone from $4 to as much as $18 in the last decade. Corsac fox has jumped from $1 to $28 per skin. Lenok and Siberian whitefish both sell for as much as $3 per kilo to markets in China. An average elk shed antler fetches $18 per kilo, blood antler $70 per kilo, genitals $30, and tail $30. Musk deer pods sell for as much as $45 per 100 grams. One brown bear gall bladder brings $250, the skin $100, and the paws $50 apiece. A Eurasian lynx skin is $30. Live saker falcons are on the market for $2,500 per bird. The only species still selling for relatively low prices are muskrat, which can be found on the market in Russia and China for only $1 to $2 a skin, and Pallas' cat, which sells for $3 at the market in Mongolia. These increases are certainly welcome as the percentage of Mongolians living below the poverty level has increased since the early 1990s, growing from 13 percent in 1995 to over 35 percent in 2000.[5]

With the opening of Mongolia's once closed borders, legal and illegal international trade has become much easier. Along its southern border, arguably the most important for wildlife trade, Mongolia has 10 seasonal border trade points (open at certain times each month), most of which are remote and severely understaffed. Survey results show that all of these are important to wildlife trade, with no particular crossing more important than another. In an effort to at least slow illegal traffic, the Central Customs Authority deliberately does not publish opening and closing schedules for each area. However, this is not enough to really hinder the organized network of traders operating on both sides of the border, who simply use cell phones to alert each other to border openings (*pers. comm.* wildlife trader in northern China). To the north, there are nine permanent stations equally understaffed and ill-equipped. The most well-known and heavily used by traffickers is the Khankh station immediately north of Lake Khuvsgul. Chronic understaffing makes this border point especially susceptible to illegal trafficking. Of the 21 official

[5] Figures based on statistics provided by the UN Common Database at http://globalis.gvu.unu.edu.

border crossings, only two, Zamiin Uud in the south and Altanbulag in the north, have even marginal capacity to investigate and control illegal trafficking. Wildlife traders in China explained that they can and do circumnavigate the Zamiin Uud station. Traders to the north primarily use the Khank station, but other crossing points also factor into trade flow.

Operating alongside international trade is a burgeoning domestic wildlife market. While the age-old barter system continues, a new economic opportunity has blossomed for entrepreneurs across the country—providing wildlife products at a price. Urban city dwellers (more than half the population) are now able to buy wild game meat, furs, and medicinal products at outdoor markets in almost every one of Mongolia's 329 soum centers, including several markets located in and near the capital city.

Once relatively rare, several species of fish can now be found at domestic markets, including taimen, river perch (*Perca fluviatilis*), Amur catfish (*Silurus asotus*), northern pike (*Esox lucius*), lenok (*Brachymystax lenok*), Siberian whitefish (*Coregonus* spp.), Potanin's osman (*Oreoleuciscus potanini*), the (introduced) common wild carp (*Cyprinus carpio*), Siberian grayling (*Thymallus arcticus*), and a species of lamprey (*Lethenteron reissneri*). Wild game meat has also become a common commodity, including black-tailed gazelle, moose, Mongolian gazelle, wild boar, roe deer, Tibetan hare, as well as gray wolf and corsac fox meat for medicinal purposes. Specialty items from certain species can also be purchased locally, such as argali horns, ibex horns, moose trophies, brown bear skins, gall bladders, and paws; as well as trophies, such as snow leopard skins, Eurasian lynx skins, sable fur, beaver skins, roe deer skin and blood, Daurian hedgehog live specimens, and Gobi-Altai mountain vole (*Alticola barakshin*, for medicinal purposes). Mongolia's bird species are also traded at domestic markets. Altai snowcock and ptarmigan meat are consumed for their medicinal properties. In addition, great bustard, black grouse, and Daurian partridge are sources of game meat. Other species and products include eagle trophies and beaks, Northern raven, Dalmatian pelican beaks, and snowy owl.

Similar to the international market, domestic prices have steadily increased over the last decade, making it a lucrative business for many. For example, marmot meat had a market value of $1.50/kg in 2004, a price that has doubled since the hunting ban instituted in 2005. Asiatic wild ass had no known market value, but can now be purchased for $0.80/kg in soum centers, black markets, and local container shops. Roe deer blood, corsac fox meat, Yakut moose meat, and many other local wildlife products are all now for sale. Taimen filets, once unknown in Ulaanbaatar's restaurant, now sell for $10.00/plate. For a complete list of wildlife products and prices compiled during the survey, see Table C3: Wildlife Product Market Values by Species, p. 140.

Ranking of Species In Order of Importance to Take and Trade

The following short tables rank the top 10 species in order of their importance to six aspects of take and trade: (1) estimated number of hunters that target the species; (2) mean annual harvest per hunter; (3) estimated total harvest in 2004; (4) estimated potential domestic trade value per animal; (5) estimated total trade value in 2004; and (6) official trophy hunting permit and license fees. Data have been extracted from Table C3: Wildlife Product Market Values by Species) on p. 140, Table C4: Estimate of total number of hunters weighted by age class) on p. 142, and Table C8: Estimates of the total number of hunters and harvests by species) on p. 144.

The core species in Mongolia's wildlife trade are those that appear in almost every ranking. These include Siberian marmot, gray wolf, corsac fox, red fox, Mongolian gazelle, roe deer, and red squirrel. Interestingly, of these species, only one (gray wolf) also appears in the ranking of domestic trade value per individual animal (Table 4, but see below). The key to their ranking as core species is volume. Although comparatively low in value, these species are all hunted in large volumes by thousands of hunters across the country. By comparison, species with the highest domestic values rarely represent significant income levels.

In all but two rankings (Table 4, value per animal and Table 6, trophy value), Siberian marmot is the lead species—hunted by more people, with the largest take per hunter, and having the largest trade volume and total trade value. Closely linked is the Altai marmot, which is second behind Siberian marmot for

mean annual harvest per hunter. It does not appear as high in the other rankings because there is only a small population in the country (in the western Altai Mountains). It is nonetheless targeted by the market and may in fact be more at risk because of its smaller population. Gray wolf also figures prominently in Mongolia's trade equation because of the high number of hunters, moderately high market values, and harvest levels, all combining to make it one of the more lucrative trade species. From our data, wolf ranked eighth in mean annual harvest per hunter, estimated total harvest volume, and estimated total trade value. However, the harvest levels estimated by hunters in the survey appear to be substantially higher than the total estimates for wolf populations in the country and have therefore not been included in the final estimates. Corsac fox ranks second in total trade value for reasons similar to the gray wolf. A high number of hunters each taking a large number of animals every year are enough to place it fifth in overall trade volume and second in total trade value.

Table 1: Ranking of species by estimated number of hunters that target the species

No.	Scientific Name	Common Name	Estimated Number of Hunters in Mongolia
1.	*Marmota sibirica*	Siberian marmot	139,000
2.	*Canis lupus*	Gray wolf	75,000
3.	*Vulpes vulpes*	Red fox	44,000
4.	*Procapra gutturosa*	Mongolian gazelle	34,000
5.	*Capreolus pygargus*	Roe deer	29,000
6.	*Vulpes corsac*	Corsac fox	25,000
7.	*Sus scrofa*	Wild boar	20,000
8.	*Sciurus vulgaris*	Red squirrel	6,500
9.	*Cervus elaphus*	Red deer	5,000
10.	*Lynx lynx*	Eurasian lynx	3,000

Table 2: Ranking of species by reported mean annual harvest per hunter

No.	Scientific Name	Common Name	Mean Annual Harvest per Hunter
1.	*Marmota sibirica*	Siberian marmot	53.6[6]
2.	*Marmota baibacina*	Altai marmot	46.8
3.	*Sciurus vulgaris*	Red squirrel	27.2
4.	*Vulpes corsac*	Corsac fox	10.2
5.	*Procapra gutturosa*	Mongolian gazelle	6.5
6.	*Ondrata zibethicus*	Muskrat	5.3
7.	*Vulpes vulpes*	Red fox	4.7
8.	*Equus hemionus*	Asiatic wild ass	4.2
9.	*Gazella subgutturosa*	Black-tailed gazelle	3.0
10.	*Capreolus pygargus*	Roe deer	2.7

6 Mean annual harvest taken from eastern steppe region. Lower harvest rates were recorded for areas with minimal distribution resulting in an adjusted nationwide mean harvest rate of only 23.6 as shown in Table C8.

Table 3: Ranking of species by estimated total harvest volume in 2004

No.	Scientific Name	Common Name	Estimated Trade Volume
1.	*Marmota sibirica*	Siberian marmot	3,000,000
2.	*Procapra gutturosa*	Mongolian gazelle	250,000
3.	*Vulpes corsac*	Corsac fox	200,000
4.	*Vulpes vulpes*	Red fox	185,000
5.	*Sciurus vulgaris*	Red squirrel	170,000
6.	*Capreolus pygargus*	Roe deer	100,000
7.	*Marmota baibacina*	Altai marmot	66,000
8.	*Sus scrofa*	Wild boar	30,000
9.	*Cervus elaphus*	Red deer	6,000
10.	*Equus hemionus*	Asiatic wild ass	4,500

Table 4: Ranking of species by domestic trade value per animal[7]

No.	Scientific Name	Common Name	Domestic Market Value ($)
1.	*Pelecanus crispus*	Dalmatian pelican	2,000.00
2.	*Ursus arctos*	Brown bear	1,340.00
3.	*Cervus elaphus*	Red deer	985.00
4.	*Alces alces pfizenmayeri*	Yakut moose	900.00
5.	*Ovis ammon*	Argali	515.00
6.	*Alces alces cameloides*	Ussurian moose	400.00
7.	*Canis lupus*	Gray wolf	310.00
8.	*Equus hemionus*	Asiatic wild ass	300.00
9.	*Uncia uncia*	Snow leopard	272.00
10.	*Sus scrofa*	Wild boar	200.00

[7] Includes values for all products derived from the species that are not exclusive of other products or uses. For example, red deer values include the sale of blood antlers, but not mounted trophy. Estimates also include substitute values for meat. For example, *S. scrofa* did not appear in our market survey results; however, the meat has value as a substitute for purchasing domestic meat on the market or consuming domestic livestock.

Table 5: Ranking of species by estimated potential total trade value in 2004

No.	Scientific Name	Common Name	Estimated Trade Value[8] ($)	Primary product
1.	*Marmota sibirica*	Siberian marmot	30,000,000	skin
2.	*Procapra gutturosa*	Mongolian gazelle	8,500,000	game meat
3.	*Sus scrofa*	Wild boar	6,000,000	game meat
4.	*Vulpes corsac*	Corsac fox	5,600,000	skin
5.	*Cervus elaphus*	Red deer	4,900,000	medicinal
6.	*Marmota baibacina*	Altai marmot	4,600,000	skin
7.	*Capreolus pygargus*	Roe deer	4,500,000	game meat
8.	*Vulpes vulpes*	Red fox	3,500,000	skin
9.	*Equus hemionus*	Asiatic wild ass	900,000	game meat
10.	*Sciurus vulgaris*	Red squirrel	360,000	skin

[8] Values based on market (or substitute) values paid in Mongolia for the primary product (typically game meat and/or skin) and do not include values for trophy hunting. For an explanation of substitute values, see Table C3.

Table 6: Ranking of species by trophy hunting permit and license fees

No.	Scientific Name	Common Name	Permit and License Fees ($)
1.	*Ovis ammon ammon*	Altai argali	18,000.00
2.	*Ovis ammon darwini*	Gobi argali	9,000.00
3.	*Falco cherrug*	Saker falcon	4,600.00
4.	*Capra sibirica*	Siberian ibex	1,000.00
5.	*Cervus elaphus*	Red deer	900.00
6.	*Alces alces pfizenmaryeri*	Yakut moose	900.00
7.	*Capreolus pygargus*	Roe deer	900.00
8.	*Sus scrofa*	Wild boar	400.00
9.	*Canis lupus*	Gray wolf	400.00
10.	*Procapra gutturosa*	Mongolian gazelle	300.00
11.	*Gazella subgutturosa*	Black-tailed gazelle	300.00
12.	*Hucho taimen*	Taimen	150.00–300.00

Trade Chains, Markets, and Enforcement Opportunities

We identified five different trade chains active in Mongolia: (1) hunters to domestic end users; (2) hunters to domestic markets; (3) hunters to domestic processors; (4) hunters to cross-border markets; and (5) hunters to the international trade chain. (Figure 4: Diagram of Trade Chain Types, p. 40)

Trade Chain 1: The first and shortest chain consists of individual hunters and anglers supplying wildlife products directly to end-users. This chain, sometimes referred to as an informal network, consists of individuals obtaining wildlife products of all types (fur, game meat, medicinal products) from friends or relatives who hunt. It is probably the oldest form of wildlife trade in the country and is still an important part of trade in several species, including marmot, roe deer, moose, red deer, most fish species, Altai snowcock, etc. However, the advent of a market economy has added a new twist to the trade, especially for fish where anglers catch and sell directly to consumers. This chain is the least susceptible to enforcement: volumes are small and dispersed, and actual trade occurs in residences or areas that are impossible to monitor effectively. A second variant of this trade chain, however, occurs at roadsides and is easily visible to enforcement personnel.

Trade Chain 2: The burgeoning domestic market has created a second trade chain one step removed from the first. Instead of supplying consumers directly, hunters bring wildlife products that require little or no processing (fish, unprocessed skins, meat, and animal parts) to small local markets and restaurants for resale to local consumers. For many, the costs and risks of transporting goods (often perishable) are outweighed by the benefits of a central market with ready buyers and consumers. The majority of outdoor markets surveyed in the wildlife trade study offer marmot meat. Also common were Mongolian gazelle, black-tailed gazelle, wild ass, Altai snowcock, taimen, and several other species of fish. A number of other species and products make up the remainder of this market chain, including eagle owl, brown bear oil and meat, and marmot oil. This second chain also has an international component where some products, (such as furs from wolf, lynx, fox, snow leopard, horns from ibex and argali) are marketed to international tourists who then transport them across borders as souvenirs.

Enforcement opportunities are much better with this degree of trade formalization. Even small markets have fixed locations and larger ones are sometimes staffed with inspectors responsible for enforcing trade regulations. However, actual enforcement here is still relatively weak. With the exception of illicit trade items such as snow leopard skins or musk deer pods, traders openly display pelts of all types and are generally willing to show them on request. Some traders are even eager to show not only what they have at the market but stockpiles of skins kept in containers or at home. The current marmot hunting ban has had only a limited effect on the marketing of marmot at the Ulaanbaatar train station—anyone interested in buying marmot can easily locate containers or stalls with available product.

International transport of illegal wildlife products by tourists also presents relatively simple enforcement opportunities. For the most part, tourists are not traders and are rarely willing to risk trouble at border points. Appropriate information on trade regulations and wildlife products at ports of entry (an activity already sponsored by WWF-Mongolia), in tourist shops, or other destinations frequented by tourists, will

Young Mongolian entrepreneurs selling fish on the Orkhon River. Image: J. Wingard, June 2005.

Emeelt Market approximately 45 kilometers to the west of Mongolia's capital city, Ulaanbaatar, is a major collecting point for wildlife products arriving from the western aimags. Image: J. Wingard, August 2005.

likely have a positive impact on this type of trade. For those not deterred, customs authorities are sufficiently equipped to monitor this type and volume of trade.

Trade Chain 3: The third trade chain feeds domestic processors, who in turn sell to local markets for domestic consumption. This is virtually the only "value-added" component of any trade chain in operation in the country. The past several years have seen a growing number of small fur processors in operation in Ulaanbaatar who accept wildlife pelts. Processed furs are sold in tourist shops and at black markets in Ulaanbaatar to Mongolians and international tourists. Surprisingly, this chain has also ventured into the processing and sale of Asiatic wild ass meat (turned into sausages) despite the species' status as "rare" under the Law on Hunting and the prohibition on take or trade for personal or commercial purposes. This third chain shares the same fixed location and international trade components as the second, and therefore has the same enforcement opportunities.

Trade Chain 4: The fourth chain consists of individual harvesters who sell directly across the border to markets in Russia and China. These harvester/traders may collect from other hunters, but individual volumes are relatively small and tend to center on trade of easily concealed medicinal products such as bear gall bladders, musk deer pods, or red deer blood antlers. Survey respondents informed us that most trade goes to China, and surveys completed in shops along the border confirm this trade path. Korean and Japanese traders apparently buy some quantities of medicinal products; however, their activities appeared to be restricted to the larger trading centers around Ulaanbaatar, and their overall presence in survey responses was minimal. Shop owners in border towns in China stated that they often buy small quantities of products directly from Mongolians, with the primary trade occurring in the fall and winter. While this trade is difficult to track, enforcement opportunities exist on both sides of the border where Mongolian traders cross into China with illicit goods. It appears that most, if not all, of this trade passes through official border points. Up to now, traders have been able to rely on the volume of border traffic and ill-equipped and complicit customs authorities to escape detection.

Trade Chain 5: The fifth type of trade chain, and the one through which the largest volume of wildlife passes, consists of both professional and amateur hunters harvesting wildlife in remote areas and bringing their products to various collecting or trade points depending on accessibility. Smaller collection points will typically transport items to a larger market such as Ulaanbaatar. It then will be sold to an international buyer, packaged, and shipped across the border, often concealed under other goods such as scrap metal. Once across the border, the products disperse quickly to processors, markets, and finally to the end users, at which point the product and its origin are virtually untraceable. Given the difficulties with patrolling vast hunting areas or trying to track goods in transit, enforcement is usually best focused on these trade markets, collection points, and to the extent they are used, regular border crossings.

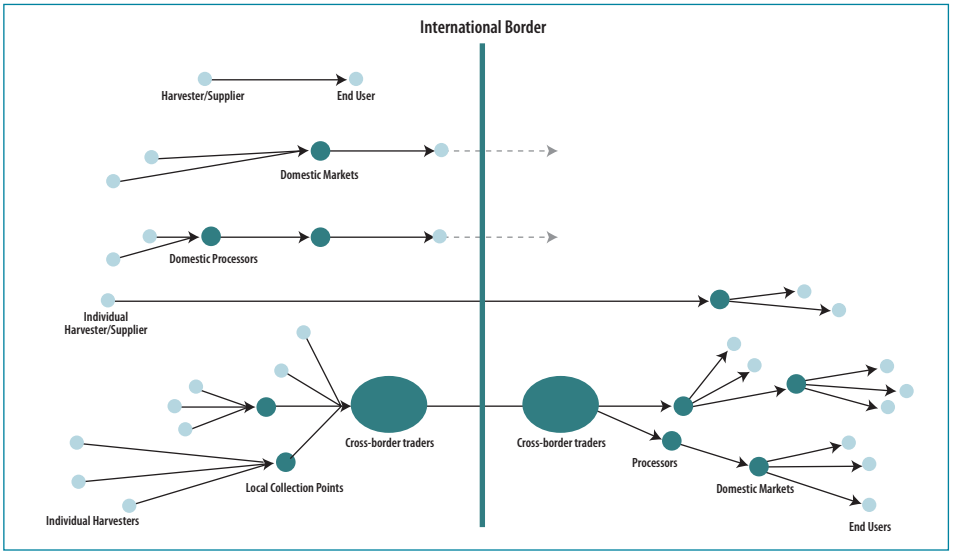
Mongolia has several well-known wildlife trade markets and many collecting points throughout the country. Almost every soum center hosts at least one individual who acts as a collector for others in the area. Despite the illegal status of most trade, who this person is and where they are located are not secret. Three of the largest markets/collection points are located in and around Ulaanbaatar. The Tsaiz market is the largest inside city limits. Another three markets inside Ulaanbaatar's city limits (Naraan Tuul, Khuchit Shonkhor, and Kharhorin) play a lesser role in wildlife trade, for the most part selling to the domestic market and international tourists. Another market near Ulaanbaatar's train station sells game meat, in particular marmot. Despite the ban, it continues to operate, albeit in a somewhat more concealed manner, but certainly taking advantage of increased prices due to the scarcity of product. Beyond the Tsaiz market, the next largest markets are outside the city approximately 45 kilometers, one on the east side (Nalaikh) and one on the west (Emeelt). These two markets serve as major receiving areas for nearly all wildlife and domestic animal products coming from eastern and western aimags. In addition to these, there are well-known markets located in Choibalsan, Baganuur, Tunkhel, Govi-Altai, Mongonmort, and Erdensant. Each of these markets represents a major collecting point from which products travel directly to the border with some potential for additional transfer to the Ulaanbaatar markets.

The volumes of wildlife passing through these markets have been high, but exact amounts are difficult to verify. One trader at the Tsaiz market reported total sales in 2004 of 500,000–600,000 marmot skins, 50,000 wolf skins, and 50,000 each for red and corsac fox skins. He also admitted trade in small quantities of medicinal products without estimating total volumes. There is no way to test the validity of these estimates other than comparison with this study's harvest estimates. With the exception of gray wolf trade, all appear plausible. The numbers of gray wolf pelts may have been exaggerated, similar to harvest estimates, or may reflect trade coming from Russia's Siberian forest region and moving through Mongolia. Interviews with other traders in the Nalaikh and Emeelt markets outside the city were less productive; enforcement actions presumably made them less willing to answer questions. However, traders who did respond reported selling skins of all types by the thousands.

Wildlife markets and collecting points in Mongolia are relatively susceptible to enforcement. For the most part, they are open, easily accessible, and wildlife products are sometimes openly displayed and advertised. The exceptions are small, highly valuable trade items associated with medicinal trade such as bear gall bladder or musk deer pods, or with illegal fur trade such as snow leopard skins. This trade is jealously guarded. Traders of these products tend to be wary of outsiders and deal principally through established connections and with known customers. As a result, attempts to question them about this trade were generally unsuccessful.

With all forms of trade that cross the border, Mongolia can and should seek additional international assistance and cooperation. CITES provides a mechanism for increased international enforcement by allowing a country to designate any species of national concern in Appendix III. Export of the species requires an export permit from Mongolia's CITES Management Authority (the Ministry of Nature and Environment) and would be subject to the harvest levels determined by the national scientific authority (Mongolian Academy of Sciences). Parties to the convention are on notice that trade in such species without the appropriate documentation is illegal. Effectively using Appendix III listings can increase enforcement opportunities for species that, while banned in Mongolia, are still legally traded in neighboring countries such as China.

Figure 4: Diagram of Trade Chain Types in Mongolia



Explanatory Note to Figure 4: This figure graphically represents the five trade chains identified during the wildlife trade study. The left side represents the starting point of trade in Mongolia, with the small gray circles as the wildlife harvesters. The right side, separated by a bold line, represents the international trade elements. Each line corresponds to the descriptions provided in this section. The size of the circles is intended only to generally indicate the volume of trade associated with the type trade chain depicted.

Known and Probable impacts

Wildlife trade is causing severe population declines. There is near unanimous agreement among hunters, traders, and biologists in Mongolia that continued wildlife trade at the volumes reported is unsustainable. In the absence of other factors, the recorded declines appear to be directly linked to trade.

While the causes of decline have been attributed to several factors—including infrastructure development, conversion of habitat for agriculture, overgrazing, competition for forage, and mining—the most serious and immediate threat is overhunting, most of it illegal. In Mongolia, infrastructure development is still limited to a few urban areas where wildlife conservation is not a concern. The reported increases in agricultural land uses are an unlikely culprit in species declines—Mongolia is an arid country with less than 1 percent of the entire country suitable for agriculture, most of which is centered in the Selenge River basin. Even if all appropriate land had been converted to agricultural production, the increases would not have affected significant percentages of wildlife habitat for any species occurring in Mongolia and would not adequately explain the 50 to 90 percent declines documented for some species. The increase in livestock over the last 15 years is certainly cause for concern, but few studies have assessed the degree to which either overgrazing and competition for forage are affecting wildlife. Two studies report significant dietary overlap between domestic sheep and goat and argali (G. Wingard 2005) and Mongolian gazelle (Campos-Arceizi et al. 2004). While both studies hint strongly at the potential for competition, neither has concluded that this would have any significant impact on wild ungulate numbers.

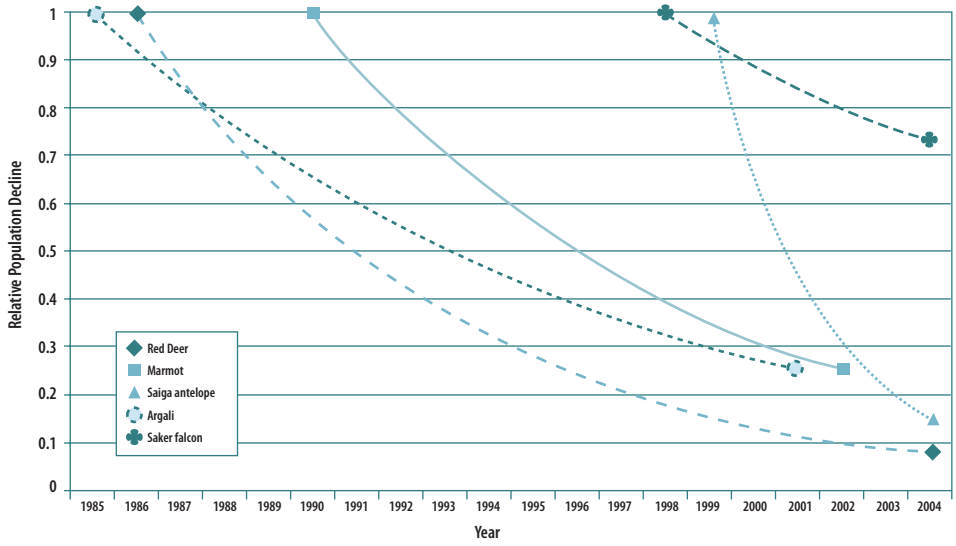
Meanwhile, Mongolia's wildlife is being hunted by the millions. This study estimates that 220,000 to 250,000 Mongolians actively harvest wildlife for personal consumption, domestic and international trade. More than 1 million Mongolians use wildlife in some form. Wildlife trade has skyrocketed in volume and value, and in 2004 was worth as much as $100 million to the Mongolian economy. Volumes include over 3 million marmots annually, 250,000 Mongolian gazelles, 200,000 corsac fox, 185,000 red fox, 170,000 red squirrel, 100,000 roe deer, 30,000 wild boar, 6,000 red deer, 4,500 Siberian ibex, and 3,000 Asiatic wild ass.

The associated declines have been rapid and drastic. Population surveys conducted over the last 30 years record dramatic declines for a suite of species, all of them of economic importance. Siberian marmots, numbering over 40 million in the wild in the 1940s, had dwindled to only a few million by 2002 (Batbold 2002); as few as 170,000 were reported for the eastern steppe in 2005, a region that once counted millions (Townsend and Zahler *in press*). Red deer were 130,000 strong in 1986. Twenty years later, there are only 8,000 to 10,000—a 92 percent decline in 18 years. Argali populations were recorded at 60,000 in 1985, but only 15,000 in 2001—a 75 percent decline in 16 years. Saiga antelope, counted at 2,500 in 1998, decreased about 50 percent in seven years (WWF 2004, Amgalan *pers. comm.*). Even the saker falcon, which in 1999 numbered 3,000 breeding pairs in Mongolia, had been reduced to 2,000 breeding pairs by 2004 (Shagdarsuren et al. 2004) (Figure 5).

Anecdotal evidence suggests the same is happening to other wildlife species for which only limited population data are available; a trend that, however unstudied, is fully known by Mongolians across the country. During the course of this survey, hunters frequently commented that red squirrels have all but disappeared from many forests. They complain that red and corsac foxes are becoming harder to find. They also state that roe deer, brown bear, black-tailed gazelle, and musk deer are all vanishing. When asked to characterize the wildlife resource, hunters and non-hunters expressed concern that unbridled hunting around the country is emptying the landscape. The vast majority of respondents (96 percent) believe that Mongolia's wildlife resources are fast disappearing, accurately reflecting the status of those few species for which population data are available (Figure 6).

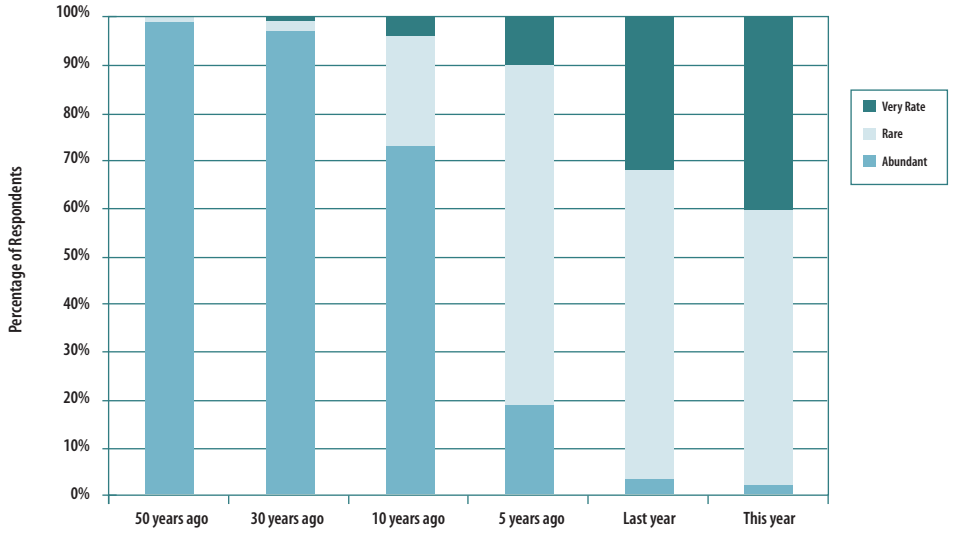
Traditional medicine at Urumai market, China. Image: Dr. Richard Reading.

Figure 5: Relative Rates of Decline for Selected Species in Mongolia



Source: Batbold 2002; Shagdarsuren et al. 2004; WWF 2004; Lhagvasuren 2001; Dulamtseren 1970.

Figure 6: Public Opinion Poll—Status of Wildlife Resources in Mongolia



Source: Results of Household Consumption Survey, asking public perception of wildlife resource over last 50 years. N=3,860

There are two exceptions to this trend in public perception. The first is the perceived increase in wolf numbers. However, even here, many Mongolians recognize that the decreasing wildlife prey base would result in wolves shifting to livestock, therefore giving the false impression of increased numbers. In fact, evidence from offtake numbers and research efforts suggest that wolves are almost certainly declining in number. Notably, a recent international study of wolves in the Gobi ended before it could begin when researchers discovered that the wolf populations present in the study area the year before had been almost completely hunted out (C. Walzer *pers. comm.*). Another recent attempt to perform a study on live wolves in Dornod Aimag had researchers count a total of 53 wolves killed by hunters during a three-day period within their study area (K. Olson *pers. comm.*).

The second exception to the trend in public perception is the recognition by older respondents that wildlife resources 30 to 40 years ago were also low due to overexploitation, had recovered somewhat in the 1970s and 1980s, only to sink again with the latest onslaught of hunting. This shifting baseline in public perception highlights the need for increased public awareness not only about the current fate of many species, but the history of trade, its impact on wildlife, and management lessons learned.

The rapid decline in wildlife is likely to have a cascade effect across Mongolia's ecosystems. "Cascade effect" refers to the myriad impacts the decline or ecological extinction of a species has on other species that depend on it or share its habitat. The basic principle is that declining or ecologically extinct species no longer serve their role in the ecosystem (even though some may persist) by providing a source of food and/or shelter, altering vegetation composition, or serving additional functions that affect the survival of other species. The decline of prey species can lead to prey switching by predators, for example when wolves turn from wild prey to livestock. Alternatively, the loss of larger predators such as wolves can lead to meso-predator release where smaller predators become abundant and increase predation, causing declines in a variety of small prey species.

Cascade effects have been documented in several places around the world. Perhaps most similar to Mongolia's current situation with marmots is the loss of prairie dogs (Rodentia: *Cynomys* spp.) from over 95 percent of their range in the grasslands of North America. At least nine other species depend directly on prairie dogs or their activities to some extent, and another 137 species are associated opportunistically (Kotliar et al. 1999). Among other species affected, prairie dog declines caused the ecological and near-

An enormous and now silent marmot colony in Mongolia's eastern grasslands. Once filled with marmots, all the burrows in this photo are empty. Image: K. Olson

complete extinction of black-footed ferrets (*Mustela nigripes*). In another example, wolf reintroductions in Yellowstone National Park have highlighted the importance and complexity of cascade effects: the reintroduction of wolves has affected at least 16 vertebrates in ecologically important ways, including the decrease in smaller predators (coyotes, *Canis latrans*), increase in scavengers, and shifting of elk distribution and habitat use resulting in changes in vegetation composition (e.g., regrowth of riparian willows) and a consequent increase in the density of songbirds dependent upon this habitat for nesting (Berger and Smith 2005).

Marmot declines are likely to have similar cascade effects to those documented with prairie dog losses. Marmots play an important role in the overall structure and health of the steppe and mountain ecosystems they inhabit and as such, are likely a "keystone species" (Puzansky 2004, Zahler et al. 2004). These subterranean architects burrow into the ground, bringing soil to the surface, recycling nutrients, and aerating the soil. Their burrows provide shelter for many native species, including ground squirrels, pikas, hedgehogs, mustelids, foxes, and Pallas' cat (Adiya 2000, Zahler et al. 2004). Their selective feeding habits affect the diversity and composition of vegetation. They are also an important food source for a wide number of raptors and carnivorous mammals, such as eagles, buzzards, wolves, snow leopards, foxes, steppe polecats, and brown bears.

Given the central role of marmots in defining the landscape, creating shelter for several species of birds and mammals, and providing a source of protein for Mongolia's carnivores, the serious decline in marmot populations is likely to have an impact on Mongolia's biodiversity as a whole. Declines in other species may also have unexpected cascade effects across Mongolia's ecosystems.

Rapid wildlife declines are forcing the Mongolian government to implement crisis management measures that are often hastily designed reactions to complex problems, are costly to implement, and have a low likelihood of success. Today's harvest levels are similar to or greater than those that prompted the Mongolian government to ban wildlife harvests in the 1970s, and are again forcing the government to adopt crisis management measures. Commercial hunting of Mongolian gazelle was banned in 2001, marmot hunting was banned altogether in 2005 for two years, red deer trophy and subsistence hunting was banned in 2000, and there has been some thought given to banning taimen fishing. Bans have also been in place since 1995 for all species classified under Mongolian law as "very rare." Despite this classifica-

Taimen. Image: Zeb Hogran

tion and associated hunting ban, several species from this category continue to figure prominently in trade as documented by this study, and include brown bear, snow leopard, Siberian moose, saiga antelope, and musk deer. Household hunting of all legally declared "rare" species is similarly banned. The associated trade list includes red deer, stone marten, black-tailed gazelle, wild boar, Siberian ibex, Eurasian lynx, argali, and Asiatic wild ass.

There is ample evidence that bans alone will not be enough. Despite legislative action, hunters continue to harvest both marmots and gazelle for commercial trade. The State Border Defense Agency reports confiscating over 26,000 marmot pelts in only the first three months of the six months that marmots are active above ground (marmots hibernate through the winter). Marmot and gazelle meat are still available for purchase at local markets without reported enforcement consequences. Saiga antelope horns, brown bear gall bladders, musk deer pods, and red deer antlers, genitalia, and tails from Mongolia are still sold at shops along the border in China. One researcher from this project found 13 fresh Mongolian snow leopard skins in a border town in northwestern China, at the same time that Russian border guards confiscated 15 skins coming from Mongolia's Altai region. Asiatic wild ass is not only consumed locally, but is also available as sausages from a meat processor in Ulaanbaatar. More than 16 percent of all hunters interviewed hunt at least one wild boar every year. Black-tailed gazelle, ibex, and argali continue to be poached by locals for meat. Lynx skins can be easily purchased in Mongolia's open-air markets.

To counteract the market that pursues the resource will require more than one management approach. To turn the tide in wildlife declines, a strong and coordinated effort will be needed, including the creation of sound legislation aimed at managing both hunting and trade; incorporating communities in the management of the resource; and training, equipping, and mobilizing enforcement staff within all relevant agencies, including the State Border Defense Agency, State Specialized Inspection Agency, the Ministry of Nature and Environment, and the Central Customs Authority.

Even under the best of circumstances, policing Mongolia's vast open areas would be a difficult undertaking. It is an unthinkable task without adequately trained, equipped, and mobilized enforcement staff. Presently, the capacity for Mongolia's law enforcement staff to control this situation is well below what is needed. Local departments are understaffed, underpaid, and poorly equipped. Almost all protected areas within Mongolia task individual rangers with the responsibility of patrolling thousands of square kilometers, and sometimes expect them to provide fuel for patrols from their own salary (which can be as low as $37 a month). Even if a ranger had a vehicle and dedicated their entire salary to conduct patrols, today's fuel costs would limit travel to a little more than 200 kilometers per month; not enough to conduct one full patrol of a ranger's average territory. Other government agencies involved in wildlife law enforcement are similarly handicapped by a lack of funding, equipment, and training.

However, simply improving enforcement capacity will have limited effect if local communities are not sufficiently incorporated into management. With a total population of only 2.5 million and a territory of roughly 1.5 million km^2, Mongolia is one of the least populated countries on earth. Enforcement staff, to the extent they exist, cannot hope to cover these remote areas without help from the small but important communities that inhabit them. Most important to this endeavor will be the creation of adequate incentives for communities to use wildlife resources sustainably, exercise self-restraint, and assist with enforcement efforts. At present, Mongolia's legal framework delegates the responsibility of wildlife management to local government, but provides no basis and offers little incentive to community participation.

Without adequate management mechanisms in place to control trade, the declining trend in wildlife populations is likely to continue and will eventually lead to the loss of biodiversity in Mongolia. If Mongolia is unable to launch a serious management campaign, the only present hope for preventing the ecological or complete extinction for some species is the elusive and uncertain point where it is no longer economically viable to harvest the species (economic extinction). However, by then it may be too late to reverse the decline. Any number of factors may present obstacles to recovery, including stochastic events such as hard winters (something for which Mongolia is well known), limited diversity of the gene pool, fragmented

or degraded habitat, or even behavioral shifts (e.g., Milner-Gulland et al. 2003). Of course, economic extinction did not prevent the complete extinction of a number of species. Famous examples include the passenger pigeon (*Ectopistes migratorius*) of North America, perhaps the most numerous bird species that ever existed, which was hunted in numbers totaling well over a million a year in the 1870s. The last survivor died in captivity in 1914. A second example is the Great Auk (*Alca impennis*), a 3-foot tall flightless seabird that was hunted to extinction for its feathers, which were used for mattress and pillow stuffing.

Recovering from such drastic declines is further hampered by the enormous investments required to bring a species back from the brink. Mongolia is already familiar with this problem. The Przewalski's horse (*Equus przewalski*) became extinct in Mongolia in the 1960s. Since 1990, the government and several international organizations have spent millions of dollars (and are still spending millions) to ensure their successful reintroduction (C. Walzer *pers. comm.*). Costs include captive breeding programs, reintroduction programs (transport, holding pens, veterinary care, staffing, etc.), and the subsequent long-term costs of post-reintroduction monitoring.

Unfortunately, declining wildlife numbers do not automatically mean decreased wildlife trade for two reasons. First, as a species decreases in number, it becomes more valuable. So long as profits exceed the costs of harvesting, there remains a market incentive to poach. This trend is already seen in Mongolia. Reflecting the decreased supply, prices for several species have been steadily increasing, including prices for wolf, red and corsac fox, red deer parts, saiga antelope horns, and marmot skins and meat. To date, this decrease does not appear to be having a serious effect on wildlife take or trade. Mongolian hunters are still actively harvesting marmot despite their recorded disappearance from many areas. The same is true for virtually all species targeted by hunters. Restaurants offer taimen despite its special protection under the law and reportedly decreasing numbers. Musk deer, brown bear, moose, and others are all still commonly hunted in the face of reduced numbers.

