

FINAL REPORT ON A WORKSHOP FOR CONSERVATION OF THE FAR EASTERN LEOPARD IN THE WILD

**MAY 11-14, 2001
VLADIVOSTOK, RUSSIA**

ORGANIZED BY:

**WILDLIFE CONSERVATION SOCIETY
STATE MINISTRY OF NATURAL RESOURCES,
RUSSIAN FEDERATION**

SPONSORED BY:

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IUCN CAT SPECIALIST GROUP**



This report can be cited as:

Wildlife Conservation Society. 2001. Final Report on a Workshop for Conservation of the Far Eastern Leopard in the Wild. Submitted to the U.S. Fish and Wildlife Service and the IUCN Cat Specialist Group. 71pp.

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Executive Summary and Assessment of Workshop

The goal of this meeting was to define and elucidate specific, very concrete management recommendations that can be implemented by specific responsible agencies/organizations to address KEY and specifically defined problematic issues that have so far eluded consensus. This meeting was intended to develop a blueprint of key and specific conservation actions that are necessary in the immediate future to reduce the risk of extinction of the Far Eastern leopard in the wild.

With this goal in mind, the specific objectives of this workshop were:

1. to develop a set of recommendations for the governments of Russia and China on the key issues that require immediate action for conservation of the Far Eastern Leopard;
2. to provide a forum for rational, sensible decisions to be made on numerous issues that will have profound impacts on how leopard management will proceed in the near future;
3. to provide a forum for representatives of Russia and China to discuss what cooperative measures are critical for leopard conservation;
4. to use the workshop as a means of leveraging commitment from the international donor community to support leopard conservation in Russia and northeast China.

The Far Eastern leopard workshop held in 1996 provided a framework for implementing conservation activities, but there were still many questions left unanswered at the end of that workshop, partly due to insufficient information. Some of that information has since been obtained, in the form of surveys, genetic analyses, and habitat analyses. The intent of this workshop was to decide on directions that need to be taken in the following arenas:

1. *Available Habitat.*
2. *Genetic Impoverishment and Management of the Captive Population.*
3. *Reintroduction.*
4. *Management of Deer Farms.*
5. *Hunting Management and Anti-Poaching Activities.*
6. *International Cooperation.*

In at least some respects, the workshop failed its primary goal - which was to develop specific recommendations - despite the fact that voluminous reports that were written and extensive efforts were made prior to the workshop to develop consensus as to what should be done. Ultimately, there were a great many participants at the workshop with interests other than leopard conservation. Thus, in some respects, the attempt to be inclusive in the list of participants became a detriment to accomplishment of the workshop goals. However, the process of debate in a public forum is a critical component of the conservation process itself, and in this respect the workshop was an effective and well attended event. Ultimately, it became necessary to extend the process for development of an "action plan" and the workshop was used as a forum for development of a "Leopard Steering Committee" whose task it was to develop this action plan and act as an advisory panel for leopard conservation. This was an important precedent, in that a large group of governmental and non-governmental entities agreed to recognize this steering committee as the proper forum for development of an action plan for conservation of an endangered species. We were perhaps naïve in expecting a consensus to be developed in such a short period, with such a large group of people. However, we are hopeful that the Steering Committee acts, in essence, as an extension of the workshop, and will provide a long term mechanism for debate and consensus building for Far Eastern leopard conservation.

A WORKSHOP FOR CONSERVATION OF THE FAR EASTERN LEOPARD IN THE WILD

INTRODUCTION

The Far Eastern, or Amur leopard (*Panthera pardus orientalis*) is one of the most endangered subspecies of large cats in the world. Reduced to a fraction of its original population, there are perhaps a few individuals in Jilin and Heilongjiang Provinces of northeast China and one remnant population in southwest Primorye Krai of the Russian Far East. There are likely wild Amur leopards in North Korea, but their status is unknown, and there have been recent but unconfirmed reports of leopards in South Korea. Recognized as a genetically discrete population (Miththapala et al. 1996), this subspecies deserves protection as a northernmost, unique genetic contribution to biodiversity of the species and the region, and as a top carnivore indicator of ecosystem health and integrity.

While anonymity can be a form of protection, for the Far Eastern leopard, it has been a curse. Forced to live in the shadows of the more glamorous, charismatic Amur tiger, with whom it has overlapping ranges, the leopard has been ignored by conservationists, wildlife management specialists, and the local citizenry. While millions of dollars from the international conservation community has been invested in protection and study of the Amur tiger since the opening of Russia in 1992, until recently the leopard has been virtually ignored.

Despite its anonymity, the woes of the Far Eastern leopard are many. It is severely threatened with extinction, much more so than the Amur tiger. While a 1996 survey suggested that 330 to 370 adults Amur tigers survived in Russia, a series of surveys on leopards has consistently pegged the number of remaining individuals to be between 20 and 30 (perhaps as many as 40), making it one of the most endangered of the large cats. While the range of the tiger extends 600 miles north into Russian territory, the historic range of leopards, who are less tolerant of snow and cold, includes only the southwest section of Primorski Krai. With much of its former habitat eliminated in China, the Far Eastern leopard's range has shrunk to one small fragment of habitat along the Chinese-Russian boundary. Habitat destruction, intensive logging, elimination of prey base, and direct hunting (both legal, and more recently, illegal) have all played a role in reducing this subspecies to a fragment of its former habitat.

Now, with such a small, isolated population, the threat of inbreeding and loss of genetic variation has lead many Russian biologists to fear that the days of the Far Eastern leopard are numbered. And unfortunately, the zoos of the world, usually the last hope for endangered species, hold a meager number of pure, Far Eastern leopards. Although hundreds of Far Eastern leopards are listed in studbooks maintained in both North America and Europe, all but eight of these animals have, in their lineage, interbred with other subspecies. This animal probably came from a geographic location close to the historic range of the Amur leopard and was not very genetically distant from the leopard gene pool as it was before recent events reduced the population (Uphyrkina et al. in press), but nevertheless his impact on the genetic makeup of the captive population must be considered

Additional background reading

For full background on the Far Eastern leopard, the following documents are recommended:

- Aramilev, V.V., and Fomenko, P. V., 2000. Simultaneous survey of Far Eastern leopards and Amur tigers in southwest Primorski Krai, winter 2000. In “A Survey of Far Eastern Leopards and Amur Tigers in Southwest Primorye Krai, in 2000”. Final report.
- Miquelle, D. G., T. D. Arzhanova, and V. Solkin (eds.). 1996. A Recovery Plan for Conservation of the Far Eastern Leopard: results of an international conference held in Vladivostok, Russia. 81pp.
- National Strategy for Conservation of the Far Eastern Leopard. Committee for Environmental Protection, Moscow.
- Pikunov, D. G., V. K. Abramov, V. G. Korkishko, I. G. Nikolaev, A. I. Belov. 2000. “Sweep” Survey Of Far Eastern Leopards And Amur Tigers. In “A Survey of Far Eastern Leopards and Amur Tigers in Southwest Primorye Krai, in 2000”. Final report.
- Pikunov, D. G., and V. G. Korkisko. 1992. The Far Eastern Leopard. Science, Moscow. 191 pp. (in Russian only).
- Uphyrkina, O., W. Johnson, H. Quigley, and D. Miquelle, and S. J. O’Brien 2001. , Phylogeography, Genome Diversity and Historic Radiation of Leopard, *P. pardus*. Molecular Ecology
- Yang, S., J. Jiang, Z. Wu, T. Li, X. Yang, X. Han, D. G. Miquelle, D. G. Pikunov, Y. M. Dunishenko, and I. G. Nikolaev. 1998. A survey of tigers and leopards in eastern Jilin Province, China, winter 1998. A final report to the UNDP and The Wildlife Conservation Society. 38pp.

Recent Conservation Actions

One of the first steps that brought the plight of the Far Eastern leopard into the international limelight was a 1996 workshop sponsored by the USAID Environmental and Policy Technology Project (EPT) and WWF. This international workshop brought together concerned biologists and zoo managers from around the world, as well as administrative representatives of Russia, and provided a framework to develop a recovery plan for leopards. In the five years since that meeting, a series of activities have been conducted, including:

1. Development of a recovery plan (based on the 1996 meeting);
2. Creation of a National Strategy for leopard conservation (1999);
3. Creation of a new regional wildlife refuge (Borisovkoe Plateau) that includes some key leopard habitat in SW Primorye;
4. Creation of an anti-poaching team, as part of the Inspection Tiger Team, to focus on the last remaining habitat of the Far Eastern leopard in Southwest Primorye;
5. Creation of a funding organization (Tigris) that specifically targets projects that will benefit the Far Eastern leopard, including support to the anti-poaching team, initiation of a fire prevention program, a compensation program for leopard and tiger depredations on deer farms, and educational programs in the region;
6. Four surveys to assess status of the leopard population (Pikunov et al. 1997; Aramilev et al. 1998; Pikunov et al. 2000; Aramilev et al. 2000);

7. Non-governmental support focused on protected areas for leopards (from Hornocker Wildlife Institute, WWF, and Tigris).
8. Creation of a new anti-poaching team, funded by WWF, organized through the Primorye Hunting Department, and led by the manager of Barsovy Zakaznik
9. New initiatives in managing the captive population of Far Eastern leopards, particularly in EEP European captive population.
10. A detailed analysis of Far Eastern leopard genetics conducted by Olga Uphyrkina from the Institute of Biology and Soils, Far Eastern Branch of the Russian Academy of Sciences, at the National Institute of Health in Frederick, Maryland, USA, under the leadership of Dr. Stephen O'Brien, considered the world's expert in wild felid genetics.

Despite these efforts, there is no convincing evidence that the leopard population has responded noticeably by an increase in numbers. While one survey (Aramilev 1998) suggested an increase in numbers, it is still unclear whether this estimate reflected a true change in numbers, or a change in methodologies. At the same time, there is debate as to whether reproduction rates are dropping.

Significant increases in the existing population are perhaps not to be expected given present conditions because the population is limited by suitable habitat, and is perhaps genetically impoverished. The remaining habitat in Southwest Primorye is a fragmented remnant of the original habitat of this subspecies. While there is hope that leopards still remain in DPR Korea, until reports are confirmed, we must base conservation actions on the assumption that a single population in Southwest Primorye remains.

GOAL AND OBJECTIVES OF WORKSHOP

This meeting was NOT designed to be simply a discussion of general problems and general solutions to the issues at hand. That discussion has been had many times, and formally reported in the 1996 workshop results. **The goal of this meeting was to define and elucidate specific, very concrete management recommendations that can be implemented by specific responsible agencies/organizations to address KEY and specifically defined problematic issues that have so far eluded consensus.**

This meeting was not meant to be an exhaustive discussion of all issues, and all problems facing the Far Eastern leopard. Its intent was to develop a blueprint of key and specific conservation actions that are necessary in the immediate future to reduce the risk of extinction of the Far Eastern leopard in the wild.

With this goal in mind, the specific objectives of this workshop were:

1. to develop a set of recommendations for the governments of Russia and China on the key issues that require immediate action for conservation of the Far Eastern Leopard;
2. to provide a forum for rational, sensible decisions to be made on numerous issues that will have profound impacts on how leopard management will proceed in the near future;
3. to provide a forum for representatives of Russia and China to discuss what cooperative measures are critical for leopard conservation;
4. to use the workshop as a means of leveraging commitment from the international donor community to support leopard conservation in Russia and northeast China.

DESIGN OF WORKSHOP

The workshop in 1996 provided a framework for implementing conservation activities, but there were still many questions left unanswered at the end of that workshop, partly due to insufficient information. Some of that information has now been obtained, in the form of surveys, genetic analyses, and habitat analyses. Now there are some very difficult decisions that must still be made that require a consensus of experts, representatives of government agencies of both Russia and China, and potential supporters. Some of the most difficult decisions concern:

7. ***Available Habitat.*** How can total available habitat for Far Eastern leopards be increased? How can the existing habitat, both inside and outside protected areas, be most effectively managed? How do we “optimize” (a Russian term) the system of protected areas in Southwest Primorski Krai? Under whose jurisdiction should protected areas for leopards be placed?
8. ***Genetic Impoverishment and Management of the Captive Population.*** Is there a need to manage the existing wild population to reduce the threat of inbreeding? Should animals be introduced to this population from the captive population to reduce the level of relatedness? What should be the relationship of the captive population to the wild population? How should the captive population be managed? How can the captive population be used to assist in maintaining a viable population of wild Amur leopards in the wild?
9. ***Reintroduction.*** Is a second (or third) population of Far Eastern leopards needed? Is reintroduction feasible, and if so, how and where? From where should animals for reintroduction be obtained, how should they be managed, and who should manage them? Is reintroduction into southern Sikhote-Alin really a good idea (an area leopards vanished from less than 30 years ago)? Should reintroduction into China be considered?
10. ***Management of Deer Farms.*** Should deer farms be managed for leopard conservation? Are the costs worth the benefit? Should deer farms be used as potential breeding sites, or as exhibits for leopards? What are the costs associated with managing deer farms?
11. ***Hunting Management and Anti-Poaching Activities.*** How can lands managed by independent hunting organizations be managed to improve conditions for leopards using these lands? What hunting regimes are most compatible with leopard conservation? How can anti-poaching activities be better coordinated and act most effectively to conserve leopards?
12. ***International Cooperation.*** How can China and Russia work most effectively in a cooperative manner to conserve leopards? What is essential on the Chinese side to increase the amount of quality leopard habitat?

These topics require careful, well thought-out discussions, and a consensus based on the best possible information. Mistakes will have costly consequences, and so people must be prepared to make difficult, but correct decisions. These decisions will depend on biological, political, and financial realities. Therefore, there will be a need to prioritize proposed activities.

Structure Of Meeting

The intent of this workshop was not just an exchange of ideas, but to set a course of action for key conservation activities that may assist in securing a future for the Far Eastern Leopard in Northeast China and Russian Far East.

