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论 文 摘 要

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Abstract

A PRELIMINARY STUDY ON THE REARING AND
BREEDING OF OUNCE, PANTHERA UNCIA

LIAO Yianfa LUO Huanwen
LIU Dening XU Shuren YUAN Binkui
(Xinning People's Park)

This paper deals with the oestrus, mating, pregnancy, parturition and breast-feeding of the ounces, as well as the behaviour and growth of young.

The oestrus of ounces usually occurs in April, but for some times may occur in early summer. A female ounce began to have an oestrus on March 5-7, 1984 and was mated with a male in Xining People's Park, Qinghai Province. The female ounce gave birth to 3 young on July 13. The Pregnancy period was 99 days. this is the first reproduction record of ounces in China.

The young ounces opened eyes on 8-9th days postnatal, and was able to see moving things within one metre on 23th day, to see immobile things within two metres on 40th day postnatal and to see anything within 5 metres on 60th day postnatal. The eye-sight of young ounces are as same as that of the adult on 90th day postnatal. The senses of hearing and smelling of young ounces are highly sensitive.

The authors have also studied the relation between the body weights and the body measurements and the average food intake of 3 young ounces, some measures were taken for the reproduction of ounces, such as the increase of light supple and physical exercises, the feeding with living animals and the control of eating quantity.

ABSTRACT

THE DISTRIBUTION AND ARTIFICIAL RAISING
OF SNOW LEOPARD IN XINJIANG

Wulumuqi Zoo, Xinjiang 830001

Mu Xinchun

The paper recounts the distribution of snow leopard in mountain ranges of Xinjiang, in which, more population appear in the areas of Tashikuergan, Minfeng and Poluokenu mountain. Snow leopard raising area, Wulumuqi city, has been seriously polluted by coal smoke- - - the cloud; introduces the general situation of snow leopard's artificial raising and its common disease; puts into discussion on improvement of snow leopard raising condition.

ABSTRACT

THE STUDY ON THE RAISING AND REPRODUCTION
OF SNOW LEOPARD IN NONPRODUCING AREA

Jinan Zoo

Zhang Jizhong

The paper mainly puts stress on the study about snow leopard, through artificial conditions and with careful raising, its oestrus, mating and reproduction in low elevation without plateau climate of cool, severe cold, long sunshine and high temperature in summer.

ABSTRACT

Title: Captive Management of the Snow Leopard (Panthera uncia)

Author: Dan Wharton, Ph.D., Curator of Animal Management Services, New York Zoological Park; and Species Coordinator for the AAZPA Snow Leopard Species Survival Plan

Once considered a difficult species to keep and breed in captivity, the snow leopard is now routinely managed and bred in zoos around the world. Longevity records of over 20 years of age are not unusual and many cubs are produced every year. Advances in the nutrition, veterinary care and behavioral understanding of this species have all contributed to the success in managing this species in captivity. This paper summarizes modern techniques in maintenance, breeding and exhibition of snow leopards, citing various papers by a number of different authors as well as surveys and personal accounts. Status of collective population management through the Snow Leopard Species Survival Plan in North America is also provided.

A Introduction on Feeding and Management of
Snow Leopards in Xining Zoo
Xu Shuren (Xining Zoo)

Abstract

This paper briefly introduces the feeding and management of snow leopards in Xining zoo.

1. (preface) summary of geographical distribution, ecological characteristics of wild snow leopards in Qinghai and snow leopards' feeding in Xining zoo.
2. Feeding cages and terms of snow leopards in Xining zoo.
3. According to the food analysis of snow leopards in the wild, introducing the specific feeding condition of snow leopards in zoo and artificial feeding of young snow leopard.
4. Summary of reproduction of snow leopards in Xining zoo.
5. Under artificial feeding, preventing disease of snow leopards.
6. Discussion.