Second, the productive capacity of the country (Mongolia's hunters) does not disappear; instead it turns its attention to new resources and the development of new markets. This happened in the 1960s and 1970s in Mongolia when the hunting brigades, faced with decreasing wildlife populations, did not quit but instead expanded the number of targeted species. The same thing is happening today with hunters apparently switching to Mongolian gazelle horns to replace the increasingly scarce supply of saiga antelope. Where substitute wildlife is not available, imitation products enter the market. Chinese traders questioned about the fate of the wildlife trade were generally aware of decreasing supply but seemed unconcerned, explaining that they would move to something else if the supply stopped. This "something else" includes shifting to the sale of imitation wildlife products. Border towns in China, already reacting to decreasing supplies, sell a number of imitation products for all types of wild animal skins, saiga antelope horns, wolf ankle bones, ibex trophies, and other parts.

Imitation wildlife pelts made from dog skins hanging outside a shop in Ereen Khot, China. Image: J. Wingard, 2005

Ultimately, short-term gains from wildlife trade will be outweighed by long-term losses. In the short term, local hunters and traders have gained from wildlife trade. Of the estimated trade value of $100 million, approximately half was garnered by individual hunters throughout the country. On a per capita

basis, this represents average yearly earnings of $200 per hunter—an amount equal to roughly four to five months salary for rural residents. The rest of the trade earnings went into the pockets of traders located in Mongolia's small and large collection centers, outdoor markets, and restaurants. This is a substantial sum considering the limited number of traders in the country, estimated at not more than 10,000. Per capita earnings for traders for this level of trade would equal $5,000/yr, approximately 10 times an average annual salary for rural residents and almost three times the annual per capita GDP of $1,800 (2003 est.).

However, at the present rate of consumption those gains will be short-lived. Harvests over the last decade have clearly outstripped the capacity of the resource to sustain itself or potentially recover. Population surveys and anecdotal information all point to severe declines for several species and hint at their economic and local, if not complete, extinction. For example, if consumption rates remain steady, scientists predict the loss of wild ass in the next ten years (Asiatic Wild Ass Conference 2005). Dwindling brown bear numbers have already forced at least some portion of the gall bladder trade to move into Russia in search of a resource. For wildlife still available in the country, many hunters asked during the survey explained that they are already expending greater efforts to find wildlife. Saiga antelope may have crossed into economic extinction at least for organized hunts that target the species. Of the approximately 800 to 1,500 animals left in the country, no more than 25 percent of them are male, and an even smaller percentage are adult males (approximately 10 percent of all males) that sport the sought-after horns. Using the higher population estimate of 1,500, the viable market is therefore probably no more than 38 animals. Each saiga antelope horn is worth $30 on the market in Mongolia (UB Post April 2004), making each adult saiga male worth just $60. The total potential market value, if all remaining saiga males were taken, would be only roughly $2,200; less if the horns are taken after the animal dies and the horns lose blood content. Because the animals are taken using a vehicle (to knock them down without killing them), saiga hunting has comparatively higher fuel costs than other forms of hunting. This is especially true considering the vast territory they inhabit (2,860 km^2) and their relatively small numbers. Such market equations, however, would not apply to opportunistic hunting that still occurs.

The loss of species, whether for trade or individual consumption, will send ripple effects throughout the economy and Mongolia's culture. On an individual level, to replace the protein normally obtained from wild game, herders will be forced to either purchase meat on the local market or consume their own livestock. Purchasing meat of course means cash out of pocket that many people, especially in Mongolia's countryside, do not have. Using livestock has even greater implications, as it will cost both the value of the animal on the market, as well as the value of dairy products, wool and/or hair, and other products (including the production of young) from the animal during its life.

The depletion of wildlife resources will in turn have larger implications for the overall economy, which can probably best be compared to the depletion of a trust account. The wildlife resources in Mongolia can be thought of as a trust fund where the principal is made up of wildlife populations. The principal produces interest in the form of wildlife production used for medicine, food, and leather products. Overharvesting

Shop owner in Ereen Khot, China on the border with Mongolia describing how a Mongolian blood antler is sliced into thin wafers and sold as medicine. Image: J. Wingard, July 2005

is the equivalent of consuming both the interest and the principal, so that with each passing year there is less principal and less interest, until eventually there is nothing left. From a longer-term perspective, while present benefits from overharvesting may be impressive, they compare poorly with benefits that could be obtained with a lower harvest rate (i.e., consuming only the interest) over time.

To illustrate the point, consider this highly simplified, but nonetheless useful, example. Survey estimates show that a population of wildlife (species X) has dropped from 40 million to 5 million over a period of 50 years, likely due to sustained harvests averaging around 1.5 million per year. Quick calculations tell us that species X is losing roughly 700,000 animals each year from the "trust fund" and has experienced a total decline in "principal" of approximately 87 percent. Looking at the future, it is easy to estimate that continued harvests of 1.5 million per annum will result in the full depletion of this wildlife account in about 3 years. In the end, 53 years of overexploitation (consuming principal and interest) yields 79.5 million animals. If each animal has a total market value of $5, earnings will reach $397 million before the trust has been fully depleted.

What would be the long-term benefit of a sustainable offtake, or consuming only the interest earned from this wildlife trust? To keep this example simple, we will ignore the complexities of determining a scientifically based sustainable offtake for a given species and say that in our example the interest from species X population was roughly 800,000. Consuming only this for the same 53 years would thus yield 42.4 million animals with a value of $212 million. This may be only half the value obtained from overharvesting, but after 53 years the entire principal remains intact allowing, in the absence of other factors, continued consumption at the same rate. This includes the potential to meet and exceed earnings realized through overharvesting, theoretically without limit. In three years time, when the overharvest strategy described in the previous paragraph is producing $0 per annum, the interest-only strategy will still be contributing $4 million to the economy. This scenario can be sketched for most, if not all, species currently being hunted in Mongolia.

Given the magnitude of the problem, the costs of policy neglect are having serious negative impacts to the present value and future earning potential of the country. If Mongolia were a company, we might compare this overharvesting to the strategy of leveraging profits through the sale of assets as opposed to trade. The basic lesson from this tried and failed strategy is this: while the "income statement" may look good today, the future earnings potential dwindles because the company's strategy is slowly destroying its ability to earn. Mongolia's income from wildlife trade, even though most of it is unrecorded, has certainly contributed to the overall economy. At the present rate of consumption, however, the ability to generate these rents is disappearing as wildlife populations decline and, in some instances, disappear. As a business, the doors will eventually have to close.

4. Enabling Wildlife Management

Since 1994, Mongolia has actively engaged in the development of an environmental legal regime that contains many of the components necessary to control illegal hunting. A few critical gaps remain, however, exacerbated by a lack of funding and capacity to implement and enforce established mandates.

Institutional Constraints

The single most important institutional constraint is the lack of any agency at the national or local level with adequate capacity and full authority to assume the task of implementing and enforcing established mandates.

At the national level, wildlife management is divided between the Institute of Biology within the Academy of Sciences, the Ministry of Nature and Environment, and the Cabinet Ministry. The Institute of Biology is charged with conducting surveys and making recommendations for hunting quotas. This institution employs nineteen field biologists—eleven to study the thirty-one mammals, four to study eighteen birds, and another four to study ten fish species that we know from this study (likely it is more) are harvested, some of which occur throughout Mongolia's 1.5 million km^2. Even with adequate training, there is simply no physical way this number of people can cover game species or the territory, let alone non-game species. Granted, a number of international organizations and volunteer students from the Mongolian National University are actively supporting research efforts, but the gap between need and capacity is still daunting.

Unfortunately, adequate capacity within the Institute would answer only part of the equation as its work only results in recommendations to the Ministry of

Wolves. Image: K. Olson

Nature and Environment, which maintains the right to set final quotas different from those recommended. The ministry, however, has no personnel with the expertise to adequately review and make such decisions. In addition, the ministry's interest in increasing revenue coupled with the power to make these decisions presents a clear conflict of interest that has led to harvest quotas in excess of those recommended by the institute. For example, argali trophy quotas in 2004 were set by the MNE at 80 when biologists reportedly recommended only 40 (Anonymous *pers. comm.*). This decision-making process coupled with a lack of ministry expertise threatens Mongolia's ability to ensure that harvest levels are based on science and not economics.

The same is true for the institute and ministry's relationship to the Cabinet Ministry, which retains the authority to make decisions for trophy hunting quotas. This additional step was originally created as a hedge against the corrupting influences of dealing in lucrative trophy species. However, it does not guard against approving unsustainably high quotas as the Cabinet Ministry, like the Ministry of Nature and Environment, does not have the expertise to review and make such decisions. At a minimum, this calls into the question the need for this extra step. More importantly, it remains a political process legally disconnected from the scientific basis for quota setting.

The research and quota setting procedures are only the beginning of the problem. The real work of implementation, monitoring, and enforcement falls to local governments and institutions. With little to no training, limited or nonexistent procedural guidelines or manuals, and little financial support, the central government expects these local entities to establish and manage, among others things, hunting reserves and hunting concessions with private individuals and companies for industrial hunting. In addition, they must enforce hunting laws and regulations over vast territories, conduct surveys, and compile and report on all baseline data. That they are not equipped to do this, along with the many other tasks, is a fundamental constraint to active management.

Economic Constraints

As the previous section demonstrates, wildlife management in Mongolia struggles with limited capacity; that is, professional staff at the local, regional, and national level with the training and equipment necessary to accomplish management tasks. But no recommendations to correct this deficit will work if funds are insufficient to support these individuals and their activities. This section takes a detailed look at Mongolia's economic realities, in particular the legal and practical constraints that have conspired to make adequate financing for wildlife management an elusive proposition.

First, we should note that over the last ten years, Mongolia has steadily improved its overall economic health, a fact that should allow for greater investment in natural resource management, including wildlife. Highlights include a more diversified economy, a steadily increasing GDP with a total volume of $4.87 billion in 2003 and a growth rate of 10.6 percent in 2004, a per capita GDP of $1,800 in Purchasing Power Parity (PPP) (2003 est.), relatively low inflation rates (4.7 percent in 2003), and expanding trade, which exceeded $600 million for the first time in 2004.[9]

The following sections can be summarized as follows: despite the growing level of economic activity in the environment sector and the increasing volume of state revenues derived from natural resource uses, government investment in wildlife management remains woefully inadequate to stem to the tide of unsustainable practices. The failure to capture revenue from the existing wildlife trade further exacerbates the problem.

Wildlife-Related Revenues

Because wildlife uses and trade belong to Mongolia's largely unmeasured "black economy" (or informal sector), their *true* contribution to the overall economy appears nowhere in official statistics. However, this study estimates a volume of roughly $100 million, making it possibly the third largest contributor to the Mongolian economy behind mining and tourism. Trade in metals, primarily copper and gold, dominate the economy, representing 49 percent of total exports

[9] US Department of State, Bureau of East Asian and Pacific Affairs, June 2005, http://www.state.gov/r/pa/ei/bgn/2779.htm.

Table 7: State Revenues from Natural Resources 1999-2003

	Revenue Source	1999		2000		2001		2002		2003	
		mil. MNT	%	mil. MNT	%	mil. MNT	%	mil. MNT	%	mil. MNT	%
1	Forest	262.8	4.1	460.5	5.2	568.3	4.4	574.3	2.5	629.9	2.6
2	Land	1,256.6	19.6	3,224.3	36.8	4,996.4	38.8	6,077.2	26.8	6,077.2	24.7
3	Minerals	3,302.1	51.5	3,431.5	39.2	3,707.5	28.8	11,545.9	51.0	11,545.9	46.9
4	Petroleum	499.6	7.8	469.2	5.3	450.9	3.5		0.0		0.0
5a	**Hunting**	815.7	12.7	907.6	10.3	1,975.4	15.3	2,174.3	9.6	2,174.3	8.8
5b	**Saker Falcon Sales**		0.0		0.0	855.7	6.6	1,408.5	6.2	2,620.8	10.7
6	Environment Related Licenses[12]		0.0	1.4	0.02	17.9	0.1	546.8	2.4	910.3	3.7
6a	*Water*	205.0	3.2	200.9	2.3	231.6	1.8	234.9	1.0		0.0
6b	*Abundant Minerals*[13]	60.8	0.9	52.3	0.6	89.2	0.7	92.0	0.4		0.0
7	Other		0.0		0.0		0.0			636.8	2.6
Total Natural Resource Revenues (NRR)		6,402.6	100	8,747.7	100	12,892.9	100	22,653.90	100	24,595.2	100
Total State Revenues		267,764.0		279,550.0		425,372.0		409,383.0		400,000.0	
NRR as % of Total State Revenues		**2.4**		**3.13**		**3.03**		**5.53**		**6.15**	

[12] Beginning in 2003, the category "environment related licenses" includes fees for both water and abundant minerals. This change in accounting practice has led to some discrepancies in figures presented for review. The numbers included in this table should therefore be considered approximations.

[13] This category refers to construction grade building materials such as sand, rock, mud, etc.

Source: MNE, MOSTEC, Open Government Website.

in 2003,[10] compared to tourism receipts of $159 million,[11] $65 million in agricultural exports (Ruzicka 2004) and an informal gold mining sector valued at more than $70 million per year (Grayson 2004).

Even though significant revenue sources remain untapped (most of it operating outside the formal economy), natural resource revenues still represent an important percentage (6.15 percent) of all government income—a revenue source that has been increasing rapidly in recent years. Some of the largest increases are directly attributable to increased wildlife rents. Table 7 contains figures on state revenues from natural resources from 1999–2003. Line items 5a and 5b (highlighted in the table) show the reported revenues from hunting and saker falcons sales in 2003 as respectively MNT 2.17 and 2.62 billion ($1.9 and $2.2 million at 2003 exchange rate of MNT 1,169 = $1), or a combined $4.1 million. Compared to all other resource uses, wildlife trade is the third highest natural resource earner behind mining licenses and land fees.

Budgeting for Wildlife Conservation

While significant revenues are generated by hunting and saker falcon sales, investment in wildlife management remains slim. Four major constraints exist: (1) the Ministry of Nature and Environment is the least-funded ministry in the country; (2) no specific budget is allocated for wildlife; (3) the law requiring investment in the resource simply is not followed; and (4) the Public Sector Management and Finance Law nullifies funding opportunities for local governments.

According to Table 8, the MNE receives the second smallest budget of all ministries, receiving just 0.74 percent of the total state budget in 2003, ahead only of the Ministry of Industry and Commerce. However, this table does not reflect all funds received and used by the "self-funding" agencies within this ministry, in particular the Mineral Resource Authority of Mongo-

[10] Official production worth $137 million in 2003.

[11] This figure was reported by the Mongolian Tourism Board. The authors were not able to discern what income sources were included and suspect that some may be from business visitors and not "tourists."

Table 8: Comparative Ministry Budgets 2002–2003

Ministries	2002 (thous. MNT)	% of Total	2003 (thous. MNT)	% of Total
Ministry of Nature and Environment	**4,424,181.50**	**0.79**	**4,294,801.20**	**0.74**
Ministry of Industry and Commerce	2,185,187.20	0.39	2,734,677.30	0.47
Ministry of Infrastructure	48,590,207.20	8.62	64,440,209.20	11.07
Ministry of Food and Agriculture	12,001,281.70	2.13	11,091,869.00	1.91
Ministry of Education, Culture, and Science	111,810,630.30	19.84	123,318,963.70	21.18
Ministry of Finance and Economy	158,555,853.80	28.14	125,259,642.70	21.51
Ministry of Justice and Internal Affairs	34,915,457.40	6.20	37,158,689.80	6.38
Ministry of Health	62,197,483.40	11.04	62,067,222.50	10.66
Ministry of Defense	18,248,169.90	3.24	17,882,426.90	3.07
Ministry of Foreign Affairs	8,202,111.50	1.46	10,612,587.00	1.82
Ministry of Social Security and Labor	102,372,216.90	18.17	123,369,978.60	21.19
Total Budget for all Ministries	**563,502,780.80**	**100.00**	**582,231,067.90**	**100.00**

lia. "Self-funding agencies" operate on an undisclosed budget funded by permits and concessions. Given the volume of economic activity in the mining sector, it is a reasonable guess that the actual budget for the Ministry of Industry and Commerce is higher than the MNE; making the MNE the least funded of all ministries. The fact that hunting and saker falcon receipts exceeded the entire budget for the MNE in 2003 (MNT 4.79 billion from hunting and saker falcon sales compared to the ministry's total budget of MNT 4.29 billion) underscores the potential and the need to return at least some of these funds to manage the resource.

Furthermore, recent increases in the Ministry of Nature and Environment's budget have had no real impact on actual funding available for wildlife (Table 9). Due to changes in accounting procedures brought on by the Public Sector Management and Finance Law, it appears that the MNE's budget has increased significantly in recent years, going from $2.3 million in 2001 to $3.8 million in 2004 (65.2 percent increase). But this is a misleading picture. Pursuant to the finance law, the MNE receives a consolidated budget that includes amounts for MNE's local branches, such as protected areas, *Aimag* environment offices, and local hydrometeorological stations. The apparent increases in the MNE's budget are due almost entirely to the inclusion of these local budgets as opposed to more money for the ministry's activities.

Within this relatively small budget, the Ministry of Nature and Environment has even less room for wildlife management—despite the responsibility to engage in wildlife conservation and the legal obligation to earmark 50 percent of hunting-related revenues for conservation of the resource. A quick review of the budget breakdowns for 2001–04 (Table 9) shows the lack of a specific budget and, when compared to Table 7, reveals discrepancies between actual and required expenditures.

Wildlife conservation would technically fit within line item #3, Conservation and Rehabilitation Measures, which was set at MNT 670 million ($568,000) in 2004. From the 2004 budget, 4 percent of this line item was dedicated to reforestation, leaving MNT 643 million ($545,000) for other resources, including wildlife, natural plants, land, timber, and water.

However, following the Law on Reinvestment of Natural Resources Use Fees, the amount allocated in 2004 should look significantly different. Each resource law (hunting, water, forests, and land) has an accompanying act that establishes fees for varying types of uses based on the "user pays" principle. These laws are complimented by a statute requiring the investment

Table 9: Ministry of Nature and Environment Budget 2001–2004

	Line Items	2001 Budget (thous. MNT)	2002 Budget (thous. MNT)	2003 Budget (thous. MNT)	2004 Budget (thous. MNT)
	Total MNE Budget	**2,754,562.20**	**2,784,063.80**	**3,817,836.50**	**4,408,076.90**
1	Subtotal—MNE Administrative Budget	472,163.70	571,596.40	572,775.10	705,448.60
1.8	Nature, Forest and Water Resource Agency	0.00	0.00	28,514.60	52,322.90
1.9	National Watershed Committee	0.00	0.00	6,915.90	7,316.50
2	Subtotal—*Aimag* HMEMA	0.00	0.00	2,405,141.40	2,632,820.90
2.1	*Aimag* Hydrometeorology Offices	0.00	0.00	1,410,328.00	1,702,009.40
2.2	*Aimag* Environment Office	0.00	0.00	482,893.40	452,311.50
2.3	Local Protection Measures and Rehabilitation	0.00	0.00	407,500.00	245,500.00
2.4	Local Budget for Forest Measures	0.00	0.00	104,420.00	233,000.00
3	**Conservation and Rehabilitation Measures**	**910,000.00**	**1,110,000.00**	**521,000.00**	**670,000.00**
4	Special Protected Areas	216,098.50	259,067.40	318,920.00	399,807.40
5	Hydrometeorology Integrated Measures	400,000.00	0.00	600,000.00	600,000.00
6	Integrated Environment Measures	0.00	0.00	178,800.00	350,000.00
7	Environment Protection Fund	400,000.00	400,000.00	65,000.00	100,000.00
8	Investment for Environment	356,300.00	21,000.00	65,000.00	0.00
9	Plant Conservation and Rehabilitation Activity	0.00	0.00	35,000.00	0.00
10	Water Resource Conservation Measures	0.00	0.00	45,000.00	0.00

Source: MNE Finance Department

of a percentage of collected fees for conservation of the resource. (Percentages and categories contained in Table 10).

Table 10: Conservation Reinvestment Percentages

Type of Natural Resource Fee	Percentage
Natural plants	30
Hunting	**50**
Land fees	30
Timber and fuelwood	85
Water	35

As shown in Table 7, just four of these five resources (no reported fees generated for natural plant use) generated MNT 12.4 billion ($10.6 million) in 2003. Applying the percentages required by the law to the revenue of each resource would have resulted in the following reinvestment requirements for 2004:

- Hunting—50 percent of MNT 4.8 billion = MNT 2.4 billion ($2.1 million)
- Forests—85 percent of MNT 630 million = MNT 535 million ($458,000)
- Land—30 percent of MNT 6.1 billion = MNT 1.8 billion ($1.6 million)
- Water—35 percent of MNT 246 million = MNT 86 million ($73,600)[14]

The total conservation budget available to the MNE in 2004 should have been at least MNT 4.8 billion ($4.1 million), a figure that exceeds the MNE's entire budget for that same year by almost 10 percent. Approximately half of this should have been dedicated to wildlife conservation. Even if the entire conservation budget had been dedicated to wildlife management in some form, the MNE's budget shortfall in 2004 for wildlife alone was at least 73 percent. If wildlife revenues are spread among other budget items, then at least half of all the MNE's activities should have been directed at wildlife management. In fact, they do not come even close.

Funding for Wildlife Research

Further exacerbating wildlife management is the lack of any budget in the Ministry of Nature and Environment for wildlife research. All science and technology

[14] Water license fees for 2003 are not separately accounted for in Table 7. The amount shown here was calculated using the relative percentages of line items 6, 6a, and 6b in 2002 as applied to the total revenue recorded in line item 6 for 2003.

Table 11: Comparative Research and Development Expenditures 2001–03

Scientific Field	2001		2002		2003		% Annual Increase in MNT	% Annual Increase in $
	(mil MNT)	($ thous.)	(mil MNT)	($ thous.)	(mil MNT)	($ thous.)		
Natural Science	182.8	165.9	231.5	207.6	286.5	245.1	18.1	16.2
Agriculture Science	491.7	446.2	590.9	530.0	583.0	498.7	7.8	5.3
Mongolian Academy of Sciences	**1,011.8**	**918.1**	**1,285.7**	**1,153.1**	**1,227.4**	**1,050.0**	**8.8**	**6.3**
Medical Science	351.2	318.7	390.4	350.1	438.1	374.8	9.9	7.5
Social Science	180.8	164.1	200.5	179.8	165.7	141.7	-4.6	-7.9
Engineering	411.8	373.7	542.8	486.8	613.8	525.1	16.5	14.4
Others	191.4	173.7	279.9	251.0	466.5	399.1	29.5	28.2
Total S&T Budget	***2,821.5***	***2,560.3***	***3,521.7***	***3,158.5***	***3,781.0***	***3,234.4***	***12.7***	***10.4***
Nominal GDP (mil. USD)		1,028.0		1,119.0		1,200.0		
S&T as % of GDP		0.25		0.28		0.27		

Source: MOSTEC

funds are managed by the Ministry of Science, Technology, Education and Culture (MOSTEC), which has budgetary oversight for Mongolia's forty-five research institutes and nine research and production corporations. Of these, 17 belong to the Mongolian Academy of Sciences—one of which, the Institute of Biology, has primary responsibility to conduct wildlife research. Table 11 shows the total budget for science and technology for the years 2001 to 2003. In 2003, the Academy of Sciences received a little over $1 million, an increase of 6.3 percent over 2001 levels.

The budget for the Institute of Biology in 2005 was MNT 108 million ($90,800). Of this, MNT 15.9 million ($13,000) went to the study of mammals; MNT 9.6 million ($8,000) for ornithology, and MNT 9.8 million ($8,200) for limnology. Compared to the overall budget for the Academy of Sciences, this amount is very small at just under 3 percent of the total. Conversations with biologists at the Institute of Biology indicate that the budget they do receive is dedicated almost entirely to salaries, and that they rely on outside funding for much of their field work.

Funding for Wildlife at the Local Level

The Public Sector Management and Finance Law adopted in 2002 represents a serious obstacle to funding wildlife conservation work at the local level, even though legally local governments still enjoy the returns on resource use fees such as hunting (PSMF §52.1.1 (2002)). In principle, the new structure is designed to guarantee the central government's ability to even out local budget discrepancies by applying needed funds to areas that are otherwise unable to generate them on their own.

In reality, the new law deprives local governments of funds generated by resource uses in their territory, leaving conservation work at the local level virtually unfunded. In brief, the law works like this: the Hunting Fee Law requires payment of licensing fees to the soum budget. However, the Public Sector Finance consolidates all financing into the state central budget and budgeting practices decrease a soum government's allocation by the amount received from hunting fees. The result is no net gain for the community and no local money to engage in the management activities mandated by the Law on Hunting.

As discussed earlier, local budgets for environment are consolidated within the MNE's budget. As a matter of practice, these budgets are only a portion of what is actually required or what might be mandated by the reinvestment law. The shortfall must be supplemented through local natural resource fines and fees. In short, the national government tells the local government what to do and then gives them only a portion of the funds necessary to accomplish the task. Compared to the many urgent funding needs at the local level, wildlife management receives little, if any, attention.

Brief Overview of Wildlife Take and Trade Laws

Use and conservation of Mongolia's wildlife are governed by four primary laws directed separately at hunting management (Mongolian Law on Hunting—MLH); the conservation of endangered species (Mongolian Law on Fauna—MLFa); the payment of fees for licenses and permits (Mongolian Law on Hunting Resource Use Payments and on Hunting and Trapping Authorization Fees—MLHF); and, regulation of domestic procedures for international trade in endangered species (Law on CITES Implementation).

The purpose of the Mongolian Law on Hunting is to "regulate the hunting and trapping of game animals and the use of hunting reserves" and divides wildlife take into four major categories – industrial, household, special purpose, and scientific. Typical of all Mongolian resource legislation, the hunting law delegates primary management responsibility to the local government while reserving primary control over the setting of quotas and trophy hunting to the national government. Critical gaps lie in the definition of hunting types, the flexibility of the law to react to a changing resource, the lack of management and enforcement capacity at the field level, the inadequate use of economic incentives and disincentives, and the absence of any basis for local communities to benefit from use (or management) of the resource.

The Law on Fauna is Mongolia's answer to endangered species legislation. In broad strokes, it calls for the classification of species as "very rare" or "rare" depending on generally defined criteria to assess the status of the population. By default, all other species are considered "abundant" and, if considered a game animal, are the subjects solely of the Law on Hunting. Unlike endangered species legislation in other countries, however, the process of listing species under the Mongolian law is fixed by parliamentary approval, denying much-needed flexibility and perhaps unintentionally politicizing the process.

The Law on Hunting Resource Use Payments establishes the rates applicable to obtaining hunting permits and licenses. First promulgated in 1995, the law has never been updated and was the subject of severe criticism at the 2005 International Conference on Wildlife Trade in Mongolia held during this study. The primary concerns surrounded the law's inability to reflect market changes, compensate the state for use of the resource, and provide an economic evaluation that can act as a true disincentive to illegal activity.

Having joined CITES (Convention on the International Trade in Endangered Species of Wild Flora and Fauna), the Mongolian government is responsible for developing appropriate legislation to regulate internal procedures in compliance with the treaty. Mongolia's CITES Implementation law designates the Ministry of Nature and Environment as the management authority responsible for issuing export permits and the Mongolian Academy of Sciences as the scientific authority responsible for setting quotas for Appendix II species. However, the dispute resolution provisions of the law conflict with the requirement that the scientific authority have ultimate control over quota setting for permissible trade, effectively allowing the Mongolia's management authority to exceed quotas and places Mongolia in violation of CITES requirements.

Recent amendments to the Law on Environmental Protection grant local communities stronger access rights to local resources, including wildlife. The new provisions, however, are still only framework-oriented, with many details left to further regulation.

Regulation of Wildlife Take

Wildlife take is regulated primarily by three of the four laws described above—the Law on Hunting, Law on Fauna, and Law on CITES Implementation. Together, they rely on six management mechanisms to limit take. These include (1) total bans, (2) closed areas, (3) closed seasons, (4) fixed quotas, (5) restricted techniques, and (6) regulation of effort.

Notably, these laws do not contain two common regulatory schemes—(1) sex-based regulations or (2) size limits—both of which are essential components of an adaptive hunting management regime. Sex-based regulations would limit the number of male or female animals that may be taken by a given hunter and has the potential to dramatically reduce hunting impacts on a population. Size limits are often applied in fishing regulations, but may be used for other species such as red deer where antler size can be determined. By ministerial order, sport fishing for taimen now comes

with an adjusted price tag based on the size of the fish caught, but there are no set restrictions on how many of what size can be taken (and no provision made for catch-and-release).

Total bans are implemented in two ways. First, there is a total ban on hunting any species classified as "very rare" under the Law on Fauna. This list includes twelve mammals, five birds, and four fish. Second, total bans may be declared for any species in decline. Total bans have been issued recently on this basis for red deer, Siberian marmot, and Altai marmot.

Closed areas may be implemented through three mechanisms. First, all of Mongolia's protected areas are closed to hunting, with two zones within national parks open to fishing for household purposes only. Second, each local government has the authority to close hunting within its territory for a period of up to three years. Finally, the central government has the authority to close hunting in political subdivisions that have not conducted "hunting management activities," a euphemism for wildlife population surveys. While the Law on Hunting does not prescribe methodologies or set survey standards, it does require that assessments define species distribution, numbers, structures, reproductive rates, and the available hunting resource. Such surveys must be conducted once every four years for the entire territory and every year following an industrial hunt. With the exception of "industrial hunting" surveys, hunting surveys are financed from the central budget.

There are two critical problems with this last construct. First, population surveys are required far too infrequently to effectively inform management decisions. This is especially true when poaching is rampant and populations are known to be declining. Using the relative rates of decline for red deer and marmot in Figure 5, it becomes clear that, even if the law were followed, population surveys would have happened only once after the targeted species had already experienced a 15 to 20 percent decline. However, one study is just a snapshot and will not be able to determine a trend. A second study would occur only after a 30 to 40 percent decline. By this time, significant damage has already been inflicted on the population and severe restrictions will probably be necessary to allow the species to recover. Without more frequent surveys, the risk is high that important trends will be missed and management unnecessarily forced into crisis mode. Second, by requiring surveys *after* industrial hunting occurs, the entire point of conducting a survey is negated. To be of any value, surveys need to be conducted *before* the resource is used to ensure the existence of a viable resource, define a scientifically based quota, and prescribe appropriate management activities. Industrial hunting in Mongolia enjoys the lion's share of the resource and the profits. Requiring surveys before harvesting would be no greater burden than the law already mandates. It would, however, ensure that the benefit of conducting the survey accrues to the conservation of the resource.

Closed seasons are the same for both industrial and subsistence hunting and have two notable problems. First, a lack of precision in naming covered species leads to confusion in management. For example, the list of birds specifically names only nine species, but may include as many as thirty depending on the interpretation. For example, the law refers to "ducks" and "other wetland birds" without clarification or limitation. Similarly, the list of fish identifies only four by name with possibly as many as forty-six included in an undefined catch-all category. In the list of mammals, this problem is minimal (both marmot species are listed together). Second, statutorily defined seasons deny wildlife managers the full benefit of this mechanism. The ability to change seasons from year to year is a fundamental component of adaptive hunting management. Adjusting the length of the season has the primary purpose of controlling the hunter's window of opportunity. Longer seasons typically result in higher take rates and are used when a population needs to be reduced. Shorter seasons reduce take and can be useful in limiting the impact on a declining species. In either case, seasons are usually reviewed on an annual basis to assess the impact on wildlife population levels and the ability of the management regime to meet defined population management goals. However, because Mongolia defines hunting seasons directly in the legislation, they have only been changed once by an act of parliament since the hunting law was first written in 1995. Without changing this procedure, it will remain impossible for Mongolia to make effective use of this tool and react in a timely manner to changing resources.

Fixed quotas also restrict the number of animals that may be harvested and can substitute for a total ban.

Asiatic wild ass, or khulan. Image: C. Walzer

Unchanged from Mongolia's socialist era, quotas are established top-down. For "abundant" species, the Ministry of Nature and Environment sets limits pursuant to recommendations from the Academy of Sciences and issues these to aimag governments, who then set limits for each soum administration. For "rare" species, the ultimate decision rests with the Cabinet Ministry and permits are issued directly by the Ministry of Nature and Environment. The law does not define how or on what basis quotas must be established for either set of species. However, this point is essentially moot, as budget constraints have meant only a few surveys over the past 20 years for a handful of species and none for the majority of them. Without wildlife surveys to inform the decision-making process, quota setting since 1990 for virtually all species has been either guesswork or based on old and probably no-longer-relevant data. Moreover, until this study, the degree of illegal hunting in the country had never been adequately studied and is still not reflected in hunting quotas. Although not explicitly stated in the law, the lack of a quota is effectively the same as a hunting ban. In practice and for many years, local governments have sold permits with or without quotas and regularly exceed them without apparent repercussions. For example, an assessment of marmot permit sales in 2002 showed that the average license exceeded the per person maximum 18 times (Scharf and Enkhbold 2002).

Similar to most hunting laws around the world, the Mongolian Law on Hunting prohibits various techniques that are likely to result in higher harvest levels. Among them is the use of automatic weapons, pursuing animals by vehicle, destroying nests or dens, and the use of pits, triggered guns, fishing nets, chemicals, explosives, or other indiscriminate techniques. Reality is of course different from the letter of the law. Vehicles are regularly used to pursue animals. A special case is the saiga antelope, where vehicles are not only used for pursuit, but to knock the animal down allowing the taking of the horns while it is still alive. Asiatic wild ass is taken using shotguns fired from close range out of a jeep window while chasing the animal. Chasing down wolves in jeeps on the wide-open steppe is a common sport. Weapons of all types are used, including automatic rifles. Nets are frequently used by subsistence and commercial fishermen despite restrictions. In their legal construction, these restrictions are straightforward. Only the lack of enforcement capacity prevents the law's full implementation.

Regulation of effort, although included in the hunting law, is limited to hunting for household purposes. It certainly has value and application for all types of hunting and should be expanded. This type of legislation limits the amount of time that may be spent in a given area for hunting. The premise is that scarce resources mean greater effort (i.e., more days spent hunting) must be expended to reach quotas. Limiting level of effort can therefore automatically limit the number of animals harvested and serves to react to changing population levels not predictable in advance of the season. Typically this type of provision is much more difficult to enforce than hunting seasons, which can serve the same purpose. Level of effort is in essence a "season" personal to the hunter and can only be enforced if there is an adequate method for monitoring individual activities. With trophy hunting, there may be easily implemented methods. Monitoring individual subsistence hunters across Mongolia's vast landscape is probably impossible and, as our study shows, the concept is completely ignored by local hunters.

Overall, the management mechanisms described in this section are widely ignored. As this study documents, many species are harvested in contravention of permanent or temporary bans, actual numbers of animals taken per year exceed authorized quotas by orders of magnitude, and techniques are used in areas and during seasons that are prohibited by law.

Regulation of Wildlife Trade

Regulation of wildlife trade is limited to a few short provisions in the Law on Hunting and one ministerial resolution requiring "certificates of origin" for trade in wildlife parts. As originally drafted, the MLH only focused on the actual hunting and not the subsequent use, possession, or sale of the animal. In other words, once an animal or part entered the wildlife trade chain, enforcement was impossible. In 2002, the Mongolian Parliament amended the law to require certificates of origin for the sale of wildlife products. The Ministry of Nature and Environment later approved a resolution allowing the use of specialized tags for this purpose. The system was implemented in 2003 with positive results reported by the State Specialized Inspection Agency. This simple mechanism enables enforcement personnel to inspect not only in hunting areas, but also market places and transportation routes.

Another vital gap in the regulation of trade is the inadequate definition and regulation of commercial hunting. The MLH does not regulate "commercial" hunting per se, restricting its focus to "industrial hunting" – a narrow area of commercial use applicable to registered companies that harvest animals in large quantities for a given market. All environmental laws assume a greater level of responsibility for companies and levy significantly higher fines for violating the law. Commercial hunting of wildlife, however, occurs in many forms and is not restricted to organized companies. Even so, individuals engaged in commercial exploitation of wildlife are treated more leniently by the law and typically risk only 10 percent of the fines applied to registered companies. For example, the same offense under the hunting law subjects a company to a fine of $250, but for an individual the fine is only $25.

This myopic legal view is mirrored by industrial hunting quotas that do not yet adequately consider the full impact on target species of all harvests (legal and illegal) whether for commercial ventures or personal consumption.

CITES Regulation

In April 1996, Mongolia became the 133rd signatory (April 1996) to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Of those faunal species on the national lists, seven species are designated as "very rare" and two are designated as "rare." Five abundant species are found in CITES Appendix I,[15] while another 47 abundant species are on Appendix II.[16]

[15] CITES Appendix I includes species threatened with extinction and that are or may be affected by international commercial trade. These species may not be traded internationally for primarily commercial purposes. They may be exported and imported for non-commercial purposes.

[16] CITES Appendix II includes species that, although not necessarily threatened with extinction, may become so unless trade is strictly regulated in order to avoid utilization incompatible with their survival. Species also may be listed on Appendix II if their parts or products cannot be readily distinguished from those of other species listed on CITES Appendix I or II. International commercial trade in Appendix II species is allowed, but is strictly controlled. Parties may only grant a permit to export such species after it has determined that the export will not be detrimental to the survival of the species.

Table 12: Mongolian CITES Exports for Selected Species 1996–2004

Species	1996	1997	1998	1999	2000	2001	2002	2003	2004
Argali trophies	23	44[17]	2	13	44	44	69	67	68
Brown Bear	1	1	—	—	—	1	3		
Gray wolf	526	111	16	15	60	69	164	87	136
Snow Leopard	—	—	—	8	—	—	—		
Pallas' Cat	4	—	—	—	18	31	6	3	2
Lynx	1	41	55	1	—	—	—		
Saker Falcon	25	154	25	61	50	187	303	400	385
Cinereous vulture					149	35	5	—	—

[17] This figures includes 28 trophies and 16 skulls. In 1998, the GOM prohibited the export of skulls.

Sources: CITES Trade Database at www.cites.org; Mongolian CITES report; Cabinet Ministry Orders for trophy hunting licenses; D. Shijirmaa, 2nd Symposium: Journal of Sustainable Use, 2000; Ministry of Nature and Environment, CITES Management Authority.

Until 2002, the Management Authority was headed by the Director General of the Environmental Protection Agency. The Management Authority has eight members, including international trade and customs officers of the Ministry of Agriculture and Industry. The scientific authority of the CITES is headed by the Vice Minister of the MNE and consists of six scientists from the Mongolian Academy of Science's Institute of Biology and Institute of Geo-Ecology, and the Mongolian National University.

There is some discrepancy in export figures for Mongolia's CITES-regulated species reported in different documents. To create the following table, we relied primarily on the UNEP-WCMC CITES Trade Database and cross-referenced other sources as stated below. The table shows only those species for which export records are available.

Mongolia's membership in CITES could help with conservation and management, in particular with the trade in falcons. Mongolia has 10 species of falcons that are listed in Appendix II of the convention, of which the saker falcon is the prime target species. Seven cases of illegal saker falcon exports have been revealed and a total of 43 falcons released from captivity. One foreign citizen managed to take four falcons without an export certificate but fortunately was arrested in Singapore. An additional two foreigners attempted to take twelve saker falcons out of Mongolia by car; they were caught by Tuvan Customs officials in Russia. The threat for continuing illegal exportation is real, as is the value of cooperation with parties to the Convention.