This workshop was not intended to be an open forum for people to stand up and discuss their “favorite theme” about leopards. Our intent was to focus on the six topics outlined above, and develop a blueprint for key (not all, but key) actions that need to be taken in the near future to reduce the risk of extinction of Far Eastern leopards in the wild. To achieve this end required substantial preparation prior to the actual meeting. We therefore created an organizing committee (Dale Miquelle-Wildlife Conservation Society; Yuri Darman-World Wide Fund for Nature; Pavel Fomenko-World Wide Fund for Nature; Dimitri G. Pikunov-Pacific Institute of Geography; Vladimir Aramilev-Institute for Sustainable Use of Natural Resources) and held a series of meetings prior to the workshop with local specialists to organize and define the structure of the workshop.

In particular, to insure we made progress we requested a set of position papers for each of the defined topics be developed PRIOR to the meeting. These position papers would be debated and discussed extensively in an attempt to develop a consensus. This approach will hopefully make the workshop a more productive and active meeting that will not get excessively bogged down on every topic. There is no doubt that there will be some topics that cannot be resolved from these preliminary rounds of discussion –and these topics will require more time and discussion during the workshop.

To insure that there exist such position papers well in advance, a coordinating committee met and developed the list of topics, and assigned or requested position papers from specific individuals, with specific questions in mind. This list included:

1. *Available Habitat*

- How do we optimize the system of protected areas in Southwest Primorski Krai?
- What types of protected areas are needed to protect leopards and leopard habitat, and what areas need to be protected?
- How do we most effectively manage the existing habitat outside protected areas?
- Under whose jurisdiction should protected areas for leopards be placed?

2. *Genetic Impoverishment and Management of the Captive Population*

- What is the status of the existing population of FE leopards in SW Primorye?
- Are wild FE leopards required to sustain the captive population as a representation of the subspecies? What is the threat of founder #2 to the integrity of the captive population?
- Can the captive population, as it now exists (or can be managed without introduction of wild representatives) serve as a source (an appropriate genetic representation) for any proposed reintroduction efforts?
- Is there a need to genetically manage the existing wild population to reduce the threat of inbreeding? (Should animals be introduced to this population from the captive population to reduce the level of relatedness?)
- How should the captive population be managed?
- How can the captive population contribute to conservation of Far Eastern leopards in the wild?

Is the captive population suitable for reintroduction? Or for supplementation to the existing population in SW Primorye (answered jointly with the section on genetics)?

3. *Reintroduction*

Is a second (or third) population of Far Eastern leopards a priority?

Is reintroduction feasible, and if so, how and where?

4. *Management of Deer Farms*

Should deer farms be managed for leopard conservation? Are the costs worth the benefit?

Should deer farms be used as potential breeding sites, or as exhibits for leopards?

What are the costs associated with managing deer farms?

5. *Hunting Management And Anti-Poaching Activities*

How can lands managed by independent hunting organizations be managed to improve conditions for leopards using these lands?

What hunting regimes are most compatible with leopard conservation?

How can anti-poaching activities be better coordinated and act most effectively to conserve leopards?

6. *International Cooperation*

How can China and Russia work most effectively in a cooperative manner to conserve leopards?

What can be done in China to increase the amount of quality leopard habitat?

Position papers were requested from a number of individuals, but could be submitted by anyone who expressed an interest in any topic. We gathered these papers together and provided them to participants upon arrival, to form a basis for discussion. These papers are summarized, by topic, in Appendix 1.

The actual meeting was divided into four components:

1. Presentations on each topic;
2. Break-out into working groups and development of workplans;
3. Presentation and discussion of results of working groups;
4. Development of workplans and final resolution.

RESULTS OF MEETING

Results of this meeting are provided in three sections below:

1. Resolution, agreed upon by all participants of the meeting.
2. Recommendations developed by the break-out groups, and discussed in open forum by all participants.
3. Position papers that were presented prior to the meeting as background and material for discussion.

Details of these results are delineated below. Because there as little need for specific input into the section on international cooperation, we collapsed all participants into 5 working groups instead of the original six planned, and results below reflect this fact.

Perhaps the most significant outcomes of this meeting were:

1. Definition of specific recommendations as high priority actions for leopard conservation in 5 key areas.
2. Definition of a steering committee to continue work on coordinating leopard conservation, with specific members and a structure to guide future activities.
3. A report from Chinese participants on the creation of a new protected area, Hunchun Tiger and Leopard Reserve, along the entire border with Khasanski Raion, Southwest Primorye.
4. Preparations should begin for reintroduction and creation of a second population to act as a safeguard from extermination in the wild.

These points, and others, are explained in greater detail in the Resolution, Recommendations, and Positions Papers provided below.

RESOLUTION
OF THE INTERNATIONAL WORKSHOP FOR CONSERVATION OF
THE FAR EASTERN LEOPARD IN THE WILD

May 11-14, 2001
Vladivostok, Primorski Krai, Russia

Sixty-five participants (representing 8 countries) of the international workshop believe that:

The Far Eastern leopard is in immediate danger of extinction. With an estimated 25-40 individuals in the Russian Far East, 4-7 in northeast China (Jilin Province), reproduction apparently at a very low level, and genetic diversity severely impoverished, this subspecies must be considered one of the world's most endangered large cats. Despite the immediacy of the threat, conservation efforts in the region have been inadequate to reverse the trend towards extinction. The purpose of this workshop was to: 1) derive a set of management recommendations to ensure the continued survival of the Far Eastern leopard in the wild in its historical range; 2) act as an advertisement of its plight; and, 3) provide a mechanism for implementing new conservation measures.

Therefore, workshop participants resolve that:

1. The conservation of Far Eastern leopards in their existent range in Southwest Primorski Krai and wherever else they may occur in China, DPR Korea or South Korea is of the highest priority.
2. The Jilin Provincial Forestry Department be highly commended for its progress in creating a protected area for tigers and leopards in Hunchun, Jilin Province, China, along the Russian border. Workshop participants fully approve and support these efforts to create a specially protected area adjacent to the existing leopard population in Southwest Primorski Krai.
3. The governments of Russia, China, and DPR Korea be requested to assess opportunities for coordination in managing transboundary protected areas.
4. The optimization of a specially protected system in Southwest Primorski Krai be accomplished through creation of a single protected territory in the immediate future.
5. To start preparing for the actions on supplementation of the wild population by collecting additional ecological, biomedical, and reproductive information of the wild population and developing the captive population as a potential source of restoration. After a decision on supplementation project has been taken, the captive population should be used to supplement and sustain the wild population. The process of supplementation should be accomplished in accordance with existing "IUCN/SSC Guidelines for Re-introductions".
6. Conservation of the Far Eastern leopard requires the creation and maintenance of additional populations within its historic range. Such a reintroduction program will

make use of the captive population and will be done in accordance with existing “IUCN/SSC Guidelines for Re-introductions”.

7. The anti-poaching activities in the contemporary and historic range of the Far Eastern leopard be coordinated and financial support be found and maintained for these efforts.
8. The activities of protected territories and hunting leases to advance leopard conservation be evaluated and that financial support for these organizations be found as part of a general leopard conservation program.
9. Conservation of the Far Eastern leopard should include efforts to develop programs mutually beneficial to all stakeholders in deer farms and leopards.
10. The proposed GEF project “Fire Management in Forests of Special Biological Importance in the Amur-Sikhote-Alin Ecoregion” could be of great assistance in protecting critical habitat for Far Eastern leopards if the focus area of this project is extended to Southwest Primorski Krai.
11. The attached recommendations are approved as the basis for further recovery activities for the Far Eastern leopard.
12. The implementation of these recommendations require establishment of a Far Eastern Leopard Steering Committee, and that such a group will be coordinated by a Chairman with the assistance of an Executive Secretary.

Chairman G. V. Kolonin

Executive Secretary: to be determined.

Working group members: V. V. Aramilev, T. D. Arzhanova, Y. A. Darman, P. V. Fomenko, V. G. Korkishko, V. Nesterenko, D. G. Pikunov, I. O. Suslov, S. A. Zubtsov, O. Uphyrkina, C. Breitenmoser, U. Breitenmoser, D. G. Miquelle, S. O’Brien, S. Christie, M. Hotte, representative of hunting society, representative of Krai Administration; Endi Zhang, Zhang Chuan Jun, Tao Jin, representative of State Forestry Administration (People’s Republic of China), representative of Jilin Forestry Department, representative from DPR Korea.

13. The Far Eastern Leopard Steering Committee will have responsibility for developing an action plan based on the “Strategy for Conservation of the Far Eastern leopard in Russia” and provide this finished plan for review by the Ministry of Natural Resources of the Russian Federation.
14. The Administration of Primorski Krai be requested to develop a regional program for regulating landuse on the territory of Southwest Primorski Krai that provides for conservation of the Far Eastern leopard.

**RECOMMENDATIONS
OF THE WORKSHOP FOR CONSERVATION OF THE FAR EASTERN
LEOPARD IN THE WILD, MAY 11-14TH, VLADIVOSTOK, RUSSIA**

**1. LEOPARD HABITAT MANAGEMENT IN SOUTHWEST
PRIMORYE**

Moderators: Yu. A. Darman, D. G. Pikunov

Participants: V.K. Abramov, V.V. Aramilev, V.A. Andronov, A.S. Bogachev, S.A. Zubitsov, Yu. N. Zhuravlev, O.F. Iskhakov, V.G. Korkishko, V.G. Krever, V. Lukarevski, Yu. A. Nesmachny, I.G. Nikolaev, O.I. Suslov, Eric and Kirsten Conrad, Dale McCullough, Dale Miquelle.

To insure long-term conservation of the existing leopard population in Southwest Primorski Krai workshop participants recommend the following actions::

1. Provide coordinated land management regime in existing leopard range in Southwest Primorye (Khasanski, Nadezhdinski, and Ussuriiski Raions) in accordance with the Ecological Program of Primorski Krai and a proposed plan (see below).
2. Establish a single, federal-level specially protected territory, with adequate legal authority, organizational capacity, and financial security to manage lands on a specially protected territory and to coordinate nature use on adjacent areas over the entire leopard range in Southwest Primorye. Jurisdiction of the specially protected territory should be decided upon by the Government of Russian Federation.
3. Develop a system of protecting individual, isolated leopard populations based on the analysis of spatial distribution of breeding females and litters.
4. Conduct a survey among local people, hunters and tourists to assess their attitude towards leopard conservation.
5. Develop and implement a management program for ungulates to provide sustainable prey base for leopards.
6. Ban hunting with dogs, and use of traps and snares in leopard habitats, through zoning of hunting leases.
7. Conduct a coordinated environmental education program on leopard conservation, including TumenNet Project.
8. Develop a coordinated fire fighting program in Southwest Primorye.
9. Find funds to support the specially protected territories in leopard range.

The workshop participants consider it necessary to plan for the unification of existing protected territories into a single federal-level specially protected territory within leopard range in Southwest Primorye (Recommendation 1, above) and for this purpose the following activities should be conducted:

1. Establish an interdepartmental commission (attached to Committee of Nature Resources of Primorski Krai) on optimization of specially protected territories in leopard range.
2. Entrust planning of specially protected territories to a specialized expedition that includes local experts (to create a working group of experts responsible for developing a zoning regime for the specially protected territory).
3. Conduct a social-economic survey in Southwest Primorye to assess the role of natural resources in meeting the needs of local people.
4. Take into consideration the following proposals on optimization of a specially protected territory:
 - to resolve the question of providing a special protection regime for leopard conservation behind the border fence that is agreed upon by the Federal Frontier Service of RF;
 - to retain the territory and protected status of Kedrovaya Pad Zapovednik as a central core of any future unified specially protected territory;
 - to improve the protective regime and restore leopard habitat in an ecological corridor between Kedrovaya Pad Reserve and border fence;
 - based on the recommendations of working group specialists, to optimize the regime of federal Barsovy Zakaznik and to develop a zoning regime within its territory that considers the needs of local people;
 - to strengthen as much as possible the nature protection regime of regional Borisovskoe Plateau Zakaznik on the territory outside the frontier zone;
 - to develop a zoning regime on make hunting lands that includes a restricted use regime on key areas for leopard conservation;
 - to optimize forest use in leopard habitat and develop use regimes that are compatible with leopard conservation.

Workshop participants consider the following scientific research to be necessary:

1. Organize continuous monitoring of the leopard population and its habitats.
2. Summarize all available data on spatial distribution of leopards, and to include all data into an existent GIS.
3. Assess the influence of hunting leases on the leopard population and its habitats.
4. Determine the reasons for low reproductive output and high mortality of young.
5. Conduct comprehensive counts of ungulate and to assess carrying capacity of habitats for prey.
6. Assess the impact of fire and logging on habitat, numbers, and distribution of leopards and their prey.

2. GENETICS AND CAPTIVE BREEDING

Moderators: Olga Uphyrkina, Stephen O'Brien, Sarah Christie, Tanya Arzhanova

Recommendation 1. Concerning genetic status of the wild population

Objective/Goal: Maximum possible knowledge of the genetic status of the wild population

Conservation Activities: Acquire blood, tissue and fecal samples opportunistically, e.g. during the monitoring program, and analyze these

Responsible agencies: People/organizations doing monitoring for sample collection, Lab Genomic Diversity, University of California, for analysis

Budget: To be determined but not much

Recommendation 2. Concerning genetic status of captive population

Objective/Goal: Maximum knowledge of the genetic status of the captive population

Conservation Activities Check records and genetic analysis in studbook and Laboratory. Determine how representative of the living population the existing sampling is, and whether further sampling is worthwhile (more than half the founders are represented, and the missing genetic material is less than 15% of the gene pool).

Responsible agencies: Laboratory of Genomic Diversity (Olga Uphyrkina, Steve O'Brien); EEP for Far Eastern Leopard (Sarah Christie, Tanya Arzhanova)

Budget: Zero

Recommendation 3. Concerning effects of genetic impoverishment on wild population

Objective/Goal: Knowledge of life history and demographic parameters, and potential correlates for inbreeding, including morphological, reproductive, biomedical and other mal-adaptive traits.