Appendix: Feeding Table of over two Months Old Snow Leopard

TITLE: Snow Leopard Conservation in Nepal

AUTHOR: Sanat K. Dhungel, His Majesty's Government, Department of National Parks & Wildlife Conservation, Nepal

The elusive snow leopard (*Panthera uncia*) is a least known and the most threatened wild cat in Nepal. Only few cursory survey were conducted by Jackson (1978 & 1979), Schaller (1976 & 1977) and Dang (1967). Recently studies on its behavior and a survey were carried out in Manang and Shey-Phoksundo National Park.

In Nepal, they inhabit the main Himalayan chain (ranging from 3000 m to 4000 m) with rugged terrain in the scrubs above the tree line along the Tibetan border. However, their distribution appears to be localized in the western half of the Nepal Himalayas like Mugu, Dolpa, Manang, Mustang districts. It is estimated that the potential habitat of know leopard is less than 20% of the country. An extrapolation to the cat's possible range in all of Nepal (including the heavily disturbed southern slopes of Himalaya) suggests a population of 150-300 animals (Jackson, 1979).

The fast disappearance of its suitable habitats and the poaching are the major threats for a healthy population of the species in Nepal. Snow leopard is mainly hunted for its pelt and abdominal fat for traditional medicine. Traditional poaching technique does not need any fire arms but simple poisoned bamboo sticks.

Establishment of various conservation areas and their management to maintain its population is underway in the country. Snow leopard is protected in Nepal by the National Parks and Wildlife Conservation Act, 1973. Nepal is also one of the signatories of the CITES to prohibit the trade of endangered species.

ABSTRACT

THE GEOGRAPHICAL DISTRIBUTION OF OUNCES IN QINGHAI PROVINCE

Liao Yanfa

(Xining People's Park, Qinghai Province)

This paper deals with the geographical distribution of ounces (*Panthera uncia* Schreber) in Qinghai Province. Ounces are distributed in 20 counties-Guide, Huzhu, Menyuan, Qilian, Tianjun, Dulan, Golmud, Guinan, Xinghai, Zhidui, Zadoi, Nangqen, Yushu, Chindu, Qumarleb, Madoi, Maqen, Jigzhi, Baima, Darlag. Among them, there are 4 counties-Qilian, Tianjun, Dulan, Zadoi, in which the numbers of ounces are bigger.

The numbers of ounces are shown in table 2. There are altogether 73 ounces (40♂, 33♀) which is supported to every park of China for ornamental, they were captured by fellow-villagers, and 44 ounces (23♂, 21♀) of them are below 6 months old, 9 ounces (6♂, 3♀) of them are 1 year old, 2 ounces (2♂) are 2 years old, 18 ounces (9♂, 9♀) are adults.

Ounces live at an altitude of 3000-4100 metres above the sea, and prefer to eat Bharal (*Pseudois noyaur*). Its breeding period goes from April to June, the number of embryos being 2-3.

A female ounce was successfully reproduced for the first time at Xining People's Park of China, in September, 1984, and she gave birth to 3 young ounces.

Observations on Snow Leopards in Mongolia

By: George B. Schaller, Wildlife Conservation International; J. Tserendeleg; Mongolian Assoc. for the Conservation of Nature and Environment; and G. Amarsanaa, Mongolian Academy of Sciences

In 1989 and 1990 the authors made four field trips in Mongolia, each lasting one to two months. Two of these trips were devoted mainly to research on brown bears (*Ursos arctos*) and wild Bactrian camels (*Camelus bactrianus ferus*) in the Great Gobi National Park, where snow leopards (*Panther uncia*) also occur, but the other two trips concentrated on snow leopard. During the winter of 1989-90 an extensive snow leopard survey was made through the Transaltay Gobi of southern Mongolia and the Altay mountains of western Mongolia. A year later a snow leopard population was studied in the Altay mountains from 9 November to 28 December 1990.