Mongolia's CITES implementation regulation, however, is in contravention of the Convention. CITES specifically requires that trade quotas for Appendix II species must be decided independently by the country's scientific authority. However, Mongolia's management authority, the Ministry of Nature and Environment, has reserved to itself the authority to resolve disputes concerning trade quotas, and exceed them if it deems necessary. In so doing, the regulation usurps the authority of the scientific authority and violates the terms of the convention. During the course of the wildlife trade study, Academy of Science biologists and hunting companies both complained that quotas in recent years have been almost double recommended levels.

In addition, Mongolia has yet to take advantage of the benefits available under Appendix III of the Convention. This appendix allows a member state to list a species of national concern and places other countries on notice of its restricted trade status. As with trade in Appendix II species, export permits are required and, although the treaty does not govern domestic trade or laws, member countries must observe CITES trade restrictions when participating in international trade of listed species. Appendix III listings would be appropriate for a number of species listed in the Mongolian Law on Fauna as "very rare" or "rare" but which otherwise have no status in CITES. These

include Siberian ibex, Ussurian and Yakut moose, black-tailed gazelle, wild boar, Daurian hedgehog, Altai snowcock, and taimen. Appendix III might also be used to control trade in species experiencing rapid declines as a direct result of international trade. This list might include Siberian and Altai marmot, gray wolf, red fox, and corsac fox.

Regulation of Trophy Hunting

Trophy hunting falls under the category of "special purpose" hunting under Mongolian law. Special purposes hunting also includes the take of species for scientific research and cultural purposes. Trophy hunting represents a significant opportunity for wildlife management in Mongolia. Effective management of this market has the potential to support wildlife management for the target species and other wildlife species as well. Mongolia is lucky enough to be home to several trophy animals, including ibex, wild boar, Siberian red deer, brown bear, Yakut moose, Siberian roe deer, the largest salmonid in the world (*Hucho taimen*), and the largest mountain sheep in the world—the Altai argali. Ostensibly as a hedge against corruption, trophy hunting decisions are consolidated at the Cabinet Ministry level.

Argali ram. Image: Dr. Richard Reading

Deficits in the trophy hunting system stem from three primary sources—a lack of defined management for targeted species; inadequate funding to conduct research, monitoring, and enforcement activities; and no local community support. Even though the Ministry of Nature and Environment has established trophy hunting permit fees for almost all trophy species (and some that are not, e.g., corsac fox), there are still no management plans for any of these species. Price tags vary from as much $25,000 to $100 with annual state revenues exceeding $2 million. Despite these actual and potential revenues, purported budget constraints still prevent the timely implementation of adequate population surveys to inform decision makers. Finally, despite laws for investment of trophy hunting fees back into conservation of the resource, current practices deny local communities and conservation efforts the legal benefit of revenues (Amgalanbaatar et al. 2002, Wingard and Erdene-Ochir 2004). As a result, some local officials are working to eliminate trophy hunting from their territories (Amgalanbaatar et al. 2002).

Prior to the consolidation of all government financing in 2002, fees paid by trophy hunters flowed in three directions—the central budget, the soum budget, and the Environmental Protection Fund. Pursuant to the Mongolian Law on Hunting Fees, the reserve use fee was set at 60 to 70 percent of the trophy animal's current market value, and the license fee was equal to 20 to 30 percent of its value. According to the hunting fee law, 10 percent of reserve use fees were supposed to flow into the Environmental Protection Fund. In 2000, this percentage was increased to 50 percent pursuant to a new law on the reinvestment of natural resource use fees for conservation purposes. Sums paid in excess of government fees go to the hunting company that conducts the hunt.

Because of the lucrative potential, the number of licensed argali hunting companies in Mongolia has

increased at least 14-fold since 1993.[18] Many of these companies have no experience operating hunts (e.g., only 12 of the 70 argali licenses distributed in 2002 were given to companies that hunted previously) and others acquire licenses simply as a speculative venture, reselling them to more experienced companies for a quick profit (Anonymous 2002, Kherlen 2002). This activity highlights the need to include restrictions on the transferability of trophy hunting licenses and criteria for selecting professional hunting companies. It also calls attention to the need to reassess license-fee levels to remove this economic margin.

Local opposition to trophy hunting is occurring, especially in areas where trophy hunting has historically occurred. Opposition stems from concerns over the impacts of trophy hunting on local wildlife populations and the lack of any financial incentives to the soum government. The problems are multiple but can be summarized as (1) little to no financial benefit to the local community, (2) illicit activities by established hunting companies (e.g., driving game from protected areas in order to hunt them), and (3) budget practices that deny local communities the benefit of the resource use.

Regulation of Status and Conservation Measures

As of 2004, Mongolia has one law dedicated solely to the conservation of rare and endangered fauna. Similar to its predecessor law, the Law on Fauna contains the list of "very rare" species and provides for a second list of "rare" species to be set by the Cabinet Ministry. By default, the remaining species are considered abundant. As a result, lists of "very rare" and "rare" species are locked in when a more flexible, science-based approach is needed. There are no legally defined procedures or guidelines for the scientific determination of a given species' status. Ultimately, the decision to list a species rests with the Mongolian Parliament, substituting a political decision for what should be a science-based one.

The Law on Fauna has a relatively strong focus on the use of fauna, to some extent separate from hunting, and specifically requires habitat conservation. However, the law contains precious little direction on how conservation objectives are to be achieved, citing only that activities shall not adversely affect habitat or otherwise cause damage to the species. Local administrations are once again responsible for financing implementation of the legislation, but lack the skills and funding necessary to make this scheme a reality.

Community-Based Wildlife Management

Community-based natural resource management (CBNRM) is an evolving and flexible concept based on the premise that local people directly dependent on a given resource are critical to its adequate and long-term management. CBNRM initiatives seek to define processes and mechanisms that enable communities to participate as a group in both the management of the resource and the benefits it provides. Because the concepts of "participation" and "community" are highly culture-, place-, and resource-specific, there can be no single recipe for success.

However, increasing experience with designing and implementing community-based natural resource programs has helped to refine our understanding. The broad categories include (a) meaningful participation in policy formulation and decision making; (b) appropriately defined community organizational structures, internal processes, and rights; (c) comprehensive and secure community resource access rights; (d) responsive institutional structures and planning requirements; (e) promotion of sustainable resource uses; and (f) efficient and fair enforcement of rights and dispute resolution both internally (within the organization) and externally (outsiders— private and government).

Local people directly and indirectly depend on Mongolia's wildlife resources and will be critical to the success of any wildlife management/conservation program. Recognizing this need, the Mongolian government has already started to formulate policies and laws that simultaneously enable communities to engage in conservation and allow them a stake in Mongolia's resource base. Until the fall of 2005, proposals remained focused on forestry, but with the adoption of certain amendments to the Law on Environmental Protection, the concept has been

[18] While only 3 companies received argali trophy licenses in 1993, 25 companies applied for and 18 received licenses in 1999. In 2002, 43 companies received licenses out of 112 applicants (Kherlen 2002).

expanded to include other resources. Unfortunately, there are still only a small number of Mongolian legal specialists involved in efforts to promote sustainable community-based natural resource management, and no institution is yet fully committed to it on the national level.

At present, Mongolia's communities have the right to form local organizations and gain access to resources, but additional regulatory work will be required to complete the process. The three most critical issues are:

First, community groups need recognition as a legal entity. Pursuant to the amendments on the Law on Environmental Protection and Civil Code §481, community-based organizations (Nokhrolol) are intended to be 'unregistered' bodies. Without registration, Nokhorlol will not have the status of a legal entity under Mongolian law. This presents numerous impediments to such organizations' ability to actually benefit from the use of any resources other than for personal consumption. Among them are the inability to open a bank account, own property jointly, enter into contracts, obtain insurance, or conduct any transactions with third parties as an organization.

This will force them to operate as individuals and thereby increase the risk that the group's efforts will be "hijacked" by individual members and result in disputes both internally and externally for which there is only limited judicial remedy. A simple example would be the sale of community property by one member to a third party who has no knowledge and no way of knowing of the property's "joint" ownership. Without notice, the third party cannot be held liable for any breach of contract or law, leaving the remaining members with recourse solely against the member who sold the property. Where the property in question is unique or where the value is otherwise not recoverable from the member in breach, such a remedy would be inadequate.

Second, Mongolia still needs to develop a full framework for community participation that ensures adequate and timely access to information, admittance to government meetings, and full participation in policy formulation and decision making. They may have some of these rights now but it is in name only, not in practice.

Third, legal access to resources needs to be coupled with sufficient security in the right. The granting of access rights has not yet been coupled with the right to exclude other, possibly conflicting uses, such as grazing or mining. Of all land tenure rights currently available, only mining and petroleum concessions enjoy real tenure security.

Enabling Enforcement

Arguably, law enforcement is the single most critical factor in controlling the unsustainable and illegal hunting that is causing dramatic declines in Mongolia's wildlife. Presently, the capacity for Mongolia's law enforcement staff to control this situation is well below what is needed. Local departments are understaffed, underpaid, and poorly equipped. Many protected areas within Mongolia make individual rangers responsible for thousands of square kilometers, and require them to provide fuel for patrols from their own salary (which can be as low as $37 a month). Assuming a ranger had a vehicle, at today's fuel costs, if a ranger dedicated their entire salary to conduct patrols, they would be able to travel little more than 200 kilometers per month. Other government agencies involved in wildlife law enforcement are similarly handicapped by a lack of funding and equipment. Enforcement issues also encompass international trade, and border patrol and airport personnel are similarly ineffective in controlling cross-border trade in wildlife species.

Better law enforcement will require adequate recruitment, training, and provisioning of officers. This, in turn, will require additional financial investment, which we believe exists if a portion of the income generated by current, legal wildlife exploitation were provided for this purpose. For example, hundreds of thousands of US dollars are generated by argali trophy hunting alone each year, yet almost none of this money helps pay for wildlife law enforcement, despite laws written to help ensure this happens. The proceeds of a single argali hunt could fund an annual conference on wildlife management to coordinate argali (or even all wildlife management) activities around the country. Saker falcon receipts alone are almost half the entire budget of the Ministry of Nature and Environment, 10 percent of which would be adequate to fully equip, train, and mobilize anti-poaching units throughout the country. Charging small license fees

for Mongolian hunters (e.g., marmot hunters) also has the potential to generate significant income for wildlife management in Mongolia. Obviously, some money generated by wildlife exploitation must also go to support wildlife monitoring and research, the results of which would form the foundation for credible and sustainable wildlife management in the nation.

Another significant gap, common to many of Mongolia's environmental laws, is the lack of adequate disincentives (fines and penalties) to poaching. The primary justification for the application of fines is twofold: (1) to deter the targeted behavior, and (2) compensate for damage caused. Mongolia's civil penalties for violating hunting legislation do neither.

One of the problems is the fixed status of penalties in the law. As a matter of legislative drafting, all fines are specified in the organic legislation (ten years ago for most laws) with no provision for inflation-indexing or regulatory mechanism to adjust fine levels. The result is a significant reduction in disincentive and compensative values. While amendments to some laws increase these fine levels, they remain fixed for long periods and therefore incapable of following market trends.

Even if the fines had been inflation-indexed, initial values were still insufficient to compensate for damages caused. The Hunting Law contains the most complicated set of administrative penalties, but still fails to establish adequate disincentives. Even though many targeted species have appreciable value, the hunting law applies fines as little as 1,000 Mongolian tugrugs (< $1) for certain forms of poaching. The majority of fines would cost the violator $10 to $20 (not including poaching rare animals for which criminal charges apply[19]).

In addition, applicable fines range widely for any given violation. While the upper-end fines might have some effect, the lower end of the range is so small as to be meaningless. Even in a cash-poor environment, the deterrent effect of a $10 fine for poaching a brown bear (worth as much as $1,300 on the black market) is questionable at best. Moreover, none of the laws provide direction on when to apply a higher fine, leaving this entirely up to the discretion of the inspector or ranger.

Another aspect worth reconsidering is the application of different fines depending on the status of the violator as a private citizen, economic entity, or public official. A number of fines address illegal market activity and yet still distinguish between private citizens and companies. Regardless of the individual's employment status, income generation is the primary function of the activity and fines should reflect this practical reality.

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19 The Law on Fauna sets forth a list of "rare" animals that may not be hunted except for certain purposes. This list is separate from the concept of "huntable" rare animals referenced in the hunting law, such as argali. Poaching from the first category may carry a fine of MNT 20,000 to 50,000(< $20-50), while hunting from the second category carries criminal penalties.

Commercial gazelle hunter proudly displaying his catch. Photo taken in 1999. Since then, the Mongolian government has banned commercial hunting of gazelle. Image: Henry Mix/Nature Conservation International.

5. Recommendations for Priority Actions

In 1991, Mongolia's new constitution declared wildlife to be the property of the government, a common resource for the Mongolian people. The constitution, with the best intentions, was meant to lay the foundation for a new form of environmental management headed by the Ministry of Nature and Environment; but this severely underfunded and understaffed ministry has struggled to establish itself, leaving a management vacuum that remains mostly open. In practice, Mongolia's wildlife still belongs to no one. Established in 1989, the Ministry of Nature and Environment has never created an agency dedicated to wildlife management. Instead, Mongolia's wildlife-related laws delegate managing authority to local governments that do not have the training or funding to implement effective management. With no one watching (figuratively and literally), hunters across the country have filled the void, staking their claim to ever increasing numbers of animals to offset low incomes, supplement livestock, or simply as a hobby. Traders in neighboring countries, especially China, have been the happy recipients of this new stream of wildlife product, consuming millions of animals every year and generating enormous profits.

To discuss management options, the project held a stakeholder Workshop on Mongolian Wildlife Trade in Ulaanbaatar on August 17–19, 2005. Over 120 people attended the three-day event, including staff from four ministries representing wildlife enforcement and management bodies in Mongolia, interested national and international nongovernmental organizations, hunting and tourism company representatives, resource specialists, and international experts. Beyond presentation of results, the conference provided input from biologists and management specialists for the participants to consider. Conference discussions focused on five management areas: international trade, domestic trade, hunting management and enforcement, trophy and sport hunting, and community-based approaches.

A major output from this workshop was the agreement that wildlife trade is having serious impacts not only on endangered species, but on several other species that occur in Mongolia; and that immediate, comprehensive measures are necessary to stop uncontrolled trade and prevent the potentially permanent loss of biodiversity. Conference attendees cited numerous gaps and conflicts in law, management structures, implementation practices, and enforcement capacity that have all allowed the overuse of Mongolia's wildlife resources for more than a decade. Among them are:

1) The lack of any legislation directed specifically at wildlife trade.
2) Offtake levels that are not scientifically based.
3) Inadequate training and capacity to enforce existing hunting and trade restrictions.
4) Inadequate use of economic incentives and disincentives in relative legislation.
5) A failure to capture revenue from the system for the benefit of the resource.
6) A lack of incentive and legal basis for effective community participation.
7) A lack of systematic knowledge on hunting and wildlife resources.

8) A lack of inter-agency cooperation and sharing of enforcement data.
9) Corruption at all management levels.

Supplementing these main themes, working groups at the conference offered several cross-cutting and sector-based recommendations, which are outlined in this section. To the extent possible, recommendations have been prioritized, and they reference likely implementation authorities. Ultimately, responsibility for implementation rests with the Mongolian government and its people. However, central to effective trade management will be the following:

1) Mongolian Academy of Sciences—to set scientifically based, sustainable offtake levels for all targeted species and to regularly and accurately monitor populations.
2) Ministry of Nature and Environment—to take a lead role in designing needed legislation, procedural mechanisms, and enforcement protocols for both national and local management actions.
3) State Specialized Inspection Agency—to shoulder primary enforcement responsibility and coordinate overlapping tasks with other key authorities.
4) State Border Defense Agency—to engage in monitoring and enforcement of cross-border trade around the country.
5) Mongolia Central Customs Authority—to develop new methods of detecting trade and establish effective cross-border cooperation with China and Russia.
6) State Police—to control the influx of weapons and ammunition into the country and enforce relevant laws in local areas.

Recommendations have been divided into six separate sections, including (1) cross-cutting recommendations, (2) international trade enforcement, (3) domestic trade enforcement, (4) hunting management, (5) trophy and sport hunting management, and (6) community-based approaches. Each section identifies short-term, long-term, and regulatory goals in order of priority within each subsection.

In drafting these recommendations, we are conscious of the fact that wildlife management requires the combination of a number of equally important ingredients. For example, public awareness campaigns will have little meaning if there is still no local incentive to conserve the resource or report violations; value-added processing will only result in higher incentives to poach if not coupled with adequate monitoring and enforcement; and improved systematic knowledge of the resource will have only marginal impact if decision making continues to ignore it and there is no capacity to implement interventions. Therefore, while we seek to establish a semblance of priority, none of the recommendations are intended as stand-alone solutions. It is also important to recognize that long-term improvements cannot be achieved without strong regional and international cooperation and sustained technical and financial assistance from the international community.

Cross-Cutting Recommendations

For the government of Mongolia to effectively manage the growing challenges to wildlife trade enforcement, it must focus its attention on eliminating several critical gaps in the overall management framework. The following recommendations are cross-cutting in nature; responsibility for pursuing them will devolve to the Ministry of Nature and Environment, Central Customs Authority, State Border Defense Agency, and State Specialized Inspection Agency in cooperation with other key organizations such as the Academy of Sciences, Ministry of Education, State Police, Mobile Anti-Poaching Units, and Protected Area Rangers.

Improving Wildlife Financing

Few of the recommendations contained in this chapter will have much chance for success without adequate financing. We have therefore chosen this as the starting point for all subsequent suggestions. Some of the goals prioritized here rely on funds already generated by wildlife trade being made available to the Ministry of Nature and Environment for conservation. The one regulatory goal targets national legislation that needs revision to help unlock these funds.

Short-Term Goals:

Assess and Prioritize Wildlife Financing Needs:
This is a short-term and continuing initiative that should be done as part of any sound fiscal management policy. If lessons from other countries are any indicator, funding will always be an issue, in particular for non-game species. In anticipation of continuing budgetary constraints, priorities

should be established; i.e., for endangered species, revenue-generating trophy species, and species in decline because of subsistence hunting and trade.

Establish a Specific Budget in the MNE for Wildlife Management: The MNE's accounting format fails to provide any specific budget for wildlife management, despite this being one of the largest potential income sources and a legally required expenditure. Regardless of the budget ultimately allocated, this is the place to start. It is also an action that requires little to no input from outside sources. Sub-accounts within this budget might include:

- Research and monitoring (allocable and prioritized by species).
- Wildlife Project (agency) administration (organizational support, communication, computing capacity, fee collection, contract administration, etc.).
- Transportation and lodging for Wildlife Project (agency) field personnel.
- Equipment for Wildlife Project (agency and enforcement) personnel.
- Facilities maintenance.
- Specific activities (i.e., infrastructure development, watershed or range restoration, GIS and mapping, etc.).

Set Goals for Achieving Reinvestment Requirements: Actually meeting the requirements of the Law on Reinvestment of Natural Resource Fees will take time. To assist in targeting and achieving full compliance, the MNE should establish viable goals tied to budgetary requests and internal accounting.

Develop a Wildlife Management Budget for Other Agencies: As part of each responsible agency's annual planning, a separate section devoted to wildlife management should be used to prioritize needs, outline required costs, avoid duplication of effort, ensure compliance with legally mandated funding requirements, and highlight progress from the previous year.

Long-Term Goals:

Establish Monitoring System for Wildlife Accounting: The primary objective should be to develop a system linked to project implementation that evaluates project results to determine whether or not objectives have been met, what costs and investments were made to achieve results, how well the system is working, and what changes in financing would improve results.

Gray wolf in Mongolia's eastern steppe. Image: K. Olson

Regulatory Goals:

Revise the Public Sector Management and Finance Law: Acting as the primary constraint to earmarking funds generated by wildlife hunting and trade for conservation purposes, this law should be a priority for legislative review and amendment. Because this touches on the overall fiscal management of the country, it is not expected that such changes will be possible in the short term.

Improving Systematic Knowledge

Lack of systematic knowledge prevents policy makers from assessing what needs to be done to improve

wildlife management systems or reform legislation. In Mongolia, the lack of systematic knowledge in wildlife management, especially trade, is substantial. Population estimates for many hunted species are either nonexistent or too infrequently conducted to inform management decisions. Local governors requesting hunting quotas for their area reportedly rely on data given to them almost 20 years ago. Harvest quotas and licensing totals are recorded by numerous bodies, but not reported to a central authority and are therefore not capable of being tracked from year to year. Enforcement data is often treated as secret information and not shared. A conference held in October 2005 has started to put together a Mongolian Biodiversity Databank that will certainly improve the current situation. Recognizing that these ongoing efforts are beginning to answer some needs, the following recommendations highlight some of the basic requirements for improving systematic knowledge identified by the participants to the International Wildlife Trade Conference.

Short-Term Goals:

Establish a Wildlife Trade Database: To ensure the efficient and timely sharing of critical wildlife data among management and enforcement bodies, a wildlife database should be created and recognized as the primary data repository for all species. The database could be part of the existing Mongolian Environmental Information Databank managed by the MNE and should be made available at the national, aimag, and soum levels.

Update Range and Distribution Maps: Range and distribution maps for most species important to hunting and trade were completed in the 1970s. These maps are available only at small scales and are too small to be useful in documenting changes. Very few have been updated in the last 30 years. Range maps should be produced at scales adequate to inform management and be used to develop cooperative monitoring programs (and perhaps regional quota systems) at the national and local levels.

Identify Important Habitats: Results of population surveys should be used to identify important habitats that are worthy of consideration for reserve status. Such sites might include areas containing a major population of a species or containing a critical breeding ground for a species. MNE should be made aware of these sites for consideration as protected areas. For various reasons, not all such areas will warrant reserve designation, but should be designated by MNE as "important ranges" and managed accordingly, with the potential to close them to hunting should local populations show consistently negative trends or reach critical levels.

Long-Term Goals:

Conduct Population Surveys to Monitor Trends: There is a critical need for regular, replicable, and scientific best-practice monitoring for all game animals to determine if populations are declining or otherwise under threat. If monitoring data suggests that a population is in decline and/or not sustainable, hunting should be prohibited until monitoring can prove that the population is again numerous enough to sustain hunting. As can be seen from the description of individual species above, almost no accurate, replicable, or regular monitoring has been attempted on any of the species. It is essential that the national (preferably) or aimag governments expend more funding, resources, and manpower to survey and monitor these species to determine their true condition and trends.

Define Sustainable Offtake Levels: The Mongolian Academy of Sciences is responsible for conducting population surveys and providing recommended offtake numbers for consideration by the MNE and the Cabinet Ministry. However, there are still no methodologies to legally establish sustainable offtake levels, an obvious prerequisite to defining appropriate harvest quotas. The improved understanding of the resource supported by the previous three objectives will assist in defining offtake levels.

Regulatory Goals:

Coordinate Wildlife Surveys and Monitoring: Wildlife monitoring should be coordinated through a central point, although actual collection of data is likely to remain the responsibility of multiple agencies, perhaps with an increasing role at the local level. The primary goal of central coordination is to ensure availability of data to support sound decision making at a national level. This also implies the use of standardized tools and

methods for collecting, analyzing, and interpreting data.

Legally Require Scientific Basis for Offtake Levels: For offtake levels to have meaning, they must be recognized by Mongolia's quota-setting body, the MNE. At present, the Academy's quota numbers are only recommendations and can be exceeded by the MNE at its discretion. The result is harvest levels issued by the MNE that often exceed the Academy's best estimate of sustainable levels. Therefore, there is a need to delegate authority to determine harvest quotas and seasons to a single, objective, scientific organization (i.e., Mongolian Academy of Sciences) with no financial interest in the use of the species. It should be required that quotas be based on the best available scientific data, and that there be full publication of all data, methodologies, discussions, and results for wildlife research.

Develop and Standardize Enforcement Information Collection and Sharing: Several government bodies have enforcement authority and regularly conduct patrols within their jurisdiction. However, there is no standardized method for collecting, processing, or distributing data to other agencies. At a minimum, an agreement should be reached that all enforcement bodies must supply information on all wildlife trade or illegal hunting interceptions with partnered agencies and include at least the following enforcement details:

- Arresting personnel's division, region, title, location, name and ID number.
- Information sufficient to fully and accurately identify the violator(s).
- Date(s) and location(s) of enforcement.
- Type(s) of wildlife product seized.
- Species name(s).
- Volume of product in a measure that allows determination of the number of animals (i.e., the number of skins as opposed to weight or estimated value).
- Estimated value of the product.
- Storage location.
- Other items seized during enforcement (i.e., equipment, vehicles, weapons, money).

Regulate Chain of Custody Requirements: Successful adjudication of poaching incidents depends in part on the integrity of the system of collecting, preserving, and submitting evidence to laboratories for testing and courts for presentation in case proceedings. At present, no such system exists. At a minimum, the following elements should be addressed either in law or regulation as appropriate:

- When evidence must be sent to a laboratory for service or courts for adjudication proceedings.
- What documents must be included when submitting evidence.
- Design of an evidence submittal form.
- Design of a chain-of-custody form.
- Guidelines for packaging, sealing, labeling, tagging, and shipping evidence (including special procedures for perishable materials).

The Community Dimension

One fundamental similarity across countries and cultures is that any government program must appear to be public, transparent, effective, and legitimate. In other words, the concept and contents of the program (including relevant legislation) have to be made available to citizens so that they can be easily understood. Simply restating what the law says (a regular practice in Mongolia) is rarely understood by local communities and fails to make the initiative relevant to their lives. The information must also be easily available in common places or media—television, radio, newspapers—vs. bulletins posted on the inside of government buildings. This information should clearly define procedures for its application; that is, it should be user-friendly. Finally, it must be created using recognized procedures from a recognized authority.

While the following list of recommendations does not address all of these issues, it does emphasize the need in Mongolia to amplify citizen involvement and understanding of wildlife management goals. Without the involvement of citizens in decisions on wildlife management, the value, validity, and integrity of attempts to include the public in hunting management and anti-poaching campaigns will likely fail.

Short-Term Goals:

Establish Wildlife Hotline: A simple and relatively easy measure to implement would be the establishment of a toll-free "Wildlife Hotline" telephone number in areas with adequate infrastructure for reporting illegal wildlife trade activity. The hotline would maintain a critical link with the public, fielding calls and ensuring caller anonymity by not requiring them to reveal their names, testify in court, or sign affidavits. Most important, it would allow the public to report wildlife violations directly to law enforcement personnel, or in the alternative to a nongovernmental organization, and potentially to a specially trained task force. Obviously, such a system would not be available in Mongolia's vast remote landscapes, but much of the trade occurs in developed cities and towns that have increasingly well-connected cell phone services.

Expand Existing Information Campaigns: Continue and expand on the information campaigns targeting both Mongolian nationals and international visitors. Current efforts focus on trade in certain endangered species and are limited to billboards located at the Chinggis Khan International Airport. Additional opportunities to "get the message out" include distribution of wildlife trade pamphlets to visa applicants in Mongolian embassies abroad and at the foreign national registration office in Ulaanbaatar. Costs of the program could be passed on to tourists through moderate increases in visa or registration fees.

Design Anti-Poaching Education Campaign: Broadcast anti-poaching public service announcements on TV channels, radio channels, and other media sources. Promote to children and adults a greater understanding of Mongolian wildlife, their habitats, and the threats to their survival by allowing people to read, listen to, or watch free educational material. Investigate potential to incorporate anti-poaching messages into established school curricula.

Long-Term Goals:

Develop and Implement a National Program for Public Awareness: Coupled with an appropriate community-based program, public education at the national and local level would go far toward reducing illegal wildlife harvests in Mongolia. A public relations and education program should focus on the rich cultural heritage that Mongolia boasts (UNDP 2000, World Bank 2003) and how poaching negatively affects and reflects on that tradition. It should work to strengthen the conservation ethic that already exists and work to reinforce social barriers to poaching. Such a program should be linked to a social development plan that provides alternatives to illegal practices. Providing jobs in law enforcement is one example, but this approach should be even more comprehensive and enlist the assistance of people trained in these areas.

Regulatory Goals:

Increase Whistle-Blower Incentives: The current whistle-blower provision in the Hunting Law does not protect the reporter's anonymity and does not provide enough incentive. It pays cash rewards that are 15 percent of the fine. In many instances, the fines are so low that a percentage would be meaningless. To be effective, the law should establish minimum rewards, with higher minimums for reporting endangered species violations. Substantial awards (i.e., up to $1,000) could be offered for information leading to the arrest and conviction of anyone in possession of or trading more than a certain quantity of wildlife parts.

Establish Participatory Processes: If wildlife trade policy is to accommodate multiple interests, the legal framework needs to provide an effective mechanism by which diverse stakeholders can make their interests known and, perhaps more importantly, interface with policymakers. This is as important at national and regional levels as it is at the level of particular communities. Critical areas to consider include access to information and participation in policy formulation and resource decisions. To help accomplish this goal, Mongolia should consider becoming a signatory to the Aarhus Convention.

Inter-Agency Cooperation and Capacity Building

In the struggle against illicit wildlife trade, there can be no substitute for well-coordinated, equipped, and trained management authorities. For the Mongolian

government to design, implement and enforce effective wildlife trade laws and policies, capacity building for wildlife trade management must be undertaken in the Ministry of Nature and Environment, Central Customs Authority, State Specialized Inspection Agency, State Border Defense Agency, as well as with local-level administrations. At a minimum, there must be one management authority with primary responsibility for the design, coordination, and implementation of wildlife management programs. Priorities include the following steps and measures.

Short-Term Goals:

Develop and Implement Inter-Agency Training Program: Assess enforcement capacity and training needs on a site-by-by site basis. A range of specialists—including State Border Defense Agency and police trainers, legal experts, and specialist wildlife trainers—should conduct training.

Create an Inter-Agency Wildlife Trade Enforcement Handbook: Draft and publish an Inter-Agency Wildlife Trade Enforcement Handbook for use by Central Customs, State Specialized Inspection Agency, State Border Defense Agency, Protected Area Rangers, and police.

Organize Annual National Wildlife Management and Trade Seminars: Organize annual national seminars—including all private, government, and NGO representatives who manage wildlife trade—to discuss ongoing and emergent issues and continue to refine management directives.

Long-Term Goals:

Establish Wildlife Management Agency: A number of government agencies in Mongolia have been delegated some authority for wildlife management. However, there is no single authority responsible for managing the system as a whole. The result is piecemeal actions by several authorities with sometimes little communication or cooperation, and ultimately ineffective management. A single authority would provide a central hub to all agencies having some management or enforcement authority and a focal point for initiatives aimed at improving the system.

Strengthen Judicial Capacity to Adjudicate Wildlife-Related Cases: Training programs are urgently needed to build knowledge and strengthen the capacities of judges, as well as that of public prosecutors, to deal with wildlife trade issues. In general, the judicial system is still weak and inadequately trained to handle environmental litigation. This proposal is probably the most difficult and will require a coordinated effort to achieve. Assistance in the development and implementation of such a training program should come from agencies with wildlife enforcement responsibilities and the Ministry of Justice.

Regulatory Goals:

Refine Delegations of Authority in Existing and Proposed Legislation: As a counterpart to the establishment of a Wildlife Management Authority, legislative action will be required to refine delegations of authority and coordinate joint initiatives such as research, monitoring, and enforcement. These issues need to be addressed and roles clarified in a manner that will enable quick action by identified agencies to issues related to wildlife management.

In the event legislative action is not possible, two alternatives may be possible:

1. Develop Regulation on Inter-Agency Cooperation: As a substitute for legislation and to ensure full and prompt cooperation between sometimes competing agencies, conference attendees recommended the development of a separate regulation to define cooperation requirements, provide specific procedures, and delineate fines for noncompliance.

2. Establish Inter-Agency Cooperative Agreements: With or without a law or regulation, all relevant agencies should still seek to establish operating agreements for wildlife monitoring, enforcement protocols, population survey methodologies, and any associated schedules. Agreements should stipulate prompt exchange and sharing of new and existing data and reference appropriate sections of Mongolia's administrative or other law to ensure adherence.

Siberian ibex. Image: Luke Distelhorst.

Economic Incentives and Disincentives

Economic incentives and disincentives will be a key factor in generating revenue from the resource and providing a check against corruption. The decision to use such measures must be made in the context of the country's overall economic planning and strategy. For this reason, we list a few examples that should be considered with the understanding that they are part of longer-term strategies still to be developed.

Long-Term Goals:

Provide Enforcement Incentives to Government Staff: For many years, the State Specialized Inspection Agency, Customs officials, and MNE staff have watched as Mongolia's wildlife leaves the country. There is no mystery as to the responsible parties, little secrecy concerning collecting points and markets, and no lack of evidence. It continues for many reasons, but one is the lack of incentive to engage in difficult, and sometimes dangerous, enforcement actions. One solution to the problem would be to incorporate enforcement incentives designed to motivate and reward public officials whose enforcement performance exceeds existing regulatory requirements.

Value-Added Processing of Wildlife Products: Products from wildlife should be transformed as much as possible within Mongolia to maximize the value captured from the resource and employment opportunities. To achieve this goal, appropriate technical assistance and financial mechanisms will be required from the international community, NGOs and the Mongolian government. While this is a high-risk strategy (because it carries the potential to increase incentives to poach), it is nonetheless a fundamental principle of economic development—that a producing country should seek to extract the maximum value from the use of a given resource through adding value to the production. This should not be considered a viable goal unless other components aimed at controlling hunting and trade have already been achieved.

Promote Alternatives to Wildlife Use: Identify and promote economically feasible alternatives to direct wildlife use. Examples have already been developed by the International Snow Leopard Trust, active in the western part of the country, and could be expanded upon for use in other areas.

Develop 'Soft' Enforcement Measures: In addition to strengthening traditional means of enforcement, there is also a need to develop alternative, "softer" means of law enforcement. This includes the use of positive incentives and voluntary agreements. The latter are likely to be vital for securing environmental commitments from local communities and the expanding private sector.

International Trade Enforcement

Illegal international trade poses the greatest threat to Mongolia's wildlife. Many of the animals hunted would have little or no value in a purely domestic market and for those with local value, trade volumes would be orders of magnitude smaller. Improving international trade enforcement must therefore be a cornerstone in any approach to managing wildlife trade in Mongolia. Primary responsibility falls to two agencies, the Central Customs Authority and the State Border Defense Agency. Sharing some responsibility is the State Specialized Inspection Agency. All struggle

with legal and management deficits to implement existing national mandates. The following actions should be undertaken in the immediate future to correct existing deficits and create a positive environment for cooperative action:

Short-Term Goals:

Improve Border Point Investigation Capacity: The Central Customs Authority is well aware of the areas most important to cross-border trade in wildlife. But they cannot stop it without the equipment and personnel capable of detecting wildlife contraband. Even the Zamiin Uud and Altanbulag locations need substantial equipment upgrading and personnel training to effectively investigate trade. While some of the equipment would be expensive and difficult to maintain (i.e., scanning equipment), other techniques, such as using trained dogs, are not only feasible, but many agents already have experience using them for other types of investigation, primarily for narcotics trade. Programs in the United States, South Africa, and Canada have shown that dogs can be used as an effective law enforcement tool to enhance the effectiveness of CITES and domestic wildlife trade controls.

Institute Random and Undercover Border Trade Investigations: To increase the potential effectiveness of enforcement actions, border trade areas should be monitored by sporadic and unannounced visits from the State Specialized Inspection Agency and/or other enforcement personnel.

Long-Term Goals:

Establish Formal Links with Trade Partners: Establish formal links with Chinese and Russian agencies, and with land managers in border areas, to facilitate information exchanges and cooperative management ideas.

Institute a Multi-Level, Multi-Partner Exchange and Training Program: Exacerbating efforts to control international trade is the inadequate exchange of information and enforcement methods with similar agencies in neighboring Russia and China. This recommendation seeks to engage communication and forge action partnerships at the international level directed at similarly situated implementing bodies. The exchange program could include joint investigative efforts to follow up on enforcement leads, joint training at identified cross-border trade points, and regular and full disclosure of domestic and cross-border enforcement actions.

Regulatory Goals:

Restrict Legal Wildlife Trade to Identified Border Points: Only two border points (Zamiin Uud and Altanbulag) are equipped to process legal wildlife trade. Restricting legal trade to these areas would not by itself prevent traders from attempting to smuggle through other border points, but it would allow enforcement personnel to focus their efforts. For example, any wildlife trade passing through other points would automatically be subject to confiscation.

Develop Standard Protocols for Handling Confiscated Wildlife Products: To date, no organizational protocols clearly define the relationship between prosecutors, police, inspectors, rangers, expert government witnesses, and the courts. Enforcement bodies can therefore unilaterally decide how to proceed with confiscated goods, making it difficult to manage court proceedings and ensure the preservation of valuable evidence.

Domestic Trade Enforcement

Domestic wildlife trade in Mongolia began in earnest with the economic collapse of the early 1990s and has grown along with the nation's improving economy. Wild game meat (e.g., marmot, roe deer, Mongolian gazelle, black-tailed gazelle, Yakut moose, Asiatic wild ass) is a popular item found on the market in many local areas, as are a number of medicinal products or species (e.g., Altai snowcock, wolf, corsac fox, Eurasian badger).

Short-Term Goals:

Expand and Improve Mobile Anti-Poaching Units: Mongolia's mobile ant-poaching units have managed to gain some ground, albeit limited, in the fight against poaching and wildlife trade. Growing recognition by and cooperation with the Professional Inspection Agency has helped give their presence and actions a degree of power. In

the immediate term, these units are in need of field training and communication equipment.

Strictly Enforce the Prohibition on Advertising Wildlife Parts in National or Local Media: Advertising laws already make it illegal to advertise wildlife parts for sale, but enforcement remains poor. Increasing fines and creating an incentive to citizen reporting (whistle-blower provisions) has the potential to increase the effectiveness of these provisions.

Long-Term Goals:

Develop Long-Term Funding Strategy for Mobile Anti-Poaching Units: These units still exist on the margins of management supported almost entirely by outside funding. If they are to become a part of permanent anti-trafficking efforts, their status and capacity needs to move to the next level. In the long term, these units will need identified sources of income and support, including potential policy changes to recognize their status in anti-poaching efforts.

Regulatory Goals:

Incorporate Effective Anti-Corruption Measures in Legislation: It is no secret that enforcement personnel are sometimes part of the problem. The efforts to disengage enforcement from management through the creation of the State Specialized Inspection Agency have not resulted in any real change in corruptive practices. All enforcement personnel still suffer from impossibly low salary levels and inadequate training, support, and safeguards for their often dangerous jobs. The situation gives new meaning to the old adage—if you can't beat them, join them. Anti-corruption measures need to be incorporated into legislation that has sufficient deterrence values.

Develop Wildlife Registration and Tagging Requirements: Tagging is a fundamental tool in hunting enforcement that has not yet been fully developed in Mongolia. The Ministry of Nature and Environment should, in concert with all other enforcement bodies (State Specialized Inspection Agency (SSIA), State Border Defense, Customs, and Police), develop wildlife registration and tagging requirements to enable tracking and enforcement of hunting and trade restrictions. In this system:

Registration would apply to a set list of species and parts that are traded for their trophy, aesthetic, or medicinal value; i.e., snow leopard pelts and skulls, brown bear paws, argali skulls and horns, ibex skulls and horns, etc.