Conservation Activities: Three to five year ecological monitoring program; radiotelemetry, camera trapping, and tissue sampling. Including at least one full biomedical evaluation of 4-10 individuals. These data should be collected and assessed in a timely manner to be advisory to the Far Eastern Leopard Working Group who would be charged with developing actions related to implementation and strategies (if approved) for genetic restoration of the wild population.

Responsible agencies Coalition of appropriate government organizations and NGOs (not up to us to decide)

Budget: \$100,000 per year for monitoring, \$30,000 for the biomedical evaluation.

Recommendation 4. Concerning captive population management strategy

Objective/Goal: Maximum possible conservation support for the wild population for the foreseeable future

Conservation Activities: Continue with existing management strategy as agreed and recommended by the captive management committee for this EEP.

Responsible agencies: EEP for Far Eastern leopard (Coordinators; Sarah Christie & Tanya Arzhanova)

Budget: Zero

Recommendation 5. Concerning genetic strategies to consider for restoration

Objective/Goal: Provision of advice on genetic strategies to the Far Eastern leopard Steering Group

Conservation Activities: Establish genetic criteria for choosing restoration strategies

Responsible agencies: Genetics and captive breeding working group; completed

Budget: Zero

3. REINTRODUCTION

Moderator: P. V. Fomenko

GOAL: Restoration of the Far Eastern leopard population in its historic, twentieth century, range, and supplement its existing population.

Recommendation 1. Assess reasons for localized extinctions.

Objective: Evaluate the reasons why leopards disappeared from its historical range, and the changes that have occurred in this range to date.

Conservation actions:

- 1.1. Request specialists to undertake an in-depth analysis of all possible reasons why the leopard disappeared from the southern Sikhote-Alin and southwest Primorye.
- 1.2. Evaluate the changes that have occurred since the disappearance of the leopard and evaluate their importance in regard to reintroduction.

Recommendation 2. Obtain support of local people.

Objective. Obtain the support of local population.

Conservation actions:

- 2.1. Develop and distribute a package of environmental education materials.
- 2.2. Carry out a public information campaign explaining the goals and objectives of the project.
- 2.3. Create additional employment opportunities.
- 2.4. Create alternative income opportunities for local people.

Recommendation 3. Increase prey in areas proposed for reintroduction.

Objective: Increase the number of prey in areas selected for reintroduction and for supplementing the current population.

Conservation actions:

- 3.1. Launch broad-based environmental protection activities in historic leopard range.
- 3.2. Develop and implement habitat improvement measures aimed at increasing leopard prey.
- 3.3. Develop and adopt a plan to increase ungulates in historic and contemporary leopard habitat.
- 3.4. Develop a specific management regime for leopard prey.

Recommendation 4. Reintroduce leopards into their historic range

Objective: Create a second leopard population in its historic, twentieth century, range.

Conservation actions:

- 4.1. Prepare projects and conduct an open competition (in consideration of IUCN recommendations and the creation of an advisory board.)
- 4.2. Conduct an environmental “ekspertiza” of all projects.
- 4.3. Gain approval of projects at the Federal level.

4.4. Begin implementation of the selected project.

Recommendation 5. Ensure conditions exist conducive for reintroduction in selected area

Objective: Establish that all conditions in areas selected for reintroduction are favorable.

Conservation actions:

- 5.1. Pursue fire suppression activities and integrate existing fire suppression activities in leopard habitat.
- 5.2. Provide an appropriate environmental protection regime in leopard reintroduction areas.

Recommendation 6. Insure survival of the existing population.

Objective: Insure the survival of the existing population.

Conservation actions:

- 6.1. Supplement the existing wild population with captive bred animals, if the criteria are met (the Steering Committee must define the criteria for intervention and initiate the monitoring of the population and the surveillance of reproduction, mortality, and health status).

Recommendation 7. Do not exclude leopards with Founder No. 2 genes for reintroduction and supplementation.

4. DEVELOPMENT OF DEER FARMS FOR LEOPARD CONSERVATION

Moderators: V. Karakin, V. Solkin

Participants: Yu. A. Nesmachny, A.B. Yurienko, Balashkin, A.S. Bogachev, S. Shaitarov, M. Hotte, S. A. Zubtsov, Tarakanov and others

Goals:

1. Develop sustainable uses of natural resources that provide for leopard conservation on deer farms and adjacent territories (including lands adjacent to nearby settlements).
2. Propagate a tolerant attitude towards leopards among local people. Explain to local people that future development investments in the region depend upon leopard conservation.

Conservation actions:

1. To develop a conceptual framework for sustainable use of natural resources on deer farms that includes leopard conservation, to assess which factors limit productivity of deer farms, and to identify additional potential revenues that could be developed using deer farms (Primorski Academy of Agriculture).

2. To develop a regional law that delineates use of natural resources in leopard range (WWF).
3. To develop a proposal for the State Duma (Russian Federation) that would include a clause in the Land Code that would provide for nature protection easements for landowners in leopard range (Krai Duma).
4. To develop a model project for sustainable use of nature within leopard range (Krai Administration, WWF).
5. To continue the compensation program for predator depredation (Tigris Foundation).
6. To conduct financial assessment of deer farms, and the potential for marketing deer farm products (Traffic).
7. To improve legal competence of deer farms managers in understanding their rights and possibilities for protection of private property (WWF).
8. To support the initiatives aimed at strengthening protection of deer farms (Tiger Volunteers and others) .
9. To conduct an information and education campaign “Leopard Land” in Southwest Primorye (WWF, Khasan Team of Tiger Inspection).
10. To establish two model information & education centers on key territories (Gamov and Yankovski Peninsulas) (WWF, Phoenix Fund, Khasan Team of Tiger Inspection).

5. HUNTING MANAGEMENT AND ANTI-POACHING ACTIVITIES

Moderators: I.O. Suslov, V.V. Aramilev

1. Anti-poaching activities

- 1.1. To coordinate the activities and structure of anti-poaching teams (Leading organizations – Ministry of Natural Resources, Primorski Krai Department of Protection, Control, and Regulated Use of Wildlife, Academy of Sciences).
- 1.2. To improve material and technical support to antipoaching teams with support from a variety of sources (state support, grants, other sources).
- 1.3. To prepare proposals for improving legislation for protection of leopards and other rare species.
- 1.4. To improve the training system of guards on protected areas and hunting leases (to conduct regular training and seminars for hunting inspectors and protection specialists).

2. Hunting Management Activities

- 2.1. To study the influence of hunting leases on leopards and leopard habitat. Develop recommendations for management of hunting leases in leopard habitat.
- 2.2. To ban hunting with dogs, traps and snares based on a zoning of hunting lease lands within leopard habitat.
- 2.3. 2.3. To improve legislation concerning protection and use of hunting resources at the regional level.
- 2.4. To use Nezhinskoe hunting lease as a model to demonstrate how hunting management and predator conservation can be complementary.
- 2.5. To assess the status and activities of hunting leases in Southwest Primorye.

- 2.6. To provide financial support for protection of leopards and their habitat in hunting leases in Southwest Primorye.
- 2.7. Environmental education targeted at hunters and local people concerning leopard conservation (signs, lectures, mass media, etc.).

POSITION PAPERS

**Submitted By Participants Of The 2001 Workshop On A
Workshop To Address Key Issues In Conservation Of The
Far Eastern Leopard (*Panthera Pardus Orientalis*) In
Russia And China**

SESSION 1. Managing Leopard Habitat in SW Primorski Krai.

RECOMMENDATIONS FOR OPTIMIZING THE PROTECTED AREAS SYSTEM IN SOUTHWEST PRIMORYE

Y. Darman

Director, WWF Far East, Vladivostok

The Far Eastern leopard is one of the most rare cat species of not only in Russia, but also in the world. The area of this subspecies' distribution was isolated long ago from the rest of Asian leopard range and covers almost one million ha. in local mountain-forest area in China, North Korea and Russia. In the last half-century, its habitat has decreased by 50%; the population, according to the last data, does not exceed 50 individuals (30-40 in Primorski Krai, 4-7 in Jilin, 3-5 in Heilongjiang). An acute problem is potential inbreeding, and the remaining population could disappear as a result of genetic degeneration, even without direct human influence. For example, cub survival has been declining, from 1.9 cubs per one female in 1973 to 1.7 in 1984 and 1.0 in 1991 (Plan for Protection of Far Eastern Leopard, 1996). In accordance with the 1999/2000 inventory, cubs make up only 11% of the population, given at least 9-12 adult females (Pikunov et al., 2000). Besides a decline in natural replacement, there is a high probability of mortality for all age groups as a result of certain diseases or direct human impact.

In order to protect the Far Eastern leopard in Primorski Krai, several protected territories were created that have different rank and status and cover a total area of 187,000 ha. Despite these efforts, the population remains at a low ebb (0.05-0.07 individuals per 1,000 ha on the area about 4,000 sq/km). The estimated population for this area, in optimal conditions and even home range distribution, should be about 60 leopards (Table). The problem is that existing protected areas belong to different agencies and activities are poorly coordinated. Thus, protection of rare wildlife species is neither the major goal of the Institute of Biology and Soil Sciences FEB RAS, the owner of Kedrovaya Pad Reserve, nor the goal of the Primorski Krai Department on Protection, Control and Management of Hunting Wildlife of the Ministry of Agricultural Production of Russian Federation, which owns the Federal Wildlife Refuge (zakaznik) "Barsovy" and Krai Level Wildlife Refuge "Borisovskoe Plateau". Current staffing for these protected areas is 35 people, with total annual budget for environmental activities around \$50,000. During the last 5 years, total international support for carrying out leopard protection activities exceeded \$200,000 (Tigris Report, 2000). In addition, WWF, in 2000-2001, committed over \$50,000 to leopard protection. But despite all this significant financial support, the effectiveness of this network is low and fundamental improvements in protection did not occur. None of these protected areas has legal entities, nor do they have a well-developed infrastructure to become a true leader and with whom local authorities and residents would have to recon.

The result of a general discussion is the Strategy for Protection of Amur Leopard in Russia that was approved, as an official document, on August 7, 1998 by the Federal Committee on Ecology of the Russian Federation. The basic tenets of this program is the creation of a single system of protected areas in leopard range and optimization of economic activities in adjacent territories. None of the agencies, however, have taken responsibility for implementing the strategy, leaving this to international nonprofit organizations. It is time to discard departmental interests and think about saving of this endangered subspecies for the long-term (at least 50 years) by predicting socio-economic development in southwest Primorye and to

influence decision-making and select ways such development considers the interest of the Far Eastern leopard.

Simultaneously, the interests of local residents must be taken into account, for without their support, long-term leopard protection is impossible. Therefore, major policies should include creating additional jobs and income through advancement of the region's tourism potential. Coastal beaches and the rational use of the area's valuable marine resources can provide sustainable growth for the economy of Khasanski Raion and to concentrate the residential population to a narrow band between the Kraskino-Terekhovka highway and the Amurskii Inlet and Razdolnaya River. In addition to direct charitable support, specific investment projects for environmentally oriented, small and middle businesses, are possible. Development of the transportation sector of the region's economy (transit from Korean Peninsula) can be another source of regular income both for the Raion and the Krai.

Southwest Primorye represents the most unique sub-region of the Russian Far East. The area represents the full spectrum of biodiversity values that are not missing in the ecosystems of China and North Korea. This area can and should become the basis for restoring and maintaining natural complexes of the adjacent territories in North Korea and China. Thus, these countries, as well as the international community, should be interested in supporting environmental activities in the southwest Primorye. A dramatic increase in the effectiveness of protected areas is possible even without expanding their total area by combining the existing areas into a single environmental structure. The functional zoning of the national park system combines the interests of biodiversity protection (lead by the leopard) with opportunities for recreation and limited economic development. A national park's functional zoning accounts for all existing problems in the most flexible way and provides conditions for the long-term maintenance of a balance between the system "Vegetation/Ungulates/Large Predators" and local community interests. The headquarters of national park should be located in the village of Slavyanka to promote close relationship with Raion authorities. Here an ecological educational center would be established to actively promote environmental awareness among local residents. This will interest local self-governments in the establishment of a national park because new jobs and tax revenues could be used for Raion development.

Unlike the Amur tiger, the behavior of the Far Eastern Leopard makes it possible for the animal to coexist with humans living in close proximity, an excellent precondition for protection of this predator even in its isolated habitat. The leopard is a much more sedentary species and its home range is significantly smaller. The simplest analysis shows that for short-term source of gene pool (10 reproducing females), the existing system of 200,000 ha of protected areas is adequate. For a minimally sustainable population (100 individuals), an area twice as large is necessary. Only 300 reproducing females can provide long-term conditions for subspecies protection. To achieve this level, it is necessary to maintain conditions for leopard existence on the territory at least 2.4 million ha. That earnestly demands creation of additional leopard populations in areas of its former distribution in the Sikhote-Alin Range (Table 1.).

GOAL ONE is to optimize the existing system of protected territories in leopard habitat and designate at least 400,000 ha (50 individual home ranges) with a leopard protection priority. There must be a multidisciplinary, well equipped scientific environmental organization with a staff of at least 70 people and an annual budget of \$150-200,000 to provide solid protection, scientific

Table 1. Worksheet For Estimating Area Requirements For Focal Species

Target Species	Tiger (per adult female/ per unit)	Leopard (per adult female/ per unit)
Breeding unit	1M:2,5F:0,5juv (4) 1F:0,4M:0,2juv (1,6)	1M:1,5F:0,5juv (3) 1F:0,7M:0,3juv (2)
Home range / Breeding unit (sq. Km)	400 (1,6 ind.)/ 1000 (4 ind.)	80 (2 ind.)/ 200 (3 ind.)
Short-term Source Pool Unit / Home Range (10 females/ 10 units)	4000 (16 ind.)/ 10000 (40 ind.)	800 (20 ind.)/ 2000 (30 ind.)
Short-term Persistence Unit / Home range (50 units)	20000 (80 ind.)/ 50000 (200 ind.)	4000 (100 ind.)/ 10000 (150 ind.)
Long-term Persistence Unit / Home Range (300 units)	120000 (480 ind.)/ 3000000 (1200 ind.)	24000 (600 ind.)/ 60000 (900 ind.)
Fact area and number at 1998/99	150000 (450 ind.) (333 Km/1 ind.)	4000 (40 ind.) 100 Km/ 1 ind.)
Required Habitats or Special Habitats Characteristics	Large prey Refuge from disturbance	Middle prey Sick forest cover

monitoring and public sector work with the local population. This can be a scientific, cultural and recreational center capable of meeting the primary goal of long-term protection of the core leopard population by applying active bio-tech approach on this species in specially designated zones and in economic recreational areas. This is the only way to fully transition the land into a nature reserve capable of providing necessary protection. This level of protected area will make it possible to implement international actions to coordinate efforts and create an international Russia-China-Korea reserve on leopard protection.