Three reserves contain snow leopards -- the Great Gobi National Park, the Khokh Serkheen Nuruu Reserve, and the Khasagt Khairkhan Uul Reserve -- but only in the uninhabited Gobi Park is there no conflict between snow leopards and herders with their livestock. Some means must be found that permit herders and snow leopards to coexist with a minimum of conflict. As an initial step the authors have proposed to the government that special areas be created in which herders and their domestic animals be permitted to live in a traditional manner but agree not to harm wildlife in exchange for economic benefits, such as a reduction in taxes or compensation for livestock killed by snow leopards.

TITLE: Evaluation of the Presence of the Snow Leopard and the Ibex in South Siberia

AUTHOR: Eugeny P. Koshkarev, Tien Shan High Mountain Physical Geography Station, Kyrgyzstan

In the summer of 1991 an expedition was undertaken in the Eastern and Western Sayan, Tuva and Altai; about 700 km of trail routes were covered in the regions of Russia bordering on Mongolia, including 17 passes and parts of the reserves "Azas" and Altaiskii". New questionnaire and field data were collected, which contribute considerably to the latest most complete survey of the distribution of the snow leopard in the South Siberian region. The total of new registrations of snow leopards is 55 (of those visual, 13); those known from literature before - 88 (59).

The habitat of the snow leopard and the ibex in the South Siberian region is subdivided into two areas with contrasting environmental conditions. They are divided from each other by the so called critical parallel, stretching from west to east from approximately 51°n.l. in the Altai to 51°30'n.l. in the Eastern Sayan. This landscape barrier determines the area of the domineering steppe vegetation in the highlands (Sedelnikov, 1988), and along with it, the major habitat of the snow leopard and the ibex. On the whole the critical parallel coincides with the axis elevation of the Altai-Sayan mountain region, from where aridity increases to the south, and humidity, to the north.

81.8% of all encounters of snow leopards and their tracks have been registered to the south of the critical parallel or in the marginal area; and 18.5% to the north of it. The numbers of the groups of ibex found to the north of the landscape barrier must not exceed 15-20% of the South Siberian population.

To date, only the Gobi Altai can be confirmed as the largest focus of snow leopard habitation in the Siberian-Mongolian part of the range. Revealing sedentary groupings in other areas requires special investigation. Among the reserves supporting the survival of the snow leopard the leading role belongs to the Sayano-Shushenskii and Bolshoy Gobiyskii.

TITLE: Snow Leopards in the Qomolangma Nature Preserve of the Tibet Autonomous Region.

AUTHORS: Rodney Jackson,¹ Lu Xuedong² and Chen Yun²

AFFILIATION: ¹ Woodlands Mountain Institute, Franklin, West Virginia, USA

² Milu Ecological Research Centre, Beijing, People's Republic of China

ABSTRACT:

Surveys were conducted in the newly established Qomolangma Nature Preserve (QNP) to establish the current status and distribution of snow leopards. The methods employed included interviews of local residents, sign transects, random searches and habitat characterization. Results indicate that snow leopards are widely but sparsely distributed in the preserve, which may support about 100 animals. However, further surveys are required in order to develop reliable population estimates. Most snow leopards are thought to occur along the southern part of the preserve in a continuous or nearly continuous strip along the border with Nepal and encompassing the northern slopes of the Himalayan Range. The largest contiguous area of habitat is located in the western portion of QNP in Jilong (Kyirong) County. Snow leopard distribution is very similar to that of blue sheep, its principal prey species. Threats to the species include hunting for their valuable pelt and bones, the depletion of the natural prey base, and retribution by herdsmen for the killing of livestock. Interviews in 10 communities indicated sheep and goat predation rates as high as 9.5% of the total livestock herd, although most loss rates were less than 3%. The authors offer suggestions for reducing livestock depredation and thus alleviating people-wildlife conflicts in the preserve and surrounding area. Other key elements for more effective management of snow leopard populations are identified.