Tagging would apply to all animals harvested for any purpose (scientific, household, commercial, or trophy) by whatever means and constitute both the permission to hunt and possess the animal indicated on the tag by a specific person. Failure to immediately tag would constitute a violation equal to hunting without permission. Tags would be required to remain with the animal at all times until consumed. Tags would not be transferable. Possession of a tagged animal by someone other than the hunter would constitute an offense punishable by civil and criminal penalties.

Develop Wildlife Registration and Tagging System: To implement the preceding requirements, the same government agencies should develop a wildlife registration and tagging system to ensure the fair and efficient administration of the requirements. To avoid confusion, registration should be restricted to the offices of responsible government agencies. Tag distribution, however, may happen through local government agencies, but is also possible through licensed private companies (pursuant to a competitive bidding process). This type of arrangement would be consistent with government policy to allow private businesses the opportunity to provide public services they can deliver efficiently.

Prohibit Possession of Unregistered/Untagged Animal Parts: MNE, with input from interested Mongolian and international agencies and NGOs, should seek to amend existing law to make possession, sale, purchase, and transportation of any wildlife parts illegal unless properly tagged and/or registered. The law would apply to all species equally with more detailed requirements (special registration, number locking tags, etc.) to control trade in endangered species parts such as snow leopard skins and meat, brown bear paws and skins, argali and ibex horns, Dalmatian pelican beaks, saiga antelope, etc.

Implement Grace Period for Wildlife Part Registration: MNE, or an entity designated by MNE, should register within a specified time frame (e.g., six months from publication of law) all hides, skulls, and other animal parts for specific species currently in the possession of any government agency, economic entity, or individual. Possession of any parts after the registration period will subject possessor to criminal and civil penalties pursuant to amended legislation. A small sample of skin or hair may be collected at the time of registration for future genetic studies. Individual owners will be informed in writing at the time of registration that it is illegal to sell or trade the registered part. Any unregistered hides or skulls encountered by law enforcement agents after the end of the amnesty period will be confiscated and the possessors prosecuted.

Redesign Wildlife Economic Assessments: The hunting law assigns licensing fees and civil fines based on the "ecological and economic assessment" of the species in question. Participants in the wildlife trade workshop felt the assessments are confusing and do not reflect actual market prices. In practice, the assessment assigns a price per kg of meat and a total value equal to the average number of kg for the animal in question; the "ecological" measure, along with many other market values for medicinal parts and furs, is completely ignored. Fees and fines therefore fail to adequately pay for the use of the resource, act as a deterrent to illegal activity, or compensate the state for violations. Assessment requirements should be redefined to eliminate the unused and confusing "ecological" measure and tie values to known market values using an identified and independent source. The value should be reviewed annually and be sufficiently higher than the market value of the animal parts to deter poaching. Market value can be determined through consultation with international entities that monitor trade in wildlife, such as TRAFFIC.

Annually Revise Fine Levels to Mirror Market: As a matter of legislative drafting, all fines are specified in the organic legislation (ten years ago for most laws) with no provision for inflation-indexing or regulatory mechanism to adjust fine levels. The result is a significant reduction in disincentive and compensative values. The Hunting Law contains the most complicated set of administrative penalties, but still fails to establish adequate disincentives applying a fine of MNT 10,000 to 25,000 for poaching (not including "huntable" rare animals for which criminal charges apply). To be effective, fines need to be set sufficiently higher than current market values and adjusted through formal channels on an annual basis. Even though fines are viewed in large part as revenue generators, the deterrent principle behind the application of administrative or monetary fines cannot be ignored. For this to work, acting illegally (and being caught) has to be more expensive than acting legally—and it must keep pace with the market. One way to do this is to ensure the regular updating of fine levels and, once appropriately set, define a procedure that keeps pace with inflation.

Hunting Management

Mongolia's wildlife trade begins with individual hunters across the country. Effective hunting management is therefore a first step in controlling wildlife trade. Attendees of the International Conference on Illegal Wildlife Trade complained that local permissions exceed authorized quotas, that hunters infrequently purchase licenses and, if they do, often exceed license limits. The MNE continues to issue quotas even in the face of dwindling resources, and there is little to no enforcement of hunting restrictions at the local level. Furthermore, the legal basis for hunting management is missing several key components.

Redressing the problems involving unsustainable and illegal hunting in Mongolia will require reforming hunting and population management to ensure (1) openness and transparency, including external review and oversight; (2) a mix of top-down and bottom-up authority that enjoys local support; and (3) active and adaptive conservation and management, including anti-poaching enforcement, and using funds generated by hunters. If Mongolia does not take immediate steps to halt this crisis and reverse the dramatic decline in wildlife, the country may soon face a series of country-wide extinctions that will forever alter the biodiversity, ecological structure, and economy of the country. Recommendations include:

Short-Term Goals:

Conduct Population Surveys to Monitor Trends: There is a critical need for regular, replicable, and scientific best-practice monitoring for all game animals to determine what level of hunting, if any, a given game species population can support.

Define Sustainable Offtake Levels: The Mongolian Academy of Sciences is responsible for conducting population surveys and providing recommended offtake numbers for consideration by the MNE and the Cabinet Ministry. However, there are still no methodologies to legally establish sustainable offtake levels, an obvious prerequisite to defining appropriate harvest quotas.

Design and Implement Hunting Districts: Other than protected areas, there are no restrictions on where hunting may take place in Mongolia. Significant benefits may be gained by limiting hunting to specific areas and adjusting management directives to meet the needs of the wildlife resources in the area. In general, hunting districts should have a clearly defined area, sufficient resources to support the type of hunting permitted, a designated management authority whether government or a local community, trained managers within those organizations, and a management plan with clearly defined requirements for its development, renewal, and legal status.

Regulatory Goals:

Revise Existing CITES Legislation to Comply with Convention: Mongolia's CITES implementation regulation is in contravention of the convention by granting the management body the authority to resolve disputes surrounding harvest quotas and thereby exceed harvest quotas. Academy of Science biologists and hunting companies both complained that quotas in recent years have been almost double the recommended levels.

Prohibit Hunting of Species with Decreasing Populations: Prohibit the taking of any species unless data indicates that the population is either stable or increasing (i.e., sustainable use at the permitted level is likely), and that the population is numerous enough to sustain hunting.

Require Management Planning: Require the development of management planning on a species-by-species basis, including compliance with this plan for local hunting management planning and activities. This will take substantial time and investment to comply with and it is therefore recommended that the requirement be phased in starting with priority species, such as marmot, wolf, red and corsac fox, etc. As management plans are completed and to ensure they are used, an additional regulatory requirement may be added explicitly restricting hunting in any area where there is no modern, replicable monitoring system in place.

Limit Hunting Licenses to Single Season: Without any specific limitations, hunting permissions are freely used in the following year if the hunter does not use it the year it was issued.

Tie Hunting Seasons to Flexible Management Scheme: Seasons, similar to quotas, should be set and adjusted pursuant to monitoring results using a flexible regulatory mechanism (not organic legislation) and adjusted on an annual basis as needed. To do this will require amending the law on hunting to define how and when such seasons will be defined, which organization will be responsible, the basis for establishing such seasons, and appropriate inter-governmental dispute resolution mechanisms that ensure fair administration of the process, but also respect the need for a science-based approach.

Establish Fines that Offset Market Incentives: Establish penalties through a regulatory mechanism that can adapt to and reflect the changing status of species, markets, and types of illegal uses. Related to this would be the elimination of distinctions between private citizens, companies, and public officials in setting penalty levels, basing them instead purely on the severity of the offense (type of species, number taken, subsequent offenses, etc.). Finally, include suspension of hunting privileges for certain types of offenses.

Refine Commercial Hunting Agreements and Legislation: Similar to, but separate from, hunting concessions, commercial hunting agreements need refining to become sustainable and ensure that

local communities benefit fully from the harvested species. Specific elements to consider include:

a) **Full Market Analysis:** Prior to approving a commercial hunting agreement concession, require the contractor to define the market for the resource (including the final product) and any particular demands, including product refinement, packaging, delivery, etc.

b) **Value-Added Production Requirements:** Consider including value-added production requirements into hunting concession contracts to ensure that a greater portion of the market value is captured by the local community. At present, commercial hunting ventures (whether conducted by companies or individuals) deal almost exclusively in the sale of raw products to China.

c) **Habitat Protection Requirements:** Fully describe habitat protection requirements, standards, and procedures.

d) **Hunting Company Certification:** Establish specific criteria for selection of qualified commercial hunting companies to ensure that only companies with adequate capacity and no previous record of illicit activities will be allowed to engage in this economic activity. Qualifications may include, but are not limited to, sufficient staff with adequate training in the harvest and processing of the targeted species, adequate financial capacity to perform all requirements that may be imposed (including habitat and resource protection requirements), monitoring activities, and value-added product development.

e) **Incentives for Community Involvement:** Create incentives for and require cooperation with local communities. Ensure that a percentage of hunting revenues are shared with the local community separate from other budgeting processes;

Trophy and Sport Hunting Management

There is little in the way of formal management of trophy and sport hunting in Mongolia. When initially conceived, the Law on Hunting identified sport hunting, but limited its application to foreign hunters. Mongolia's improving economy, relaxed gun controls, and abundant supply of ammunition have made it possible for a growing number of people, including Mongolians, to discover (or rediscover) the sport. Numerous sport hunting companies now offer high-end hunting excursions in the country for a number of species, including argali, ibex, wild boar, Yakut moose, Mongolian gazelle, black-tailed gazelle, and Siberian roe deer.

Many of the goals stated in this section are the same or similar to those listed in the recommendations under the previous section. We repeat them here with slight changes for clarity.

Short-Term Goals:

Conduct Population Surveys to Monitor Trends: There is a critical need for regular, replicable, and scientific best-practice monitoring for trophy and sport game animals to determine if populations are declining or otherwise under threat. If monitoring data suggests that a population is in decline and/or not sustainable, hunting should be prohibited until monitoring can prove that the population is again numerous enough to sustain hunting. As can be seen from the description of individual species in Appendix A, almost no accurate, replicable or regular monitoring has been attempted on any of the species. It is essential that the national (preferably) or aimag governments expend more funding, resources, and manpower to survey and monitor these species to determine their true condition and trends.

Define Sustainable Offtake Levels: The Mongolian Academy of Sciences is responsible for conducting population surveys and providing recommended offtake numbers for consideration by the MNE and the Cabinet Ministry. However, there are still no methodologies to legally establish sustainable offtake levels, an obvious prerequisite to defining appropriate harvest quotas.

Design and Implement Trophy Hunting Reserves: With the exception of protected areas, there are no restrictions on where trophy hunting may take place. As with other hunting districts, trophy hunting reserves should have a clearly defined area, sufficient resources to support the type of hunting permitted, a designated management authority whether government or a local community, trained managers within those organizations, and a management plan with clearly defined requirements for its development, renewal, and legal status.

Regulatory Goals:

Revise Existing CITES Legislation to Comply with Convention: Mongolia's CITES implementation regulation is in contravention of the convention by granting the management body the authority to resolve disputes surrounding harvest quotas and thereby exceed harvest quotas. Academy of Science biologists and hunting companies both complained that quotas in recent years have been almost double the recommended levels.

Prohibit Hunting of Species with Decreasing Populations: Prohibit the taking of any species unless data indicates that the population is either stable or increasing (i.e., sustainable use at the permitted level is likely), and that the population is numerous enough to sustain hunting.

Require Management Planning: Require the development of management planning on a species-by-species basis, including compliance with this plan for local hunting management planning and activities. This will take substantial time and investment to comply with and it is therefore recommended that the requirement be phased in starting with priority species, such as argali, ibex, taimen, etc. As management plans are completed and to ensure they are used, an additional regulatory requirement may be added explicitly restricting hunting in any area where there is no modern, replicable monitoring system in place.

Tie Hunting Seasons to Flexible Management Scheme: Seasons, similar to quotas, should be set and adjusted pursuant to monitoring results using a flexible regulatory mechanism (not organic legislation) and adjusted on an annual basis as needed. To do this will require amending the law on hunting to define how and when such seasons will be defined, which organization will be responsible, the basis for establishing such seasons, and appropriate inter-governmental dispute resolution mechanisms that ensure fair administration of the process, but also respect the need for a science-based approach.

Establish Fines that Offset Market Incentives: Establish penalties through a regulatory mechanism that can adapt to and reflect the changing status of species, markets, and types of illegal uses. Related to this would be the elimination of distinctions between private citizens, companies, and public officials in setting penalty levels, basing them instead purely on the severity of the offense (type of species, number taken, subsequent offenses, etc.). Finally, include suspension of hunting privileges for certain types of offenses.

Develop Full Hunting Regulations for Sport Hunting: Sport hunting for foreigners is mostly a function of the permit system from the MNE. Where, when, and how sport hunting can occur has not been adequately addressed and is resulting in negative impacts to communities and targeted species. Cited problems include a lack of defined local hunting areas; hunting tourism companies moving with relative freedom in search of trophies; hunting scouts driving animals out of protected areas so they can be hunted within the technical requirements of the law; hunting during seasons that overlap with breeding times; failure to comply with buffer zone requirements; no requirements, monitoring, or budget at any level for actual conservation of the resource; and little or no connection with local communities.

Refine Hunting Concession Agreements and Legislation: As part of sport hunting legislation, it may be desirable to define concession agreements—although this concept should be treated carefully, as it has the potential to result in the privatization of the resource and does not by itself guarantee the achievement of targeted management outcomes. Mongolia is currently experimenting with the concept of concession agreements for sport fishing, but has yet to approve any law or expand the

concept to other wildlife. Several components to a fair and enforceable system should be explored including, but not limited to:

a) **Outfitter Certification:** Establish specific criteria for selection of qualified hunting outfitters. Hunting tourism is classified as "tourism" and is therefore open to any company with experience running a tourism operation, even completely unrelated forms of tourism. The result is an ever-increasing number of applicants and still no established criteria for selecting companies.

b) **Incentives for Community Involvement:** Create incentives for and specifically define all elements of cooperation with local communities. This may include requirements for selecting and training local community members to provide various supplemental services; a share in hunting profits earmarked for community initiatives and separated from government budgets; and development of value-added local products and services associated with hunting tourism.

c) **Capacity Building Requirements:** Consider adopting capacity building requirements into hunting concession contracts to identify and build local capacity to engage in hunting management and production of wildlife products.

d) **Resource Protection Requirements:** To ensure the sustainable use of hunting resources, companies should be responsible for adequately protecting the resource within their concession. Such requirements should not only include protection of the species, but also habitat.

e) **Increase Monitoring Requirements:** Hunting companies are currently required to assess the status of hunted populations and areas once every year. Stricter monitoring and controls need to be instituted to ensure compliance with this provision. Monitoring of some species only once per year may also be insufficient to inform management.

Community-Based Approaches

With chronic unemployment across Mongolia, the government has naturally focused much of its attention on creating economic opportunities for its citizens. To this end, Mongolia has also been part of the worldwide trend to foster community approaches to manage a variety of natural resources. Recognizing the need to involve communities, the government has begun the process of enabling communities to stake a claim in Mongolia's resource base. The legislative vehicles for local access to resources are the Law on Environmental Protection, the Law on Forests, and the Regulation on Community-Based Natural Resource Management.

However, important changes in both law and practice will be required if community-based initiatives are to succeed.

Short-Term Goals:

Develop a Strategy for Community-Based Wildlife Management: The Ministry of Environment has recently engaged in the development of a regulation aimed at implementing the community rights contained in the Law on Environmental Protection. Access to wildlife resources is an intended part of that regulation, but remains a difficult subject because of the special requirements of wildlife management. Before implementing this regulation, it would be useful to develop a strategy to address these issues on a test basis for later inclusion into the regulation.

Long-Term Goals:

Implement Community-Based Wildlife Management Nationally: In the long term, the creation of a nationwide system for community-based wildlife management should be the ultimate goal. Such a system will be in large part dependent on the legal system that supports it, (described in the next section) as well as the full commitment of the government to support the effort. As with any natural resource management system, it will also need careful tailoring to the communities and wildlife resources of the various regions and subregions in Mongolia. What may be appropriate for a community reliant on marmots for subsistence purposes may not be adequate for a community

engaged in the management of a trophy hunting species such as argali.

Regulatory Goals:

Legally Recognize Community-Based Organizations: Even though there is little hope of achieving this goal in the short term, it is a critical step in this process. Any organization forced to act without recognition as a legal entity faces unavoidable risks and insurmountable obstacles. Giving local people the right to access resources, but taking away their right to form a legally recognized entity may in the end cause more problems than it solves. Therefore, this should be a priority.

Develop Appropriate Framework for Community Participation: Mongolia has yet to develop an appropriate framework for community participation that ensures adequate and timely access to information, regular admittance to government meetings, and full participation in policy formulation and decision making. At present, the laws directed at participation remain principles without defining a guaranteed and specified process and as such are almost entirely ineffective.

Provide Secure Community Access Rights: As of November 2005, Mongolian citizens now have the right to access certain natural resources. Land-lease tenure provisions contained in the Law on Land provide a starting point, but tenure security has not been adequately defined and will likely conflict with other concession types such as mining and petroleum. Without security, there can be no long-term interest in the sustainable use of the resource, which is one of the ultimate goals of this approach.

Devolve Real Rights to Engage in Local Management: The trend in community resource legislation in Mongolia has been to delegate the right to protect resources or advise on resource uses without adequate rights to actually manage resource use or enjoy the benefits. The result is understandably a lack of interest by local community members. A fundamental shift in policy direction will be required that ensures a return to local communities for their investment in resource protection.

Clearly Define the Balance of Power between Local and National Government: From a purely technical point of view, there is clearly a need to involve government in community approaches. While local communities are in the best position to affect local management, they lack fundamental capacities that can only be improved with the help of responsible government agencies and through appropriately selected policies and actions. A fine balance of power therefore needs to be defined and achieved to foster and sustain community management activities. This would include the identification of (1) services the government or other organization is uniquely positioned or authorized to provide, (2) the complementary or supplementary role of communities, and (3) cooperative mechanisms to allow the smooth functioning of these sometimes separate, sometimes combined roles.

Clearly Define Community Enforcement and Dispute Resolution Mechanisms: The legal framework is still silent on private enforcement and dispute resolution mechanisms. Dispute resolution is the exclusive domain of the Ministry of Justice and local governors, neither of whom are adequately equipped to handle the growing complexity and frequency of resource-related disputes. Providing comprehensive guidelines for community dispute resolution will provide a measure of efficiency in the system and support the fair administration of community rights at the local level.

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Appendix A: Species Case Studies

In addition to conducting surveys and reviewing official data sources, the project team engaged in the review of scientific papers on the status of targeted trade species in Mongolia. The following case studies highlight the impacts of hunting on Mongolia's wildlife resource and provide a summary of what is known about each species' legal status, distribution and densities, and the results of the surveys conducted during this study.

In general, the case studies provide ample evidence that the suspected and observed patterns of overuse extend to most, if not all, species and echo sentiments expressed by participants to the Mongolian Biodiversity Databank workshop held in October 2005. During our survey, we did not limit our questions to a pre-selected group of species and therefore collected data on many—several of which are also under extreme pressure. Moose and wild boar, for example, are considered to be declining in the north (Pratt et al. 2004); ibex, roe deer, lynx, red fox, corsac fox, otter, sable, wolverine, and Pallas' cat are all under threat and likely to be declining. These species are heavily hunted throughout their range for their meat, skins and/or for the international trade in body parts. In virtually all cases, hunting occurs outside of the legal requirement for permits, quotas, or hunting areas.

Pallas' cat. Image: Dr. Richard Reading

Marmot (*Marmota sibirica* and *Marmota baibacina*)

Because of the marmot's importance to Mongolia's culture, economy, and ecology, this case study provides more detailed information than the rest. In addition to discussing population distribution and trends, the text also provides background on taxonomy, habits, and habitat to inform the discussion on hunting impacts, and biodiversity conservation.

Taxonomy: Some controversy exists surrounding the number of marmot species in the world, the disagreement centering on the species occurring in Eurasia. Some authorities count only three while others as many as eight (Corbet 1978, Nowak 1999). Following the systematics of *Marmota* presented in Walker's Mammals of the World (Nowak 1999) and Adiya (2000), there are 14 marmot species worldwide, of which 8 inhabit the Eurasian continent including *M. baibacina, M. bobak, M. camtchatica, M. caudata, M. himalayana, M. marmota, M. menzbieri*, and *M. sibirica* (Corbet 1978; Hall 1981; Hoffman et al. 1979; Hoffman et al. in Wilson and Reeder 1993).

Two of these species, *M. baibacina* (Altai marmot) and *M. sibirica* (Siberian marmot or "*Tarvag*" or Trans-baikal marmot) are found in Mongolia. The most common of these two is the Siberian marmot and, according to Russian and Mongolian scientific literature, it comprises two subspecies—the Mongolian mountain marmot (*Marmota sibirica caliginosus*, Bannikov and Scalon 1949) and the Mongolian plains marmot (*Marmota sibirica sibiricus*, Radde 1862). The literature describes separate distributions for each—mountain marmots inhabit higher mountains and ranges in the Altai, Khangai, and Khuvsgul regions and plains marmots occupy Mongolia's vast steppe and grasslands stretching from the far eastern steppe to the Altai Mountains of the west. However, a majority of the literature reviewed does not treat them separately, subsistence hunters and fur traders do not distinguish between them, and there are no genetic studies confirming this distinction. We therefore discuss these sub-species in this text without separate reference.

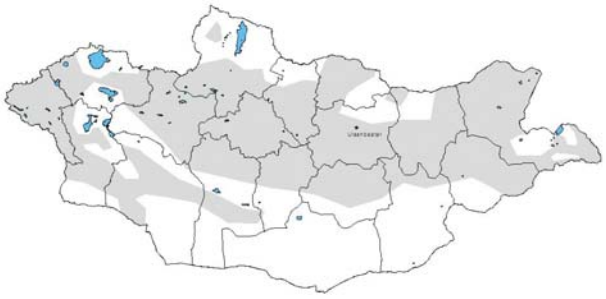
Legal and Conservation Status in Mongolia: Hunting of any marmots was recently banned for two years starting in 2005 through the end of 2006. Prior to 2005, Mongolia's hunting law allowed hunting of Siberian and Altai marmots from August 10 to October 16. Each hunter was allowed take three marmots. In addition to the hunting season, the law requires local governments to conduct surveys every four years and gives them the authority to close areas for the protection of the species. In areas where industrial hunting takes place, surveys must be completed on an annual basis and paid for by the hunting company. The Mongolian Law on Fauna does not regulate conservation of marmots. The Mongolian Red List of Mammals (Clark et al. 2006) classifies the Siberian marmot as Endangered, and the Altai marmot as Data Deficient.

Siberian marmot. Image: K. Olson

Legal and Conservation Status Worldwide: Neither Siberian nor Altai marmot conservation is regulated by international, multi-lateral or bi-lateral agreement. The IUCN Red List (assessments in 1996) classifies both the Siberian and Altai marmots as Lower Risk/Least Concern.

Summary: Marmots may be a keystone species and are experiencing significant declines across their range in Mongolia, roughly 75 percent in the last 60 years (Eregdendagva 1972, Demberel 1997, Adiya 2000, Batbold 2002). They are a traditional source of protein, medicine, and fur, with annual fur trade exceeding 1.2 million skins on average since the late 1800s. Harvest volumes were estimated at 1-1.5 million in 1999 and over 3 million in 2004. Because of their heavier coat, Altai marmot are the preferred species in Mongolia's fur trade, although their limited range results in most marmot skins in Mongolian trade coming from Siberian marmot.

Figure 7: Siberian Marmot Distribution 1970

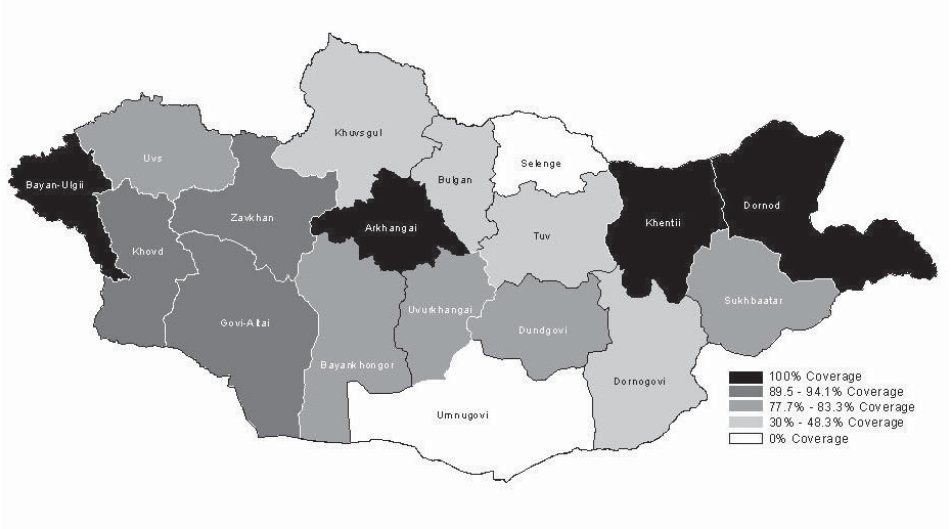


Source: Dulamtseren, S. 1970. Mongolian Mammal Guidebook. Ulaanbaatar, Mongolia.

Habitat and Distribution (*Marmota sibirica*): Typical of marmot species, the Siberian marmot occupies open grasslands, alpine meadows, pastures, and forest edges (Nowak 1999). It may be found in Mongolia, neighboring Buriyat, Tuva, southern Siberia, northern China and Manchuria. (Adiya 2000, Nowak 1999). In Mongolia, it occurs between elevations of 600-3,000 meters a.s.l. and occupies all but a small portion of suitable habitat, (Demberel 1997). Its range extends from the edge of the northern taiga forest regions south through Mongolia's steppe to the edge of the Gobi desert; from the base of the Nomrog Mountains in the east to the Altai Mountains in the west (Adiya 2000). Its distribution in Mongolia was first mapped in 1935 by Simokov, with updates in 1950 (Scalon and Bannikov), 1954 (Bannikov), 1956 (Pavlov), and 1972 (Eregdendagva). The maps produced are extremely small scale, making it difficult to compare or use them as a reference to record changes in distribution. The 1970 distribution map shows an even distribution over approximately 68 percent of Mongolia's territory, or roughly 1.07 million km^2. In recent years, more detailed surveys conducted in the eastern steppe region show substantially reduced distribution over much of the territory (Batbold 2002), with only 5 percent of existing burrows now active and perhaps as few as 159,000 remaining in this region covering the aimags of Dornod, Sukhbaatar and Khenti (Townsend and Zahler *in press*). Anecdotal information suggests that they have already disappeared from many areas where they were once numerous.

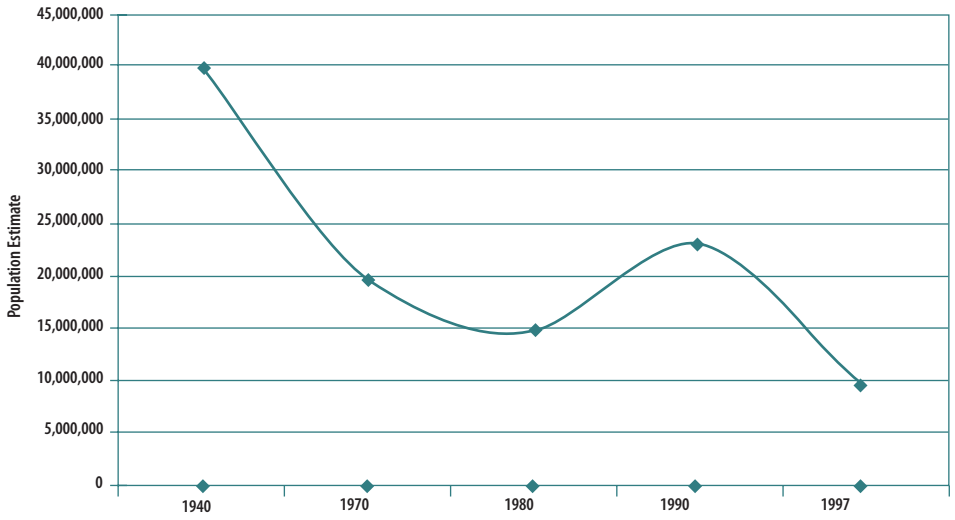
Habitat and Distribution (*Marmota baibacina*): The Altai marmot resides in high elevation alpine meadows. It may be found in the northern Mongolian Altai, and along the same mountain range in southwestern Siberia, eastern Kazakhstan, Kyrgyzstan, and Sinkiang (Nowak 1999, Adiya 2000). Mongolian biologists record six main populations in the Altai

Figure 8: Percentage coverage map for marmots in Mongolia



Source: adapted from Adiya, Ya., 2000.

Figure 9: Marmot population declines 1940–1997



Source: Batbold 2002; Adiya Ya., 2000.

range covering an area approximately 1,000 km^2 in size and belonging to Bayan Ulgii and Khovd aimags. (Amantai 1990, Adiya 2000). Although Kastschenko recognized *M. baibacina* as a separate species as early as 1899, distribution maps for the species in Mongolia did not separate it from *M. sibirica*, noting only three local populations (Bannikov 1954, Adiya 2000). Distribution maps in the 1970s did not include even this much detail.

Mongolia's scientific literature distinguishes five loosely defined marmot distribution patterns based on percentage of distribution coverage for 17 aimags in Mongolia and makes no distinction between Siberian and Altai species. According to the data summarized by Adiya (2000), four aimags have populations occurring throughout their territory—Arkhangai, Dornod, Khentii, and Bayan Ulgii; an estimate that is at odds with the distribution map in Figure 7. Another four have 89.5 percent–94.1 percent coverage—Khovd, Zavkhan, Khuvsgul, and Gobi Altai. Five aimags have 77.7 percent to 83.3 percent coverage—Bayankhongor, Dundogovi, Ovorkhangai, Sukhbaatar, and Uvs. Dornogovi and Tov have only 30 percent and 48.3 percent coverage respectively, while Omnogovi and Selenge have no marmots. There is some inconsistency between the data for Dornogovi aimag presented in Figure 8. Dornogovi shows 30–48 percent coverage, but density data are missing. Recent survey results indicate that these coverages are greatly reduced today (Batbold 2002; Townsend and Zahler *in press*).

Habits: Siberian marmots are active approximately six months of the year (one month longer than their mountain relative the Altai marmot) beginning in March, with hibernation starting sometime in September. Altai marmots first emerge from hibernation in April. Both species have an average lifespan of 10 years and they take at least three years to mature. Breeding age lasts seven years from ages 4-10. About half the females breed in a given year and for Siberian marmots litter sizes average 3-4 pups but may be as many as 12; one study recorded an average of 7 pups (Adiya 2000). Approximately 25 percent to 30 percent of the pups do not survive the first year with an estimated reproductive capacity of 60 percent in the absence of other factors, such as hunting, habitat conversion, plague, or other disturbance. Due to intensive hunting, Mongolian scientists estimate actual reproduction for Siberian marmots at only 20 percent. Altai marmot litters, while large compared to Siberian marmots (about six pups compared to three), suffer high first

year mortality with less than 20 percent surviving the first year (Adiya 2000).

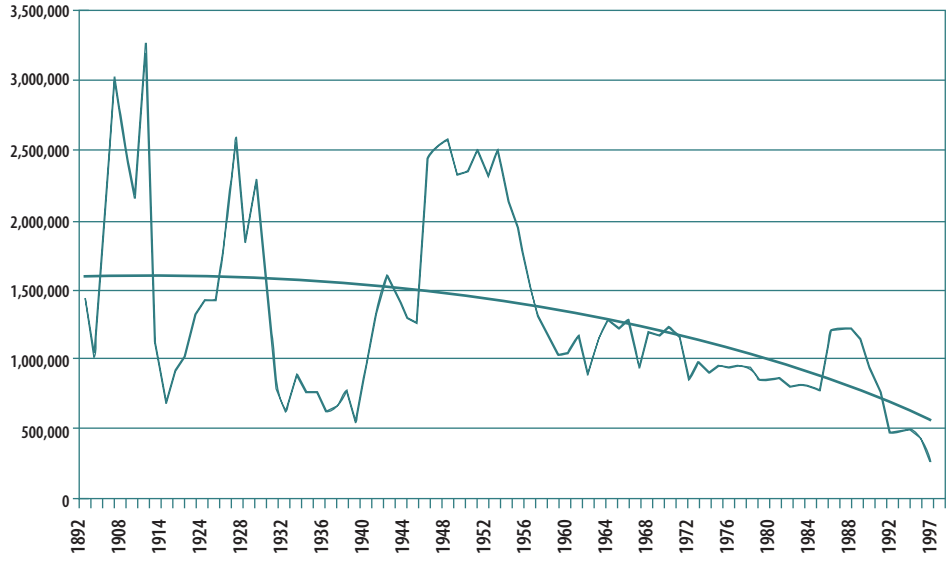
Population Trends: Typical of marmot species, Siberian and Altai marmots live in fairly large colonies and have recorded densities in Mongolia as high as 400/km^2. In his thorough literature review, Adiya (2000) notes some inconsistency in population survey data and a lack of any standardized methodology. Some surveys, for example, do not count juveniles (not defined, but presumably marmots between 0 and 2 years of age) while others do, making the estimates difficult to compare.

Despite these problems, the results over the last 60 years document a decline in total population size of approximately 75 percent from a high of 40 million in 1940 (Eregdendagva 1972) to a low of just over 10 million in 1997 (Demberel 1997) (Figure 9). One biologist (Dash 1970) attributes the sharp decline between 1940 and 1970 to a sevenfold increase in agricultural land use during that period. More likely, the precipitous decline is related to the massive sustained marmot harvests to supply the Russian army with meat and furs during the same period. Mongolia is an arid country with less than 1 percent of the entire country suitable for agriculture, most of which is centered in the Selenge river basin, an area that has never had very many marmots. Even if all appropriate land had been converted to agricultural production and all of that land were suitable marmot habitat, the increases would have affected less 2 percent of marmot habitat across the country and does not adequately explain the 50 percent decline in the species during the same period.

The continuing decline from the 1970s to the 1980s may be related to any number of factors including extermination campaigns, inaccurate survey data, or continued habitat conversion for agriculture. During this period, a single authority controlled commercial trade and reported take remained steady at roughly 1 million animals per annum. The sudden drop in population from 1989-1991 corresponds in time with Mongolia's transition to a market economy and is probably linked to increased reliance on wildlife during that period, an increase in marmot fur values, and collapse of management systems.

Take and Trade: Exported almost exclusively to Russia from the 1920s to 1991, the bulk of marmot fur trade now flows south to China, with a small percentage continuing to arrive in Russia. Our study

Figure 10: Official Marmot Skin Trade in Mongolia 1892–1997



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984; Adiya Ya., 2000.

did not uncover any marmot fur trade with Japan or Korea. Fur trade alone resulted in intense hunting pressure at least as early as the 1890s and likely earlier. Harvests in excess of 2 million animals happened on several occasions since records were kept (1906-1910, 1927, 1929, and 1946-1954) with a record high 3.2 million animals taken in 1910. From the 1960s to the late 1980s, harvest rates steadily decreased.

Since 1991, we no longer have reliable trade data. Looking only at the enforcement record indicates that harvest levels have consistently exceeded established quotas. A hunting study conducted in 2002 observed trade volumes in Siberian marmot skins in eastern Mongolia that exceeded hunting quotas threefold. Although the government issued 100,000 marmot licenses, 88,000 marmot skins were found in the markets of just three towns in Mongolia in 2001, while in that same year 200,000 skins were officially imported to China from Mongolia (Scharf and Enkhbold 2002). In 2003, just two seizures of illegal shipments into China totaled 37,332 marmot skins. In 2005, despite the ban, the Mongolian State Border Defense Agency reports confiscating over 26,000 before the end of August, just a few months after marmots emerged from hibernation and still one month before the legal hunting season would normally begin.

In each instance, confiscations and observed market activity were undoubtedly only a small fraction of the number of marmot skins that cross the border. In 1999, the Eastern Steppe Biodiversity Project estimated total harvest volumes between 1 and 1.5 million animals. Our study estimates 2004 harvest levels at between 3 and 4 million. Mean harvest levels for Siberian marmot hunters is 54 and for Altai marmot hunters 46. Together, total harvest volumes are between 3 and 4 million. International trade value of one marmot skin averages $10, making this trade worth $340 million.

However, marmot skin trade is only part of the picture and is not exclusive of other forms of marmot trade. All the parts sold on the local market can be and often are sold separately from the skin. Local trade for meat and medicinal parts is therefore additive to skin trade. Prized for its meat, oil, fur, and medicinal properties, subsistence hunting of marmots has likely been a part of the Mongolian diet since well before recorded history. Virtually all parts of the animal are consumed (excluding the tongue) and are believed to be good for several ailments including the general health of heart, lungs, liver, and kidneys. Marmot oil has several traditional uses including as a leather conditioner, to treat burns, frostbite, anemia, tuberculosis, and as a dietary supplement for animals and children. (Adiya 2000). Even though domestic livestock is abundant, many Mongolians continue to harvest marmot as a supplement to their diet.

Of the hunters questioned in the wildlife trade survey, more than 60 percent said they hunt marmot. This translates into an estimated 139,000 hunters nationwide. Many more purchase marmot at local markets or obtain products from friends and relatives who hunt. Survey results show that 27 percent of all Mongolians (445,000 people age 15 and older) use marmot products in some form on a regular basis. For the majority of these (85 percent, 370,000 people), the primary use is meat. Oil is the next most important use at 5 percent, followed by kidney—3 percent, "khun" meat—2 percent, lung—1 percent and stomach—1 percent. However, only 25 percent of all consumers (110,000 people) obtain their marmot products from hunter friends or relatives. The remainder either hunt it themselves, or purchase from a local market, which means that local purchasers may be as many as 160,000 across the country. On average, these consumers spend $25 annually on marmot for a total of $4 million in domestic marmot trade.

Harvest Sustainability: Even though there are no recent surveys to determine the decline of marmots, all circumstantial evidence points to a critical and catastrophic decline across most of their range in Mongolia. Besides the level of annual offtake, the other primary concern is the timing of the hunt, which begins for the fur market as soon as the animals emerge from hibernation sometime around mid-March for Siberian marmot, and mid-April for Altai marmot.[64]

Spring hunting is preferred by some hunters because the fur is denser in the spring and therefore commands a higher market price. The animals are also easier to

[64] Hunting for meat and oil does not occur until after the animals have gained sufficient fat and pups weaned, usually beginning mid-August.

take at this time because they are hungry and must spend longer periods of time outside their burrow to feed compared to later in the season. However, spring is also critical to the reproduction of the species. As with all other members of this genus, Siberian and Altai marmots have a single mating season per year, beginning shortly after they emerge (Adiya 2000, Armitage and Downhower 1974, Banfield 1974, Godin 1977). Young are born anywhere from April to June, first emerge from the burrow after 1 month, and are finally weaned 2 weeks later (Adiya 2000). Taking females during this period removes them from the reproductive capacity of the population and, for pups already conceived, destroys any chance of survival they may have. The potential impact is particularly severe for Altai marmots that experience first year mortality rates already as high as 80 percent (Adiya 2000).

Without actual data, it is impossible to determine the degree of impact this type of hunting is having. However, employing some conservative numbers, a few basic assumptions, and a highly simplified calculus, we can at least give some idea of the theoretical impact. Using the 2004 hunting quota of 100,000 as a starting point, what would be the impact on a population if these animals were taken in the spring?