As the first stage we propose organizing a Russian Nature Park within the already existing protected areas, with specific types of functional zones (Figure 1.). The zones for this nature park would be:

Zone 1 - strictly protected core (reserve) – the territory of the existing Kedrovaya Pad' Zapovednik (wildlife reserve) (18,000 ha);

Zone 2 - area with strict environmental regulations – west section of “Barsovy” wildlife refuge up to the system of engineer technical installations (ETI) along the border (about 30,000 ha) and a section of “Borisovskoe Plateau” up to ETI (about 40,000 ha);

Zone 3 – area with border regulations – sections between ETI and the boundary between North Korea and “Barsovy” (40,000 ha) and “Borisovskoe Plateau” (20,000 ha) wild refuges;

Zone 4 – area of economic development (including regulated game reserves under the control of the Park Administration) – west section of “Barsovy” wild refuge (30,000 ha);

Zone 5 – area of deer breeding – territory of neighboring deer parks.

In such a case it would be necessary to shift all federal forestlands in Zone 2 to Group One forests to be placed under the direct control of the Park Administration, with double control on the lands belonging to the Ministry of Defense. In the future, military forest units in the

area should be transferred to parklands. Zone 3 forests should be transferred to Zone 1 forests, and managed jointly by the Park Administration and the Border Patrol. Zone 4 forests need to be shifted to Group Two (except those already designated in environmentally protected sections of First Group) and apply intensive biotechnique activities (including thinnings) to increase ungulate numbers. The Park Administration can organize strictly regulated hunting on these territories, first of all selected hunting of ungulates to create a highly productive sustainable population. Priority hunting rights should be given to local residents and foreign tourists (to increase profitability of the Park).

Government lands released from the land fund should also be part of the national park with a management coordinated with local authorities. As for lands belonging to agricultural cooperatives and private lands situated within the borders of existing sanctuaries, it is possible to organize protection regulations on them and use them in keeping with the current owners existing economic activities. Adjacent deer parks can be included in the national park, with preservation of their tenure by signing a mutual cooperation agreement with owners. Thus, the park owners will bear additional responsibilities for leopard protection, and park administration will be responsible for paying damage compensations and for attracting tourists. If a deer park changes ownership, at the point that land tenure rights negotiations, additional obligations should be included in the license in accordance with the Law on Wildlife Protection and National Strategy for Protection of Amur Leopard.

The second stage of national park organization requires solving the question of including all frontier zones behind ETI line from the Korean border along the Chinese border to Razdolnaya floodplain, an additional 40,000 ha, with regulations designated for a third zone. This will be an ecological corridor for leopard distribution to Korea and China and for movement of animals into the area of its former habitat in the Pogranichnyi Range. When organizing “Borisovskoe Plateau” wildlife refuge, an important leopard protection area in the between the Amba, Gryaznaya, Ananyevka, Nezhinka, Borisovka Rivers, about 50,000 ha., was left outside the reserve's boundaries. This area's forests should at least be transferred to the Second Group; but in the case of agreement with military forest unit – to the First Group with their assignation to the national park. Regulations in this area must comply with Second Zone (in reproduction units) and Fourth Zone (the rest area), with organized, regulated hunting only under the control of park authorities. Based on an agreement, the Nezhinskoe Hunting Society can become a subtenant on the land.

GOAL TWO is to provide priority for leopard protection on unprotected lands. A detailed plan for the Econet of southwest Primorye and neighboring territories of China (the system of protected areas of different rank and sections of land with different limitations of development activities) and approve it as a planning document of inter-district level (as a regional environmental program of Primorski Krai - “Leopard”) should be completed.

Special attention should be paid to regulating economic activities in the sections of natural corridors combining isolated leopard groups in the Gamov Peninsula and Barsov Range. The Econet should connect leopard units with each other through a system of protected areas combined by ecological corridors (forest belts, watershed protection forests, and recreational riparian zones) and buffer zones. Those buffers can be formed by the rest zones (reproduction sites) located in the places of leopard and deer concentration in game reserves, as well as resort areas and deer parks. The latter should play a special role in leopard protection and tourism development. The model WWF project on sustainable development of southwest

Primorye can be the basis for the integrated approach, and in the long term, the new national park can take on coordination of all activities.

GOAL THREE is to provide a unified environmental policy for Russia and China in the frontier belt near Chernyi Mountains, where ungulate, tiger and leopard migrations occur. This goal can be achieved by organizing protected territories in Chinese provinces Jilin and Heilongjiang (at least in 10-15 Km frontier) with the area of 15-20,000 ha and strict anti-poaching regulations. A future plan is to sign an international agreement on creating a Russian-Chinese Trans-Border Reserve, something only possible if there is a single federal protected territory subordinated to a specially authorized body on environmental protection.

GOAL FOUR is to prepare a system of protected territories in the areas of former leopard range for a reintroduction program. The priority core for a new population is Lazovskii Zapovednik (Wildlife Preserve), the Federal "Zov Taiga (Call of the Tiger) National Park, and the Primorski Krai level Vasilkovskii Wildlife Reserve. At the same time the status of the latter needs to be raised to the federal level, with a buffer zone on the left bank of Vasilkovka River. All riparian zones from Lazovskiy Zapovednik to Vasilkovskii Wildlife Reserve must obtain a special environmental status. The second area for leopard reintroduction is in Ussuriiskii Zapovednik which should be reorganized into a national park by combining the existing territory to an experimental forest unit and the "Orlinoye" forest hunting enterprise. A future opportunity is to look at reintroduction in the area of the proposed "Yuznj-Primorskii" Nature Park in the Livadiiskii and Partizanskiy ranges.

Based on these goals, and in accordance with the Strategy for Amur Leopard Protection in Russia and recommendations contained in the Russian Federation and IUCN Red Book, and the IUCN Action Plan for Cats, we consider expedient the following actions:

1. Appeal to the Ministry of Natural Resources of the Russian Federation Nature RF to expedite the creation of a national park on the basis of existing protected areas: Federal Wildlife Reserve «*Barsovy*», Primorski Krai level Wild Reserve «*Borisovskoe Plateau*», Kedrovaya Pad' Zapovednik.
2. Request the Presidium of the Far Eastern Branch of the Russian Academy of Sciences to assist in designing a national park, keeping in mind the need to preserve the scientific field station of the Institute of Biology and Soil Sciences FEB RAS.
3. Request the Department on Protection, Control, and Managing of Hunting Wildlife of MAP RF to consider reorganizing the «*Barsovy*» and «*Borisovskoe Plateau*» wildlife reserves into a national park and assign the existing staff and material resources to Vasilkovskiy Wildlife Reserve.
4. Request the Primorski Krai Administration to assist in designing and organizing a national park in Far Eastern Leopard habitat.
5. Propose to the Primorski Krai Administration the creation of an inter-departmental commission that brings together all interested organizations and experts to implement the Strategy on Far Eastern Leopard Protection and to develop a Krai Program «Leopard».
6. Request the RFE office of WWF to provide financial and organizational assistance to the ECONET group working in Far Eastern leopard habitat.
7. Request the Ministry of Natural Resources of the Russian Federation to negotiate with China and North Korea on issues of creating trans-boundary protected natural territories in Far Eastern leopard habitat.
8. Appeal to the IUCN Commission on Large Cats to coordinate international donor

support in keeping with the Strategy for Far Eastern Leopard Protection and to seek additional sources of funding for proposed activities.

9. Develop, together with interested governmental and non governmental environmental organizations, a program for reintroduction of the Far Eastern leopard and organize fundraising to implement such a program.

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OPTIMIZATION OF NATURE USE REGIME IN THE AMUR LEOPARD HABITATS

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Changing of the Amur leopard environment is one of the primary reasons of the decline in this predator's population. Reduction of the area of acceptable habitats and their deterioration results in reducing living space and intensification of competition within the population. In result of this competition, young and even adult individuals are being replaced into pessimal habitats, where risk becoming a victim of intentional or casual poaching is greatly increasing. Due to this fact the population has been preserved at constantly low level for a long time (at least, since the early 70s, when inventories began, and up to 90s): all replenishment of population was absorbed by poaching. According to results of 1991 leopard inventory, in spite of the low level of population, there was recorded rather favorable demographic situation – optimal ratio between males and females, significant number of productive females, and large prospect of young generation. But that prospect did not have chance to be realized. Since the early 1990s, from the moment of significant economic and social reconstructions reforms, equilibrium was moved towards negative for leopard direction. The system of land use fragmentation has been becoming less and less controlled and the process of reduction and defragmentation of suitable leopard habitats was accelerated. As a result, during the 1997 reconnoitering leopard inventory, reduction of population was registered, and the repeat inventory of 2000 corroborated this reduction rather accurately. What is the most alarming, the fact of reduction of cub number happened to be with females. Even taking into account probabilistic character of data inevitable in existing approach, this trend is being observed during every inventory (Table 1).

Leopard habitats are rather diverse in the character of land use, degree of agricultural development, and environmental status of the area. In sketched way, we can divide the whole territory represented some interest for leopard protection into three major types. In the first

Table 1. Results of the Leopard Population Absolute Inventory

Inventory year	Number of adults and independent young animals								Cubs	Total	Source of data	
	♂			♀			Ind. sex					Total
	ad*	y*	Σ	ad	y	Σ	Ad	y				
1972-1973									28-36	10	38-42	Abramov, Pikunov, 1974
1984-1984	5-6	3	8-9	7-8	1	10-11	1	2	25-30	6-7	31-37	Pikunov, Korkishko, 1985
1991	4-6	2-3	6-9	14	5	19		3	28-31	5	33-36	Abramov et al 1994
1997*			3-4			5-6	13-17		21-27	4	25-31	Pikunov et al 1999
2000	3-4	1	4-5	6-8	3	9-11	8-9		21-25	1-3	22-27	Pikunov et al 2000

*ad - adults; y - independent young animals, 1997 – single inventory

place, we should designate unsuitable habitats, which lost any importance for leopard both at present and in future. Those unfit areas include the main part of coastal line and broad valleys of large rivers where forested vegetation is absent because of natural reasons or as a result of anthropogenic disturbance (Fig. 1). Forest fire is one of the main reasons of forest disappearance that in turn is connected with agricultural land development and construction of railroad. Traditional forest burning and regular vegetation fires along the railroad in dry seasons (in the period of the use of steam locomotives in particular) transformed forest vegetation into grassland and scrubland, which is characterized by much higher pyrogenicity. Frequent fires caused soil layer leachate, which prevents natural and artificial reforestation. This process is probably inevitable on the part of the territory. Within this zone, economic activities of population as well as hunting and poaching pressure is the highest.

At best, this territory is being visited by leopard during its transitions between acceptable habitats, if they are not separated by significant space.

This type of lands does not play any important role in maintaining populations of leopard major prey species (roe and sika deer) as well. Proximity to settlements told on those areas as well, and very visibly. Besides, in open places, roe deer and sika deer are becoming an easy prey of poachers.

The second zone represents acceptable leopard habitats. There is deciduous secondary forest here, mostly oak forest and woodland altered between shrubs and meadows, here and there with portions of relatively well-preserved forest (on northern slopes). This area is also periodically burnt, although the degree of vegetation degradation is not so high as in the first zone. The area is characterized by easy access by local residents as well (due to the proximity of settlements and road network). The area is inhabited by small population of roe deer; the population is sometimes increasing on account of migrating individuals, in snow seasons in particular. Despite optimal habitat conditions for roe deer and sika deer, their populations are suppressed by over-hunting and poaching.

This zone includes individual units of several residential leopards. But interruptive character of suitable habitats' distribution and instability of land use regime considerably lower capacity of this area for leopard.

Third zone is characterized by favorable habitat conditions for leopard. Despite some negative features (high snow cover, less attractive vegetation for major leopard prey), the highest leopard density is and was observed namely here. Influence of negative factors is nullified by landscape diversity and patchiness. Relative difficulty on access and good shelter quality of habitats positively affect distribution of both leopard and its prey species. Pressure of hunting and poaching is not so intense here. Up to the recent time, economic activities were limited significantly. In the whole, anthropogenic disturbance affected this territory least of all.

Besides these principal types of habitats, deer parks occupy the special position. Almost all deer parks were formed on the territory of favorable in the past leopard habitats. Question about the deer parks influence on the leopard population deserves special discussion. It is necessary to highlight the fact that deer husbandries, being fallen into decay, are losing their importance as a source for replenishment of sika deer population in neighboring territories. But, being remained as a concentration place (though in fewer quantity) for one of the main prey species for leopard, deer parks continue to attract this predator. So the risk to lose some individuals in result of the conflict of interests between the predator and deer park employees is remaining.

A special role belongs also to forest road network. During the last decade, it has been developed especially intensely. Improvement of the old roads and construction of new ones in the core of favorable leopard habitats (including those behind the ETI line) is especially alarming. If in the past, until 90s, the roads were mostly used as far as the frontier posts and along the border (with rare exception) mainly by frontier guards, at present these roads are constructed almost to the very frontier, following almost all major rivers and creeks, and their density has greatly expanded. The area of the roads themselves is insignificant, but the area 10-15 km along the roads is becoming very easily accessible by people.