FURTHER STUDY ON THE GEOGRAPHICAL
DISTRIBUTION AND CONSERVATION OF SNOW
LEOPARD IN QINGHAI, P. R. CHINA

YANG Qisen

Northwest Plateau Institute of Biology, Academia Sinica

Xining, Qinghai P. R. China 810001

SUMMARY

Surveys were conducted to ascertain the past and present status of snow leopard (*Phaenarctos uncia*, Ounce) in Qinghai Province. Snow leopard distribute in the high plateau of Central and Middle Asian. No irrefutable evidence of current snow leopard existence was found, although circumstantial evidence of snow leopard in several areas was obtained. Being destroying of habitant and human activites (kill and poach), Snow leopard is being to be endagered. It is very urgency to set up conservation areas and enhance the human sense of wildlife conservation for snow leopard at present.

Dealing with uncertainty in counts of mountain ungulates. Richard B. Harris, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana 59812, USA.

In mountainous regions of Asia, species such as bharal, argali, and ibex are difficult to census, not only because they inhabit difficult terrain, but because they live in loose groups that shift and move. Successive observations of a band in the same basic area results in uncertainty about which animals have, and have not been counted toward the total. Investigators either decide which animals are unique and report a single number, or report both a minimum and maximum possible total. I suggest instead applying to each observation the best estimate of the probability that the individuals seen have not otherwise been counted toward the total, based on all relevant biological information. Probabilities for all observations are then applied in straight-forward numeric procedures to yield the best estimate of the total number of animals seen, as well as confidence limits. This approach does not produce an estimate of the true number present, but rather lays out clearly the methods and assumptions used by the investigator when reporting the number of individuals observed.

Title: *Dulan International Hunting Reserve Qinghai Province*
Abstract Author: *Yongsheng Liu* Northwest Plateau Inst. Biology, Xining
* *University of Montana*

International hunting in Qinghai, initiated in the mid-1980s, is gaining support from wildlife agencies as well as from local society. In most of China's designated wildlife reserves, financial shortage is the main problem for implementation of conservation programs. The great monetary benefit from international hunting programs is the driving force that attracts wildlife management decision makers. Non-local poaching is nearly uncontrollable on a provincial scale and is the main factor that brought certain species, such as musk deer and brown bear, to extinction in most of their habitats in the Province. Lack of manpower in wildlife management agencies has excluded the possibility of removing non-local human pressures from some wildlife reserves. This has made local involvement in wildlife reserves very important. The International Hunting Program in Dulan has provided local residents substantial income and has made the local people interested in being involved in wildlife conservation programs.

TITLE: Snow Leopard Conservation on a Regional Basis: *Elements in Planning Protected Areas*

AUTHORS: Chuck Villarrubia¹ and Rodney Jackson²

AFFILIATION: ¹ Syntex, Palo Alto, California

² International Snow Leopard Trust, Seattle, Washington

ABSTRACT:

Ensuring viable populations of a wide-ranging, sparsely distributed carnivore like the snow leopard requires innovative approaches to park planning and management. Recent research indicates that relatively large populations, with continuous gene-pool mixing, are needed if the danger of in-breeding and extinction is to be avoided. This paper describes some of the key elements that land-use planners and resource managers should consider while developing and implementing conservation measures.

Snow leopards need large protected areas, encompassing high quality habitat for all seasons of the year, to serve as core refuges from which animals without permanent home ranges can disperse. Protected areas must be linked by corridors, which provide habitat ranging from favorable to marginal, to accommodate the dispersing individuals. Besides linking adjacent protected areas, corridors overcome natural barriers to movement. We speculate that the largest proportion of the wild snow leopard population resides outside protected areas in lands where a dominant land-use embraces animal husbandry, with depredation of livestock representing a legitimate concern of pastoralists. Thus, the needs of snow leopard, their prey and people must be addressed through economically and ecologically sustainable development strategies. Transborder parks may ultimately play a significant role in the conservation of snow leopards: much of the species range is located along international borders between the twelve countries that host wild populations. This augurs for cooperation between individuals and countries toward protecting a unique keystone species.