Regardless of the season, we would assume equal rates of take for male and female marmots. We believe this assumption is justified for several reasons. First, although the ratio of male to female in any given population fluctuates, it is typically 1:1 (Adiya 2000). Second, one of the only ways to distinguish between males and females is early in the year when males are moving between hibernaculars and are therefore more exposed. There is no practical way to distinguish between them simply by looking at them. Although females are slightly smaller than males (Adiya 2000), size alone is not an effective indicator. Younger yet mature males may be of equal size. Further, we assume that all animals taken are mature and capable of reproduction. This assumption works only if we also assume that all animals are taken by rifle. Rifle hunters are capable of and do select for mature animals; trappers of course do not. Hunters distinguish juveniles by their overall size and the coloring of the tail (Adiya 2000). Hence, in this scenario taking 100,000 adult marmots in any season is likely to result in the removal of 50,000 females.

According to prior research, we know that mature females in Mongolia do not always breed every year, often skipping a year (Adiya 2000). Mongolian biologists estimate that only half of the mature females are reproductively active in any given year (Adiya 2000). Thus, we assume that of the 50,000 females taken in the spring, 25,000 would either be pregnant or have recently given birth. Using average birth and first year survival rates, we can estimate the number of offspring potentially lost to the population due to a spring hunt of this magnitude. Siberian marmots have litters ranging from three to four pups and first year survival rates of 70 percent. Using a mean of 3.5 pups/litter, we would expect 2.45 pups to survive from each litter. Consequently, taking 25,000 reproductively active female Siberian marmots would translate into the elimination of an additional 61,250 animals above and beyond the 100,000 taken by hunters; taking the same number from an Altai marmot population would eliminate an additional 30,000 (6 pups/litter, 20 percent first year survival rate = 1.2 pups/litter).

The probable scale of out-of-season hunting is certainly several times greater than what we have pictured here. Even though Mongolia's hunting law correctly prohibits marmot hunting during this period, spring hunting is common in many areas.

Other Threats: Similar to other areas and marmot species, Siberian marmots in Mongolia have reportedly suffered habitat loss due to agricultural production. However, the total impact of habitat conversion on Siberian marmots has likely been overplayed. The coming of agriculture on any serious scale is a relatively recent event in Mongolia's history; the plowing of large fields virtually unknown until the 1950s, long after marmot population declines were already being documented. Agricultural production is also concentrated in Mongolia's Selenge river basin where marmots have apparently never been numerous. Increases in habitat conversion may have removed some former strongholds but, with almost 70 percent of the country considered suitable habitat, would have represented an extremely small percentage of marmot habitat overall. Since 1991, agricultural production has declined sharply and much of the land previously used has been left fallow, at least in theory allowing Siberian marmot to regain some of its former territory similar to experiences with *M. bobac bobac* in Eastern Europe (Zimina and Gerasimov 1973). A longer-term

and perhaps more realistic threat to marmots has been the extermination campaigns waged against them over the last hundred years to curb the risk of bubonic plague. In recent years, however, neither habitat conversion nor extermination campaigns can claim serious impacts. A majority of agricultural land has been left untilled since the early 1990s and extermination campaigns no longer target marmots. The only real present threat comes from overhunting.

Impact on Biodiversity: Given the central role of marmots in defining the landscape, creating shelter for several species of bird and mammal, and providing a source of protein for Mongolia's carnivores, the serious decline in marmot populations is likely to have an impact on Mongolia's biodiversity as a whole.

Marmots play an important role in the overall structure and health of the steppe and mountain ecosystems they inhabit and as such, are likely a 'keystone species'. (Puzansky 2004, Zahler et al. 2004). These subterranean architects burrow into the ground bringing soil to the surface, recycling nutrients, and aerating the soil. Their burrows provide shelter for many native species including long-tailed ground squirrel (*Spermophilus undulatus*) and Daurian ground squirrel (*S. dauricus*); Mongolian (*Ochotona pallasi*), Daurian (*O. dauurica*), and northern (*O. hyperborea*) pika; the least weasel (*Mustella nivallis*); ermine or stoat (*M. erminea*); Eurasian badger (*Meles meles*); hedgehogs (*Hemiechinus* spp.); foxes (*Vulpes* spp.); and Pallas' cats (*Otocolobus manul*). (Adiya 2000, Zahler et al. 2004). Their selective feeding habits affect the diversity and composition of vegetation. They are also an important food source for a number of raptors and carnivorous mammals; e.g. eagles (*Aquila* spp.), upland buzzard (*Buteo hemilasius*), gray wolf (*Canis lupus*), snow leopard (*Uncia uncia*), foxes (*Vulpes* spp.), steppe polecat (*Mustela eversmanni*) and brown bear (*Ursus arctos*).

Regulation and Enforcement: Even though the government has instituted a complete ban on marmot hunting for two years beginning in 2005, without amending the underlying legal framework the problem will continue, as evidenced by marmot skin seizures by the State Border Defense Agency in the summer of 2005 (>26,000). Looking at past reactions to hunting limitations in the absence of active management, we see only one basic response that is not likely to have any serious impact on the actual number of animals harvested – for the most part, officials will adhere to the hunting ban and refuse to issue any licenses for household consumption. Legally correct, the result will be that household hunters will hunt without a license—most of them do so anyway.

Siberian marmot. Image: K. Olson

When the hunting ban finally ends, there will still be the problem of adequately defining "household" and "industrial" hunting. "Household" hunting is loosely defined as the number of animals an individual may take for personal consumption. For marmots, the hunting law sets a limit of three (Scharf 2002, Wingard and Odgerel 2001). "Industrial" hunting does not have a specified limit, but it implies an organized hunt by a registered company for strictly commercial purposes (Wingard and Odgerel 2001, Zahler et al. 2004). Most hunters fall between the two categories, hunting more than the three marmot "household" limit but without crossing the legal threshold into "industrial" hunting.

Wolf (*Canis lupus*)

Legal and Conservation Status in Mongolia: Mongolia's wolf population may be hunted for household and industrial purposes. There is no season and no quota limit. The Mongolian Red List of Mammals (2006) classifies the species as Near Threatened.

Legal and Conservation Status Worldwide: *Canis lupus* is recognized by CITES under appendix II of the Convention, requiring export permits from the country of origin. Although it still faces some threats, its relatively widespread range and stable global population trend mean that the species does not meet any of the criteria for the threatened categories. Therefore, it is assessed on IUCN's Red List as Least Concern.

Distribution and Population Trends: Largest of the wild individuals in the family Canidae, the gray wolf was historically one of the most widely distributed mammals in the world, ranging across the entire northern hemisphere north of 15°N latitude. Hunting and extermination campaigns (trapping, poisoning, bounty systems) succeeded in extirpating the species from many areas (most of western Europe, United States and Japan) and reducing its overall distribution by about 30 percent. In the last 30 years, increased legal protections (CITES, endangered species acts, hunting restrictions), reintroduction programs, land-use changes, and shifting human populations from rural to urban areas have all helped stabilize global declines and allowed some areas to be naturally re-colonized (Nowak 1999).

Unfortunately, we can only guess at the total number of wolves in Mongolia. No population studies have ever been conducted to determine wolf population densities, distribution, pack size, or range. In the 1970s, Mongolian biologists produced a map describing widespread distribution covering the entire country with no estimate of area-specific densities or population numbers. National and international experts believe the population has probably fluctuated greatly due to intense extermination and harvest campaigns and point to indicators, if not actual proof, of both past and present population declines. At least once in the past (1976 to 1980), concerns over population declines led to the banning of wolf hunting. Some biologists believe the same may be happening now because of extreme harvest numbers. However, we still do not have any assessment of the population.

Wolves for sale at a border market. Image: K. Olson

Wolf pack home ranges and average pack sizes may provide some clue to potential wolf numbers in Mongolia, but have not yet been adequately studied in Mongolia. Wolf home ranges typically correspond to a defended territory and have little or no overlap with neighboring packs. Home range size in combination with average pack size can therefore be a useful tool in estimating overall population numbers. Two projects in Mongolia (WCS and International Takhi Group) have managed to collar wolves and have started tracking their movements. However, results are not yet available.

For purposes of comparison only, the following information describes wolf populations from other countries. Worldwide, wolf home ranges vary considerably and are directly linked to food availability, season, and wolf population sizes. The largest home range for one pack ever recorded was 13,000 km^2 during the winter in Alaska (Mech 1970). The smallest, at 18 km^2, was in southeastern Ontario during summer. Pack ranges in Canada and Kazakhstan were as little as 30 km^2 in areas with abundant food and cover and as much as 1,000 km^2 in desert or tundra regions (Bibikov et al.1983).

Similar to home ranges, biologists have recorded vastly different densities for wolf populations around the world. In Canada, for example, density levels varied from as low as 1/520 km^2 to 1/26 km^2 (Fuller and Keith 1980, Mech 1970). The highest recorded densities occurred on Isle Royale, where the wolf population reached 1/10 km^2 before experiencing a crash (Nowak 1999). Density estimates for Alaska are 4–5 wolves per 100 km^2 (Nowak 1999). Population densities in Kazakhstan may be as low as 1.5 wolves/100 km^2 (Dimitriyev 2005). For all populations, densities are likely a function of many factors, but food supply appears to be a main determinant (Peterson 1977).

Total wolf populations in Canada were estimated at 30,000 to 60,000. In Alaska, scientists estimated populations ranging between 4,000 and 7,000 (Carbyn 1983, 1987; Theberge 1991). According to Soviet biologists, between 150,000 and 200,000 wolves survived in the Soviet Union after World War II. This dropped to around 15,000 by 1962 due to a government control program that killed 40,000-50,000 every year for a 15-year period, but has rebounded to an estimated 44,000 in 1999.[65] A recent report claims there are over 40,000 wolves in Kazakhstan; an increase attributed to the cessation of government sponsored hunting programs (Dimitriyev 2005).

Even assuming the highest possible wolf density ever recorded, Mongolia's total wolf population would not exceed 157,000 wolves. At the wolf density rates for Alaska of 3-5/100 km^2, Mongolia's wolf population would be approximately 62,000.

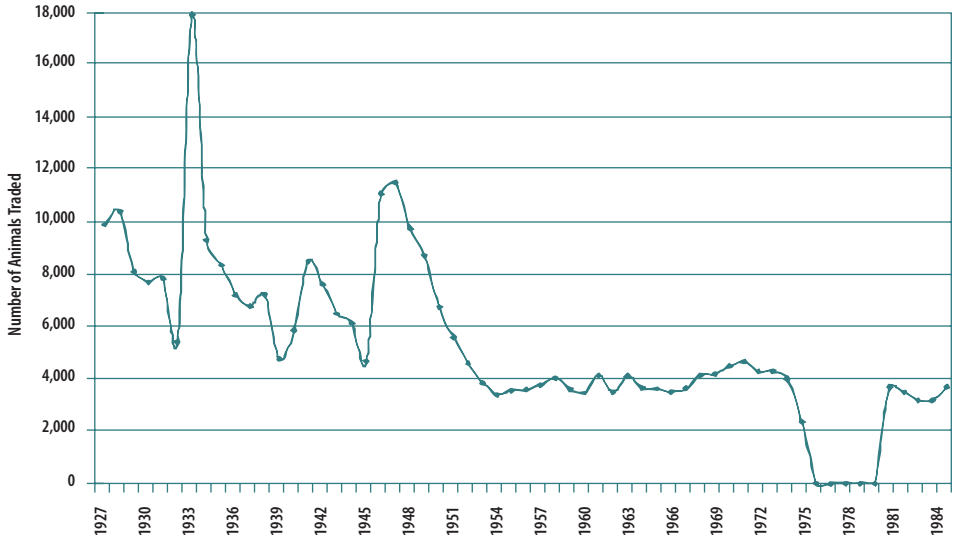
Take and Trade: In Mongolia, wolves are targeted by hunters because of livestock predation, perceived threats to humans, for sport, and for a growing domestic and international trade in wolf pelts for the fur market and other body parts for the traditional medicine market.

While still under Soviet tutelage, wolf hunting in Mongolia was a function of government mandates. Even though Mongolia was not officially a part of the Soviet Union, it was certainly a part of the system, and wildlife harvests generally followed Soviet models, requirements, and trends. In Mongolia, wolves were officially harvested to control numbers and provide furs since at least the early 1920s (Figure 11). From 1926 to 1985, official wolf harvests averaged 5,308 animals with a peak harvest of 18,000 in 1933 and a total trade volume of 313,153 in 55 years of recorded trade. However, these are only the official numbers. Certainly, Mongolians hunted wolves in addition to official trade to protect livestock, for traditional medicines, and killed pups during extermination campaigns, none of which was ever recorded.

This compares to wolf extermination campaigns in the Soviet Union that averaged 50,000 wolves annually from the mid 1950s through the 1960s. According to V.V. Kozlov, the USSR destroyed 42,300 wolves in 1945, 62,700 wolves in 1946, 58,700 wolves in 1947, 57,600 in 1948, 55,300 in 1949, and similar numbers for the next two decades. Even though overall harvest levels dropped in the 1970s, as they did for most species, hunting never stopped completely and in the 1980s sobering harvests over 30,000 were recorded.

65 Wolf Cull Dilemma for Russia, *Bounties Are Paid for Wolf Kills*, CNN News/December 2000.

Figure 11: Official Wolf Skin Trade in Mongolia 1927–1985



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984

Mongolians have a special relationship to the wolf that paradoxically spurs the hunt and yet in some ways has probably forestalled its complete annihilation. On a personal level, attitudes toward wolves in Mongolia are the same as they are for any rural community dependent on livestock for survival. The wolf is one of three large predators in the country (snow leopard and lynx are the other two) that prey on livestock and is therefore considered a direct threat to the Mongolian way of life. In years past and in concert with the Soviet Union, Mongolia declared the wolf an enemy of the state. Unmitigated by an understanding of wolf ecology, the ultimate goal during the communist regime was the elimination of the animal. Today, the wolf is one of the only animals in Mongolia for which there is a blanket authorization to hunt without limit or season.

However, the taking of wolves in Mongolia is not just a function of fear, competition, and government mandates. Mongolians have a historic and cultural relationship to the wolf that, while not ensuring the wolf's survival in the region, at least gives it a fighting chance. The wolf is a mythical being believed to possess great power, and virtually all parts find some use in traditional medicine. To the casual observer, the fierceness and suddenness with which Mongolians will pursue and shoot a wolf can be easily mistaken as an expression of aggression toward a feared and hated animal. However, Mongolians hunt wolves with such passion because of their traditional respect, even reverence, for the wolf; its power, tenacity, and cunning. In parts of Mongolia, it is still believed that no one can see a wolf unless he or she is that wolf's equal, and no one can kill a wolf unless the wolf chooses to submit and, in so doing, admits the superiority of the hunter. Killing a wolf is thus celebrated because it confirms the hunter's power and skill, not simply because it has eliminated a dangerous threat. More important for the survival of the species, the wolf is linked by legend to the origin of all Mongolians, and when pressed, most will say that the wolf should remain a part of their landscape, albeit in controlled numbers. It is this belief that led to the practice of leaving one or two pups in wolf dens during state-sponsored extermination campaigns in the Soviet era and probably prevented more serious declines than otherwise experienced. It remains to be seen whether history and tradition will win against the market.

Even though numbers are no longer kept, this survey indicates that the gray wolf has been and continues to be important to Mongolia's domestic and international trade. In domestic trade, virtually all parts of the wolf have value. The fur is considered one of the warmest and a good wolf pelt sells for as much as $150; lesser quality pelts sell for $50. Wolf meat is consumed as a

Wolf canines on sale in China. Image: J. Wingard

tonic against numerous ailments from the common cold to asthma and goes for as much as $5 per kilo on the market. Wolf bones, tongue, kidney, and spleen complete the wolf's pharmaceutical contributions and bring an additional $50 to the purveyor. One gray wolf is thus worth as much as $300 to $350 on the market in Mongolia.

Internationally, wolf trade is almost exclusively with China. Gray wolf carcasses, pelts, ankle bones, paws, skulls, teeth, and trophies were common items in most (64 percent) of the shops surveyed in 15 cities along China's border with Mongolia. Wolf pelts were openly displayed and priced as high as $250 for good quality and $35 for low quality. Teeth sold for $2 to $3 apiece. Ankle bones ranged from $3 to $10. Paws had a price tag of $6. Skulls were $5. Wolf carcasses commanded a small price of $50 compared to mounted trophies that sold for $375.

Given the market values and traditional medicine practices in both China and Mongolia, and Mongolians' relationship to the wolf, it is not surprising that it is the second most targeted species by hunters in Mongolia. Of the 949 hunters surveyed throughout the country, almost 40 percent (321) claim to hunt wolves. Extrapolated out to the entire population of hunters in the country (245,000), this means potentially 75,000 hunters actively harvest the animal. The adjusted mean take for these hunters was 3.4 animals with the highest harvest being 100 animals for a single hunter. Looking only at the hunter respondents in the survey, at least 1,777 wolves were killed in 2004. Total harvest volumes were difficult to estimate and are likely the result of exaggeration on the part of respondents. Without absolute certainty, we believe it is possible that Mongolian hunters may have taken at least 20,000-30,000 wolves in 2004 with a potential market value of approximately $7 million. One market in Ulaanbaatar claims to have sold 50,000 wolf pelts in 2004 alone. We were unable to verify if all pelts were from Mongolia or from the same year. Given that Mongolia's maximum carrying capacity for wolves is likely to be somewhere between 50,000 and 100,000 based on estimates from elsewhere, and the actual population is very likely well below this, the current level of offtake is almost certainly unsustainable.

While we are unable to state with any clarity what the true offtake is for wolf in Mongolia, hunting levels appear to be highly unsustainable and evidence suggests that the wolf in Mongolia is currently undergoing a severe and precipitous decline in numbers. Circumstantial evidence points to localized disappearance of wolves in areas of the Gobi and Eastern Steppe. While herders have implied that wolf numbers are actually increasing due to an increase in livestock losses in some areas, this is more likely to be the result of loss of wild prey in the area (e.g., marmot, red deer, gazelle), which is forcing the remaining wolves to turn to livestock for food.

Corsac Fox (*Vulpes corsac*)

Corsac fox. Image: Dr. Richard Reading

Legal and Conservation Status in Mongolia: Corsac fox hunting for household and industrial purposes is permitted by the Law on Hunting from October 21st to February 16th. In an apparent attempt to limit corsac fox hunting, the Ministry of Nature and Environment has not issued hunting quotas in recent years. The Mongolian Red List of Mammals (2006) classifies the corsac fox as Near Threatened.

Legal and Conservation Status Worldwide: The IUCN classifies the corsac fox as a species of Least Concern (assessment in 2004). It has no special status under CITES.

Distribution and Population Trends: The corsac fox is a small canid adapted to arid landscapes and ranges from northern Afghanistan to Tibet, through Mongolia to northern Manchuria (Heptner and Naumov 1992). It is a typical inhabitant of steppes and semideserts; avoids forests, thickets, plowed fields, and human settlements. *V. corsac* lives in burrows, sometimes self-excavated, but often taken over from other animals such as marmots or badgers. Its diet comprises primarily small rodents, pikas, birds, insects, and plant material. The mating season for *V. corsac* is between January and March with a gestation period of 50-60 days. Litter sizes are typically between 2 and 6 young at a time, with reported litters of up to 11 young (Nowak 1999). Other than humans, wolves and large predatory birds are probably their only serious enemy.

Despite its Asia-wide distribution, scientists know little about the biology and ecology of this small carnivore (Sillero-Zubiri et al. 2004). However, older studies of wild and captive populations suggest that some of its behavioral and ecological characteristics are unique among fox species. For example, corsac foxes are reportedly known to live gregariously in 'corsac cities' that are composed of several adjoining den complexes shared by multiple family groups (Murdoch 2005 citing Novikov 1962, Ognev 1962, Heptner and Naumov 1992). Corsac foxes have also been described hunting in small packs (Dinnik 1914, Ognev 1962, Stroganov 1962), migrating during periods of low prey abundance, and exhibiting large population fluctuations (Ognev 1962, Heptner and Naumov 1992). These accounts, however, are largely based on anecdotal observations and it is unclear how accurate they are. Most quantitative information on the species is from hunting records and taxonomic studies. Details of the species' fundamental biology (i.e., ranging behavior, diet, or basic social organization) or habitat requirements are few (Sillero-Zubiri et al. 2004).

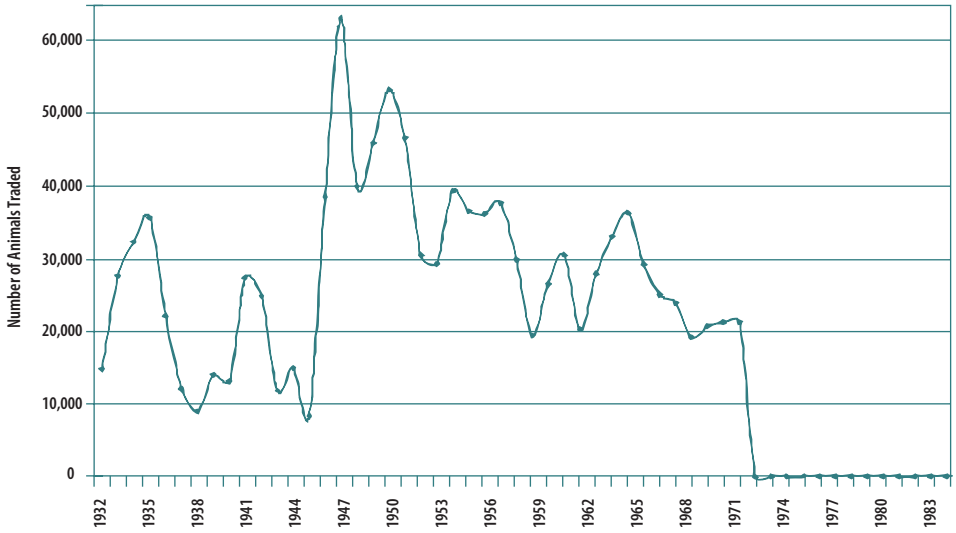
The corsac fox is probably most similar to the kit fox (*Vulpes macrotis*) and swift fox (*V. velox*) of North America, small species that are also arid adapted, depend on underground dens often "borrowed" from other burrowers, make use of multiple dens during the year, and exhibit large population fluctuations at least partly in response to interaction with humans. For example, the swift fox was driven to extinction in Canada by 1928 and declined by up to 90 percent across the US prairie grassland during the last century, primarily due to a combination of general predator control efforts, direct hunting for fur, and habitat loss.

Take and Trade: Corsac fox has been a staple source of fur in Mongolia for many years. Of the larger mammals traded for their fur, only marmot and roe deer were ever traded in greater volumes. From 1932 to 1972, more than 1.1 million corsac fox furs were sold to the Soviet Union with a peak trade of 62,926 in 1947. In 1973, concerns that harvest levels had been unsustainable for many years caused the Mongolian government to ban trade in corsac fox furs. It was never reinstated under the communist system.

In the 1990s, Mongolians once again started harvesting this small carnivore to sell on the international market. With the shift in government, trade went primarily south to China along with virtually all other forms of wildlife trade.

At $28, corsac fox skins are substantially more valuable than red fox skins ($18). Spurred by rapidly

Figure 12: Official Corsac Fox Fur Trade in Mongolia 1932-1985



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984

increasing prices, corsac foxes have also been harvested in greater numbers than almost all other species with the exception of marmot and red squirrel. Approximately 12 percent of hunter respondents to the wildlife trade survey actively harvest the species. We estimate over 25,000 hunters across the country participate in corsac fox trade. Likely stemming from their comparatively higher market value (and the fact that they live at higher densities and are less shy than the red fox), adjusted mean harvests per hunter for corsac fox (10.2) are more than twice what they are for red fox (4.7/hunter). The maximum harvest for one hunter was 100 animals in a single year. Total harvest estimates for 2004 are 200,000 with an international fur market value exceeding $5.6 million.

Adding to this trade, at least in cash value if not total harvest volumes, is the little known domestic market for corsac fox game meat, purported by some respondents to the survey to have medicinal properties. Purchased in small quantities for relatively high prices, one corsac fox is worth approximately $37 just for its meat. Because the skin is sold separately from the carcass, one corsac fox in Mongolia can be worth as much as $65 to the enterprising hunter. Response numbers from the survey were too low to make an accurate estimate of the total trade volume of *V. corsac* game meat.

Overhunting, coupled with habitat disturbance, has caused the corsac fox to disappear from much of its historic range (Ognev 1962, Stroganov 1969). The current level of trade in Mongolia has the potential to similarly impact the species. This study estimates total trade at more than twice the annual volume that caused the Mongolian government to institute a hunting ban in the 1970s. The lack of hunting quotas is a signal, if not an effective management tool, that concerns over dwindling populations will again make hunting bans necessary to prevent extermination of the species.

Hoping to generate more revenue from the resource, the Mongolian government has established trophy hunting rates for corsac foxes. A single trophy license sells for $100 (MNE 2004). Not typical of trophy species, our research and inquiries were unable to find any hunts currently being offered. If other trophy hunting offers in Mongolia are any indication, corsac fox (if it is ever marketed) will probably be taken as part of hunts for larger trophy animals and will thus be incidental to the main excursion.

Red fox in Ikh Nart Nature Reserve. Image: Dr. Richard Reading

Red Fox (*Vulpes vulpes*)

Legal and Conservation Status in Mongolia: Red fox is an "abundant" species under the Law on Hunting and may be hunted for household and industrial purposes from October 21st to February 16th. Although hunting has not yet been banned, no hunting quotas have been set in recent years. Trophy hunting is permitted pursuant to special permit, which may be purchased from the Ministry of Nature and Environment for $100. It is classified as Near Threatened in the Mongolian Red List of Mammals.

Legal and Conservation Status Worldwide: *Vulpes vulpes* is not listed by CITES in any appendix. IUCN assessed it as a species of Least Concern in 2004.

Distribution and Population Trends: Rivaling the gray wolf, the red fox has one of the widest natural geographical distributions of any living mammal, ranging throughout the temperate regions of Europe, Asia, and North America (Nowak 1999, Wilson and Reeder 1993, Sillero-Zubiri et al. 2004, Murdoch 2005). Habitats vary from forest to arctic tundra, open grasslands, and farmland, but typically the species prefers areas with highly diverse vegetation (Ables 1975). In Mongolia, *V. vulpes* can be found throughout the country inhabiting a diverse range of habitats from the arid Gobi to the northern taiga (Ognev 1962, Heptner and Naumov 1992), but apparently avoiding open habitat with little relief or dense vegetation. In contrast to corsac foxes, red foxes typically maintain one den and one or more emergency burrows within their home range. Generations of foxes may use the same den. Red fox studies in Asia indicate they are generalist predators and opportunistically feed on animals ranging in size from steppe voles (*Microtus brandti*) to tolai hares (*Lepus tolai*) to newborn domestic sheep and goats (Ognev 1962, Heptner and Naumov 1992).

The competitive relationships between red foxes and other carnivores is important to conservation. Red foxes are adept competitors and known to exclude smaller sympatric carnivores in some regions. In Fennoscandia (Norway, Sweden, Finland), for example, red foxes are known to kill arctic foxes (*Alopex lagopus*) and exclude them from optimal breeding habitats (Tannerfeldt et al. 2002). Researchers also suggest that the southern limit of arctic fox range is largely determined by interspecific competition with the red fox (Hersteinsson and Macdonald 1992). In Mongolia, red foxes undoubtedly compete for resources with the smaller corsac fox. Heptner and Naumov (1992), for example, report that interference competition

occurs between the species as red foxes kill corsac foxes during encounters. In open habitats, where competition between species that interact aggressively can be intensified (Creel et al. 2001), understanding the degree of competition and the mechanism of coexistence between corsac and red foxes will be useful for conservation efforts (Murdoch 2005).

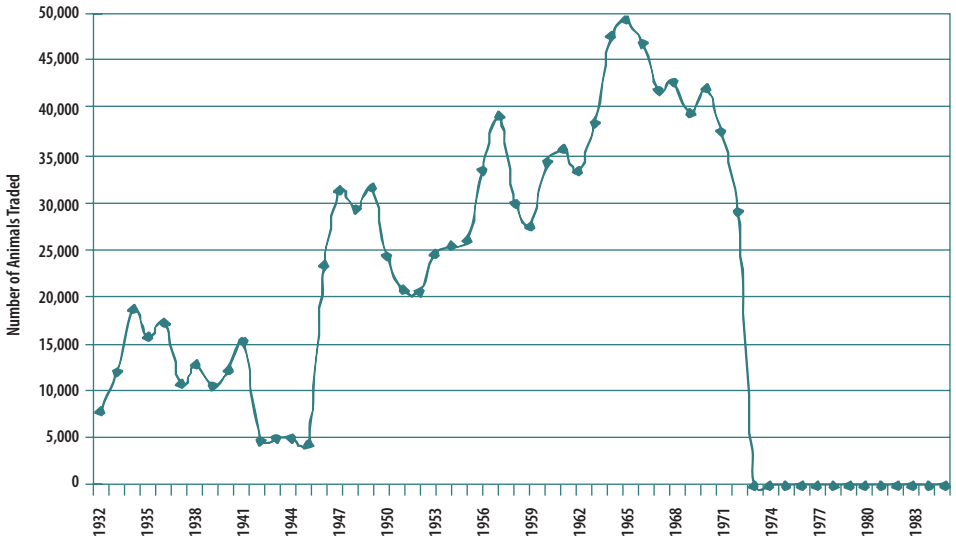
Knowledge of red fox abundance and regional ecology will also be important to conserving the species in Mongolia (Murdoch 2005). So far undetermined in Mongolia, it is possible that the country supports red fox populations approaching 1 million animals. Studies have shown that population densities for red foxes in the most favorable areas average one or two adults per square kilometer (Ables 1975, Haltenorth and Roth 1968), however, home range sizes vary with habitat conditions and food availability (Ables 1975). Under natural conditions, home ranges average 1–10 km^2, but can be as small as 10 ha. in suburban landscapes (Grzimek 1990). Similar to the gray wolf, red foxes have defended home ranges having little overlap with other individuals (Storm and Montgomery 1975). One home range is typically occupied by a breeding pair, sometimes one male and two females, and their young.

Take and Trade: Red foxes are an important economic species in Mongolia with annual fur trade, past and present, running closely behind corsac fox trade. Historic trade volumes averaged almost 18,000 animals per annum from 1932 to 1972, compared to 19,500 corsac foxes annually for the same period. Total trade was slightly more the 1 million skins over 40 years (Figure 13). Official red fox trade peaked 20 years later than corsac fox trade (1967) and never breached the 50,000 mark before coming to an official close in the early 1970s.

In tandem with corsac fox harvests, the 1990s saw renewed hunting for red fox fur that likely became significant with the relaxation of gun ownership laws in 1995. At the same time, newly opened border crossings along Mongolia's southern border with China provided numerous access points to a formerly closed market.

At $18 per pelt, red fox skins are roughly two-thirds the value of corsac fox. However, a wider distribution and possibly greater numbers result in a larger population of hunters targeting them. Just over 28 percent of all hunter respondents spread over much of Mongolia

Figure 13: Official Red Fox Fur Trade in Mongolia 1932–1985



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984

claim to harvest red fox and almost 100 percent sell their skins to the Chinese market. Survey results calculate over 44,000 hunters involved in red fox harvests. In contrast to corsac fox, however, individual hunters take far fewer animals on average (4.7/hunter) resulting in slightly smaller overall harvest rates for red fox. The maximum reported harvest for one hunter was 100 animals in a single year. Total harvest estimates for 2004 are 185,000 with an international fur market value of over $3 million.

Red foxes have also been included in Mongolia's efforts to increase sport hunting revenues. The same price set for corsac fox applies to red fox trophy permits—$100. The total potential value of fox trophy cannot be estimated as no known hunts have yet been offered or advertised. However, supplemental services associated with trophy hunts often generate 10 to 20 times the cost of official permits.

Unlike corsac fox, which has some additional domestic value for the medicinal properties of its meat, domestic trade red fox is limited to fur for hats and coats. The overall volume of domestic trade is almost negligible relative to international trade. Fewer than 2 percent of all respondents from the survey purchase red fox skin at local markets in Mongolia.

Red fox. Image: Luke Distelhorst

Siberian roe deer. Image: WWF Mongolia.

Siberian Roe Deer (*Capreolus pygargus*)

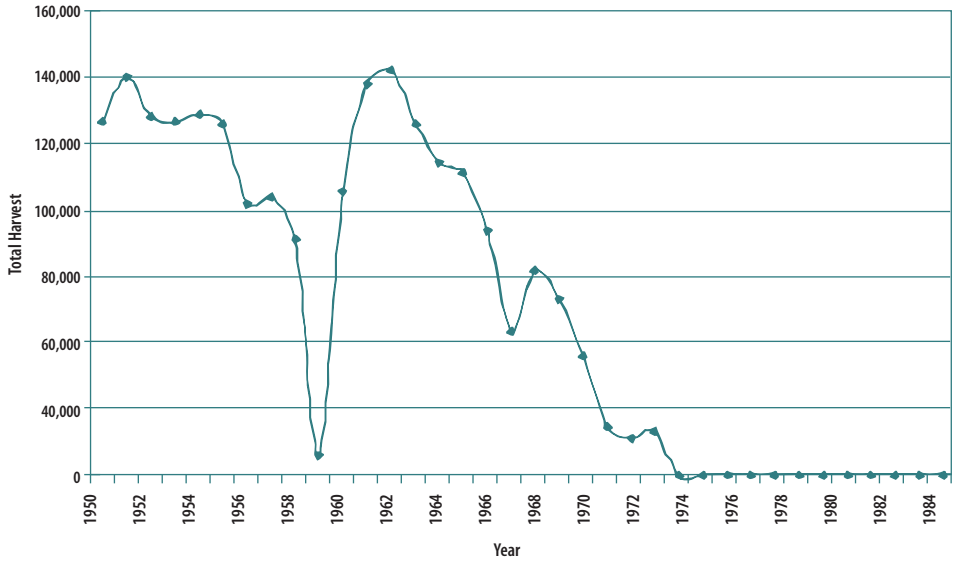
Legal and Conservation Status in Mongolia: A traditional source of meat, medicine, and fur, Mongolia's roe deer may be hunted for household consumption from August 1st to December 1st. A standard permit allows the hunter to take one animal per year. Foreign sport hunters may hunt the species pursuant to a special permit priced at $900 and issued by the Ministry of Nature and Environment. There is no restriction on age, size, or sex. No known quotas issued. The Mongolian Red List of Mammals (2006) classified the species as Least Concern.

Legal and Conservation Status Worldwide: Considered a common species, IUCN lists *C. pygargus* as Lower Risk/Least Concern; the last assessment was in 1996. It is not listed in CITES, or in other international agreements.

Distribution and Population: *Capreolus pygargus* occurs from the Don River to southeastern Siberia, Korea, and as far south as central China. Common in many parts of Mongolia, roe deer can be found almost anywhere that offers cover including forests, sparsely wooded valleys, open fields, and agricultural areas (Olson et al. 2004).

No population studies have ever been done for *C. pygargus* in Mongolia. In general, members of this species live alone or in small groups, but herds of

Figure 14: Official Roe Deer Trade in Mongolia 1950–1985



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984

as many as 100 have been documented at favorable feeding sites or in migration (Hewison, and Danilkin 2000). During the spring, when *Capreolus* lives alone or in doe-fawn pairs, both male and female adults establish defended territories that range in size from 7-25 ha for males and 3-180 ha for females. This defended territory represents only a portion of the total home range, with spring breeding ranges for males as large as 170 ha and covering as much as 500 km during seasonal migrations recorded in Russia. Unlike many other deer species, most males will usually escort only one female (Nowak 1999).

Take and Trade: From 1950 to 1973, Mongolia traded roe deer skins with Russia. For several years trade volumes exceeded 100,000 skins annually and averaged more than 87,000 for the 23 years of recorded trade. However, because of declining populations, trade volumes decreased rapidly beginning in 1965 and were eventually stopped in 1974, never to be restarted as officially sanctioned trade. Today, there is no apparent international trade for roe deer meat, antlers, or other parts (Figure 14).

Domestic harvests and trade have stepped in to replace the former international trade with volumes that equal and may even exceed historic records. The 2005 wildlife trade survey results place roe deer seventh in the list of most targeted species in the country with roughly 12 percent (112 of 949 hunter respondents) of hunters in the northern forested regions engaged in the harvest. We estimate that 34,000 Mongolians actively hunt the species. Total take in 2004 for the 112 roe deer hunters queried during the study was 491. Adjusted mean take per hunter was 2.7 with the highest reported take at 50 animals for a single hunter. We estimate an annual harvest exceeding 100,000, a volume that approximates official trade volumes recorded in the 1950s and 1960s.

Harvesting roe deer is primarily for personal consumption for meat (96 hunters of 112, or 86 percent), with the remainder also harvesting for the medicinal properties of its blood, liver, and oil. No one interviewed during the wildlife trade survey reported using or selling roe deer antlers. One roe deer yields approximately 20 kg of meat and at 2.7 per hunter provides roughly 60 kg of game meat, or 25 percent of an average Mongolian family's meat intake for the year (based on average family size of 4). Hunters take the species in the fall for game meat, liver, and oil. In the spring, the animal is also hunted for its blood, which

hunters consume fresh after the kill, believing it cures liver ailments and makes the user's blood "rich."

Eleven percent (12 of 112) of the roe deer hunters interviewed said they sell roe deer meat and other parts to local markets. Because the trade survey was conducted during the summer months, surveyors did not observe any trade in roe deer meat or other perishable parts. Only one domestic market located in Sukhbaatar Aimag (eastern Mongolia) reported selling a small quantity (9) of roe deer skins at $6 apiece. Contrary to the observed trend for other species (i.e., marmot), the mean take for commercially motivated harvests was significantly lower at 2.7/hunter than the mean take for subsistence purposes (6.6/hunter). One explanation for this difference is the degree of informal trade associated with the species. Of the respondents who do not hunt but still use roe deer meat, the majority (75 percent) obtains them directly from hunters they know and not the market. This compares to only 25 percent of marmot users whose supply comes directly from hunters. In other words, while some hunters take numbers (20-50 animals, or 400 to 1,000 kg of meat) clearly greater than personal consumption warrants, these harvests are not reflected in our analysis of commercial harvests because the same hunters reportedly do not sell them even though they may trade them to non-hunters for other goods.

A number of companies offer sport-hunting trips that include Mongolia's roe deer. The Siberian roe deer in Mongolia is larger than its counterpart in Europe (*Capreolus capreolus*), making it a viable trophy animal in its own right. Trip costs start at around $4,500 depending the number of trophies included and length of stay.

Brown Bear (*Ursus arctos*)

Legal and Conservation Status in Mongolia: Mongolia's wildlife legislation distinguishes between brown bear (*U. arctos pruinosus*) and Gobi bear (*U. a. gobiensis*—"mazaalai" in Mongolian). The brown bear has no protected status and may be hunted for household purposes from October to February. *Mazaalai* is listed as "very rare" in the Law on Fauna, and the Mongolian Red List of Mammals (2006) classified the species as Critically Endangered. All hunting of this subspecies is prohibited. While the brown bear is hunted as a trophy animal in neighboring parts of Russia, this survey did not find any advertised hunts, nor has the Ministry of Nature and Environment established a trophy hunting fee for the species. The Mongolian Red List of Mammals (2006) classified the brown bear as Data Deficient.