Analyzing dynamics of habitat conditions, it must be emphasized that this situation has been formed basically during the period from 1880s to the early 1970s. Later on, changes happened intensively – but economic development of new areas included only relatively limited logging. One of the first and major negative for leopard changes was recorded in the late 70s of last century: mass fall migrations of roe deer from neighboring territories of China were practically stopped. Those migrations substantially replenished local roe deer population and nullified the influence of overhunting and poaching. Some people connected the ceasing of migrations of so called “running goat” with construction of a line of Engineer Technical Installations (ETI) along the Russia-China border. It was supposed that these ETI (high barbed wire fence) blocked migration ways. By implication, that was proved by concentration of roe deer behind this fence in the first years of its erection. But later it was discovered that roe deer adapted to overcome it easily. Nevertheless, migrations were completely stopped up to the mid- 80s; as was shown that was connected with significant decline of roe deer population in China.

As for positive changes, it should be emphasized that during the same period sika deer population considerably increased thanks to the hunting ban. That was especially visible in

Borisovskoe Plateau, on the territory of Nezhinskoe Game Refuge. Population peak came on the early 80s. That gave a chance to replenish roe deer population for some time. But that time in Primorye wild pig population was drastically reduced due to the plague epidemic. Passion of sport hunters has got satisfied at the expense of other species including roe deer. Probably this reason has played its role in abolition of hunting ban for sika deer, in particular, on the background of recorded death of some sika deer in 1989. That fact was considered as a result of overpopulation and shortage of natural forage, although the true reason happened to be epidemic of unknown disease registered for roe deer as well. It resulted in enthusiastic "regulation" of sika deer population, which caused drastic reduction of leopard feed basis. If in 1983 visual inventory from a car showed up to a hundred sika deer for 20 km rout along Ananievka River, in 1991 the same inventory showed none.

The burst of economic development on the territories of leopard habitats happened to be in the early 90s; that was connected with popular (for that time) farming. Despite of the breakup of governmental agricultural structures, designation of parcels under new farms was done not within abandoned sovkhos lands, but was implemented at expense of new undeveloped lands including forested areas being leopard habitats.

In the mid - 90s, burst of another economic activity came on the place of bankrupted private farms. High demand for timber, opportunities for legal and illegal export visibly livened up logging, including cuttings within leopard range. It is worth noting that timber-felling sites happened to come in the areas earlier difficult of access, in the core of favorable habitats zone including a territory along the frontier behind the ETI line. The process of logging and timber transportation itself creates, except changing of leopard environment and decreasing forest productivity, a strong factor of unrest for wildlife. Besides, development of new cutting areas is accompanied by creation of a network of new roads, which facilitate accessibility of the area for hunters, poachers, wildlings collectors, and other subsistence users, with the same consequences. The development of Coal Deposit in Vtoraya River also caused the loss of certain habitats.

These economic activities resulted in accelerating process of leopard habitat reduction and fragmentation. It must be emphasized that the area of lost habitats is not in direct proportion to the area under ongoing development, but vastly larger. The point is not only that unrest factor is being distributed at some distance around the developed parcels. If the residential female unit is being crossed by a band of unfit habitats, the female stops using it. At best, those sites are used by independent young individuals and adult males. Broader space of unfit habitats make leopard transferences within the range difficult and prevent contacts between individuals. That can affect genetic processes. Observed trend of fragmentation of the rest habitats reminds a process of the united leopard range division into isolated sections, happened in the mid 20th century.

As regards to the development prospects of this region, Tumen Economic Development Project, intended to create large transport junction in the south of Khasanski District, represents the highest danger to leopard. Creation of transport passage through the Russia-China Frontier in fact almost deprived of any hope for restoration of the direct connection with North Korea's population. Besides, infrastructure development will substantially increase population with following consequences. Other projects such as development of marble and coal deposits in Upper Amba River, present danger as well. By now they succeeded to stop them, but a threat of their realization still exists.

Stopping the next fragmentation of leopard range and loss of his habitats is impossible without essential improvement of the protected nature area network. In the strict sense, the whole range needs a special environmental status.

Leopard range includes Kedrovaya Pad' Zapovednik, "Barsovy" Federal Wildlife Refuge and "Borisovskoe Plateau" District Wild Refuge as well as a number of game refuges: Slavyanskoye, Nezhinskoye, Borisovskoe, and Ussuriiskoye. Besides, one more area, behind ETI line, should be highlighted as of especial importance. Part of it belongs to "Barsovy" Wildlife Refuge, but for a long time it was kept under very strict, almost zapovednik regulations. Access to this area except frontier guards was extremely limited; those limitations have been strictly maintained. This band was characterized by well-preserved forest never suffered of fires. Loggings were limited. Poaching, if happened in some frontier posts, was not mass. But recently access has been increased for both loggers and hunters including illegal ones. This area became frequently visited by illegal collectors of wildlings from China.

The practice proved that creation of zapovednik is the most effective measure to protect the habitat area with preservation of nature complex at a whole. But nowadays, creation of zapovednik for such large cats with the area guaranteed its population maintenance is practically unreal. Besides, in creating zapovednik, except a goal to protect one species, other conditions should be taken into account, such as preservation of original nature complexes, their uniqueness, species diversity, endangered species richness, degree of economic development. Taking these parameters into consideration, it is undoubtedly necessary to create a zapovednik in Borisovskoe (Shufanskoye) Plateau. Not dwelling on description of all points of interest and ecosystems, I will note that landscape and biological diversity of this so small area does not have analogous examples in the South of the Russian Far East. Uniqueness of nature complexes of this area served as a basis for including this territory (as a future zapovednik) in Long-term Program on Environmental Protection and Rational Natural Resources Use in Primorski Krai up to 2005. That will make provisions to take essential part of major leopard habitats under strict protection. This area is inhabited by one third of the leopard population being survived, and even better, there are reproductive females among them. Creation of zapovednik regime in Borisovskoe Plateau is expedient from the prospect of formation here international environmental complex. Neighboring areas of China are characterized by well-preserved forest close to optimal leopard habitats. Under conditions of strengthening protection regulations, restoration of population for both major leopard prey species (low hooved population is one of the main disadvantages of these habitats) and leopard itself in neighboring China territories will become possible.

Boundaries of proposed zapovednik territory encompass the areas of Nezhinskoye, Borisovskoe, and Ussuriiskoye game refuges as well as District Wildlife Refuge "Borisovskoe Plateau". To draw borders more accurately, some additional research is to be done. The sketch of zapovednik boundary can look the following way: starting from the north, from China Border to the south of Korfovka and Nikolo-L'vovskoye villages, then it encompasses a strip behind the ETI line and forest parcels in Upper Gribovaya and Malaya Kazachka rivers, then up to Monakino Deer Park. Then it follows along the Levaya Pavlinovka River excluding agricultural lands in its basin, encompasses Pravaya Pavlinovka and Krounovka watersheds, then goes up to Pushkino village and east of it up to Malaya Kedrovka River. Following this river, the boundary comes out to Razdolnoye-Khasan highway. Excluding settlements and attached agricultural lands, coal deposit, the boundary

goes to Gryaznaya River and then to ETI line, then along it to south up to Vinogradovka Watershed with its inclusion (Fig.2).

We should give some explanations on the reasons why some portions were included into the zapovednik zone. Last inventories leopard was not recorded in the areas to the north of Krounovka Watershed. But we put the boundary somewhat further because leopard inhabited this area in the past. That is a perspective territory to enlarge leopard range. Besides, being in immediate proximity to well-preserved forest in neighboring China, it has significant importance (as well as a frontier strip) in the case of creation international protected area.

Proximity of this zapovednik zone boundary to deer parks is impediment in the case if we'll succeed to pioneer a comprehensive strategy and joint activities on rising sika deer population outside the park.

It would be worth to combine a newly created zapovednik area with Kedrovaya Pad' Zapovednik. But secondary forest in "Barsovy" Wild Refuge present low interest for protection. Probably it would be expedient to combine these territories by buffer zone of Kedrovaya Pad' Zapovednik establishing it in Narva and Barabashevka rivers watersheds, under regulations more strict than in wild refuge.

Other part of suitable leopard habitats should be covered by wildlife refuge with strict regulations limited all economic activities affected leopard habitat conditions. Besides "Barsovy" Wild Refuge, it should include the territory between its northern border and proposed zapovednik up to the Gryaznaya River watershed including the portion between highway and railroad. To the south from the Wild Refuge, the same regulations should be established in the Ryazanovka River Basin and Gamov Peninsula as well as in all frontier band behind ETI line, from Vinogradovka River watershed to Tesnaya River Basin.

One more portion requires specific protected status. That is the area around Terekhovka and Baranovskii villages. The very area leopards use sometimes to penetrate Sikhote-Alin through. Within this corridor, loggings and construction of industrial objects should be prohibited.

Within the rest area of suitable habitats occupied by game refugees, hunting should be strictly regulated right up to the total prohibition in the period of population restoration for major leopard prey species.

As regards the "Borisovskoe Plateau" Wild Refuge, considering its not so high status (comparatively with "Barsovy" Wild Refuge and proposed zapovednik), part of it should be included in the proposed zapovednik zone, the other part to incorporate in "Barsovy" Wild Refuge.

In organizational scheme, all these protected territories should be subordinated to one managing body. The major controlling structure can be a cluster zapovednik or biosphere range (biosphere area) including sections with different environmental regulations - from the total prohibition of visiting to experimental sites where optimal forms of land use will be developed right up to forestry and hunting husbandry. In this case it would be expedient to combine these areas with game refuges situated within acceptable leopard habitats.

As regards the deer parks, which are of big importance, both positive and negative, for leopard, the separate program of cooperation with them is to be created. The best (for leopard protection) way out is their incorporation into united environmental complex.

Proposed Nature Complex, besides protection of leopard environment, could take responsibility for development of other environmental projects such as creation of rehabilitation center and center for rare wildlife (including leopard) and plants breeding. Part of the territory can be used for ecological tourism. Development of environmental complex infrastructure will allow solve some social problems including population employment. That will help to relieve some tensions and stress which could rise during the lands withdrawal (of lands being used at present for the purposes different from protection and conservation). It must be emphasized that withdrawal of these lands almost will not affect interests of local residents except hunters and trappers. Basic loggings are conducted for the most part by newcomers. Local population does not prevail among hunters, though. Even if creation of new environmental complex will infringe upon somebody's interests, that is the only way which gives us a chance to save the unique animal.

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АНАЛИЗ СОСТОЯНИЯ ПОПУЛЯЦИИ ДАЛЬНЕВОСТОЧНОГО ЛЕОПАРДА НА ЮГО-ЗАПАДНОМ УЧАСТКЕ АРЕАЛА ДАЛЬНЕГО ВОСТОКА РОССИИ В 2001 ГОДУ

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Юго-западный участок Приморского края России – последнее и основное место, где сохранилась дикая популяция ДЛ на всем азиатском континенте. Зимой 1997-98гг. международная группа специалистов определила, что в восточной части провинции Дзилинь (КНР) обитает не более 4-7 особей леопардов (Ян Ш. и др., 1998). Зимой 1999г. международной группой специалистов признаков присутствия леопардов в провинции Хейлунцзян не обнаружено, хотя и предполагается, что 3-5 леопардов еще существует в этой провинции (Сунь Б. и др., 1999). В КНДР в заповедной территории

предгорий Пектусана при проведении учета, организованного нами в 1998г., также не обнаружено каких-либо признаков присутствия леопардов. Нет также достоверной информации о присутствии леопардов в других провинциях КНДР и, тем более, в Южной Корее.

В пределах Юго-западного участка ареала ДЛ в России нами были организованы фронтальные леопардовые учеты в 1972-73гг., 1983-84гг., 1990-91гг., 1997г. и 2000г. Все учеты проводились по единой методике. Суть методики заключалась в следующем. В предварительном этапе определялись все существующие леопардовые местообитания. Этот этап начал осуществляться с 1960г. и продолжается до настоящего времени. В процессе каждого учета проводилось последовательное маршрутное обследование всех выявленных леопардовых местообитаний. Организаторы учета (авторы доклада) хорошо представляли всю территорию местообитаний, безусловно владели следопытскими навыками, позволяющими безошибочно определять принадлежность следа тому или другому хищнику (леопарду, тигру, рыси и др.). Обоснованно запланированной сетью учетных маршрутов (обычно 130-140) определялось присутствие или отсутствие хищников, их видовая принадлежность, а по параметрам следов их половозрастная структура. Главным достоинством применяемого метода, практикуемого при всех предшествующих леопардовых учетах, является его полная идентичность и преемственность. Это дает основание получать объективные, достоверные, абсолютно сопоставимые материалы, идентичные для всех предшествующих учетов, и своевременно определять все тенденции, складывающиеся в популяции. После минувшей леопардовой конференции (октябрь 1996г.) нами было организовано два фронтальных леопардовых учета. Первый учет состоялся в феврале 1997г. Результаты его следующие. На Юго-западном участке ареала обитало: 3-4 самца, 5-6 самок, 8010 особей неопределенного пола, 4 молодых леопарды, находящихся в сопровождении самок. На неохваченной учетом территории, следующей вдоль границы, вероятно, обитало еще 5-6 особей ДЛ. Общая численность популяции Юго-западного участка ареала составляла на 1997г. 25-31 особь (Пикунов и др., 1999).

В январе-феврале 2000г. на этой же территории было учтено: 4-5 самцов, 8-9 самок без котят, 1-2 самки, находящихся в сопровождении 1-3 молодых. Общая численность популяции не превышала 22-27 особей (Пикунов и др., 2000).