Jigme Dorji Wildlife Sanctuary, Bhutan
By Mingma Norbu Sherpa, World Wildlife Fund, U.S.

The Jigme Dorji Wildlife Sanctuary covers the whole of northern Bhutan and, with the size of 7,982 square km., is one of the largest protected areas in the Indian Subcontinent. The sanctuary's northern boundary essentially follows the boundary with Tibet. The southern boundary, though not well demarcated, roughly extends for about 250 km from Haa in the west to Tashingang in the east. Not only is there a tremendous range of biological diversity in the Sanctuary, but it also contains the upper watershed areas of Bhutan's major rivers and is of vital importance to downstream communities in Bhutan, India and Bangladesh.

Competing land use between inhabitants of the valleys, who subsist mainly by yak herding and live within the precincts of the Sanctuary, is by far the biggest threat to the Sanctuary. Competition principally involves rival demands for grazing resources between livestock and wild ungulates. Also indiscriminate burning of forests has destroyed important habitat for wild animals and resulted in erosion on steep slopes. A strategy for the development and implementation of a management plan for Jigme Dorji Wildlife Sanctuary is underway.

FOOD HABITS OF SNOW LEOPARD IN LADAKH, INDIA

R.S.Chundawat and G.S.Rawat
Wildlife Institute of India
P.Bag No.18, Dehra Dun

ABSTRACT (*Panthera uncia*) were studied

from Food habits of snow leopard (*Panthera uncia*) were studied from October 1987 to February 1990 in Hemis National Park in Ladakh. Diet of snow leopard were quantified from scat analysis. Prey items were identified mainly through macro and microscopic characteristics of hair remains of prey eaten and was also substantiated by bones, claws and hooves remain found in the scats. Only fresh scats were systematically collected every month from the entire study area. A total of 173 scats were collected for the analysis. Vegetal matter was found most frequently (41%). Parts of *Myricaria germanica* were most frequently seen, which accounted for 65% of all the vegetal matter. Remains of Yak, donkey and horse were suggestive of scavenging by snow leopard. Blue sheep was the major prey (46%). Other animals such as marmots, pikas and birds formed substantial part of snow leopard diet. The annual consumption of snow leopard of 45 kg. (@ 2 kg/day) was estimated to be six blue sheep, twenty three marmots, five domestic goat, nine T.W.Hare and fifteen birds. This predation by snow leopard alone is not a threat to blue sheep population and is within sustainable limits of the blue sheep population of study area.

TITLE: Ecodevelopment and Management: Needs for Snow Leopard Conservation in Himalayan Protected Areas

AUTHOR: G.S. Rawat, H.S. Parwar and K.S. Chundawat, Wildlife Institute of India, India

There are over 18 protected areas (PAs) in Himalayan region with snow leopard (*Panthera uncia*) populations. Management of these PAs for the long term conservation of their fragile ecosystems and overall biological diversity becomes our prime objective. To meet this, the Government of India has taken up strict measures to check hunting and illegal trade of wild animals and wildlife products. Other management activities such as habitat improvement and control of biotic pressures still lack behind for the want of proper management plans which need baseline information of the species and their habitat. While these activities would take their own course we need to take proper measure to establish ecosystem based development activities and congenial people-park relationships in and around PAs simultaneously. Keeping this in view, Wildlife Institute of India has initiated a country wide Ecodevelopment and PA Management consultancy. In the light of above, we discuss the important issues pertaining to snow leopard conservation and its habitat in this paper.