Legal and Conservation Status Worldwide: *Ursus arctos* is generally listed in CITES Appendix II, although some subspecies and populations (like those in Mongolia) are included in Appendix I. Mongolia has never issued an export permit for brown bears occurring in its territory. Mazaalai are also covered under Appendix I.

Distribution and Population Trends: The brown bear has one of the greatest natural distributions of any mammal in the world, occurring throughout northern Asia, Europe, and North America (and previously

Gobi bear. Image: WWF Mongolia

Gobi bears. Image: WWF Mongolia

also in northern Africa). Historically the brown bear ranged throughout the region north of approximately 35º latitude, but often extending further southward along a number of mountain chains.

In Mongolia, the brown bear occurs primarily in the northern taiga forest zone in the north-central aimags of Selenge, Khentii, and Khuvsgul. A small pocket of bears, numbering between 20–40, lives isolated in the Gobi Desert and is considered by some to be a separate subspecies (McCarthy 1999). According to a Mongolian Institute of Biology report from 1986 (General and Experimental Biology Institute 1986), there were about 500 brown bears in Mongolia inhabiting 50,000 km^2, or approximately 1 bear for every 100 km^2. This compares to reported population densities in neighboring Lake Baikal of 1 bear per 60 km^2, and the Carpathian Mountains of 1 bear per 20 km^2. Brown bears have greater population densities in areas with greater food resources such as the coastal regions in Alaska and in Russia's Kamchatka peninsula where salmon is plentiful.

Take and Trade: Since 1986, no population surveys have been performed for brown bears in Mongolia. However, circumstantial evidence suggests that the number of brown bears and their distribution in Mongolia have declined sharply since the early 1990s. Most likely, this is a result of illegal hunting and increased demand for bear body parts in the medicinal trade. Survey results show hunting activity restricted to the northern-forested region of Mongolia, which coincides with brown bear habitat in the country. Researchers did not uncover any incidents of poaching Gobi bears, found exclusively in Mongolia's southwestern Gobi Desert region.

While many reports cite the growing international trade in brown bear gall bladders (TRAFFIC 1995), this survey discovered that the domestic market in Mongolia might be similarly important. Bear parts can be found at domestic markets, such as the Ulaanbaatar's black markets, central train station, or in container shops that deal in wildlife products. Bear products traded domestically include the meat, kidney, gall bladder, oil, and paws. Bear meat is a source of protein, while the oil, kidney, gall bladder, and paws are used in traditional medicine. The brown bear has also not escaped the growing interest in hunting as a

sport in Mongolia, but is not yet marketed by hunting tourism operators.

Not including potential sport hunting values, one brown bear has a total potential domestic market value of over $1,300. A set of four paws can be sold for $100; a bear gall-bladder sells for $250–300, the skin is worth $200–300; bear meat can be purchased for $1.50/kg (an average bear yields approximately 300 kg of meat[66]); and bear oil is sold for $1.00/kg (Table C3).

Although many parts of the brown bear are used in traditional Chinese medicine, international trade in brown bear parts from Mongolia appears to be almost entirely focused on gall bladders with no recorded difference in market values between China and Mongolia. The bear gall bladder is a cornerstone in traditional Chinese medicine used for treating cancers, burns, pain and redness of the eyes, asthma, sinusitis, pain, and liver disease. Researchers observed some brown bear skins in markets on China's northern border, but the age of these trophy furs suggested that active trade was minimal. In an October 2004 UB Post newspaper article (Anonymous 2004a), it was reported that three Vietnamese nationals were captured attempting to smuggle 80 bear gall bladders out of Mongolia. Even if this were the only smuggling effort involving brown bear parts, it is still likely a sizeable fraction of the brown bears left in Mongolia. Traders interviewed at the Tsaiz market admit to some intermittent trade in gall bladders, but were unable to confirm if these were coming from Mongolia or Russia. No gall bladders were observed in surveys conducted in Mongolia, Russia, or China; this may be because gall bladders are traded in small quantities and are easily concealed.

Part of the problem with controlling gall bladder trade is the lack of a domestic ban on trade in either China or Mongolia. Domestic markets in both countries remain open and easily feed the international black market even though CITES bans international trade in this sub-population of brown bear. Thus, the only obstacle to trade is the international border, which presents no real problem to traders.

66 Bear weights vary depending on the time of year. Bears weigh the least in the spring or early summer. They gain weight rapidly during late summer and fall. At this time most mature males weigh between 180–410 kg. with extremely large individuals weighing as much as 640 kg. Females weigh half to three-quarters as much.

Ussurian moose in Nomrog Strictly Protected Area, Sukhbaatar aimag, Mongolia. Branched antlers just visible between trees. Image: Chadd Fitzpatrick

Moose (*Alces alces pfizenmayeri* and *A. a. cameloides*)

Legal and Conservation Status in Mongolia: Mongolia has two subspecies of moose, *Alces alces pfizenmayeri* and *A. a. cameloides*. Both are listed in the Law on Fauna as Very Rare. The Law on Hunting makes no distinction between the two subspecies and limits hunting to scientific purposes only. The Mongolian Red List of Mammals (2006) classifies both subspecies as Endangered.

Legal and Conservation Status Worldwide: In 1996, the species *A. alces* was classified by IUCN as Lower Risk/Least Concern. A separate assessment was also performed in 1996 for the subspecies *A. a. cameloides*, classifying it as Lower Risk/Near Threatened. There was no separate assessment for *A. a. pfizenmayeri*, which is considered common. Neither the species or either of the subspecies is listed in CITES.

Distribution and Population: The largest member of the deer family, the species *A. alces* historically occurred from northern Europe to the Caucausus to eastern Siberia and Manchuria, and from Alaska throughout Canada to Northern Colorado and the northeastern United States. Of the six subspecies of *A. alces* in the world, two make their home in Mongolia;

Hunting of moose for subsistence purposes. Image: K. Olson

A. a. pfizenmayeri (Yakut moose) and *A. a. cameloides* (Ussurian moose).

The Yakut moose is similar in size to the North American moose. A good set of antlers can span over 100 centimeters and bulls can weigh over 500 kg. The Yakut can be found from the Yenisei River in Siberia to northern Mongolia. In Mongolia, *A. a. pfizenmayeri* occurs in the northern boreal forests, preferring moist areas with abundant willows and poplars. This habitat type comprises roughly 8 percent of Mongolia's total territory, or 125,000 km2.

A. a. cameloides, or Ussurian moose, is similarly sized but physically distinct from *A. a. pfizenmayeri*, sporting small branched antlers rather than large palmate ones. Little is known about the subspecies *A. a. cameloides* other than that it occurs in Mongolia's eastern Nomrog Strictly Protected Area, with populations in neighboring Manchuria. Nomrog SPA is situated at Mongolia's far eastern edge where vast expanses of grassland finally give way to the Khyangan Mountains. The protected area covers 311,205 ha, one-fifth of which is forested and provides habitat for *A. a. cameloides*. A 2004 WCS survey of ungulates in Nomrog SPA came up with a rough population estimate of 73 Ussurian moose in the protected area (Fitzpatrick *pers. comm.*).

Males and females are sexually mature at two years of age, but full growth potential is not reached until 4 or 5 years of age. At that age, females are at their reproductive peak. The mating season begins in September and lasts until October. Females give birth in the spring (May-June) following an eight-month gestation period (Franzmann,1981, Wilson and Ruff 1999)

Population surveys of moose have never been completed in Mongolia, and it is difficult to extrapolate possible numbers based on other regions. Worldwide, population densities vary from 0.1/km^2 to 1.1/km^2, but may reach as high as 200/km^2 in local areas. Population estimates suggest there may be as many as 1 million moose in Eurasia (Nowak 1999).

Take and Trade: This survey and literature review did not discover any international trade for moose meat or parts from Mongolia. There are also no historical records for international trade in the species. However, despite clear legal restrictions both subspecies receive

hunting pressure for personal consumption, domestic wild game trade, and from sport hunters as a trophy animal.

Even though the number of respondents is too low to estimate the total number of moose hunters and harvest volumes in the country, the wildlife trade survey documented both subsistence hunting and a domestic market for moose meat. Of the more than 4,000 people interviewed during the survey, only three reported hunting moose in 2004. These three respondents were all from Khuvsgul aimag, a boreal forest region in north-central Mongolia, and reported taking 2 animals per year. One of the hunters interviewed explained that he sells moose meat at the black market in the local soum center. One moose can provide as much as 200–300 kg of meat, enough to feed a Mongolian family of four for one year. Average meat prices in Mongolia are approximately $2 per kg making one moose worth as much as $400–600 for the game meat alone, an income equal to one year's salary in rural Mongolia.

The Tsaatan (or Dhuka) reindeer people residing in an area to the north and west of Lake Khuvsgul are noted for pursuing Yakut moose as an important source of protein in their diet. However, the increasing harvest of moose and other wildlife in the area is having a serious impact on their traditional way of life. As populations of wild game decrease, the Tsaatan have no choice but to consume the reindeer herds upon which they are primarily dependent for survival (K. Olson *pers. comm*.).

In addition to domestic hunters, international sport hunters are also targeting the resource. Legal restrictions notwithstanding, several national and international hunting tourism companies market moose hunts in Mongolia on the Internet. Surprisingly, one company based in Russia even offers moose hunts in the Gobi Gurvan Saikhan National Park where hunting of any kind is prohibited (www.irkutsk-baikal.com) and where no moose are known to occur. Another article reports that "[o]f the few Yakut moose hunted by Americans, many have come from Mongolia, probably taken incidentally on hunts for other game, such as sheep." (McIntyre 2004). A market visited by the survey team in Songin Khairkhan soum (north-central Mongolia) had a moose trophy on display with a price tag of $500.

Snow Leopard (*Uncia uncia*)

Legal and Conservation Status in Mongolia: Classified by the Mongolian Red List of Mammals (2006) as Endangered. The species is also listed in the Mongolian Law on Fauna as "very rare" pursuant to parliamentary approval in 1994. The Mongolian Law on Hunting prohibits subsistence and commercial take, but allows hunting for scientific purposes. Poaching is subject to criminal penalties under the Mongolian Criminal Code and civil penalties under the Law on Hunting.

Legal and Conservation Status Worldwide: Listed in the IUCN Red Data Book as Endangered and on Appendix I of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES), which include species considered threatened with extinction. The IUCN Species Survival Commission Cat Specialist Group assign the snow leopard a Global Vulnerability Ranking of Category 2 (highly vulnerable) and actively threatened due to hunting.

Distribution and Population Trends: The snow leopard's range is restricted to the mountainous regions of Central Asia including the Altai, Tien Shan, Kun Lun, Pamir, Hindu Kush, Karakoram, and Himalaya ranges. It is known to occur in twelve countries, including Afghanistan, Pakistan, India, Nepal, China, Bhutan, Mongolia, Russia, Tajikistan, Uzbekistan, Kazakhstan, and Kyrgyzstan, with occupied habitat of between 1.6 and 2.0 million km^2. Snow leopards most frequently occur at elevations between 2,000 and 5,500 m, in areas of steep and broken rocky slopes that support shrub, grass, or steppe vegetation. In the northern limits of their range, in Mongolia and Russia, they may use elevations as low as 600 m in relatively flat terrain, and occasionally occur in forested habitat. Range-wide, population estimates vary from 3,500 to 7,500.

Snow leopards are widely distributed in the mountains of western Mongolia and occur in the Altai Mountains, the Khangai Mountains, the Khan Khukhii Uul and Kharkhyra ranges, and in isolated mountainous sections of the Trans-Altai Gobi. They are thought to occur in up to 10 aimags and 107 soums with a total range of about 100,000 km^2. Population estimates vary from about 800 to 1,700 animals. Highest densities are thought to be in the South Gobi, Central

Snow leopard. Image: Sabine Schmidt.

Trans-Altai Gobi, and Northern Altai. Remnant populations occur in the Khangai and possibly Khuvsgul, although no snow leopards have been sighted in the latter area since the 1960s, coinciding with the near disappearance of argali and ibex from the same region.

Take and Trade: Despite being afforded complete protection in Mongolia, illegal hunting is an ongoing problem of unknown magnitude. There are three incentives to poaching: 1) a high value on the international market (primarily for fur, but also bones), 2) the need to protect livestock from depredation, and 3) for the meat, which is believed to have medicinal properties. Although the illegal kill has been estimated at more than 100 animals per year, there is no clear method for calculating more than a minimum estimate. During the 2005 wildlife trade survey in Mongolia, only one individual reported hunting snow leopards for the fur trade. Another three individuals admitted harvesting the animal for medicinal purposes. Poaching for commercial reasons may be on the rise as trade with China increases, particularly at border stations where law enforcement is more difficult. Researchers in China uncovered 13 fresh snow leopard skins from Mongolia in one of China's northwestern border towns in 2005. The value of snow leopard bones on the Asian medicinal market will likely continue to make this an attractive activity for poachers and traders. The recent rise of the middle class in the Tibet Autonomous Region has led to a sharp increase there in illegal traffic of big cat skins (including snow leopard), which have long been used in traditional clothing. An increasing demand for pelts in Eastern Europe may also be driving prices up for snow leopard hides in Russia, which will make trade in that direction, and cross-border poaching, an escalating concern. In the summer of 2005, Russian border guards uncovered 15 snow leopard skins apparently taken from Mongolia's North-Altai region. According to sources in Mongolia and China, snow leopard pelts are sold for as much as $250 per meter length, with good pelts measuring over 2 meters from head to tail.

Retaliatory killing of snow leopards by herders who have experienced livestock losses is difficult to quantify and only a small fraction of kills are made known to authorities. Information campaigns by the International Snow Leopard Trust and other organizations, along with more focused enforcement action by the government and WWF-sponsored anti-poaching units appear to have had at least some impact. Of more than 1,000 herders questioned during the survey who live in snow leopard habitat, all were aware of the snow leopard's protected status. None, however, claimed to kill snow leopards in retaliation for livestock depredation, although this is a well-documented problem in the country. Snow leopards may take horses, yaks, and camels more readily than small livestock because large stock is often allowed to roam untended in areas where leopards occur. The economic impact of snow leopard depredation can thus be substantial to an individual herder, despite the fact that, overall, herders in snow leopard range lose a very small percentage of their herds to the cat. Snow leopards are not easily hunted in the wild, but can be relatively easy to shoot or trap when they are on livestock kills. Because most herding in snow leopard range is conducted far from towns, kills of the cat are rarely reported or discovered by authorities. Given the value of the pelt, chances are high that pelts from retaliatory kills also end up in the market chain.

Wild Boar (*Sus scrofa*)

Legal and Conservation Status in Mongolia: A traditional game animal, *S. scrofa* in Mongolia is classified as "rare" by the Law on Fauna, and may be hunted only for "special purposes," which includes sport hunting by foreigners. It is classified as Near Threatened in the Mongolian Red List of Mammals (2006). Trophy permits are available for $400 from the Ministry of Nature and Environment. The hunting season is set from August 1st to December 1st.

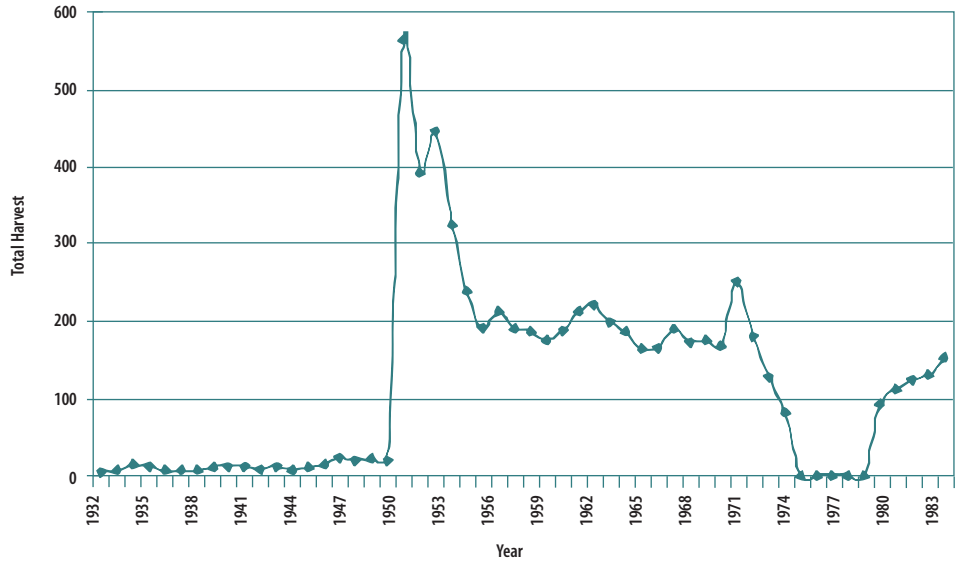
Legal and Conservation Status Worldwide: *S. scrofa* has no trade status under CITES. It is classified as Lower Risk/Least Concern by IUCN (assessment in 1996). No other international agreement regulates hunting or trade of the species in Mongolia.

Distribution and Population Trends: Wild boar inhabit many kinds of habitat, but generally prefer areas with some cover. They tend to be most plentiful in forests and reed beds in Asia, with a major limiting factor thought to be snow depths greater than 40-50 cm (Groves 1981). Activity is mainly nocturnal and crepuscular. *S. scrofa* is omnivorous and its diet consists of fungi, tubers, bulbs, green vegetation, invertebrates, small vertebrates, and carrion. Estimated home ranges are 500–1,000 ha for adult females and twice that for adult males (Nowak 1999).

Wild populations of *S. scrofa* were exterminated from much of their former range including the British Isles and Scandinavia, but have been successfully reintroduced in the latter (Lever 1985). In general, the species has remained more common than some other large game animals in eastern Asia (Oliver 1993). From 1965 to 1975, populations across Europe dramatically increased, with hunter offtake more than doubling and reaching 100,000 per year in Russia (Saez-Royuela and Telleria 1986). However, wild boar populations are known to fluctuate widely over much of their range, showing periodic sharp declines due to hard winters and disease outbreaks, suggesting that "adaptive management" (e.g., shifting quotas and seasons dependent upon population trends) may be especially important for this species.

Mongolia's wild boar population persists mainly in the northern forested regions of Khuvsgul, Khentii, and Selenge aimags, with a small population in Nomrog

Figure 15: Historic Wild Boar Trade in Mongolia 1932-1985



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984

Special Protected Area in the east (Fitzpatrick *pers. comm*.). Population densities, ranges, and numbers have not been adequately studied.

Take and Trade: Wild boar is another species that Mongolia historically traded with the Soviet Union. Official statistics record trade volumes in kilograms of meat only. To estimate the total number of animals traded, we used the average meat yield (100 kg) for one animal as published by the Mongolian Academy of Sciences, although weights may vary and this level may be high—some of the largest wild boars taken by hunters are only slightly heavier and much of the weight is not usable meat.

Wild boar meat trade began in 1932 with the modest number of 5 animals. Trade remained small, averaging just 13 animals per year through 1950. In 1951, trade suddenly jumped from 2,000 kg the previous year to over 56,000 kg (567 animals). From 1951 to 1975, trade averaged 226 animals annually. The next year saw the beginning of a ban effective for all species in the territory of Mongolia. Trade resumed in 1981, averaging approximately 50 percent of former trade volumes through 1985. From that point on, records are no longer available. In the 53 years for which records exist, Mongolia harvested approximately 6,500 wild boar (650,000 kg) in total.

Wild boar is a traditional game meat favorite in Mongolia but has no reported medicinal properties. Roughly 8 percent (n=73 of 949) of the hunters interviewed admitted taking wild boar every year, despite the ban on subsistence hunting. Nationwide, we estimate a wild boar hunter contingent of more than 20,000. Most claimed to hunt only one animal per year (70 percent) with a few harvesting as many as 5 for a mean take of 1.9 per hunter. Total take is estimated at 30,000 animals in 2004.

Internationally, the only documented form of trade is sport hunting. The Ministry of Nature and Environment has established a sport-hunting fee of $400 per trophy, with trophy hunts selling for approximately $4,500.

Little is known about the impact of hunting on wild boar populations in Mongolia. Studies in other areas show that wild pig populations have the potential to triple every year when conditions are optimal, as wild pig sows can produce two litters per year of five to six piglets each. However, the breeding rate is highly dependent on environmental conditions. When environmental conditions are unfavorable (e.g., drought or crop failure), birth rates are lower and mortality of young wild pigs can be high. If these conditions are particularly severe or predation is exceptionally high, the population can decrease rapidly. Studies in Europe indicate that offtake levels as high as 80 percent of the total population may be possible.[67] However, it is unlikely that a similar offtake level would be sustainable in Mongolia, where productivity is lower (much more arid environment, fewer mast tree species) and winters are much more severe, likely resulting in lower population densities and population swings. Close (yearly) monitoring of wild boar populations and adaptive changes in legal take is recommended to properly manage this species in Mongolia.

[67] On the European continent wild boar numbers are often controlled by hunting with a sustainable harvest of 0.4 million taken from a population of 0.5 million (Myberget 1990).

Red Deer (*Cervus elaphus*)

Legal and Conservation Status in Mongolia: Red deer is listed in the Law on Fauna as "rare," a designation mirrored in the Law on Hunting, which restricts hunting to "special" (or sport) purposes only. Trophy permits for foreign hunters were quoted at $700, however all sport hunting has been temporarily stopped due to declining populations. The species was assessed as Critically Endangered in the Mongolian Red List of Mammals (2006).

Legal and Conservation Status Worldwide: IUCN lists *C. elaphus* as Lower Risk/Least Concern (assessment in 1996). There is no other international treaty or agreement regulating take, trade or habitat for the species.

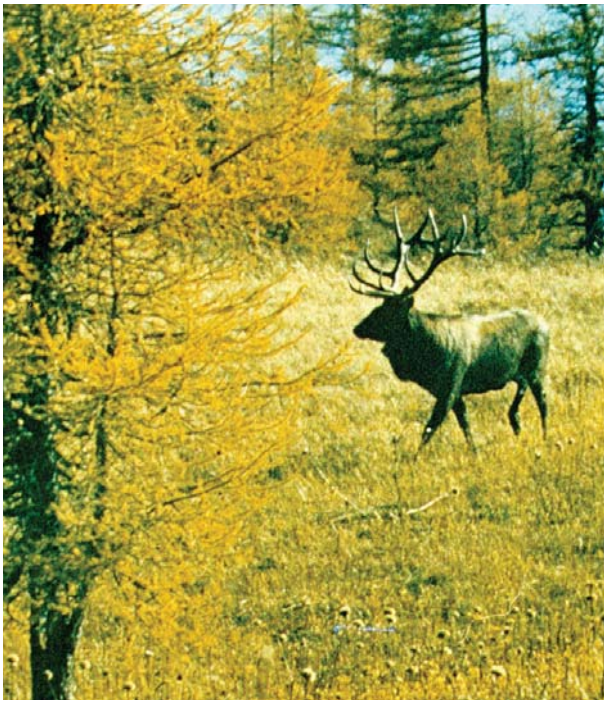
Distribution and Population Trends: *C. elaphus* is the largest of the *Cervus* genus (Groves and Grubb 1987). Animals in the populations of northeastern Asia are among the largest in the world, similar in size to the North American elk or red deer, and usually larger than those of Europe and southern Asia. Males are larger than females. *C. elaphus* is highly gregarious. Discrete herds are formed, with males and females remaining separate for most of the year.

Red deer are both grazers and browsers with much of the spring forage consisting of grass, shifting to forbs and woody plants in the summer, changing again to browse and dried grasses in late summer and fall, and finally moving to shrubs and conifers that persist above the snow in winter (Chen et al. 1998). Siberian red deer were once common throughout much of Mongolia. They occurred in large numbers in the forested north, and occurred in lesser and more scattered numbers, but still common, across much of the steppe, where they were usually found near or within wooded or hilly regions. Cover in the form of bushes or trees is critical, as it provides both protection from predators such as wolves and important food in winter in the form of browse.

Unfortunately, red deer have also declined catastrophically across Mongolia. According to a 1986 government assessment, the population size was approximately 130,000 inhabiting 115,000 km^2. The most recent population assessment in 2004 showed that only about 8,000-10,000 red deer are left, a greater than 77 percent decrease in less than twenty years.

Take and Trade: Red deer played no role in Mongolia's foreign exchange with the Soviet Union. With the easing of Sino-Soviet relations, however, a new wildlife trade opportunity opened for Mongolia in the form of red deer antlers for traditional Chinese medicine. Once trade began, the volumes were shockingly high. Starting in 1965, Mongolia began shipping thousands of tons of red deer blood antlers to China. This trade was followed immediately by shipments of shed antlers at twice the volume. In just the first year of trade, Mongolia sent 33,700 tons of red deer blood antlers to its southern neighbor. The following year, the volume of blood antler trade increased to 40,000 tons and was coupled with almost 90,000 tons of shed antlers. Over the next 8 years, trade steadily increased for both blood and shed antlers, reaching a high of 57,000 tons of blood antlers and 155,000 tons of shed antlers.

While habitat loss may play a small role, over-harvesting from the mid-1960s to the mid-1980s, followed by uncontrolled and illegal hunting from the 1990s on, is the primary reason for the dramatic decline. There is no information available on the impact of historic



Bull red deer in Siberian Taiga. Image: WWF Mongolia

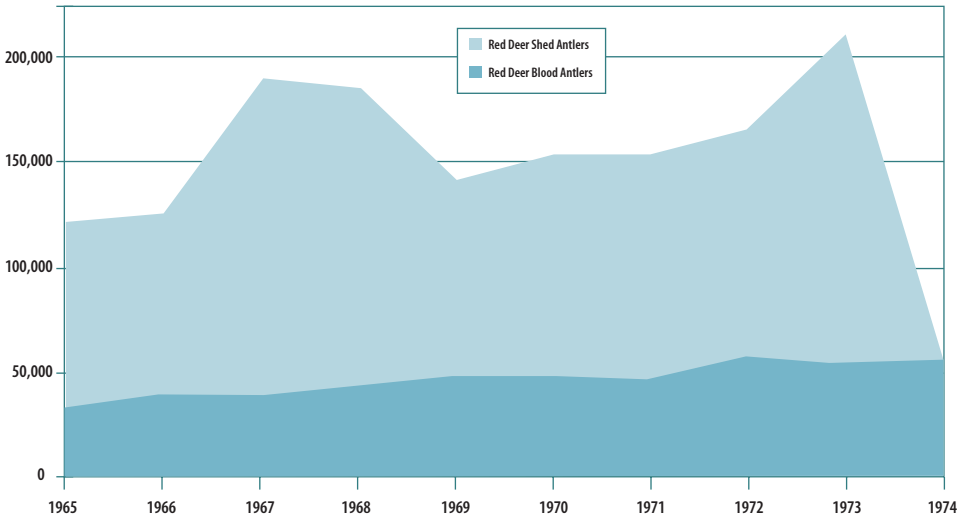
blood antler trade on red deer populations, but experience with attempts to harvest blood antlers in the early 1990s is a strong indicator that animals were either shot or died from the handling. Trade in blood antlers was often the equivalent of harvesting the animal.

Much of the poaching and subsequent trade is directed toward the international medicinal market, and include harvesting for antlers ($60–100/kg), male genital organs ($70–80), fetuses ($20–50), and female's tails ($50–80).

In this wildlife trade study, only 3 percent (26 of 949) of all hunter respondents targeted this species. These hunters came primarily from the northern part of the country in Khentii, Selenge, Tov, and Khuvsgul aimags. Weighted by human population densities in these areas, the total number of hunters harvesting red deer may be as many as 5,000, although this figure appears to be high. The mean harvest rate based on their responses was 1.9/hunter with a maximum of 4 for one hunter. The total harvest volume in 2004 of the hunters queried was 53. With such a low level of hunter response, estimates of total take are difficult to make. Tentative estimates are approximately 6,000 animals or 50 percent of the estimated remaining population. Even accounting for exaggerated responses, there is a strong indication that continued unsustainably high harvests are occurring in the country and may soon cause local extinctions of the species.

Red deer antler chips for sale in Ereen Khot, Inner-Mongolia, China. Image: J. Wingard, July 2005

Figure 16: Red deer Antler Trade with China 1965–1974



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984

Argali (*Ovis ammon*)

Legal and Conservation Status in Mongolia: *Ovis ammon* is listed in the Law on Fauna as "rare." It is classified in the Mongolian Red List of Mammals (2006) as Endangered. The Law on Hunting allows hunting only for "special" purposes pursuant to license issued by the Ministry of Nature and Environment. A highly prized trophy animal, argali licenses range in price depending on the regional population. Altai argali (*Ovis ammon ammon*) are the largest and command a license and permit fee of $25,000. Gobi argali (*O. a. darwini*) are smaller with fees of $16,000. Altai argali may be hunted from July 20th to October 31st. The Gobi argali trophy season extends from July 20th to November 15th. No subsistence or commercial hunting is permitted.

Legal and Conservation Status Worldwide: Biologists currently recognize 9 different subspecies of *O. ammon*, 7 of which are listed in CITES Appendix II and 2 of the most critically endangered subspecies, *O. a. hodgsonii* and *O. a. nigrimontana*, are listed on Appendix I. The IUCN Red List separately evaluated each subspecies as follows: Altai argali as Vulnerable (VU—A2cde, C1); Gobi argali as Endangered (EN—C1); Kazakhstan argali (*O. a. collium*) classified as Vulnerable (VU—A2cde, C1); Tibetan argali (*O. a. hodgsonii*) Vulnerable (VU—A2cde); Northern Chinese argali (*O. a. jubata*) Critically Endangred (CR—C2a); Tien Shan argali (*O. a. karelini*) Vulnerable (VU—A2cde, C1+2a); Kara Tau argali (*O. a. nigrimontana*) Critically Endangered (CR—C2b); Marco Polo argali (*O. a. polii*) Vulnerable (VU—A2cde, C1); and Kyzylkum sheep (*O. a. severtzovi*) Endangered (EN—A2cde, C2b) (IUCN 2004).

Distribution and Population Trends: The 9 recognized subspecies of argali occur throughout central Asia with each subspecies' distribution restricted to separate regions. The furthest west is *O. a. severtzovi*, which occurs in Uzbekistan, and the furthest east is Gobi argali in Mongolia. Some contention surrounds the designation of two subspecies of argali in Mongolia. For many years, biologists have recognized the Altai argali (*Ovis ammon ammon*) and Gobi argali (*Ovis ammon darwini*) (Tsalkin 1951, Zhirnov and Ilyinksi 1986, Geist 1991). However, the results of a recent DNA study do not support the distinction, suggesting that argali in Mongolia may be a single, polytypic subspecies (Tserenbataa 2003).

The argali is described as a highly social animal spending much of the year in single-sex herds with as many as 100 individuals. Mating season for Mongolia's argali begins late September to early October and lasts approximately one month, during which time males and females will congregate in a single herd and males will compete for females. Females have a 5-month gestation period and give birth sometime in March or April to a litter of 1 or 2 lambs (IUCN 2003).

Owing to its status as a trophy animal, argali is one of the few species in Mongolia for which population surveys have been done. Despite inconsistencies in study methodologies and results, in general Mongolia's population of argali appears to be declining. Historical data record a general distribution of argali across approximately 400,000 km^2 of Mongolia's western, southern, and central aimags (Institute of Biology 2001). Population estimates have varied considerably from 40,000 in 1970 (Dulamtseren 1970) to just 10,000–12,000 in 1976 (Shanyavskii 1976)

Adult rams in Ikh Nature Nature Reserve. Image: Dr. Richard Reading

to 18,000-20,000 in 1985 (Gruzdev et al. 1985), compared to 60,000 also estimated in 1985 (Institute of Biology 1985). A number of smaller studies have been conducted in discrete areas since 1990 using different methodologies and for the most part were never repeated (Institute of Biology 2001). Not until the summer of 2001 did the Mongolian government sponsor a nationwide survey, 16 years after the last nationwide estimate. Conducted from July to August 2001 by the Institute of Biology, this study documents a sharp decline in argali populations from 60,000 in 1985 to just 13,000-15,000 in 2001 (Institute of Biology 2001; Amgalanbaatar et al. 2002).

Take and Trade: Mongolia's earliest documented experience with argali trophy hunting goes back as far as 1910 when Curruther brought home trophies from Mongolia's western Altai. Officially, trophy hunting of argali has been allowed in Mongolia since the late 1960s and generated over $20 million from the taking of 1,630 rams between 1967 and 1989 (Amgalanbaatar 1993, Luschekina 1994). Average annual take was 74 trophies per year with each ram bringing approximately $12,000 to the Mongolian economy—a striking sum in comparison to the value of other traded species for the same period (e.g., marmot skins sold for $0.09 each) and a reflection of Mongolia's direct interface with economies outside the Soviet Union.

Amidst much controversy and despite their threatened status, argali trophy hunting remains legal in Mongolia. While recommended quotas from Mongolia's CITES Scientific Authority (Academy of Sciences) have remained steady since the early 1990s (approximately 60), the number of licenses has steadily increased from fewer than 20 in 1993 to 40 in 2001, to 80 in 2002 (Amgalanbaatar et al. 2002). Notably, the last figure surpasses the Scientific Authority's recommended quota and is in direct contravention of Mongolia's CITES obligations. The increase also represents a doubling of the quota in a single year. Mongolia reported selling only 68 trophies in 2004, but this figure is still more than the recommended quota of 40 issued by the Academy of Sciences.

The driver behind the increase is the species' unique status in the trophy hunting community and concomitant high price tag. Mongolia's argali is the largest of the world's wild sheep and the Altai argali is considered the pinnacle of the "Ovis World Slam," a hunting endeavor monitored by US-based Ovis, Inc. that requires the legal taking of a trophy from 12 wild sheep species in the world. Trophy hunting companies catering to an elite and wealthy group of hunters offer excursions from $25,000 to $50,000.

Because of its potential to provide needed funds for local communities and the conservation needs of the species, the controversy, whether voiced nationally or internationally, centers on the failure to improve management. For local communities, the core complaint is that monies given to them by one law (Law on Hunting Resource Use Fees; herein "Hunting Fee Law") are taken away by another (Law on Public Sector Finance). The Hunting Fee Law requires payment of licensing fees to the soum budget, which it sets at 20-30 percent of the current market value of one trophy. For a Gobi argali, the license costs $2,000, and for an Altai argali, $4,000. However, the Public Sector Finance consolidates all financing into the state central budget and budgeting practices decrease a soum government's allocation by the amount received from hunting fees. The result is no net gain for the community and no local money to engage in the management activities mandated by the Law on Hunting.

For conservationists and concerned citizens, the complaints are numerous but primarily center on the lack of funds made available for conservation of the species, government corruption, the absence of management planning, and illegal and unsustainable trophy hunting practices. One of the most disconcerting problems is the lack of funds for conservation. Given the species' high trophy value and Mongolia's legal requirements, more than enough funds should be available to engage in regular monitoring and comprehensive conservation efforts. The 1995 Hunting Fee Law required that 10 percent of "hunting reserve use fees" paid to the central budget be transferred to an Environmental Protection Fund. In 2000, a new law (Law on Reinvestment of Natural Resource Use Fees for Conservation of Natural Resources; herein "Reinvestment Law") increased this amount to 50 percent (Wingard and Odgerel 2001). The Hunting Fee Law sets the resource use fee at 60-70 percent of its trophy value, or $14,000 for Gobi argali and $21,000 for Altai argali. The 1995 Hunting Fee Law would thus require payments to the Environmental Protection Fund of $1,400 and $2,100 respectively,

while the 2000 Reinvestment Law would increase these payments to $7,000 and $10,500. From 1996 to 1999, Mongolia reports exporting 66 argali trophies. No breakdown of the number of Altai and Gobi argali is given. However, a simple estimate is possible using the 1995 requirement of 10 percent and assuming a mean of $1,750 per trophy. Under these terms, the fund should have received approximately $115,000 in 4 years. From 2000 to 2004, Mongolia exported 292 trophies. Applying the 2000 reinvestment obligation of 50 percent and a mean trophy value of $8,750, the Environmental Protection Fund should have received more than $2,550,000, for a total of more than $2,650,000 over the last 10 years. In the same period, only one nationwide study has been conducted on argali populations at a cost of less than $18,000 (Institute of Biology 2001), less than 1 percent of the estimated revenues generated.

Internationally, the controversy was voiced in a U.S. lawsuit alleging the failure of the U.S. Fish and Wildlife Service to exercise "due diligence" in its determination of Mongolia's management of the species. The U.S. Endangered Species Act allows hunters to import trophies of endangered species only where the exporting country has completed nationwide surveys showing population trends and the responsible agency has sustainable management plans that are actually conserving the species. The implication of the lawsuit was that U.S. hunters, the largest percentage of Mongolia's customers (Amgalanbaatar et al. 2002), would not be able to import their trophies if the Mongolian government was not able to prove it was managing the species.

The combination of public outcry in Mongolia and the U.S. lawsuit prompted the Mongolian government to conduct a nationwide study in 2001. The Minister of Nature and Environment even contributed personal funds to implement the study (Institute of Biology 2001), which was especially surprising as there should have been over hundreds of thousands of US dollars in the Environmental Protection Fund for this sort of activity.

However, one study does not equal effective management and in the absence of on-the-ground actions and local incentives to conserve the species, poaching remains a serious problem, adding to threats posed by trophy hunting, predation by domestic guard dogs, and competition with domestic livestock (Amgalanbaatar and Reading 2000, Wingard 2005). In the wildlife trade survey, however, the number of hunters who admitted taking argali was low (4 of 949, <1 percent) with a mean harvest of 1.3 and a maximum harvest by one individual of 20. Anecdotal information collected during the wildlife trade study and reports by many respondents suggest that poaching is common throughout the country, with game meat a primary motivator but also the sale of argali horns and mounted trophies to markets in China (Institute of Biology 2001, Amgalanbaatar et al. 2002, Maroney 2003, Wingard 2005).

None of the respondents to either the household consumption survey or market survey reported selling or trading argali meat. However, one individual in the survey reportedly took 20 argali in 2004. One adult argali ram yields approximately 120 kg of meat; 20 would supply the hunter with 2,400 kg—enough to feed 13 families of 4 individuals for a year. Although this hunter did not claim to sell or trade argali meat, the quantity harvested is well beyond the level of personal consumption. Whether traded or not, the meat has value as a substitute for purchasing domestic meat on the market. Based on a single animal game meat yield of 120 kg with a value of $2 per kg (substitute value for domestic meat), one argali has a nominal domestic value of $240. The market survey also found mounted trophies for sale at $275, making the total potential market value of an argali ram approximately $515.

Saker Falcon (*Falco cherrug*)

Saker falcon. Image: Simon Busittil/RSPB

Legal and Conservation Status in Mongolia: Curiously, saker falcon is an unregulated species in Mongolia. The Law on Hunting does not establish a season for taking the bird; nor does the Law on Fauna classify them as "very rare" or "rare." The species is also not listed in the Mongolian Red Book.

Legal and Conservation Status Worldwide: The IUCN Red List classifies *F. cherrug* as Endangered (A2bcd+3bcd) (assessment in 2004). The classification is due to the species' rapid population decline, particularly on the Central Asian breeding grounds, owing to inadequately controlled capture for the falconry trade. Rapidly declining populations have led many range states to protect and red-list the species, especially in the western part of the range (Baumgart 2000). CITES gives the species Appendix II trade status and in 2002 imposed a trade ban on the United Arab Emirates (Fox 2002). A similar ban on all saker trade states has been proposed by CITES, including Mongolia.