Можно предположить, что до настоящего времени включительно популяция с определенными сложностями пока удерживается почти на одном уровне. Лишь в последние годы просматривается некоторая тенденция к ее снижению. Незначительный репродуктивный потенциал не способствовал росту популяции, а стабилизировался естественной смертностью или, что более очевидно, гибелью животных преимущественно от браконьеров. Все более очевидным становится дальнейшее снижение репродуктивного потенциала. К 1997г. ареал в Юго-западном участке по сравнению с 1972-73гг. сократился почти вдвое и сегодня занимает площадь на российской стороне не более 2600 кв. км (Пикунов и др., 1999). Перспектив для восстановления популяции ДЛ естественным путем с каждым годом остается все меньше и меньше. В лучших леопардовых местообитаниях по долинам рек Борисовского плато ежегодно возрастает фактор беспокойства. Сюда для охоты, рыбалки, сбора дикоросов и просто для отдыха ежедневно заходят 15-25 автомашин. Посещение отдаленных районов Ситхотэ-Алиня для подавляющего большинства населения становится все более дорогостоящим. Ограничение доступа людей в

основные леопардовые местообитания невозможно осуществить в условиях ведения охотничьего хозяйства. При этом даже в сезон охоты не более 15-20% охотников охотятся законно, т.е. имеют путевку на право охоты, соответствующие лицензии на отстрел животных и разрешения на оружие. Основная масса охотников, представляющих местное население, охотится нелегально и не поддается никакому контролю. Более того, не менее 75-80% даже самых лучших леопардовых местообитаний (например, территория Борисовского плато) являются охотничьими угодьями различных военных ведомств (см. карту).

Результаты мониторинга популяции амурского тигра и ДЛ, проводимого нами на средства WCS и при поддержке Хорнокерского института охраны дикой природы подтвердили, с декабря 1998г. по февраль 2000г. четко подчеркивают явное скопление ДЛ, тигров и диких копытных именно на той ограниченной территории, где существует зона покоя и официальная охота запрещена.

За минувшие 20 лет с территории Юго-западного участка полностью исчез изюбрь, который до конца 70-х годов включительно являлся обычным охотничьим объектом. С этой территории практически исчезла кабарга, которая практически до начала 80-х годов была одним из самых массовых видов копытных. Вне всякого сомнения, та же участь может постигнуть и ДЛ в течение последующих 5-10 лет.

Юго-западный участок ареала нуждается в особом природоохранном статусе. Следует обеспечить его, учитывая степень современного хозяйственного освоения таким природоохранным режимом, где приоритет должен быть за сохранением леопардов. Предлагаемая нами для охраны леопарда территория должна быть разбита на следующие по режиму участки.

ПЕРВАЯ ЗОНА. Наиболее действенной мерой охраны территории местообитаний является создание заповедников. Крупные кошки в этом плане естественно не являются исключением. Учитывая это, мы полагаем совершенно необходимым создание заповедной территории в лучших местообитаниях ДЛ в районе Борисовского плато, западной части заказника Барсовый, Нежинского охотхозяйства и заповедника Кедровая падь. Ландшафтное биологическое разнообразие названной территории вне сомнения не имеет аналогов не только в ДВ регионе, но и в целом по РФ. Уникальность природных комплексов данной территории послужило основанием для ее включения, как потенциального заповедника в «долговременную программу охраны природы и рационального использования природных ресурсов Приморского края до 2005г.» 1992г. По существу это единственная и наиболее надежная форма охраны последних и лучших местообитаний ДЛ. Здесь сегодня обитает 2/3 популяции ДЛ и пока среди них есть размножающиеся самки. Создание заповедного режима на предлагаемой нами территории в РФ соответствует аналогичной и сохранившейся территории на китайской стороне. Это послужит важным аргументом для дальнейшего создания международного природоохранного резервата. Полный мораторий на охоту должен быть одинаков для КНДР, КНР и, в обязательном порядке, для России, где пока существуют и являются лучшими последние местообитания ДЛ.

ВТОРАЯ ЗОНА. Должна выполнять роль охранной зоны заповедной территории. Она должна иметь статус заказника федерального подчинения. Здесь в обязательном порядке должна быть исключена всякая охота, а также промышленные

заготовки леса. Разрешается ограниченные рубки леса для нужд местных жителей, продолжение производства зерновых и др. с/х культур, животноводства, в том числе паркового оленеводства. Здесь предусматривается проведение комплекса биотехнических мероприятий, направленных на улучшение или увеличение численности диких копытных. Во вторую зону должна входить вся территория, находящаяся между линией КСП и государственной границей РФ-КНР. Сюда входит вся территория, расположенная западнее трассы Уссурийск-Хасан от с. Тереховки до пос. Краскино. В эту зону входят также территории оленепарков, включая о. Гамов.

ТРЕТЬЯ ЗОНА. Рекреационная и курортная от побережья Японского моря до трассы Уссурийск-Хасан. Разрешается ограниченная хозяйственная деятельность, не оказывающая отрицательного действия на местообитания ДЛ, разрешается регламентированное ведение охотничьего хозяйства.

COMMENTS AND PROPOSALS FOR A DISCUSSION ON FAR EASTERN LEOPARD PROTECTION

V. Lukarevsky

The Far Eastern leopard currently has only 300,000 - 400,000 ha of habitat and it is physically impossible to increase it. Even so, this figure does not include agricultural lands and villages. So the true areas is 300-400,000 ha and that means, if we exaggerate quite a bit, that this area can support 30-40 mature females, with individual home ranges of 10,000 ha. In practice, however, the situation is completely different. If we aim to increase the population, the area could support 60-80 mature females, not counting males. That is the ideal situation.

This is the goal that we should aim for and that we should understand when planning environmental protection actions. How do we reach this goal? In practice we can achieve 30-40 adult females. This situation would remove the need for reintroduction.

How can we expand habitat? Only by expanding into lands that were formerly a part of Far Eastern leopard habitat. These lands are more than 80% of the habitat and are located in China. That is a separate question that should be discussed together with other international questions.

As for the Russian Federation, we need not speak of increasing the area of habitat, but about increasing their carrying capacity and effectiveness.

How can we achieve this? We need to change: (a) the structure; (b) the configuration; and (c) the management of protected territories.

The system of protected territories, including hunting enterprises, should be under single management, at least the hunting enterprises. We need to make sure that all leopard habitat in Russia is located in a "single set of hands," that is, in the control of environmental protection agencies. As a minimum, that they are subordinated to a single agency. One organization needs to be responsible, not dozens.

The protected area system should serve as the core of leopard population, not in a geographic sense, but from the point of view of effectiveness. The population core should consist of three to five compact groups.

What does a compact group mean? That presupposes that, for example, for a 10-15,000 ha area, we should have at least three, regularly reproducing, females, given that we know that an adult female has a home range of 5-6,000 ha.

Those areas should be very strictly protected. That will give us 12-15 regularly reproducing females in the core population, not counting other territories. The total area of these territories should be at least 90-100,000 ha.

What should this organization be? I suggest that the most appropriate form to achieve our goals is a Biosphere Reserve (zapovednik) made of several clusters. Then, when our Chinese neighbors join this decision, this structure can be expanded to international status.

Let's return to the effectiveness of a protected area. Under the circumstances described above, we can have, and just from the core population, at least 5-6 cubs; this is a reserve population from which at least 1 or 2, or even 3-4 cub can be a source for dispersion, something that has been proven by a different subspecies.

Under favorable conditions, we know that these young cubs will move as far as 50-100 km to "restore" historical range. But only under one circumstance: only if there are restored habitats. This can realistically be achieved in less than five years.

We know that the Far Eastern leopard lives in the same habitat as the Amur tiger. We know that the leopard disappeared from the southern Sikhote-Alin more than thirty years ago.

Statements that the tiger does not force out leopards is something that I take as unproved. The example of southeast Asia, where both species live together, cannot be seen as a norm for the northern part of the range. One cannot compare the habitat carrying capacities of these species in north and the south. The carrying capacity of tiger and leopard habitat in the north is significantly lower.

An analysis of the literature (Matyushkin 1977; Korkishko 1986, etc.) shows that these two species use home ranges in almost identical ways. That is proof enough to say that competition is almost inevitable. It also demonstrates the point that in the last 30-40 years, tigers have steadily increased their population and range, while just the opposite can be said for the leopard. It is also known that in this period, the range and population of sika deer has increased while the roe deer population has decreased.

We can thus suggest that the reason for a decrease in leopard population and range is connected with those facts.

The solution to these problems can be found in wildlife refuges (zakaznik), buffer zones and hunting enterprises. These assumptions are corroborated by the data of Dmitri Pikunov. Pikunov points out that the number of leopards on the Shufanskoye Plateau was higher in hunting enterprises than after a portion of this enterprise was reorganized into a wildlife refuge.

This is support for the fact that in practice we can and should support a reduction in the sika deer population and an increase in the roe deer population, and thus have leopard, and not tiger habitat

As for hunting enterprises and hunting in general, where it is allowed in leopard habitat, hunting should be permitted only for sika deer, red deer, wild boar and waterfowl. All other types of hunting should be prohibited.

How can we optimize a system of protected areas?

We should reexamine the shape of the existing system. To not create an illusion of a large area of protected territories, wildlife refuges should be shifted to wildlife reserves (zapovednik), even if this means decreasing the total area, but increasing the effectiveness of territories.

A system of protected territories should include areas on both sides of the Chinese/Russian border that combined with the existing Russian territories, would increase the general protection of the habitat.

Whose jurisdiction would these protected territories be? Many years ago Viktor Korkishko proposed considering wildlife reserves (zapovedniks) as part of a world heritage system for not just the then Soviet Union but for the entire world, and that management would be through non-government organizations. This is a question for the future. Currently, the most effective scheme would be to subordinate them to a governmental structure which is to the Federal wildlife reserve (zapovednik) system.

2. Do we need a second (third) population? Undoubtedly, the answer is yes, but today this is only a theoretical question. We need to create a true population in captivity, and in the wild prepare territories for future reintroduction, if this question, with time, remains relevant.

Reintroduction is possible. Potential territories for reintroduction are in the southern Sikhote-Alin and some areas in China, but only when leopard habitats are prepared and restored. These are territories where satisfactory refugees exist and where the roe deer population is at least 15-20 individuals per 1,000 ha.

How would reintroduction be carried out? In the practice, it could look like this. At reintroduction sites large enclosures are built on tens or maybe even hundreds, of hectares for females and cubs. Roe deer are placed in these enclosures for adults and cubs to learn hunting skills. In mating season, if cubs are already a year old and are capable of independently hunting, they are removed to another enclosure where they are tested for the ability to independently survive, and in two to three months, they are released to an open enclosure. This is one possible method.

A second possibility would be for leopards ready for independence or better yet, pregnant females ready for delivery, to be released into prepared habitat. What do we mean by preliminary prepared territories? We have adequate knowledge on how leopards use their home ranges. Several days before the release, one person "spreads" throughout the "home range" the individual's smell, that is, the smell of the individual that is about to be released.

As for males, young animals, two to three years old, should be released, using the same procedure as for females, that is, with a preliminary distribution of the smell of a host.

3. Do we need to manage the existing wild population? Are we sure that a threat of inbreeding exists for real? Are we sure that the threat of inbreeding really exists? Is there any other research other than the data of Korkishko?

4. The captive population should be increased by animals from the wild population. In this I am convinced.

5. We need to now recommend and request appropriate structures in China to take the same range of measures for creating a system of protected territories - the very system that presently exists in Russia for tiger protection. Especially important is to examine clusters on the border with Russia. This will provide an opportunity to tie all protected areas into a united network.

6. Should deer parks be managed and is it worth the effort? Absolutely so and it is worth it not only in the event that it is effective. The situation with deer parks in recent years has dramatically changed and I do not have any information about their condition. With additional information I will be ready to share my thoughts on this. As to shifting deer parks into the "leopard parks," that looks a lot like building temples during a general collapse. Aside from the major investments, we, or to me exact, the leopards will not get anything out of the process. One can create such parks for those animals that are in trouble, and just leopards, and so, in the taiga of the Far East, they can be built for all animals. In such a case, the illustrative impact would be the same, if not greater, than a "leopard park." It would be better to use those funds in real protection of the core group of leopards.

SUITABLE HABITATS

Vladimir k. Abramov

Ussuriski Zapovednik

Develop protected areas with different natural resource use regimes in the southwest portion of Far Eastern leopard habitat: zapovedniks, federal zakaznik, area of restricted land use.

Zapovednik regimes should extend throughout the Kedrovaya Pad Zapovednik, the most central and northern parts of the Federal Barsovy Zakaznik, Nezhinskoe and Borisovskoe Hunting Leases, and outlying eastern areas of Borisovskoe Plateau.

A federal zakaznik regime should extend over the rest of Borisovskoe Plateau Zakaznik, along a four to five km stretch of northern and eastern borders of zakaznik to the south with an entrance to the Vladivostok-Khasan highway to the Sukhanovskiy pass, then to the west approaching to the border patrol fence to the south under Kraskino. A federal zakaznik regime should be announced in for the Gamov peninsula. Area of restricted land use should bend along the federal zakaznik area from the northern and eastern sides.

SESSION 2. Genetics of Far Eastern Leopards and Management of the Captive Population

FAR EASTERN LEOPARD GENETIC BACKGROUND: IMPLICATIONS FOR MANAGEMENT AND POTENTIAL RESTORATION ACTIONS Prepared by the Genetics/Captive Management Working Group

The Far Eastern leopard (*Panthera pardus orientalis*) survives as a single small relict population of between 30 and 50 individuals in the Russian Far East (RFE). The population descends from a 19th century Northeast Asian subspecies whose range had extended through eastern Russia, North Korea and North Eastern China. A molecular genetic analysis of leopard DNA collected from the remaining RFE population and from captive animals derived from the North Korean (NK) population, using mitochondrial gene sequences (Control region and NADH5; 727 base pairs) plus 25 nuclear microsatellite loci, has revealed a marked depletion of population genetic diversity relative to that observed using the same genetic markers in other leopard subspecies. The genetic results are described in detail in two scientific reports authored by Uphyrkina, Miquelle, O'Brien and collaborators that are submitted for publication. The findings affirmed the subspecies level distinctiveness of the *P. p. orientalis* specimens and also demonstrated a close genetic relationship with the formerly adjacent Chinese subspecies, *P. p. japonensis*. The observations were evident for both the RFE and the NK populations, samples of which (although limited - 7 and 5 individuals respectively) showed highly similar genotypes and amounts of genetic depletion.