TITLE: Protection of Snow Leopards through Grazier Communities; A Few Examples from WWF Projects in Northern Pakistan

AUTHOR: Ashiq Ahmed Khan, Conservation Director, WWF-Pakistan

Snow leopards occur in various numbers around the snowline in Northern Pakistan. Consequently upon the fast decline in the populations of their natural prey, snow leopards have gradually turned towards the domestic livestock and are now largely dependent upon goats and sheep in the alpine and subalpine regions of Pakistan.

Although new and evolved, this semi-natural ecological system has been useful for the survival of several endangered wildlife species as their predatory pressure is now largely shared by domestic livestock; however, the grazier communities have obviously turned against the snow leopards, killing them either directly or helping the fur traders to remove them.

The problem of snow leopard persecution is growing rapidly and may end up with the total elimination of this beautiful animal from some of their natural range if corrective measures were not adopted.

Realizing the important role of grazier communities in the protection and conservation of snow leopards, WWF-Pakistan has initiated two model projects in Northern Areas where various incentives are being tried and provided to persuade the local communities to accept the responsibility of protecting several wildlife species, including snow leopards. Although too early to conclude, positive results are coming up. Details of these projects and nature of incentives are explained in the paper.

A note on snow leopards and local people in Nangqian county, southern Qinghai Province. Richard B. Harris, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana, USA 59812.

In November 1990, during a study of musk deer in Baizha Forest, Qinghai, I purchased, marked, and re-released into the wild a snow leopard cub that had been captured by a local Tibetan pastoralist. Although my attempt to determine it's survival was unsuccessful (because the radio-collar fell off), I used the opportunity to learn about local attitudes and practices toward snow leopards in this area. Although snow leopard cubs are occasionally taken for sale (both pelt and bones), most local Tibetans in Baizha do not hunt, and, despite incurring losses through livestock depredation, display some tolerance of snow leopards. The re-emergence of Buddhist monasteries in the region as cultural focal points has benefitted blue sheep populations, and probably snow leopards as well. I recommend that new programs for snow leopard conservation should consider the specific cultural forces at work in each locale, should not extrapolate assumptions about cultural mores from other areas, and should not weaken cultural institutions that have allowed the existence of snow leopard populations to the present.

ECOTOXICOLOGY AS A KEY FACTOR FOR EFFICIENT MANAGEMENT OF PROTECTED AREAS: LESS LEARNED FROM THE FLORIDA PANTHER. E. Hol¹, B.T. Marden², M.E. Roelke³. ¹The Institute of Wildlife Environmental Toxicology, Clemson University, SC. ²ManTech Environmental Toxicology Inc., U.S. EPA Env. Lab., 200 SW 35th St. Corvallis, OR. ³Florida Game and Freshwater Fish Commission, Gainesville, FL.

Contaminants can have profound impacts on individuals within a population and can alter the structure and diversity of impacted populations or communities. Studies from around the globe document incidences of contaminants among wildlife species by anthropogenic pollutants. Exposure to contaminants has led to precipitous declines in populations of affected species (eg: brown pelicans and DDT; mink and PCBs). Exposure pathways are unclear and contaminant sources may be distant from areas of concern. Impacts of contaminants can be primary (eg., acute toxicity) or secondary (eg., reduced food availability). Additionally, contaminants can cause decreased reproductive success, increased susceptibility to other stressors (eg., disease), or behavioral perturbations. Concerns of population level impacts from exposure to environmental contaminants are more pronounced in regions of threatened or endangered species. Often species of concern are geographically isolated, are members of high trophic levels, have small population size and reduced genetic variability, and have a limited prey base. These attributes render such a species more susceptible to severe impacts from exposure to environmental contaminants.