Distribution and Population Trends: *Falco cherrug* has a wide Palearctic distribution stretching from eastern Europe to China. It is known to breed in several countries within this range including Austria, Hungary, Czech Republic, Slovakia, Serbia and Montenegro, Bulgaria, Romania, Moldova, Belarus, Ukraine, Turkey, Iraq, Armenia, Russia, Uzbekistan, Tajikistan, Kyrgyzstan, Kazakhstan, Mongolia and China, and at least formerly in Turkmenistan, probably Afghanistan, and possibly India. Regular wintering or passage populations have been documented in Italy, Malta, Cyprus, Israel, Jordan, Egypt, Libya, Sudan, Tunisia, Ethiopia, Kenya, Saudi Arabia, Yemen, Oman, UAE, Bahrain, Kuwait, Iran, Pakistan, India, Nepal, Afghanistan and Azerbaijan (Birdlife International 2005, Haines 2002, Snow and Perrins 1998).

In 1990, the global population of saker falcons was estimated at 8,500-12,000 pairs. By 2003, this number had dropped to 3,600-4,400 for an estimated global decline of 61 percent (ERDWA 2003). Mongolia is home to roughly half the world's remaining population of saker falcons, but this avian sanctuary has been discovered and declines here are as dramatic as in other countries. In 1999, Mongolia's saker falcon population was estimated at 3,000 breeding pairs (Shagdarsuren et al. 2001). However, in 2000, the population dropped to an estimated 2,200 pairs. In 2003 the number of falcons breeding in 6 study sites was less than 50 percent that of previous years, with most sites being unproductive. Today, Mongolia's saker falcon population is threatened by illegal trapping, effects from Brandt's vole poisoning, and electrocution (Gombobaatar et al. 2003). The extent to which these different factors contribute to saker declines in Mongolia requires urgent analysis, but it is likely that international trade is the greatest driver in population declines.

Take and Trade: Because of their large size and capable hunting skill, saker falcons are highly prized among falconers. Trapping for the falconry trade, especially the export trade to the Middle East, is growing rapidly. The Ministry of Nature and Environment records saker exports pursuant to CITES Appendix II requirements. Similar to argali trade, there has been a sharp increase in officially sanctioned falcon trade, going from a yearly average of 63 birds from 1996 to 2000 to almost 400 birds in 2004 (Table A1). This current level of trade in Mongolia is roughly 10 percent of the estimated remaining population

of sakers in the world and almost 20 percent of Mongolia's declining population.

With no management plan in place for the protection of the species, harvesting areas and levels appear to be a function of convenience if not greed. While somewhat more than 300 licenses were purportedly issued in 2004, as many as 250 falcons were taken from one aimag (Sukhbaatar) in Mongolia's Eastern Steppe region. Anecdotal information from individuals surveyed suggests that population levels have decreased substantially in the east, following similar declines in the west.

Saker falcons are not traditionally used by Mongolians and do not factor into any known form of domestic trade. Still, illegal international trade occurs. From 1993 to 1999, there were 16 known attempts to smuggle a total of 69 falcons from the country, mostly by foreign nationals (Badam 2001). However, we do not know, and there is no way to measure, the true level of illegal trade actually occurring. None of the respondents to the wildlife trade survey reported harvesting or trading falcons.

Table A1: Export revenue from saker falcon in Mongolia 1996–2003

Year	Number of Falcons Exported	Direct Payments[68]	Fees	Total Revenue
1996	25	85,000	88.50	85,088
1997	154	520,000	545.00	520,545
1998	25	85,000	88.50	85,088
1999	61	200,000	215.00	200,215
2000	51	170,000	180.00	170,180
2001	180	712,350	641.40	776,490
2002	303	1,155,945	1,073.10	1,263,255
2003	392	1,345,932	1,430.80	1,826,096
Total	**1,191**	**4,274,227**	**4,261.90**	**4,278,488**

Source: Ministry of Nature and Environment 2004, Wingard and Odgerel 2001, CITES Database, 2005.

[68] Payments for the years 1996–2000 were estimated based on mean trade values for subsequent years. These figures may not be accurate, but were used as approximate values in the absence of official data.

Saiga antelope (*Saiga tatarica mongolica*)

Legal and Conservation Status in Mongolia: Mongolia has prohibited hunting saiga antelope by law since 1930. In 1953, the species was listed as a protected species by Mongolia government. The law on fauna lists *S. t. mongolica* as very rare, prohibiting both personal or commercial hunting, but allowing take for scientific purposes. Two of the prime areas for saiga are under state protection, Sharga-Mankhan Nature Reserve established in 1996 and Khar Us Nuur National Park established in 1997. The subspecies is listed in the Mongolian Red List of Mammals (2006) as Endangered.

Legal and Conservation Status Worldwide: *S. tatarica* was assessed by IUCN as Critically Endangered (A2a) in 2003, with a regional assessment of *S. t. mongolica* in 2005 as Endangered (A2acd) (November, 2005). *S. t. tatarica* is listed in Appendix II, CITES. *S.t. mongolica* is listed in CITES Appendix I.

Distribution and Population Trends: Saiga antelope are migratory herd animals that live on open steppe and desert steppe. They once spanned the Eurasian continent from southeastern Europe to Mongolia and China. Today, they may be found only in Russia, Kazakhstan, Turkmenistan, Uzbekistan and far western Mongolia. The Mongolian saiga antelope (*S. t. mongolica*) is a distinct subspecies that has long been isolated from the main populations in Kazakhstan and Russia by the Altai Mountains. Historically, *S. t. tatarica* occurred in the Dzungarian Gobi of Mongolia, but became regionally extinct there around the mid-1950s. *S. t. mongolica* (Bannikov 1948) is endemic to Mongolia and was formerly found in the semi-desert zone, from Mongolia's northwest corner, east to approximately 101 E. Populations have declined drastically from historic levels and today this rare species exists only in the southwestern part of the country, primarily in Khovd and Govi-Altai aimags. More specifically, it may be found in Shargiin Gobi, Khuisiin Gobi, Khuren tal and the Mankhan area.

Population estimates over the last 30 years vary, but ultimately reflect a decrease of approximately 50 percent in the last 7 years. Dash et al. (1977) estimated the surviving Mongolian population as low as 200. Reports from the 1980s show an increase to around 300 animals. Assessments in 1997 recorded 1,000 animals, rising in 1998 to between 2,000 and 2,500. A study conducted by WWF Mongolia showed continuing growth in numbers to a high of 5,200 in 2001. However, a survey in 2002 sadly recorded a decline to 1,020 and a further study in 2003 by WWF Mongolia recorded a mere 750. (WWF 2003). The most recent survey estimates 1,500 saiga remaining in Mongolia (Amgalan 2005).

The decline in Mongolia follows shortly after a similar collapse in the major populations of saiga in Kazakhstan and Russia, where populations have crashed by as much as 97 percent from over 1 million in the early 1990s to perhaps as low as 31,000 in recent years (Millner-Gulland et al. 2001). The decline is exacerbated by skewed sex ratios due to focused hunting on the horned males, which has negatively affected the populations' breeding system and its ability to recover (Millner-Gulland et al. 2003).

Take and Trade: The single most important driver in *S. t. mongolica* declines is the Chinese medicinal market for saiga horn. Mongolians do not traditionally use saiga horn and the value of the meat is either so low or non-existent that hunters do not trade it. Furthermore, a WWF Mongolia survey conducted in 2004 confirmed that the 2,860 km^2 area where saiga presently occur in Mongolia has no major environmental problems (i.e., overgrazing, habitat fragmentation), nor were there any negative climatic conditions that might contribute to the observed decline in the species. In other words, the reduction in Mongolia's saiga population is directly, and possibly solely, related to hunting.

During the course of the study, WWF Mongolia spoke with a number of poachers and learned the astonishing reality behind saiga harvests. Because the blood horn is the singular object of pursuit, poachers attempt to harvest them while the animal is still alive. Chinese buyers apparently pay much more for horns taken using this technique ($30 per horn) because the horn contains more blood. To do this, poachers pursue the animal by car and literally run into the saiga. Then, and while the animal is still alive, the horns are removed with an axe. Having no further value, the injured animal is left to bleed to death (WWF 2004).

Herd of Mongolian gazelle in Dornogovi Aimag near Ikh Nature Nature Reserve. Image: Dr. RichardReading

With such drastically reduced numbers, the real threat to the survival of the species may shift from hunting to stochastic events. While hunting will likely continue at least on an opportunistic basis, organized hunts may no longer be commercially viable. The actual market resource (adult males) is only a small percentage of the total population – estimated at 10 percent of males, which make up only 25 percent of the total population. The present population of 1,500 may therefore only have 380 males and of these, only 38 with real market value. At $60 per male, the total potential market could be as little as $2,300. With so few animals spread over such a large area, it may not make economic sense to continue to hunt them as a targeted species, although opportunistic hunting is likely to continue. However, those same small numbers mean the population is extremely vulnerable to stochastic events such as hard winters and drought, limited diversity of the gene pool, and/or fragmented or degraded habitat.

Mongolian gazelle (*Procapra gutturosa*)

Legal and Conservation Status in Mongolia: Mongolian Law on Hunting permits subsistence take of Mongolian gazelle from August 1st to October 1st with no restriction on age, sex, or size. Industrial hunting is permitted by the same law, but was banned in 2000 pursuant to an order by the Ministry of Nature and Environment. The species was classified by the Mongolian Red List (2006) as Endangered.

Legal and Conservation Status Worldwide: The IUCN Red List evaluated *P. gutturosa* in 2003 as Least Concern based on an assumption of a population of approximately 1,000,000. However, the IUCN Red List also cautions the need for annual monitoring of the status of the species as the impacts of disease, severe winter conditions, legal and illegal harvests could result in a sharp decrease qualifying for a classification of Near Threatened or Vulnerable.

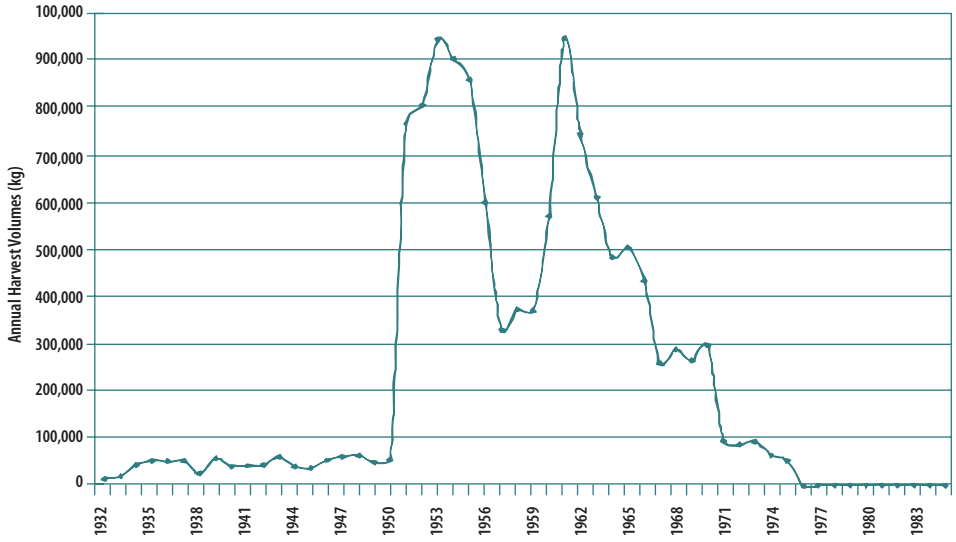
Distribution and Population Trends: Mongolian gazelles still number around 1 million animals in Mongolia, and represent one of the great migratory ungulate spectacles in the world, and the last such event in Asia. Historically they occurred throughout the eastern aimags and in a broad band across central Mongolia and west to the base of the Altai Mountains. This range has been dramatically constricted over the past 100 years, with much of the loss occurring in western Mongolia. Today, only a few western locations still contain gazelles.

Globally, Mongolian gazelle range has dropped by as much as 75 percent over the past 50 years in at least 3 of its 4 range states, which included Mongolia, China, Russia, and Kazakhstan. In Mongolia, range fell from 780,000 km^2 in the 1940s to only 190,000 km^2 in 1997. Similarly, in Inner Mongolia, China the range contracted from 300,000 km^2 in 1970 to less than 75,000 km^2 by 1995. The species has disappeared from Kazakhstan and been virtually eliminated from its range in Russia outside of a small migratory population in the Chital region across the northeast border of Mongolia (Bannikov et al. 1961, Lhagvasuren and Milner-Gulland 1997, Xiaoming et al. 1997, Jiang et al. 1998). Over 90 percent of the remaining population of this species is in Mongolia.

In Mongolia, population estimates have ranged from as few as 180,000 to as many as 2,670,000 (Milner-Gulland and Lhagvasuren 1998, Olson et al. 2004). Olson et al. (2004) estimated 800,000–900,000 gazelles (about 10–11 gazelles/km^2) over an area of 80,000 km^2 in Mongolia's eastern steppe. In 1994, Mix et al. estimated a total population of 2,670,000 after surveying over 475,000 km^2 of gazelle range (unpubl. data cited in Reading et al. 1998); an area 6 times larger than the Olson study. In 1998, Reading et al. (1998) reported 250,000–300,000 gazelles occurred in Dornod Aimag based on local interviews. In 2001 V. Kiriuluk made an educated guess that 300,000–500,000 gazelles remained throughout eastern Mongolia, while in 2003 B. Lhagvasuren estimated 750,000 gazelles in all of Dornod (Olson et al. 2004 citing *pers. comm.*).

In late August and early September of 1998, a massive die-off of gazelles occurred following record rainfall levels. A study conducted by WCS and the Mongolian Institute of Biology in the same year showed that af-

Figure 17: Trade in Mongolian gazelle game meat in Mongolia 1932–1985



Source: Mongolian Academy of Sciences, Institute of Biology, Historical Trade Records, 1926–1984

fected animals had signs typical of a bacterial infection (*Fusobacterium*) of the feet of livestock kept in muddy conditions. The disease is known to affect caribou in Alaska during unusually wet conditions. Later in the fall, thousands of gazelles succumbed as the weather turned cold and the year's planned commercial harvest was canceled to allow the population to recover (Schaller 1998).

Other than overhunting, threats to the continued survival of Mongolian gazelle include 1) infrastructure development such as the Millennium Road that threatens to divide the steppe and disrupt gazelle migration; 2) proposals to remove large portions from protected areas; and 3) changing land use practices that also threaten long-term sustainability, including agricultural expansion, fencing of land, and overgrazing due to disruption of pastoral traditions. Oil and mineral extraction in the area may also pose a substantial threat if it is not carried out in a manner consistent with ecological preservation of migratory movements.

Take and Trade: Mongolians have traditionally harvested Mongolian gazelles to supplement their diet, and from 1932 to 1976, the species was commercially harvested for trade with the Soviet Union (Milner-Gulland and Lhagvasuren, 1998, Reading et al. 1998). Official statistics do not give actual numbers of animals taken, instead quoting total kilograms of meat processed. This taxon of gazelle typically weighs between 20–40 kg (Nowak 1999). Using a median of 30 kg and subtracting weight not attributed to meat (roughly 50 percent) gives an average game meat yield of 15 kg per animal for a total of 845,000 animals officially traded in 45 years, with an average trade related harvest of 15,665 animals per year and peak harvests exceeding 50,000 animals in the early 1950s and 63,000 animals in 1961. Halted in 1976, official trade was never reestablished in socialist times.

Commercial hunting began again in 1995 with average quotas of 20,000 gazelles per year. The primary market was China. In 2000, the Ministry of Nature and Environment announced a ban on commercial hunting. However, in 2001 the Chinese government was still officially permitting the import of gazelles from Mongolia, approving the import of 100 tons of Mongolian gazelle meat or roughly 6,600 animals (Scharf and Enkhbold 2002). That Chinese officials approved imports at any level is symptomatic of the management disconnect between the Mongolian government and counterparts in Chinese agencies—with limited ability to control actual harvests, the continued open market in China has immediate and negative consequences for managing wildlife harvests in Mongolia.

It is almost certain that hunting for subsistence purposes continued after 1976, but there are no records for the level of offtake. Subsistence hunting was certainly a factor after 1990 as economic hardship forced Mongolians to return to subsistence practices including hunting. The opening of additional border points between China and Mongolia along with generally increasing trade to the south encouraged hunters to harvest wildlife, including Mongolian gazelle, for the new market. Again, no records exist documenting the actual level of offtake.

However, a hunting survey conducted in 2001 found that local herders in the Eastern Steppe region take as many as 200,000 gazelles annually (K. Olson *pers. comm*.). Urban dwellers in just one city in eastern Mongolia (Choibalsan) were estimated to consume approximately 16,000 gazelles a year (Scharf and Enkhbold 2002). This wildlife trade survey found that similar numbers continue to be harvested throughout the gazelle's distribution in the country. Of the 3,119 hunters interviewed, 150 report harvesting gazelle (5 percent of all hunters). Our estimate of the total number of gazelle hunters nationwide is 40,000. The adjusted mean harvest level for these respondents was 5.2 with a maximum harvest of 100. The total harvest in 2004 may have been as high as 250,000.

Seventeen percent (n=25 of 150) of the Mongolian gazelle hunters interviewed said they sell gazelle meat and other parts to local markets. The majority of these sell the game meat (n=17), while a few also sell the skin (n=5), blood (n=1), or the whole animal (n=2). Because the trade survey was conducted during the summer months, surveyors did not observe any trade in gazelle meat, blood, or skins.

Mongolian gazelle trade appears to be even more commercialized than marmot trade, with only 20 percent of users obtaining parts from hunters compared to 25

percent of marmot users whose supply comes directly from hunters. Much of this trade can be found in local markets or the train station in Ulaanbaatar.

In addition to commercial harvests and subsistence trade, Mongolia has recently started advertising gazelle trophy hunting. Official trophy permit and license fees are $300. Sold by hunting companies as a combination hunt, individual gazelle trophies are sold to the hunter for around $550 per trophy. Hunting starts in September 1st and extends to December 1st. Average trophy horns measures 8-11 inches in length.

Millner-Gulland and Lhagvasuren (1998) developed a harvest model that suggests a total sustainable offtake of 6 percent, or 60,000 gazelles a year if the total population is 1 million. With estimated total harvests exceeding this level by more than 300 percent, it is possible that Mongolian gazelle are experiencing a decline similar to that documented for many other species in Mongolia. This decline could accelerate if there is a commercial switch from saiga to gazelle horns. Evidence for this ominous trend has been found in the recent increase in price for gazelle horns and a market in China for gazelle heads of $12 per specimen.

Musk Deer (*Moschus moschiferus*)

Legal and Conservation Status in Mongolia: The Mongolian Red List of Mammals (2006) classifies the musk deer as Endangered. The Law on Fauna (2000) and Law on Hunting (1995) both describe the species as "very rare." No personal or commercial hunting is permitted.

Legal and Conservation Status Worldwide: *M. moschiferus* is classified as Vulnerable (A1acd) by the IUCN Red List (assessment in 1996). The justification for this classification is based on an estimated or suspected reduction of at least 20 percent over the last 10 years as shown by direct observation, a decline in area occupancy, and actual or potential levels of exploitation for musk deer pods. *M. moschiferus* is also listed in Appendix II of CITES, except for subpopulations in Japan, Denmark, and the Himalayas. Musk deer species found in Afghanistan, Bhutan, India, Myanmar, Nepal and Pakistan are listed in Appendix I. Because of continuing illegal trade at levels likely to cause significant population declines, musk deer have received additional attention from CITES. Notably, In April 2000, at the 11th meeting of the Conference

Gazelle heads discarded after commercial harvesting. In recent years, gazelle horns have begun to enter the market as a substitute for saiga antelope horns. At the time this photo was taken (1999), the heads and horns were simply discarded. Image: Henry Mix/Nature Conservation International.

of the Parties to CITES (CoP11), member states adopted Resolution Conf. 11.7—Conservation of and Trade in Musk Deer. The resolution asks all CITES Parties to "take immediate action in order to reduce demonstrably the illegal trade in musk". In particular, member states are asked to:

1. Introduce innovative enforcement methods and strengthening enforcement in key border regions;
2. Develop a labeling system to identify products containing musk;
3. Develop and use forensic tests to detect the presence of (genuine) musk in products;
4. Encourage musk deer range States and consumer States not Parties to CITES to accede to the Convention;
5. Work 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;
6. Develop bilateral and regional agreements for improving musk deer conservation and management, strengthening legislation and enforcement efforts (Homes 2004).

Distribution and Population Trends: The taxonomy of musk deer has not been conclusively resolved, but there are at least four (Himalayan or Alpine Musk Deer *Moschus chrysogaster*; Black Musk Deer *M. fuscus*; Forest Musk Deer *M. berezovskii*; and Siberian Musk Deer *M. moschiferus*) and possibly six or more species of *Moschus* spp. Little is known about their biology. Musk deer occur in at least 13 countries in South Asia, East Asia, Southeast Asia and the eastern parts of Russia and northern Mongolia (Homes 1999).

Musk deer are unusual, primitive members of the deer family. Musk deer do not grow antlers—instead, males develop elongated 'tusks' that extend downward and are used as sexual ornamentation and for dominance displays. These small deer live in thickly forested regions across much of Asia. Musk deer habitat comprises conifer forests, often in mountainous areas, with good lichen abundance—this item provides a majority of the winter diet and is critical for the deer's survival.

In Mongolia, *M. moschiferus* can be found in the northern slopes of the Khentii and Khuvsgul Mountains and along the mountaintops of the Khangai and Khan Khokhii mountain ranges. They are distributed through 40 soums, involving 10 aimags across 27,000 km^2 (Dulamtseren et al. 1975). In 1975, the Institute of Biology estimated Mongolia's musk deer population at over 44,000. Biologists believe that the population has declined sharply since then, primarily due to the liberalization of trade and increased harvests for the valuable musk pods. Surveys have not been completed in the last 20 years and the current population is unknown.

Take and Trade: *M. moschiferus* are hunted for the valuable scent glands, or pods, which only male musk deer produce, at the rate of about 23–25 g of musk, per animal, per year. Musk pods, the glands that secrete the musk, are harvested by killing the deer, and three or more musk deer may be killed before a male with a sufficiently large musk gland is caught (Homes 2004). Musk secreted from the scent pods of male musk deer has been used for thousands of years in traditional medicines in Asia to treat conditions such as pain, swelling, convulsions and delirium. The musk deer pod is also one of the most expensive natural products, with a retail value that has been described as higher than that of gold (although this survey found 2005 values of gold to be about 4 times the market price of musk).

The majority of the medicinal products containing musk and sold in the U.S. are produced in China. Research by TRAFFIC North America conducted in 2003 shows increased availability of musk products in major cities in the United States. For example, the study found musk products "in all of New York City's traditional Chinese medicine (TCM) stores and 50 percent of San Francisco's TCM shops". These numbers highlight a significant increase in "the availability and use of musk products over previous years." (Homes 2004).

Although no national surveys have been performed for Mongolia's musk deer population in the last 30 years, there is evidence of an unsustainable increase in hunting of this species. Population levels for the few areas surveyed by Mongolian scientists show disproportionately low ratios of male to females resulting from hunting pressure and suggest that some populations are barely viable (Homes 2004). Over a five-year period from 1995-2001, the number of musk deer traders increased by a factor of four and

the number of musk pods traded increased six-fold, probably as a direct result of the price of a musk deer pod increasing six times. Mongolian scientists believe that musk deer populations peaked at 44,000 in the 1980s due to strict state control of hunting and trade. Over the last 11 years, market-based estimates of offtake were as high as 33,000 (Tsendjav and Batbold 2003). A report by TRAFFIC Europe (Homes 2004) found that in Russia, an estimated 80 percent of all musk deer killed appear to have been poached and the illegal trade in musk is thought to have been five times that of the legal trade in the early 2000s. In neighboring Mongolia, despite the fact that hunting of musk deer has been illegal since 1953, a minimum average of 2,000 male musk deer have been poached annually (Homes 2004).

Because of the relatively heavy civil and criminal penalties for poaching musk deer, respondents to the wildlife trade survey appeared unwilling to admit to trade in musk deer pods. However, three markets reported selling musk deer pods at a price of $4.50 per gram, primarily for export to China.

Musk deer. Image: Dr. Richard Reading

Appendix B: Additional Species Information

1) **Dalmatian pelican *(Pelicanus crispus)***—Included in the Mongolian Red Book (1987) and Appendix I, CITES and the Bonn Convention on Migratory Species (CMS). Listed as "very rare" in the Mongolian Law on Fauna. Hunting in Mongolia has been prohibited since 1953.

   The Dalmation Pelican is distributed in the Balkans, Black Sea, and Caspian Sea across Central Asia to Mongolia and China. They breed from the Yellow River west to the Balkan Peninsula. Historically they were present in Mongolia as summer migrants to Khar Us, Khar, Airag, Hyargas, Uvs, Khunguin Khar, Boontsagaan, Orog, Kholbooj, Taaziin Tsagaan, Ugii Lakes. Today only a few breeding pairs persist in Khar Us and Airag Lakes in summer.

   An estimated 3,200, to 4,200 Dalmatian pelicans can still be found in the world, and the species is classified by the IUCN Red List as Vulnerable (A2ce+3ce) (assessment in 2006). Studies in Mongolia record declines over the last 50 years for most areas. In 1956, over 300 were counted on Shuvuun Tsuglaan and Khar Us Lake. By 1972, this number had dropped to 207, and to only 10 birds by 1981. Surveys record just over 200 Pelicans present in Mongolia today (WWF 2004).

   The Dalmatian pelican has been traditionally hunted by Mongolians for its beak, which is used to scrape sweat off horses after a run. Highly prized, Dalmatian pelican beaks are now one of the most expensive wildlife parts in the country. Prices probably vary, but wildlife trade researchers were quoted $2,000 by traders at an outdoor market in Ulaanbaatar. The limited supply has also resulted in the production of imitation beaks carved from ibex and cattle horns. Imitation beaks are openly displayed while real specimens are not.

2) **Taimen *(Hucho taimen)***—Classified by the Mongolian Red List of Fishes (Ocock et al. *in press*) as Endangered and listed as "rare" in the Mongolian Law on Fauna. Take is restricted to sport fishing for which the Ministry of Nature and Environment has set a $150–300 price tag depending on the size of the fish. In 1996, the IUCN Red List assessed the taimen's European relative (*H. hucho*) as Endangered (A2bcde, B1+2bce). At this time the Mongolian population was regarded as a subspecies of *H. hucho*, and it was thus included within the Endangered classification; it is now recognized as a separate species in its own right.

   The largest of all freshwater salmonids (capable of exceeding two meters in length), the taimen is an especially important species in Mongolia's rivers, both ecologically and economically. The known distribution stretches from the Urals in the west across Siberia to the Amur River basin. Little is known about the life history of taimen in Mongolia. According to studies in river systems connected or adjacent to Mongolia, Siberian taimen exhibit increasing migration patterns

as they grow in size, seeking out ever deeper over-wintering habitat. Popular belief holds that older taimen establish over-wintering holes to which they return year after year (Augerot 2000). Because of the length of time to first breeding (up to 6 or 7 years) relatively low densities, and long lifespans (>30 years), taimen are extremely vulnerable to over-fishing.

Despite restrictions, Mongolia's taimen are harvested both for personal consumption and to supply an increasing market in Ulaanbaatar's restaurants and food stores. Prices range from $1–3 per kg. No data are available on the average weight of taimen, but it is not unusual for one fish to weigh 20 kg, with the largest weighing as much as 50 kg. Using the lower weight of 20 kg makes one taimen worth approximately $20 to $60 on the market in Mongolia. The wildlife trade survey was unable to estimate the probable volume of sales due to low response rate from interviewees, but anecdotal information suggests that taimen is common fare in many markets and restaurants. In addition, several fly-fishing companies offer trips with some (in particular, the Association of Mongolian Angling Guides, www.taimen.mn) limiting their activities to catch-and-release only. Their efforts, however, remain a self-regulated attempt to conserve the resource while ensuring that local communities benefit from the use and provide an alternative to poaching. The Law on Hunting has not yet been amended to support such initiatives.

3) **Lynx *(Lynx lynx)***—The Eurasian lynx is listed by the Law on Fauna as "rare" and may be hunted for "special" purposes pursuant to the Law on Hunting. The hunting season extends from October 21st to February 16th. The species is listed in the Mongolian Red List of Mammals (2006) as Least Concern. The IUCN Red List's global classification of the species lists it as Near Threatened (assessment in 2002) and international trade is restricted by CITES Appendix II status.

The Eurasian lynx is found in the forests of northern Europe and in the Siberian taiga from the Ural Mountains to the Pacific. In 1992, the Russian population was estimated at 36,000-40,000 (Matjuschkin 1978, Zheltuchin 1992). In China, lynx populations are widely if patchily distributed throughout the country, mostly concentrated in mountainous regions.

No recent studies have been completed on Mongolia's population. They are thought to occur mostly in the northern taiga forests, but at least one individual was sighted as far south as the Ooshiin Gobi, some 700 kilometers southeast of Ulaanbaatar and the taiga's southernmost extent in the country (Reading *pers. comm.* 2005). Bannikov (1954) described lynx as common in the desert hills of south-western Mongolia.

Historically, Mongolia traded lynx pelts to the Soviet Union, averaging 440 pelts per year from 1958 to 1974. Official records do not show any trade from that date forward. Today, lynx pelts are one of the more common furs seen in Mongolia's markets following wolf, red fox, and corsac fox. Hunters interviewed in the wildlife trade survey were all from towns located along the northern taiga forest region in Mongolia. Mean harvest rates were 1.2 per hunter. Response rates were too low to estimate probable total harvest volumes. High quality winter pelts sell for $80 while pelts from other seasons are only $25. Despite export trade restrictions, a surprising number of traders market skins to foreign tourists as souvenirs. Undetermined quantities of pelts are also exported directly to markets in China where they are available for between $100 and $200. Mounted lynx trophies from Mongolia can also be found in China's border markets commanding prices as high as $375.

4) **Pallas' Cat *(Otocolobus manul)***—Classified by IUCN as Near Threatened (assessment in 2002) and listed in CITES Appendix II, neither the Mongolian Law on Fauna nor the Law on Hunting offer any special or protected status to this species. It also has no established hunting season and so, by default, may be hunted year round. The Mongolian Red List of Mammals (2006) lists the species as Near Threatened.

O. manul is a small cat weighing between 2-4 kg (Heptner and Sludskii 1992). It has a wide distribution in Mongolia, inhabiting the steppes, high deserts, and mountainous country and can

be found at elevations exceeding 4,000 meters, It shelters in caves or burrows and feeds primarily on small mammals and ground-dwelling birds.

Records made available to the wildlife trade research team show historical trade in Pallas' cat skins beginning in 1965 and trade averaging over 5,400 skins annually until 1985. However, other sources note that as many as 50,000 animals may have been traded in the early 1900s, with harvests averaging 10,000 animals per year from the 1920s to 1980s (Heptner and Sludskii 1992, Nowell and Jackson 1996). While there may have been some restrictions on trade in place in Mongolia under the former regime, this is no longer the case and Pallas' cat pelts are once again being traded at local markets. There is no evidence of international trade from this survey, although this should not be ruled out.

Pallas' cat pelts are not considered high quality fur and therefore have low values compared to Mongolia's other wildcat species, snow leopard and lynx. Local hunters responding to the survey reported selling small quantities (1 or 2 pelts) for just $3 per skin. However, in addition to the fur trade, Mongolians also harvest *O. manul* for its oil and meat, both of which are purported to have medicinal properties. Sold in small quantities, the oil is sold for $4 per gram. No price was quoted for game meat.

5) **Eurasian Red Squirrel *(Sciurus vulgaris)*—** Classified by IUCN as Near Threatened (assessment in 2002), Mongolia's red squirrel population may be hunted for household and commercial purposes from October 21st to February 16th. It has no status under CITES and is not protected by Mongolia's Law on Fauna. It is listed in the Mongolian Red List of Mammals (2006) as Least Concern.

Although there are few studies on *S. vulgaris* in Mongolia, anecdotal information suggests that the species is ubiquitous throughout the northern woodlands representing roughly 8 percent of Mongolia's territory (200,000 km^2). A 1966 study described high population numbers in areas around Mongonmort, a town situated northeast of Ulaanbaatar on the border of the present-day Khan Khentii Strictly Protected Area and within the taiga forest zone. A 1987 study conducted in a forested region near Batshireet, also located in the taiga forests of the Khan Khentii, reported sightings of only a few individuals and hunter harvests of only 4 animals. Without more detailed and systematic study, it is impossible to say what the trend in red squirrel populations was over time. During the wildlife trade survey, hunters reported drastically reduced numbers with large forested areas virtually devoid of squirrels where they were once plentiful.

Historic trade in squirrel skins began in 1932 with an initial trade volume of 77,530. From then to 1985, with a brief respite from 1976-1980 when hunting was banned, Mongolia officially recorded procuring more than 4 million skins with a peak volume of 231,000 in 1953 and an annual average of just over 77,000. The few wildlife trade surveys conducted in Mongolia since 1991 have not focused on red squirrels. Reported volumes are therefore only a small portion of the overall trade and exist only for certain years. Scharf and Enkhbold (2002), for example, report seizures from 1999-2001 by Chinese Customs officials of just 1,425 squirrel skins among other traded wildlife products. Our wildlife trade survey estimates more than 6,500 hunters (n=32 of 949 hunters) actively harvesting red squirrels. Mean harvest volumes were 27.2 animals per hunter with an estimated total trade volume exceeding 170,000 skins in 2004. Although hunters reported selling skins to wholesale and black markets for $2–$3 per skin, no red squirrel trade was visible on the markets in Mongolia or China. This apparent absence of trade is likely a result of the timing of the survey (summer) not coinciding with the primary trading seasons of winter and fall.

6) **Ibex *(Capra sibirica)*—**Last evaluated in 1996, Siberian ibex is classified by IUCN as Lower Risk/Least Concern. The species has no status under CITES, but is listed in the Law on Fauna as "rare." Hunting is restricted to trophy hunting by the Law on Hunting, with the season running from June 1st to November 15th. The Mongolian Red List of Mammals (2006) classified the species as Near Threatened.

Capra sibirica is widely distributed through eight range states including Afghanistan, China, India, Kyrgyzstan, Mongolia, Pakistan, Russia, and Tajikistan. The Siberian ibex is primarily an alpine species that inhabits rocky hills typically at altitudes of 3,000-5,000 meters (Nowak 1999). In Mongolia, Siberian ibex may also be found at lower elevations (1,500 meters) in areas providing adequate escape terrain such as Ikh Nart Nature Reserve (Wingard 2005). *C. sibirica* is a gregarious animal living in herds as large as 40-50 animals. Older males are often solitary or in small groups of 3-4, frequently in more inaccessible terrain.

Despite its status as a prized trophy animal among international big game hunters, the Siberian ibex has not been adequately studied in Mongolia. The Mongolian Red Book (1997) cites a population of 80,000 (without reference to when the last survey was performed) distributed throughout the Mongolian Altai, Gobi-Altai, Zuungariin and Trans-Altai Gobi, Khan Khokhii, Khoridol Saridag and Ulaan Taiga Ranges as well as the desert and desert-steppe regions in Dundgobi and Dornogobi amaigs. With increased pressure from trophy hunting and poaching, it is likely that the population has declined substantially from these numbers. Other threats include competition with domestic livestock for grazing and water, fatal diseases, parasites, and severe winters (Mongolian Red Book, 1997).

C. sibirica is hunted by Mongolians for its horns, meat, blood, and skin. Similar to roe deer, the blood is considered to have healing properties and is one of the primary uses reported by 14 respondents to the wildlife trade survey. Supply sources for all parts were evenly split between the informal network of friends/hunters and formal markets located in soum centers; however, skin was the only product for which respondents gave a price, $2. To estimate the value of game meat, we used the mean weight from hunter responses to the survey of approximately 40 kg and gave a value of $2/kg as a substitute for purchasing domestic meat for a total of $80. The horns are also valued as trophies and fetch $30 on the market in China. The number of hunters targeting the species is difficult to estimate. During the survey, only 8 hunters claimed to harvest ibex and all of whom personally consumed the meat. The mean harvest was 2.1 with one individual claiming a harvest of 20.

Trophy hunting also factors into the total volume of take. From 1995 to 2000, the Ministry of Nature and Environment authorized a total of 1,310 trophy licenses (Wingard and Odgerel, 2001). None were apparently issued in 2001.

7) **Black-tailed gazelle *(Gazella subgutturosa)*—** This species was evaluated as Near Threatened by IUCN (assessment in 2005), and is classified as "rare" by the Mongolian Law on Fauna. The Mongolian Red List of Mammals (2006) classifies the species as Vulnerable. Commercial hunting has been prohibited since 1962 and a total hunting ban enforced beginning in 1965. Only trophy hunting is permitted by the Law on Hunting.

Black-tailed or goitered gazelle inhabit the southern plains of Mongolia's Gobi and Trans-Altai desert region. Its distribution is closely associated with spear grasses (*Stipa* spp.) and aggregations of *Stipa glareosa-Anabasis brevifolia* in mountain foothills; with saxaul (*Haloxylon ammondendron*) and Russia thistle (*Salsola* spp.) in the Gobi; and generally with shrubs and bushes in desert and sandy steppe regions (Mongolian Red Book 1997).

Likely due to over-exploitation and competition with domestic livestock for forage, *G. subgutturosa*'s population and distribution sharply declined in the 1950s and 1960s and even disappeared in some areas. The population apparently rebounded beginning in the 1980s, but has never reached its former numbers. The Mongolian Red Book quotes a current population of 60,000 without indicating when this information was collected. High mortality during severe winters remains a concern, as does population fragmentation resulting from illegal hunting and disturbance (Mongolian Red Book 1997).

Unlike Mongolian gazelle, black-tailed gazelle were never formally traded to the Soviet Union. By all accounts, however, subsistence use played a significant role in historic distribution reduction and population declines. Subsistence use con-

tinues at some level in spite of legal constraints. In the wildlife trade survey, only 6 individuals claimed to harvest the species, with one individual reporting a total take of 30 and the others 2-4. The large volume by one individual is at least an indication of commercially motivated harvests at the local level. Another respondent who reported purchasing black-tailed gazelle meat from the local soum market confirmed this suspicion. Responses to the survey are unfortunately too low to hazard a guess at the total of either subsistence or commercial harvests.

Although smaller than the Mongolian gazelle, black-tailed gazelles still produce relatively long horns averaging 25-32 centimeters with trophies as large as 40 centimeters. Trophy hunting outfits offer black-tailed gazelle hunts in Mongolia as side game to argali hunts.

8) **Asiatic Wild Ass *(Equus hemionus)***—The IUCN Red List classified the Asiatic wild ass as Vulnerable (A3bcd; C1) in 2002. International trade is restricted under CITES Appendix II. The species is listed in the Law on Fauna as "rare," and hunting is limited to "special" purposes by the Law on Hunting, allowing the take of this species for undefined "cultural" purposes. Sport hunting is also permitted under this category, but none are apparently offered. The Mongolian Red List of Mammals (2006) lists the species as Vulnerable.

E. hemionus (or "khulan" in Mongolian), including its various subspecies, is one of the most endangered large herbivores in the arid palearctic zone. The status of *E. h. hemionus* in northeastern Mongolia is presently unknown, but presumed extinct in the wild (Cromsigt 2000). *E. h. luteus*, a subspecies found in the Gobi Desert region of southern Mongolia and northern China, was estimated at only 10,000 in 1985 by Mallon (1985). Although recent population surveys estimate that as many as 20,000 persist in Mongolia, increasing pressure by humans, including direct offtake by poachers, is resulting in rapidly declining numbers and a shrinking distribution across its range.