The levels of diversity measured are remarkably low, indicative of a history of inbreeding in the population for several generations. The levels of genetic depletion observed in *P. p. orientalis* is comparable to the reduction observed using the same genetic techniques in the severely inbred Florida panther (*Puma concolor coryi*) and the relict Asiatic lion (*Panthera leo persica*) from the Gujarat state in western India. Such levels of genetic reduction have been associated with severe congenital and reproductive abnormalities that impede the health, survival and reproduction of some but not all genetically diminished small populations. Such abnormalities have not been observed in the free ranging *P. p. orientalis* population, although sufficient monitoring to exclude their occurrence has not been achieved. When considered in the context of non-physiological perils that threaten small populations (e.g. chance mortality, poaching, climatic extremes, infectious disease and others), the genetic depletion and demographic data indicate a critically diminished population under severe threat of extinction.

The captive population of Amur leopard was established in 1961 from 9 wild born founders as a back-up to the wild population. Molecular genetic analysis of a sampling of 22 individuals revealed that the population contains appreciable genetic diversity compared to the wild population or other leopard subspecies. However, that diversity is clearly the result of representation of a mixture of founders from *P. p. orientalis* and another subspecies, most likely the neighbouring *P. p. japonensis*. At least two founders (SB2 and SB89) and their offspring show genetic influence that is diagnostic for *P. p. japonensis* inclusion.

As such the captive population is robust and genetically diverse and should be considered as a potential source for restoration of the genetically diminished wild population. Evolutionary

coalescent calculations based on molecular genetic distance between subspecies indicate that gene flow between *P. P. orientalis* and *P. p. japonensis* likely occurred in the last 1000 years and as recently as 200 years ago. Thus the captive population would genetically reflect the common gene flow status of a contiguous range of East Asian leopards that had occupied Asia a millennium ago. As such it would seem to provide a suitable candidate population for potential restoration of the wild population of *P. p. orientalis*.

GENETIC STATUS OF THE CAPTIVE POPULATION OF FAR EASTERN LEOPARDS

Prepared by the Genetics/Captive Management Working Group

A total of 160 Amur leopards (*Panthera pardus orientalis*) are held in zoos in Europe and Russia (the EEP) and North America (the PMP). This population has a founder base of 15 animals, of which three have not yet produced any surviving offspring. Four of the founders are on record as originating from Russia, ten (including the three that have not yet bred) from North Korea, and one from an unknown location – the notorious founder number 2.

Molecular genetic work indicates that not only founder 2 but also founder 89 belongs to the subspecies *P. p. japonensis*, from northern China. While founder 89 constitutes only 4% of the genome of the living population in 2001, only ten of the 160 living animals in the managed zoo program do not contain any genetic contribution from founder 2. These ten animals consist of six adults which originated from North Korea and four cubs born to them, and are listed in Table 1 below.

Location	ID No	Origin	Sex	Age	Status and notes
Moscow Zoo	212	Wild-caught, Korea	F	~12	Infertile, never bred.
Moscow Zoo	460	Unknown if wild-caught or captive bred, Korea	M	~8	Fertile, no surviving offspring yet
Prague Zoo	211	Wild-caught, Korea	M	~12	Fertile, has bred.
Prague Zoo	294	Unknown if wild-caught or captive bred, Korea	F	~10	Never bred and poor health. Probably infertile; has had hormone treatment
Prague Zoo	376	Assumed wild-caught, Korea	F	~8	Fertile, has bred.
Prague Zoo	492	Born in Prague to 211 and 376	M	~2	Too young to assess fertility. Has skeletal defects in front legs
Rotterdam Zoo	451	Born in Prague to 193 and 376	M	~4	Has only one testicle. Not yet bred.
Berlin Tierpark	216	Wild-caught, Korea	M	~12	Fertile, never bred.
Berlin Tierpark	452	Born in Prague to 193 and 376	F	~4	Not yet bred
Prague Zoo	515	Born in Prague to 193 and 376	M	0	Too young to assess fertility. Has skeletal defects in front legs

Table 1. Living Far Eastern leopards without genetic contributions from founder 2

As can be seen, of the ten living animals with no contribution from founders 2 or 89, one is infertile, another is probably infertile, two are fertile but have not yet produced any surviving

offspring, several are close to the end of their reproductive lives, and three of the young ones have defects that are probably due to inbreeding.

It has been clear since 1998 that these few leopards derived solely from Korea are not nearly numerous enough, nor from a sufficiently large founder base, to produce a healthy and viable population if they are managed in isolation. EEP policy has therefore been to mate leopards without any founder 2 in their genome to leopards with low levels of these founders in their genome, instead of exclusively with each other. In addition, in order to minimize the contribution of founder 2 as far as is possible, while still maintaining a healthy level of genetic diversity, all leopards with more than 41% founder 2 have been excluded from the EEP breeding pool entirely (the origin of founder 89 was only discovered in 2001, and her contribution to the population is insignificant in comparison to founder 2). The PMP population does not contain any animals without founder 2 in their genome and so did not have to make the management decision above, but is effectively being managed on similar lines.

There are approximately 100 animals in the EEP and PMP with less than 41% founder 2 in their genome. With good management, this population is capable of retaining about 90% of the genetic diversity one might expect to find in the wild over at least the next few decades.

A matrix of “similarity co-efficients” among the leopards without founder 2 or 89 in their genomes, produced from the molecular genetic analysis, was seen by the EEP Coordinators for the first time at the May 2001 Amur leopard workshop in Vladivostok. Relevant data are reproduced in Table 2 below (provided by the Laboratory of Genomic Diversity).

SB #	211	212	193	142	451	376	492	294	216
211									
212	0.78								
193	0.78	0.76							
142	0.76	0.82	0.86						
451	0.78	0.72	0.86	0.80					
376	0.84	0.78	0.86	0.76	0.84				
492	0.88	0.73	0.71	0.69	0.69	0.79			
294	0.80	0.84	0.78	0.78	0.74	0.80	0.77		
216	0.77	0.83	0.73	0.71	0.75	0.83	0.74	0.79	
460	0.77	0.79	0.75	0.77	0.71	0.77	0.72	0.81	0.74

Values shown are the coefficient of similarity (Mxy). A parent-child, or brother-sister pairing in a large unrelated population would have a coefficient of 0.5. The high values shown here are equivalent to the result of continuous brother-sister matings over generations.

Pairing between 211 and 376 – has produced one cub with bone deformity

Pairing between 193 and 376 – has produced one cub with one testicle and one with bone deformity

Table 2: Coefficients of similarity (Mxy) between the leopards without genetic contribution from founder 2.

The data in Table 2, in combination with the recent birth of the third defective cub, make it clear that the existing EEP policy does not go far enough; in fact, all attempts to produce cubs

from pairings between the Korean leopards listed in Table 1 should cease immediately. Those Korean leopards that are fertile should be paired instead with animals containing low levels of founder 2 in their genome in order to begin producing healthy, less inbred cubs while also decreasing the overall representation of founder 2 in the population. Once this process is under way, and if a restoration program is judged to be a necessary and feasible part of an integrated strategy for the long-term conservation of Amur leopards in the wild, it is likely that in about three years time the captive population will be in a position to provide adult stock from which cubs could be produced for such a program.

POTENTIAL FOR THE CAPTIVE POPULATION OF FAR EASTERN LEOPARDS TO SUPPORT RECOVERY OF WILD LEOPARD POPULATIONS IN THE RUSSIAN FAR EAST

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Introduction

Amur or Far Eastern leopards are held in zoos in Europe (including Russia), North America, North Korea, Japan, China and Indonesia. There are active management plans and studbooks for these leopards in Europe/Russia (the EEP) and in North America (the PMP). Some of the remaining leopards in the Asian zoos might be useful breeders, but none of them are currently part of any managed programme. With the possible exception of the leopards held in Japan, it appears unlikely that this situation will change.

Managed captive populations of this (or any other) taxon can support the conservation of their wild conspecifics in four ways: generation of awareness and education; generation of funds; generation of useful information and skills; and of course the conservation of a representative gene pool as a hedge against extinction in the wild. The gene pool is covered first, and in most detail, here as it is of great importance for this cat.

Genetic status

The managed captive population has a genetic base of a maximum of 15 individuals (see Table 1). All but five of these are dead. Those leopards that came from Korea in recent years all came from Pyongyang Zoo and are almost certainly closely related to one another. However as we have no exact records of their parentage they are listed in Table 1 as individual founders. Table 1 thus gives the *most optimistic* view of the genetic base; it is probably more limited than this in reality.

Three potential founders listed in Table 1 have not yet bred. Of the 12 effective founders (founder leopards that contributed to the captive population before dying or becoming post-reproductive) seven came from North Korea and four from Russia. The remaining founder leopard (#2) came from an unknown location. According to DNA studies, this founder was not very genetically distant from the Amur leopard's gene pool as it historically existed before recent events reduced the wild population. Indeed, it probably came from the same population from which the Russian population later evolved.

ID No	Sex	Origin	Age	Location	Status
2	M	Wild-caught, unknown location	–	N/A	Dead – many descendants
3	F	Wild-caught, Russia	–	N/A	Dead – many descendants
14	M	Wild-caught, Russia	–	N/A	Dead – has descendants
15	F	Wild-caught, Russia	–	N/A	Dead – has descendants
35	M	Wild-caught, Russia	–	N/A	Dead – has descendants
89	F	Wild-caught, Korea	–	N/A	Dead – has descendants
136	M	Wild-caught, Korea	–	N/A	Dead – few descendants
140	M	Wild-caught, Korea	–	Pyongyang Zoo	Dead or post-reproductive – has descendants
141	M	Wild-caught, Korea	–	Pyongyang Zoo	Dead or post-reproductive – has descendants
193	M	Assumed wild-caught, Korea	–	N/A	Dead – few descendants
211	M	Wild-caught, Korea	~12	Prague Zoo	1 surviving offspring to date
216	M	Wild-caught, Korea	~12	Berlin Tierpark	No surviving offspring to date
294	F	Unknown if wild-caught or captive bred, Korea	10	Prague Zoo	Never bred – almost certainly post-reproductive
376	F	Assumed wild-caught, Korea	~8	Prague Zoo	3 surviving offspring to date
460	M	Unknown if wild-caught or captive bred, Korea	~8	Moscow Zoo	No surviving offspring to date

Table 1. Founder base for the global managed Far Eastern leopard population in zoos

Approximately 160 Far Eastern leopards are now part of the global managed population (the EEP and the PMP leopards). All but nine of these animals carry in their genome some genetic contribution from this founder (#2) that was not of Russian or Korean origin. Given the small size of the present population in the wild, the fact that founder 2 did not originate from Korea or Russia is probably of little importance. In fact, it may be of great benefit because its slight difference in origin increases the overall genetic diversity of the population.

The nine living leopards which do not contain a genetic contribution from founder 2 have been the subject of extensive health and reproductive assessments carried out by the Amur leopard EEP. Their status is reported in Table 2

Location	ID No	Origin	Sex	Age	Status and notes
Moscow Zoo	212	Wild-caught, Korea	F	~12	Never bred, known to be infertile
Moscow Zoo	460	Unknown if wild-caught or captive bred, Korea	M	~8	Fertile, breeding with female with 12% founder 2, no surviving offspring yet
Prague Zoo	211	Wild-caught, Korea	M	~12	Fertile, breeding with 376 (0% founder 2), also being mated to female with 38% founder 2
Prague Zoo	294	Unknown if wild-caught or captive bred, Korea	F	~10	Never bred and poor health. Probably infertile; has had hormone treatment
Prague Zoo	376	Assumed wild-caught, Korea	F	~8	Fertile, breeding with male 211
Prague Zoo	492	Born in Prague to 211 and 376	M	~2	Has skeletal defects; future uncertain
Rotterdam Zoo	451	Born in Prague to 193 and 376	M	~4	Has only one testicle. Nevertheless, to be mated to a female with 25% founder 2
Berlin Tierpark	216	Wild-caught, Korea	M	~12	Fertile, never bred. To be mated with female 452 (0% founder 2), and with several other females with between 20 and 40% founder 2
Berlin Tierpark	452	Born in Prague to 193 and 376	F	~4	To be mated to male 216

Table 2. Living Far Eastern leopards without genetic contributions from founder 2

As can be seen in Table 2, of the nine living animals with no contribution from founder 2, one is infertile, another is probably infertile, two are fertile but have not yet produced any surviving offspring, several are close to old age, and two of the young ones have defects that may be due to inbreeding.

The PMP population does not contain any animals without founder 2 in their genome and so did not have to make the management decision above, but is effectively being managed on similar lines.

Genetic analysis has been carried out using the GENES software. The global population is currently retaining about 86% of the genetic diversity one would expect to find in a wild population, with the potential to increase this to 95% through good breeding management. The maximum potential given by the genetic analysis can never be attained in practice, but we can realistically expect to achieve the generally accepted target of 90% retention of genetic diversity. Neither the EEP nor the PMP populations could achieve this in isolation, so continued management of both regions is essential.

One concern that all three coordinators of the global captive population share is that some other agencies involved have expressed interest in obtaining additional captive stock from the wild. Given the very small size of the wild population, the well-studied Russian one being estimated to be only 25-30 individuals, such actions are not thought by the EEP and PMP Coordinators and the International Studbook Keeper to be in the best interest of conservation. Moreover, both the EEP and PMP populations are growing. Although the founder base of the global captive population could be larger, it may differ little from that of the wild population in the RFE as this is a small and fragmented population. The EEP and PMP managers therefore feel that only an injured or orphaned animal should ever be considered for transfer to the global managed programme, and then only to an EEP zoo. Since no such animals have been identified since the 1996 workshop, leopards from such sources are not anticipated.

It may be that at some stage supplementation of existing wild stock, or reintroduction to form a second wild population, is put forward as a necessary and feasible conservation action, using leopards from the global captive population. Before the captive population could be used as a source for animals for such a purpose, it must be further developed and increased so that removal of animals for release did not impact the genetic or demographic viability of the remaining captive stock. This process is likely to take until at least 2005.