Research conducted on the endangered Florida panther (*Felis concolor coryi*) provides a compelling example of the need to combine ecotoxicology with wildlife management practices. Much effort has been undertaken by wildlife managers to maintain a viable population of the panther in Florida. However, in July 1989 an apparently healthy radio-collared panther was found dead. Analysis of internal organ heavy metal levels revealed high concentrations (110 ppm wet wt) of mercury (Hg) in the liver. Since this discovery, Hg contamination has been identified in archival tissue samples, organs collected during subsequent necropsies, and in blood and hair samples collected from Florida panthers. Hg concentrations have been shown to be correlated with specific regions within the panther range. Panthers from areas where Hg contamination of tissues was high exhibited reduced reproductive success. Although Hg has not been irrefutably linked with declines in panther populations, it may be a critical factor influencing the survivability of the species in certain geographic regions. The outcome of this study illustrates the importance of including contaminant studies in an effective management strategy for an endangered species.

TITLE: Parks, People and Snow Leopards: the Indian Endeavour

AUTHOR: M. K. Ranjitsinh, Additional Secretary, Ministry of Environment and Forests, GOI, India

Though more reclusive and less destructive of livestock than members of the genus *Panthera* in Asia -- the lion, leopard and tiger -- snow leopards take a significant toll of such stock. Further, even their most remote habitats in the Himalayas not under permanent snow or in the higher cliffs, are utilized during some part of the year at least by livestock and the local subsistence -- living people. It is axiomatic that the longterm survival of the snow leopard or of any other large predator habitat and its biomass can only be assured with the acquiescence, if not the active cooperation of the neighbouring people, for which economic incentives including compensations, alternatives and substitutes would have to be found, without jeopardizing the quality and extent of the park. A difficult task indeed, but certainly not impossible. In India, endeavours have been initiated in this direction, including eco-development of these neighbouring people to inter alia generate alternative fuel and fodder and to improve human health and the quality of the livestock.

SNOW LEOPARD CONSERVATION IN THE WILD - A COMPREHENSIVE PERSPECTIVE ON A LOW DENSITY AND HIGHLY FRAGMENTED POPULATION.

JOSEPH L. FOX, Department of Ecology (IBG), University of Tromsø, N-9037 Tromsø, Norway

Abstract: Within the past 15 years there has been a dramatic increase in general interest, field studies, and actions taken with regard to conservation of the snow leopard. Placed on Appendix I of the Convention on International Trade in Endangered Species and similarly regarded as an endangered species in other conservation legislation, the snow leopard has enjoyed complete legal protection throughout its range (except in Mongolia) since 1972, although enforcement of such legislation has been extremely variable. Within the past 10 years we have come to know that the snow leopard in the wild (total population 3,500-7,500) is not in imminent danger of extinction, and that high priority conservation efforts need to be wild rather than captive oriented. Nevertheless, it is also now clear that the tenuous and fragmentary distribution of prime snow leopard habitat, low densities and apparent downward trends in population numbers in most areas, and known decimation of populations of its major prey species require that its official designation as endangered be maintained for the foreseeable future. As we come to better understand the fragmentary nature of snow leopard populations, the extinction threat in many subpopulations is of increasing concern, and emphasis should be given now to protect well the core populations that do occur.

TITLE: Protecting the Mountains of Central Asia and their Snow Leopard Populations

AUTHOR: Michael J.B. Green, World Conservation Monitoring Center, United Kingdom

Efforts to establish mountain protected area networks in central Asia are reviewed with respect to conserving the snow leopard. This review is based on a directory of *Nature reserves of the Himalaya and the mountains of central Asia* recently prepared by the World Conservation Monitoring Centre in collaboration with the IUCN Commission on National Parks and Protected Areas.