E. h. luteus is hunted by Mongolians in the southern Gobi aimags for its meat and the medicinal properties of the liver. All products are available at local markets, and anecdotal information indicates that khulan game meat has been processed into sausages in Ulaanbaatar for sale in food markets. In any event, all such uses are illegal. In the wildlife trade survey, 17 individuals reported harvesting on average 4.2 animals in 2004. Khulan are not small animals and, according to hunters who harvest the animal, can yield between 100 kg and 180 kg of game meat. At 150 kg and a reported market price $2 per kg, one khulan has an approximate domestic market value of $300, not counting the value of the liver, which sells separately for $5.

9) **Lenok *(Brachymystax lenok)***—Lenok have no classification in the IUCN Red List, have no trade status under CITES and may be harvested in Mongolia pursuant to the Law on Hunting for personal consumption. The species is classified as Vulnerable in the Mongolian Red List of Fishes (*in press*).

The lenok is a medium-sized member of the salmonid or trout family. It can reach over 50 cm in length and weigh 3-5 kg, although most lenok caught are smaller. They are fairly common in most streams and rivers in northeastern Asia, including Mongolia's northern aimags. Two forms are known in Mongolia, one with a down-turned (subterminal) mouth and the other with a terminal mouth—it is not known if these are simply different morphs or subspecies. Lenok are found in cold-water streams and rivers, rarely in lakes, and are a target of both local subsistence fishing and international sport fly-fishing, although ranking a distant second in importance to its giant relative the taimen.

Because of unclear responses from interviewees, this survey is unable to estimate the total take and trade of lenok in Mongolia. Respondents to the survey did, however, indicate that lenok have entered the local market stream and may be purchased for about $1/kg, or roughly $3 per fish.

10) **Altai snowcock *(Tetraogallus altaicus)*—**Altai snowcock are classified as Least Concern by the IUCN Red List and appear in the Mongolian Red Book (1997). The Mongolian Law on Fauna clas-

sifies the species as "rare" and the Law on Hunting permits their take for "special" purposes."

The five species of snowcock are all large gallinaceous birds found in mountains throughout Asia. The Altai snowcock is limited to the Altai Mountains of Mongolia, Russia, Kazakhstan and China. There they are found in the alpine zone above treeline, where they roost on steep cliffs and forage for roots, tubers, and other vegetation in the early morning and late afternoon. They live in small flocks and do not migrate. The global population was estimated at between 50,000-150,000, with Mongolia holding the majority of the population (Madge and McGowan 2002). The authors identify the traditional medicinal market as a threat to the small Chinese population, as snowcock is considered a cure for rheumatism.

Hunted for both its game meat and the medicinal properties, Altai snowcock was one of the most common bird species hunted by respondents to the wildlife trade survey. Still, only 2 percent of all hunters (n=20 of 949) claimed to hunt it. Potentially more than 3,000 hunters target the species. The mean harvest per hunter was 4.5 with a maximum harvest for one hunter of 24. The total harvest for 2004 is estimated at 14,600 birds. Available at local markets, the reported price for one bird was approximately $3.50. Almost 2 percent of all respondents to the survey (n=71 of 4,010) reported using *T. altaicus* with the overwhelming majority (n=56 of 71, 79 percent) interested in the game meat for its medicinal properties. Of all users, few (n=5, 7 percent) obtained birds directly from hunters; the rest purchase Altai snowcock at local markets for approximately $10 per bird.

Other Species

A number of other species receive at least some hunting pressure, some of which are not covered by either national legislation or international conventions. This list includes six mammals (Eurasian badger, ground squirrel, muskrat, American mink, sable, and Daurian hedgehog), at least 12 species of bird (Cinereous vulture, black-eared kite, great bustard, snowy owl, ptarmigan, greylag goose, Daurian partridge, black grouse, gadwall, Arctic loon, Eurasian eagle owl, and Pallas' sandgrouse), and a number of fish species (Northern pike, Siberian whitefish, Potanin's osman, common wild carp, catfish, Arctic grayling, and Eurasian perch).

The Eurasian badger is harvested both for its pelt and for the medicinal properties of its meat, oil, stomach, and blood. Respondents to the survey reported obtaining badger products from several sources including local hunters, black markets, soum center markets, and Ulaanbaatar train station market. Ground squirrel, muskrat, American mink, and sable are all harvested for their fur, with sable the most expensive selling for $35 per pelt. While sable is an important part of fur trade in Russia, the wildlife trade survey in Mongolia had only one respondent claim to hunt the species, despite interviewing more than 300 hunters in regions with suitable habitat. The lack of response may be more an indication of reluctance to respond on the part of hunters than lack of trade. Muskrat and American mink are both introduced species and are therefore not a concern for this study.

Appendix C: Tables

Table C1: Legal and Conservation Status of Harvested Species

No.	Scientific Name	Common Name	IUCN Red List (2006) Global category[20]	CITES[21]	Mongolian Red Lists (2006) (Mammals and Fish)	Law on Fauna[22]	Law on Hunting[23]
	Mammals						
1.	*Spermophilus undulatus*[24]	Long-tailed ground squirrel	LR/lc 1994 (1996)		LC		H/I
2.	*Ondatra zibethicus*	Muskrat	LR/lc 1994 (1996)		N/A (introduced)		H/I
3.	*Mustela vison*	American mink	LR/lc 1994 (1996)		N/A (introduced)		H/I
4.	*Mesechinus dauuricus*	Daurian hedgehog	LR/lc 1994 (1996)		LC		H/I
5.	*Marmota sibirica*	Siberian marmot	LR/lc 1994 (1996)		EN		H/I
6.	*Marmota baibacina*	Altai marmot	LR/lc 1994 (1996)		DD		H/I
7.	*Meles meles*	Eurasian badger	LR/lc 1994 (1996)		LC		H/I
8.	*Sciurus vulgaris*	Red squirrel	NT 2001 (2002)		LC		H/I
9.	*Vulpes vulpes*	Red fox	LC 2001 (2004)		NT		H/I
10.	*Procapra gutturosa*	Mongolian gazelle	LC 2001 (2005)		EN		H/I
11.	*Capreolus pygargus*	Roe deer	LR/lc 1994 (1996)		LC		H/I
12.	*Alticola barakshin*	Gobi-Altai mountain vole	LR/lc 1994 (1996)		DD		H/I
13.	*Martes zibellina*	Sable	LR/lc 1994 (1996)		VU		H/I
14.	*Vulpes corsac*	Corsac fox	LC 2001 (2004)		NT		H/I
15.	*Canis lupus*	Gray wolf	LC 2001 (2004)	II	NT		H/I
16.	*Ursus arctos*	Brown bear	LR/lc 1994 (1996)	I	DD		H/I
17.	*Otocolobus manul*	Pallas' cat	NT 2001 (2002)	II	NT		H/I
18.	*Cervus elaphus*	Red deer	LR/lc 1994 (1996)		CR	R	Special
19.	*Martes foina*	Stone marten	LR/lc 1994 (1996)		DD	R	Special
20.	*Gazella subgutturosa*	Black-tailed gazelle or Goitered gazelle	NT 2001 (2005)		VU	R	Special
21.	*Sus scrofa*	Wild boar	LR/lc 1994 (1996)		NT	R	Special
22.	*Capra sibirica*	Siberian ibex	LR/lc 1994 (1996)		NT	R	Special
23.	*Lynx lynx*	Eurasian lynx	NT 2001 (2002)	II	LC	R	Special
24.	*Ovis ammon*	Argali	VU A2cde 1994 (1996)	II	EN	R	Special
25.	*Equus hemionus*	Asiatic wild ass	VU A3bcd; C1 2001 (2002)	II	VU	R	Special
26.	*Castor fiber*	Beaver	NT 2001 (2002)		EN	VR	Scientific

Table C1: Legal and Conservation Status of Harvested Species

No.	Scientific Name	Common Name	IUCN Red List (2006) Global category[20]	CITES[21]	Mongolian Red Lists (2006) (Mammals and Fish)	Law on Fauna[22]	Law on Hunting[23]
27.	*Alces alces cameloides*	Ussurian moose	LR/nt 1994 (1996)		EN	VR	Scientific
28.	*Alces alces pfizenmayeri*	Yakut moose	LR/lc 1994 (1996)		EN	VR	Scientific
29.	*Saiga tatarica mongolica*	Saiga antelope	EN A2ad; C1+2a(ii) 2001 (2005)	II	EN	VR	Scientific
30.	*Moschus moschiferus*	Musk deer	VU A1acd 1994 (1996)	II	EN	VR	Scientific
31.	*Uncia uncia*	Snow leopard	EN C2a(i) 2001 (2002)	I	EN	VR	Scientific
	Birds						
1.	*Perdix dauurica*	Daurian partridge	LC 2001 (2004)				H/I
2.	*Corvus corax*	Northern raven	LC 2001 (2004)				H/I
3.	*Milvus lineatus*	Black-eared kite	LC 2001 (2004)	II			H/I
4.	*Anas strepera*	Gadwall	LC 2001 (2004)				H/I
5.	*Tetrao tetrix*	Black grouse	LC 2001 (2004)				H/I
6.	*Aquila* spp.	Eagle species					H/I
7.	*Nyctea scandiaca*	Snowy owl	LC 2001 (2004)	II			H/I
8.	*Lagopus lagopus*	Willow ptarmigan	LC 2001 (2004)				H/I
9.	*Anser anser*	Greylag goose	LC 2001 (2004)				H/I
10.	*Gavia arctica*	Arctic loon	LC 2001 (2004)				H/I
11.	*Syrrhaptes paradoxus*	Pallas' sandgrouse	LC 2001 (2004)				H/I
12.	*Prunella montanella*	Siberian accentor	LC 2001 (2004)				H/I
13.	*Falco cherrug*	Saker falcon	EN A2bcd+3bcd 2001 (2004)	II			*[25]
14.	*Bubo bubo*	Eurasian eagle owl	LC 2001 (2004)	II			H/I
15.	*Aegypius monachus*	Cinereous vulture	NT 2001 (2006)	II			H/I
16.	*Tetraogallus altaicus*	Altai snowcock	LC 2001 (2004)			R	Special
17.	*Otis tarda*	Great bustard	VU A3c 2001 (2004)	II		R	Special
18.	*Pelecanus crispus*	Dalmatian pelican	VU A2ce+3ce 2001 (2006)	I		VR	Scientific
	Fish						
1.	*Esox lucius*	Northern pike	NE		LC		H/I
2.	*Brachymystax lenok*	Lenok	NE		VU		H/I
3.	*Oreoleuciscus potanini*[26]	Potanin's osman	NE		LC		H/I
4.	*Thymallus arcticus*	Siberian grayling	NE		NT		H/I
5.	*Silurus asotus*	Catfish	NE		LC		H/I
6.	*Lethenteron reissneri*[27]	Eastern brook lamprey	NE		N/A		
7.	*Coregonus* spp.[28]	Siberian whitefish					H/I
8.	*Cyprinus carpio*[29]	Wild common carp	DD 1994 (1996)		N/A (introduced)		H/I
9.	*Perca fluviatilis*	River perch	LR/lc 1994 (1996)		LC		H/I
10.	*Hucho taimen*	Taimen	NE		EN	R	Special

[20] CR—Critically Endangered, EN—Endangered, VU—Vulnerable, LR/nt or NT—Near Threatened, LR/lc or LC—Least Concern, NE—Not Evaluated, DD—Data Deficient. The first year listed is the date the categories and criteria used in the assessment were defined; the year in parentheses is the date of the most recent assessment.

[21] I—CITES Appendix I, II—CITES Appendix II

[22] VR—very rare, R—rare. The scientific names for some species listed under Mongolian laws are not valid, and hence may differ from those listed in this table.

[23] H/I—hunting permitted for household and industrial purposes; Special—trophy hunting permitted; Scientific—take of animals permitted for research purposes.

[24] The Mongolian laws refer to *Citellus undulatus*, an invalid name which may be intended to cover more than one species of ground squirrel.

[25] No apparent status in Mongolia's hunting legislation.

[26] Two other species of osman, *O. angusticephalus* and *O. humilis* are also listed in the Law on Hunting. These species are less widespread than *O. potanini* and were both classified as Vulnerable in the Mongolian Red List of Fishes (Ocock et al. *in press*).

[27] It is commonly believed that the arctic lamprey (*Lethenteron camtschaticum*) is present in Mongolia; a taxonomic review of Mongolia's fishes currently underway determined that there is in fact no valid evidence for the occurrence of this species in Mongolia (Kottelat *in prep*). The only definitively identified species in the country is the Eastern brook lamprey, *L. reissneri*. Less than 1 percent of the population occurs in Mongolia, and hence a regional assessment is not appropriate.

[28] Mongolia's laws refer to *Coregonus lavaretus*, a name used regionally as a catch-all for possibly as many as 50–100 species, but is in fact only valid for a species endemic to Lake Bourget in France. A taxonomic review by Maurice Kottelat (*in prep*) conservatively identified three Coregonus species native to Mongolia (*C. pidschian, C. chadary* and *C. migratorius*) and one introduced species (*C. peled*)—further taxonomic work would no doubt reveal more species. *C. pidschian* is commercially fished, and was classified by the Mongolian Red List of Fishes (*in press*) as Endangered. Both *C. peled* and *C. pidschian* have the global classification of Data Deficient on the IUCN Red List (assessment in 1996).

[29] The wild common carp, *Cyprinus carpio*, is introduced in Mongolia; only *C. rubrofuscus* (the *C. haematopterus* of Russian and Chinese literature) is native (Kottelat *in prep*). *C. rubrofuscus* is native to the Amur river basin, and may also be in trade; further work would be needed to determine this.

Table C2: International and Domestic Trade Purpose of Targeted Species

No.	Scientific Name	Common Name	International Trade Purpose					Domestic Trade Purpose				
			Fur	Meat	Medi-cinal	Trophy	Other	Fur	Meat	Medi-cinal	Trophy	Other
	Mammal Species											
1.	*Sciurus vulgaris*	Red squirrel	X									
2.	*Mustela vison*	American mink	X									
3.	*Lynx lynx*	Eurasian Lynx	X									
4.	*Spermophilus undulatus*	Long tailed ground squirrel	X									
5.	*Castor fiber*	Beaver	X									
6.	*Vulpes vulpes*	Red fox	X					X				
7.	*Lepus tibetanus*	Tibetan hare	X						X			
8.	*Marmota sibirica*	Siberian marmot	X					X	X	X		
9.	*Marmota baibacina*	Altai marmot	X					X	X	X		
10.	*Meles meles*	Eurasian badger	X					X		X		
11.	*Uncia uncia*	Snow leopard	X		X	X		X		X		
12.	*Vulpes corsac*	Corsac fox	X					X		X		
13.	*Canis lupus*	Gray wolf	X		X	X		X		X		
14.	*Ursus arctos*	Brown bear	X		X	X		X		X	X	
15.	*Martes zibellina*	Sable	X					X		X		
16.	*Ondatra zibethicus*	Muskrat	X					X	X	X		
17.	*Moschus moschiferus*	Musk deer			X		X					
18.	*Equus hemionus*	Asiatic wild ass			X				X			
19.	*Saiga tatarica mongolica*	Saiga antelope			X				X	X		
20.	*Cervus elaphus*	Red deer			X	X			X	X		
21.	*Capra sibirica*	Siberian ibex				X			X		X	
22.	*Ovis ammon*	Argali			X	X			X		X	
23.	*Sus scrofa*	Wild boar				X			X			
24.	*Procapra guttuorosa*	Mongolian gazelle				X			X			
25.	*Gazella subgutturosa*	Black-tailed gazelle				X			X			
26.	*Alces alces cameloides*	Ussurian moose				X			X			
27.	*Alces alces pfizenmayeri*	Yakut moose				X			X			
28.	*Capreolus pygargus*	Siberian roe deer				X		X	X	X		
29.	*Otocolobus manul*	Pallas' cat						X		X		
30.	*Mesechinus dauuricus*	Daurian hedgehog								X		X
31.	*Alticola barakshin*	Gobi-Altai mountain vole			X							
	Bird Species											
1.	*Falco cherrug*	Saker falcon					X					
2.	*Aegypius monachus*	Cinereous vulture					X					
3.	*Milvus lineatus*	Black-eared kite					X					
4.	*Otis tarda*	Great bustard							X			
5.	*Perdix dauuricae*	Daurian partridge							X	X		
6.	*Tetraogallus altaicus*	Altai snowcock							X	X		
7.	*Corvus corax*	Northern raven								X		
8.	*Pelecanus crispus*	Dalmatian pelican										X
9.	*Bubo bubo*	Eurasian eagle owl										X
10.	*Tetrao tetrix*	Black grouse							X			
11.	*Nyctea scandiaca*	Snowy owl										X
12.	*Lagopus lagopus*	White ptarmigan							X			
13.	*Anser anser*	Greylag goose							X			
14.	*Anas streptera*	Gadwall							X			
15.	*Gavia arctica*	Arctic loon							X			
16.	*Syrrhaptes paradoxus*	Pallas' sandgrouse							X			
17.	*Prunella montanella*	Siberian accentor										X
18.	*Aquila* spp.	Eagle species									X	
	Fish Species											
1.	*Hucho taimen*	Taimen		X		X			X			X
2.	*Brachymystax lenok*	Lenok		X		X			X			X
3.	*Perca fluviatilis*	River perch		X					X			
4.	*Esox lucius*	Northern pike		X					X			
5.	*Thymallus arcticus*	Siberian grayling		X					X			
6.	*Coregonus* spp.	Siberian whitefish							X			
7.	*Oreoleuciscus potanini*	Potanin's osman							X			
8.	*Cyprinus carpio*	Common wild carp							X			
9.	*Silurus asotus*	Catfish							X			
10.	*Lethenteron reissneri*	Eastern brook lamprey							X			

Table C3: Wildlife Product Market Values by Species

No.	Scientific Name	Common Name	Game Meat	Skin	Medicinal and Cultural Products				Mounted Trophy	Domestic Trade Values[30]	Sport Hunting[31]
					Gall bladder	Gland	Horns/ Antlers	Other			
	Mammal Species										
1.	*Ovis ammon*	Argali	240.00[32]	—	—	—	—	—	275.00	515.00	40,000.00[33]
2.	*Cervus elaphus*	Red deer	200.00	—	—	—	700.00[26]	85.00[27]	200.00	985.00	5,000.00[36]
3.	*Alces alces pfizenmayeri*	Yakut moose	400.00	—	—	—	—	—	500.00	900.00	5,000.00
4.	*Alces alces cameloides*	Ussurian moose	400.00							400.00	—
5.	*Sus scrofa*	Wild boar	200.00	—	—	—	—	—	—	200.00	4,500.00[37]
6.	*Capreolus pygargus*	Siberian roe deer	40.00	6.00	—	—	—	*[38]	—	46.00	4,500.00[39]
7.	*Capra sibirica*	Siberian ibex	80.00	2.00	—	—	30.00	—	—	112.00	4,000.00
8.	*Canis lupus*	Gray wolf	50.00	250.00	1.50	—	—	8.50[40]	375.00	310.00	3,500.00[41]
9.	*Procapra gutturosa*	Mongolian gazelle	40.00	3.00	—	—	—	—	—	43.00	3,500.00[42]
10.	*Gazella subgutturosa*	Black-tailed gazelle	20.00	—	—	—	—	—	—	20.00	2,750.00
11.	*Vulpes corsac*	Corsac fox	37.00	28.00	—	—	—	—	—	65.00	100.00[43]
12.	*Vulpes vulpes*	Red fox	—	18.00	—	—	—	—	—	18.00	100.00
13.	*Ursus arctos*	Brown bear	800.00	100.00	8.00	200.00	—	232.00[44]	—	1,340.00	—
14.	*Equus hemionus*	Asiatic wild ass	300.00	—	—	—	—	—	—	300.00	—
15.	*Uncia uncia*	Snow leopard	22.50[45]	250.00	—	—	—	—	—	272.50	—
16.	*Moschus moschiferus*	Musk deer	—	—	—	120.00	—	—	—	120.00	—
17.	*Martes zibellina*	Sable	35.00	37.50[46]	—	—	—	—		72.50	—
18.	*Saiga tatarica mongolica*	Saiga antelope	—	—	—	—	60.00	—	—	60.00	—
19.	*Otocolobus manul*	Pallas' cat	25.00	3.00	—	—	—	20.00[47]	—	48.00	—
20.	*Castor fiber*	Beaver	—	40.00	—	—	—	—	—	40.00	—

[30] Lists the highest possible combined market value for domestic uses and products traded internationally, to the extent such uses are not mutually exclusive. For example, red deer domestic value includes game meat, antlers, and medicinal parts, but excludes mounted trophy value.

[31] Sport hunting values are based on average costs to the consumer quoted to wildlife trade researchers or advertised on the Internet. They include the cost of the tour, trophy fees, government permit and license fees, but not travel to and from Mongolia.

[32] Based on average game meat yield of 120 kg and a substitute meat value of $2/kg.

[33] Argali sport hunting license and permit is $25,000 . Actual hunts vary in cost from $70,000 to $35,000 .

[34] Price is for blood antlers weighing 5 kg each priced at $70 per kg. This estimate is probably low. Mature bull red deer can produce as much as 10 kg per antler.

[35] Includes price of tail ($30), female genitals ($25), and male genitals ($30).

[36] Includes $700 trophy hunting license (MNE 2004).

[37] Wild boar trophy is $400 (MNE 2004).

[38] Roe deer blood available on local markets. No price quoted.

[39] Roe deer trophy permit is $900 (MNE 2004).

[40] Includes price of 1 gray wolf tongue ($5), 1 spleen ($0.50), lung ($1.50), and kidney ($ 1.50).

[41] Gray wolf trophy permit $400 , exportation taxes $586 (MNE 2004).

[42] Mongolian and black-tailed gazelle trophy permit is $300 (MNE 2004).

[43] Sport hunting license fee. No known sport hunts offered.

[44] Includes price of four bear paws valued at $50 /ea ($200 total) and the value of brown bear oil used for medicinal purposes, $32 .

[45] Based on the minimum average snow leopard weight of 30 kg, 50 percent of which is usable meat, and a substitute per kilo price of $1.50 .

[46] Price based on average sale value in Mongolia and China. Highest recorded value was $275 for high-quality specimens on the market in China.

[47] Price is for Pallas' cat oil from one animal as quoted by survey respondent.

Table C3: Wildlife Product Market Values by Species (cont.)

No.	Scientific Name	Common Name	Game Meat	Skin	Medicinal and Cultural Products				Mounted Trophy	Domestic Trade Values[30]	Sport Hunting[31]
					Gall bladder	Gland	Horns/ Antlers	Other			
21.	*Meles meles*	Eurasian badger	—	12.00[48]	—	—	—	27.00[49]	—	39.00	—
22.	*Lynx lynx*	Eurasian Lynx	—	30.00	—	—	—	—	—	30.00	—
23.	*Marmota baibacina*	Altai marmot	10.00	13.00	1.00	—	—	6.50[50]		27.50	—
24.	*Marmota sibirica*	Siberian marmot	7.00	10.00	1.00	—	—	6.50		24.50	—
25.	*Spermophilus undulatus*	Long tailed ground squirrel	—	7.00	—	—	—	—	—	7.00	—
26.	*Ondatra zibethicus*	Muskrat	1.00	5.00	—	—	—	*	—	6.00	—
27.	*Lepus tibetanus*	Tibetan hare	2.00	2.50	—	—	—	—	—	4.50	—
28.	*Sciurus vulgaris*	Red squirrel	—	2.00	—	—	—	—	—	2.00	—
29.	*Mustela vison*	American mink	—	*[51]	—	—	—	—	—	No price	—
30.	*Mesechinus dauuricus*	Daurian hedgehog	—	—	—	—	—	*[52]	—	No price	—
31.	*Alticola barakshin*	Gobi-Altai mountain vole	—	—	—	—	—	*[53]	—	No price	—
	Bird Species										
1.	*Pelecanus crispus*	Dalmatian pelican	—	—	—	—	—	2,000.00[54]	—	2,000.00	—
2.	*Aquila* spp.	Eagle species	—	—	—	—	—	1.00[55]	200.00	200.00—	—
3.	*Aegypius monachus*	Cinereous vulture	—	—	—	—	—	—	150.00	150.00	—
4.	*Milvus lineatus*	Black-eared kite	—	—	—	—	—	—	120.00	120.00	—
5.	*Otis tarda*	Great bustard	30.00[56]	—	—	—	—	—	—	30.00	—
6.	*Nyctea scandiaca*	Snowy owl	—	25.00	—	—	—	—	—	25.00	—
7.	*Tetraogallus altaicus*	Altai snowcock	10.00	—	—	—	—	—	—	10.00	—
8.	*Lagopus lagopus*	White ptarmigan	10.00	—	—	—	—	—	—	10.00	—
9.	*Anser anser*	Greylag goose	8.00[57]	—	—	—	—	—	—	6.00	15–350
10.	*Perdix dauuricae*	Daurian partridge	6.00	—	—	—	—	—	—	6.00	10.00
11.	*Tetrao tetrix*	Black grouse	5.00	—	—	—	—	—	—	5.00	10.00
12.	*Anas streptera*	Gadwall	1.50	—	—	—	—	—	—	1.50	10.00
13.	*Gavia arctica*	Arctic loon	1.50	—	—	—	—	—	—	1.50	10.00
14.	*Syrrhaptes paradoxus*	Pallas' sandgrouse	0.30	—	—	—	—	—	—	0.30	—
15.	*Falco cherrug*	Saker falcon	—	—	—	—	—	—	—	—	4,660.00[58]

[48] Price based on average weight of one adult badger of 10 kg to 16 kg (approximately 8 kg of meat) and a substitute per kilo price of $1.50 .
[49] Includes price of oil, $2 and stomach $25 ; both are used for Mongolian traditional medicine.
[50] Includes price of kidney ($1), lung ($2.50), and oil ($3).
[51] Skin traded on the international market with China. No price quoted.
[52] Live specimens for sale at local markets. No price quoted.
[53] Used for medicinal purposes, but no price quoted by interviewee.
[54] Dalmatian pelican beaks are traditionally used as sweat blades to wipe the sweat of a horse. Price quoted by trader at the Naraan Tuul market in Ulaanbaatar.
[55] Price for one eagle beak on the local market in Mongolia.
[56] Estimated value based on average weight of 18 kg and game meat yield of 15 kg priced at $2 /kg.
[57] Estimated value based on average game meat yield of 4 kg per bird priced at $2 /kg.
[58] Value based on official export revenue statistics for offtake levels and total receipts from direct payments and fees (MNE 2004).

No.	Scientific Name	Common Name	Game Meat	Skin	Medicinal and Cultural Products				Mounted Trophy	Domestic Trade Values[30]	Sport Hunting[31]
					Gall bladder	Gland	Horns/ Antlers	Other			
	Bird Species										
16.	*Bubo bubo*	Eurasian eagle owl	—	—	—	—		—	—		—
17.	*Corvus corax*	Northern raven	—	—	—	—	—	—	*[59]	No price	—
18.	*Prunella montanella*	Siberian accentor	—	—	—	—	—	—	—	No price	—
	Fish Species										
1.	*Hucho taimen*	Taimen	5.00	—	—	—	—	—	—	5.00	5,000.00[60]
2.	*Branhymystax lenok*	Lenok	3.50	—	—	—	—	—	—	3.50	10.00–20.00[61]
3.	*Esox lucius*	Northern pike	2.00	—	—	—	—	—	—	2.00	10.00–20.00
4.	*Coregonus* spp.	Siberian whitefish	2.00	—	—	—	—	—	—	2.00	10.00–20.00
5.	*Oreoleuciscus potanini*	Potanin's osman	2.00	—	—	—	—	—	—	2.00	10.00–20.00
6.	*Cyprinus carpio*	Common wild carp	2.00	—	—	—	—	—	—	2.00	10.00–20.00
7.	*Silurus asotus*	Catfish	1.80	—	—	—	—	—	—	1.80	—
8.	*Thymallus arcticus*	Arctic grayling	1.80	—	—	—	—	—	—	1.80	—
9.	*Lethenteron reissneri*	Eastern brook lamprey	1.80	—	—	—	—	—	—	1.50	—
10.	*Perca fluviatilis*	River perch	1.80	—	—	—	—	—	—	1.50	—

[59] Medicinal purpose, price unknown.
[60] Includes sport fishing permit of $150 for taimen up to 1 meter, and $300 for taimen exceeding 1 meter.
[61] Sport fishing permit values.

Table C4: Estimate of total number of hunters weighted by age class

Age class (i)	Number of Males (N_{mi})	Male Respondents in Age Class (m_{ai})	Hunter Respondents in Age Class (m_{hi})	Estimated Total Number of Hunters (N_h)
<1	42,200	—	—	—
1-4	189,300	—	—	—
5-9	268,800	—	—	—
10-14	316,900	18	4	*
15-19	293,100	154	40	38,753
20-24	266,100	315	98	41,853
25-29	231,200	458	160	40,105
30-34	198,900	410	152	36,702
35-39	181,700	410	151	33,110
40-44	148,700	444	138	22,782
45-49	101,900	344	105	15,506
50-54	69,500	235	58	8,367
55-59	58,200	137	27	5,597
60-64	49,500	88	9	2,363
65-69	36,600	60	3	*
70+	51,400	46	4	*
Totals	2,504,000	3,119	949	245,138

Table C5: Estimate of total number of hunters weighted by aimag

No.	Aimag (j)	Aimag Population (N_j)	Male Respondents in Aimag (m_{aj})	Hunter Respondents in Aimag (m_{hj})	Estimated Total Number of Hunters (N_h)
1.	Tov	985,000	442	108	74,405
2.	Uvs	81,900	270	93	8,713
3.	Dornod	74,400	83	45	12,459
4.	Sukhbaatar	56,400	94	48	8,895
5.	Dornogovi	52,100	252	46	2,937
6.	Dundgovi	50,500	19	4	3,284
7.	Arkhangai	96,100	11	1	2,698
8.	Omnogovi	46,700	199	30	2,174
9.	Uvurkhangai	113,200	194	29	5,227
10.	Khuvsgul	121,500	273	137	18,832
11.	Bayankhongor	83,200	112	52	11,931
12.	Bayan Ulgii	100,800	193	98	15,809
13.	Khentii	71,100	27	9	7,320
14.	Govi Altai	61,400	75	42	10,620
15.	Khovd	87,500	194	22	3,065
16.	Bulgan	62,800	55	17	5,995
17.	Selenge	101,800	168	53	9,919
18.	Zavkhan	82,900	397	105	6,772
19.	Govi-Sumber	12,200	41	9	827
20.	Orkhon	75,100	9	0	0
21.	Darkhan Uul	86,500	11	1	2,429
	Totals	**2,504,000**	**3,119**	**949**	**214,313**

Table C6: Estimate of total number of hunters weighted by urban or rural residency classification

Residency	Urban/Rural Population (N_r)	Male Respondents (m_{ar})	Hunter Respondents (m_{hr})	Estimated Total Number of Hunters (N_h)
Ulaanbaatar residents	893,400	315	190	72,708
Aimag center residents	570,800	1,982	715	49,901
Countryside residents	1,039,800	822	83	119,165
Totals	2,504,000	3,119	949	**241,774**

Table C7: Comparison of Mongolia's number of hunters and rate in population to selected countries

Country	Number of Hunters	Rate in Population
Austria	110,000	1/72
Belgium	29,000	1/348
Denmark	177,000	1/29
Finland	300,000	1/17
France	1,650,000	1/35
Germany	326,000	1/247
Greece	293,000	1/35
Hungary	50,000	1/206
Ireland	120,000	1/30
Italy	895,000	1/60
Luxemburg	2,500	1/160
Mongolia	245,000	**1/10**
Netherlands	32,000	1/454
Norway	170,000	1/25
Poland	99,000	1/389
Portugal	243,000	1/40
Slovenia	23,000	1/84
Spain	1,000,000	1/27
Sweden	320,000	1/39
Switzerland	30,000	1/230
United Kingdom	600,000	1/58
United States	14,000,000	1/19

Sources: Chardonnet, Ph., des Clers, B., Fischer, J., Gerhold, R., Jori, F,. and Lamarque, F. (2002). The Value of Wildlife. *Rev. sci. tech. Off. int. Epiz.*, 2002, 21 (1), 15-51; U.S. Census Bureau 1996 population estimates; Mongolian National Statistics Office 2003 population estimates; and this report Table C4.

Table C8: Estimates of the total number of hunters and harvests by species in Mongolia

No.	Scientific Name	Common Name	Respondent Hunters (m_{sj})	Estimated Number of Hunters — —	Adjusted Mean Harvest per Hunter (H_j)	Max. Individual Harvest	Estimated Total Harvest Volume Nationwide (N_a)
	Mammal Species						
1.	*Marmota sibirica*	Siberian marmot	657	139,000	23.6	1,000	3,300,000
2.	*Canis lupus*	Gray wolf	321	75,000	3.4	100	!62
3.	*Vulpes vulpes*	Red fox	233	44,000	4.7	100	185,000
4.	*Procapra gutturosa*	Mongolian gazelle	126	34,000	6.5	100	250,000
5.	*Vulpes corsac*	Corsac fox	112	25,000	10.2	100	200,000
6.	*Capreolus pygargus*	Roe deer	106	29,000	2.7	50	100,000
7.	*Sus scrofa*	Wild boar	73	20,000	1.9	10	30,000
8.	*Sciurus vulgaris*	Red squirrel	32	6,500	27.2	150	170,000
9.	*Cervus elaphus*	Red deer	26	5,000[63]	1.9	10	6,000
10.	*Marmota baibacina*	Altai marmot	18	1,400	46.8	100	66,000
11.	*Equus hemionus*	Asiatic wild ass	17	1,500	4.2	15	3,000
12.	*Capra sibirica*	Siberian ibex	14	2,000	2.1	20	4,500
13.	*Ursus arctos*	Brown bear	10	2,500	1.2	10	*
14.	*Ondatra zibethicus*	Muskrat	8	2,000	5.3	30	*
15.	*Lynx lynx*	Eurasian Lynx	7	3,000	1.2	2	*
16.	*Gazella subgutturosa*	Black-tailed gazelle	6	1,400	3.0	30	*
17.	*Otocolobus manul*	Pallas' cat	6	1,000	2.2	4	*
18.	*Ovis ammon*	Argali	4	*	1.3	20	*
19.	*Moschus moschiferus*	Musk deer	4	*	1.5	7	*
20.	*Spermophilus undulatus*	Long tailed ground squirrel	4	*	7.5	30	*
21.	*Alces alces*	Moose	3	*	1	1	*
22.	*Mustela vison*	American mink	1	*	*	*	*
23.	*Martes zibellina*	Sable	1	*	*	*	*
24.	*Mesechinus dauuricus*	Daurian hedgehog	1	*	*	*	*
25.	*Uncia uncia*	Snow leopard	1	*	*	*	*
26.	*Meles meles*	Eurasian badger	1	*	*	*	*
	Bird Species						
1.	*Tetraogallus altaicus*	Altai snowcock	20	3,250	4.5	24	14,600
2.	*Lagopus lagopus*	White ptarmigan	8	*	2.3	10	*
3.	*Perdix dauuricae*	Daurian partridge	5	*	4.5	30	*
4.	*Anser anser*	Greylag goose	3	*	2.0	30	*
	Fish Species**						
1.	*Branhymystax lenok*	Lenok	4	*	10	20	*
2.	*Hucho taimen*	Taimen	3	*	2.0	20	*
3.	*Perca fluviatilis*	River perch	3	*	15	100	*
4.	*Esox lucius*	Northern pike	1	*	5	5	*

* indicates either no or insufficient data.

** Estimates of the number of anglers and harvest volumes for individual fish species were not possible as most anglers did not differentiate adequately between species to enable separate analyses. In total, approximately 10 percent of all hunters interviewed (n=92 of 949) also claimed to fish for one or more species with a mean harvest rate of 21.5 fish per angler. Extrapolated to the entire population of anglers (exclusively in the northern half of the country) would be approximately 20,000 with a total harvest volume for all fish combined of 430,000 fish in 2004.

62 The estimated harvest level for wolf hunters exceeds the largest possible estimate for wolf populations in Mongolia. We have therefore chosen not to publish this figure. The inflated result may be a function of both the number of individuals claiming to hunt wolves as well as an exaggeration of the number harvested per hunter.

63 The number of red deer hunters was adjusted downward more than other species to reflect a higher than normal percentage of "hobby" hunters responding to the survey. Although these individuals hunt red deer, they did not report taking any animals last year.

Appendix D:
Household Consumption Survey

Date: Survey Member Names:

Location: Soum/Duureg: Aimag:

Family Information and Demographics:

1. Age Gender How many people are in your immediate family?
2. Where do you currently reside? Aimag Soum Bag

   Nearest Aimag center? km, Soum center km?
3. What is your educational background? ❑ University ❑ Special Secondary ❑ Secondary ❑ Elementary
4. Do you work? ❑ Yes ❑ No Profession? Where? Monthly Income?
5. If you are a herder, how much money do you earn on average per year or how many livestock do you own?
6. Do you have any other sources of income? ❑ Yes ❑ No What, how much?
7. Does anyone else in your family work? Profession? Where?

   How much do they earn per month?
8. How much of your salary do you save for your personal use?
9. How much meat does your family consume on a daily basis?
10. Do you own a car or a motorcycle? ❑ Yes ❑ No Vehicle Purchase price

    Motorcycle Purchase price
11. Do you own a gun? ❑ Yes ❑ No Type of gun
12. Do you use traps? ❑ Yes ❑ No Type of trap Number of traps

Wildlife Harvest Information:

13. Do you or members of your family harvest wildlife now or have you in the past for any purposes?

    ❑ Hunt (Ages) ❑ Never Hunted ❑ No Longer Hunt (Ages)

    if no longer hunts, when stopped , why?

Attention: If interviewee has never hunted, skip to question #24.

14. If interviewee or family now hunts or used to hunt, fill in the following table.

Species Name	Where hunted	How hunted (gun, traps, dogs, etc.)	Transportation	Has method changed? How?	Purpose of hunt	How many animals taken each trip	How many taken each year	How many years hunted	When do you hunt for this species	Why hunted at this time of year	How much meat from one animal	How important is hunting to your family

15. How many days do you spend hunting for each trip? How many hunting trips do you take each year?

16. Have the quality or quantity of the animals you hunt changed? If so, how?

17. Do you hunt for this animal more or less than you did before? Why?

18. What is the legal status of the species you harvest?

19. Do you know if you need a permit?

20. Do you know how many can you take, when, and for what period of time?

21. Have you ever obtained a hunting permit? ❑ Yes how many per year? price? ❑ No Why?

Sales from Wildlife Harvests:

22. Of those species harvested, are any parts sold? If yes, fill in the following table. No.

Species Name	Part	To Whom	Where	When	How	Price	Which Year	How many per year

23. Has any of this changed (parts sold, who buys it, price, quantity)?

24. What do you think about the permit process? Why?

25. Do you think hunting is a problem? Why or why not?

26. What do you think should be done about it?

Wildlife Consumption Information:

27. Do you or members of your family use wildlife products ❑ Use ❑ Never Used ❑ No Longer Use If no longer uses, when stopped , why?

28. If interview or family uses or used animal parts in the past, fill in the following table.

Species Name	Part	Purpose	How important is this use	Source (market, aimag, soum, person)	How often used annually	Quantity per use	Price	Which year	How many years used

29. Has your use changed, the parts or species used, the quality or quantity of the parts changed over time? ❑ Yes ❑ No Why?

30. How would you characterize wildlife resource (abundant, rare, very rare)?

50 years ago? 30 years ago? 10 years ago? 5 years ago? Last year? Now?

Environment and Social Development
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