TITLE: LIVESTOCK AND SNOW LEOPARDS: *Making Room for Competing Users on the Tibetan Plateau*

AUTHORS: Daniel J. Miller¹ and Rodney Jackson²

AFFILIATION: ¹ School of Forestry, University of Montana, Missoula, Montana 59812

² Woodlands Mountain Institute, Main and Dogwood Streets, Franklin, West Virginia 26807

Snow leopards are widely but sparsely distributed through the mountain chains delineating and penetrating the Tibetan Plateau, a 2.5 million km² high-altitude region encompassing all of the Tibetan Autonomous Region and most of Qinghai Province. Although legally protected, snow leopard populations are threatened by hunting for their valuable pelt, trade in their bones (used in traditional Chinese medicinal practices) and in retribution for killing livestock. The cat's prey species, once numerous and widespread, have been reduced in numbers due to uncontrolled hunting for meat, rodent control programs and habitat destruction. With its extensive grasslands, the Tibetan Plateau is home to about four million people, 40 million sheep and goats, and some 12 million yaks. The modernization process is increasing demands for livestock products and indications are that livestock numbers are rising throughout the region, with implications for prey species, their habitat and the future of snow leopards. Livestock and snow leopards can be compatible if multiple-use resource management strategies are pursued. However, this will require more information about the distribution and status of snow leopards and their prey, as well as greater knowledge of livestock production systems and rangeland dynamics. The killing of livestock by snow leopards, wolves and other predators is a growing problem, which may be partially solved by alternative livestock management practices. The survival of viable populations of snow leopard and other wildlife depends upon a system of well-managed protected areas, control of illegal hunting, management of prey species and participation of local pastoralists in conservation. This paper offers some possible approaches for managing livestock that considers wildlife (especially snow leopards) and the needs of local pastoralists in ways that ensure sustainable use of resources, thereby helping to protect biological diversity on the Tibetan Plateau.

Project Snow Leopard: Conservation of Central Asian Biodiversity
Authors: Helen Freeman, ISLT; Don O. Hunter, U.S. Fish & Wildlife Service; Rodney Jackson, ISLT; and Darla Hillard, ISLT

Project Snow Leopard provides direct support to Central Asian high altitude reserves through the implementation of three key programs: 1) Technology Transfer, 2) International Symposia, and 3) Environmental Awareness. The Project is built around the snow leopard because the snow leopard is an indicator species for the health of Central Asian mountain ecosystems. The species has captivated humans around the globe and has the appeal necessary to serve as a focal point for collaborative programs involving protected areas.

1) The Technology Transfer program establishes an information network on Central Asian reserves and promotes the use of standardized methodology for assessing biodiversity. It includes field training of reserve personnel and the establishment of in-country database stations. 2) International Symposia provide a continuing forum for the participants in Project Snow Leopard to meet and reinforces the importance of international cooperation. 3) Materials developed in the Environmental Awareness program promote public understanding of environmental issues, with special emphasis on the need for sustainable solutions which include sound economic management.

Project Snow Leopard is a practical approach to the multiple challenges facing snow leopard countries in their attempts to protect biodiversity in high altitude reserves, while simultaneously recognizing the needs of the local economies and cultures.

Technology Transfer in Project Snow Leopard

Authors: Don O. Hunter, U.S. Fish & Wildlife Service; Helen Freeman, Rodney Jackson and Darla Hillard, International Snow Leopard Trust

Over the past four years, the International Snow Leopard Trust and the U.S. Fish and Wildlife Service's National Ecology Research Center have developed a computer program to store biodiversity information on reserves and drafted a field techniques handbook which describes how to conduct high mountain habitat and animal surveys. The program and handbook are meant to help each country collect and store data in a standard fashion. The data on the reserves will reside in branch nodes in computers supplied by Project Snow Leopard. Each data station will share data with ISLT and each other, thus creating a network among the snow leopard reserves of Central Asia.

The computer program for reserves is presently called the Snow Leopard Information Management System (SLIMS). The SLIMS computer program consists of two closely related databases: 1) a relational database designed to permit rapid comparison of data across the snow leopard's entire range or between selected reserves; and 2) a text database designed to provide profiles of selected reserves or specific summaries of relevant environmental issues. The first step in implementing Project Snow Leopard, after a branch node is established, will be to conduct workshops on the SLIMS computer program and the standardized methodology handbook. The workshops will include classroom presentations and field training.