Other forms of conservation support

- ◆ *Funding.* Both the EEP and the PMP are actively engaged in fund-raising for the field and have to date contributed over US\$130,000 in total, through the *Tigris Foundation*. This is a very substantial proportion of the funding so far supplied from all sources for the conservation of wild Amur leopards.
- ◆ *Awareness and education* Both the EEP and the PMP have actively supported websites carrying information on Far Eastern leopards, and of course the individual zoos involved all seek to inform and inspire their visiting public to support the conservation of these cats.
- ◆ *Information and skills.* The managed programmes have also been able to contribute to the general store of knowledge about these leopards through provision of tissue samples for taxonomic, veterinary and genetic work, and photographs and carcasses of known-origin animals for morphological studies. The programmes are also providing committed and informed individuals who have contributed, and will continue to contribute, their time and energy to the production and implementation of collaborative conservation plans to ensure the continued existence of wild Amur leopards.

Both regions of the global managed programme are committed to continuing to provide support for the conservation of Far Eastern leopards in the wild by every possible means.

In summary, the few remaining leopards derived solely from Korea are not nearly numerous enough, nor from a sufficiently large founder base, to produce a healthy and viable population if they are managed in isolation. Because of this, it is established EEP policy since 1998 that:

1. Leopards without any founder 2 in their genome, especially the males, will be mated to leopards with low levels of founder 2 in their genome, instead of exclusively with each other.
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SESSION 3. Reintroduction of Far Eastern Leopards

REINTRODUCTION OF THE FAR EASTERN LEOPARD INTO THE SOUTHERN SIKHOTE-ALIN

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It is difficult to rely on the long-term conservation of this subspecies of leopard without development of a second population of Far Eastern leopard in the Russian Far East. The basis for a second leopard population in the southern Sikhote-Alin is its long-term habitation in this area in the past, and data based on interviews of local people in this area at present time. According to foresters and hunters, lone individuals, pairs, and females with cubs have been registered in Ussuriyskii, Mikhailovskii, Shkotovskii, Lazovskii, Chuguevskii, Kovalerovskii and Olginskii Raions of Primorskii Krai since the early 1980s (Drawing 1.). Inspection tiger documented a case of a leopard being hit by a car in the area of Tavrichanka (Nadezhdinskii Raion).

For reintroduction to be successful, we have to answer one fundamental question: Why did the leopard disappear from the southern Sikhote-Alin in the middle of the previous century? An analysis of the literature and interview data presents the following picture. As early as the beginning of the 19th century, leopards, together with tigers, inhabited the southern Sikhote-Alin (Przhevalskii, 1870. Arseniev, 1949). Information on the disappearance of the leopard in the southern Sikhote-Alin is available for the 1860-1870 period, this at a time when Amur tiger number were increasing. A special leopard survey was conducted in the Sikhote-Alin only in the beginning of 1980s (Pikunov, 1988). The most difficult period for analysis is during the Second World War and the post war period because there is almost no published information about that period of time. This was, however, when the southern Sikhote-Alin was host to a large military contingent, and the population density was incomparable with current density. A huge army of convicts and peasants were used for the military service. Intensive agriculture and livestock grazing in remote areas provided the military and civil population with food. Fishing and fish processing collectives were organized in all suitable bays. Teams of hunters were sent into the forest for game, and activity that went on year round. A result was that ungulate numbers reached an historic low. Sika deer remained only in shore-side areas of Olga and Moryak-Rybolov Bays. There were no ban on hunting predators and they were shot year round. The disappearance of the leopard in these conditions could be entirely expected.

In choosing a site for reintroduction, Amur tiger density must take into consideration since both these big cats are competitors. According to Valov (1989), historical experience at the Lazovskii Zapovednik shows that the leopard existed in the zapovednik at a time when the tiger was absent but as tiger numbers increased at the end of the 1960s and early 1970s, leopard tracks were less often encountered, and then disappeared entirely.

A documented kill of a leopard by a tiger was reported in March 2001. Rangers at the Borisovskoe Hunting Lease registered the incident and the cause of death was confirmed in an autopsy preformed by specialists and independent experts. V.N. Dyukov, inspector with Inspection Tiger, has twice found leopards killed by tigers. The difficult conditions of the mountains of the Sikhote-Alin make it difficult to trace incidents of leopard being trailed and

killed by tigers because the corpse, depending on conditions, is used in a matter of day, if not hours. Competition between the two large cats for food and home range mostly exists here as in other areas of the world (Seidensticker, 1976). Not only adult individuals die, but also young leopards.

Thus, the following things are necessary for the leopard introduction in Sikhote-Alin: high number of ungulates, habitats undisturbed or slightly impacted by humans, and within the limits of the possible low number of the tiger.

There are two sources of leopards for reintroduction: leopards born and raised in zoos and leopards raised in a special reintroduction center passed through rehabilitation program for life in the wild.

After discovery that "active" founder leopard #2 was imperfect, the main part of leopard population in zoos was identified as "not pure". Despite the assurances of geneticists that the genetic status of the Far Eastern leopard did not suffer from breeding with male #2, some biologists consider descendants from male #2 as not "pure" breed leopards from southwest Primorye. So in developing a leopard population for the Sikhote-Alin, it is necessary to start leopard reintroduction at the most remote possible location from southwest Primorye.

Taking into account all these features, there are two possible ways of obtaining material for a leopard reintroduction project in the Sikhote-Alin. The first is to use young zoo leopards whose relatives descended from male #2. A second way is "pure" individuals raised in a special breeding center from zoos specimens and wild individuals with physical and psychological defects.

At the current time it is unacceptable to save the Far Eastern Leopard by capturing animals from the wild population.

There is one more problem connected with leopard reintroduction in the Sikhote-Alin. Some specialists consider acclimatization a very expensive process. From my point of view, a leopard acclimatization project the Sikhote-Alin will be much cheaper in comparison with a mountain lion acclimatization project in Florida. Currently there are significant amounts of habitat relatively unaffected by human activity and that have large ungulate populations in those areas where in the 1960s and 1970s leopards were documented. These are areas located in the southern Olginskii Raion, on the seashore near Evstafiya Bay. This is a low elevation area with low mountains, oak and Korean pine, broad leaf deciduous forest with cliffs both along the seashore and inland. The area has a low snow pack and a short winter. The area's geographical latitude is the same as the Borisovskoe Plateau. Our data for recent years shows an average sika deer density of 25-30 individuals in this area, and in winter, along the sea shore, the density reaches 70-100 individuals / 1,000 ha. The roe deer density is 8-10 individuals / 1,000 ha, and the wild boar density is 10-15 individuals / 1,000 ha. There is a goral micro population in uncovered cliffs, red and musk deer inhabit mid reaches of mountains, with densities of 5-7 individuals and 2-3 individuals / 1,000 ha, respectively. There is a Manchurian hare population in the area, an average badger and raccoon dog density of 15-20 and 7-10 individuals / 1,000 ha, respectively. Ungulates concentrate in this area in winter when they migrate to areas with less snow, and in spring - when they migrate to the sea for salt.

Tiger tracks have been documented for short periods of time in the last 5 years, an event probably connected with constant migrations of wild boars to adjacent areas. Anthropogenic impact is not substantial, and the distance south to the nearest settlement exceeds 30 km, to the north - 100 km, to the west - about 60 km. Vasilkovskii Zakaznik is located to the north of Evstafiev Bay, Lazovskii Zapovednik is to the south and the area of a future national park to the west. So reintroduced leopards could not only find home ranges in areas with little human impact, there are also highly protected territories in this area.

There will be no costs to increase ungulate numbers with introduction and protection costs will be minimal. The high ungulate numbers means supplemental feeding will be a minimum expense.

The most suitable version for leopard reintroduction is to use genetic material from zoos, from the offspring of male #2. Young leopards should be brought to the reintroduction area and placed in enclosures built in a way that minimizes changes to the natural surroundings. The leopards will adapt to local conditions here and, if necessary, develop the skills to live in the wild. It could take several months, but the Florida panther experience shows that adaptation can take as little as several weeks. In addition, genetic material from rehabilitation and breeding centers can be used, if these are created. To establish an independent population, at least ten leopards must be raised and prepared for release into the wild. In a year, another ten leopards can be released. Based on success in dispersing, in the second year leopards could be transported to the nearest suitable habitat. Thus, with favorable circumstances, in six to eight years there could be a leopard population in the Sikhote-Alin of 40-50. The big surprise might be the breeding of introduced with the resident leopards in the Sikhote-Alin.

To reduce program costs, the enclosures can be built near ungulate concentrations on the coast. When coming migrate to the sea, they can periodically be herded into the leopard enclosures, this way solving part of the prey problem. The true reintroduction expenses will be the cost of the enclosures and a maintenance staff. Release into the wild from enclosures can be done once the leopard adapt and begin to take prey on their own. Tracking can be done with radio collars. Upon release, the leopard enclosures should be left opened and, if necessary, provide food. The next set of expenses is funds to monitor and habitat protection measures. A team of specialists should monitor population conditions for three to four years. Inspection Tiger and the Primorskii Krai Wildlife Department should provide operative groups for further protection activities.

Thus, the most important aspect of Far Eastern leopard conservation is to develop a second leopard population in the Sikhote-Alin. The most suitable approach for leopard adaptation is to use young individuals from zoos, and first of all, those who have a genetic connection to male #2. The most suitable location for leopard reintroduction, according to IUCN requirements, is an area near Evstafiev Bay. According to an expert assessment, project costs are estimated at several hundred thousand dollars. In the event this preliminary variant wins approval, a detailed project for reintroduction of the Far Eastern leopard, with all necessary operational factors, will be developed.

REINTRODUCTION IS THE WAY TO SAVE THE FAR EASTERN LEOPARD IN THE WILD

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The low number of Far Eastern leopards and its currently, very restricted habitat are the two main obstacles impeding the population from restoring its former range. An additional obstacle is low reproduction that only maintains the quantitative structure of the population at a level of sustainable depression. Therefore, conditions in leopard habitat do not meet the needs of the species to "enlarge reproduction." The population is barely able to compensate for losses through its own reproductive cycle. The existence of several areas inhabited by the leopard will secure preservation of the gene pool of the wild population. A similar situation existed with the Amur tiger in 1930's through the 1950's. However, a limited number of tigers were able to recover because of a huge area of suitable habitat and because of inhabited fragments in Russia, China and Korea. Undoubtedly there was an exchange of individuals between those fragments that provided a boost to habitat restoration. Therefore, human intervention by reintroducing tigers was not required. The situation with the leopard is much more dangerous and immediate human intervention is necessary for its preservation in the wild. Thus, leopard reintroduction is inevitable.

I envision the following reintroduction plan:

1. Place for reintroduction - the entire forest covered area from the left bank of the Razdolnaya River, including the Nesterovka, Ilistaya and Komissarovka Rivers watershed (eastern slopes of the Pogranichnyi Ridge) in Russia and also in adjoining spurs of the Pogranichnyi Ridge in China. Timber harvest and all types of hunting should be banned from this area; the area should be established as a protected area with the status of a Federal wildlife reserve (zakaznik), with responsibility for its management transferred to the Ministry of Natural Resources. The presence of a roe deer, wild boar and red deer in this area provides adequate prey for the leopard. Simultaneously, sika deer, which also used this area not long ago, should be reintroduced.

2. Organize breeding (in captivity) of the Far Eastern leopard in three or site in Primorye with small groups of two to three males and three to four females (reproductive groups). Such a method is used in establishing the gene pool of new live stock species. I have no doubts in the positive effects of this method that has been tested in practice.

3. Release of the young leopards obtained and prepared for an independent life at the age of one, but very importantly, in the second half of summer (July-August), in the areas mentioned, in mixed sex groups of five or six. A part of the animals unsuitable for release into the wild by virtue of their behavior can be made available to zoos to expand genetic variety and as individuals for exchange between reproductive groups.

4. When developing reproductive groups, genetic material will be required. This cannot be accomplished without removing individuals eliminating from the wild population. These will be, first of all, problem animals entering deer farms (potential "shooting victims"), as well as cubs from litters with more than three cubs since there is inadequate breeding stock (founders) for zoos. Leopards from zoos may be used only as an additional, reserve fund. To

replenish population loss resulting from removing resulting from removing a portion of the individuals in the wild, it will be periodically necessary to replenish losses with individuals raised in captivity.

5. As new population groups of Far Eastern leopards, consideration of reintroducing leopards into Lazovskii Zapovednik will be necessary. This is a more problematic issue than for the Prikhankaiskii region, but also has its chance for success. A female with two cubs was registered there about ten years ago and three years ago two leopards were seen moving together in the Pogranichnii Ridge. This very good sign shows that even with low numbers, leopards visit former habitat almost regularly. With our active and immediate help it is still possible to preserve the Far Eastern leopard in the wild.

SESSION 4. Management of Deer Farms

PROBLEMS OF DEER FARMS IN SOUTHWEST PRIMORYE

Vladimir P. Karakin

Development of this territory began in the 1870s. Culmination of that period happened in the late 19th century, its completion – the mid- 1930s. That was Russian (Cossack-Governmental)-Korean development of the territory.

Until 1930s, agricultural (namely field-cropping) activities dominated economy. Except Town of Ussuriisk (population 37,000), the rest population was rural. In structure of crops, southern part was dominated by legumes and corn, northern part – by cereals. Deer husbandry was represented only in former Yankovskii farms (Bezverkhovskiy and Gamovskiy ones). Table 1 characterizes a type of agricultural land use and a sort of economic development of the area.

Table 1. Territory, population, and crops area in southwest Primorye in 1930*

Districts		Posietskii	Suifunskii	Pokrovskii	
General area, sq. km		4,345	4,141	2,103	
Population density, person/sq. km		9.8	10.3	11.7	
Settlements (1920 census)	total	367	298	103	
	including with population	up to 19 people	75	104	3
		20-449 residents	286	180	92
		500-999 residents	5	8	4
		over 1000 residents	1	6	4
Population, to January 1 st , 1929, thousand	total	47,1	87,1	29,0	
	including urban	-	37,4	-	
Number of farms		5,197	5,873	3,400	
General area of crops, hectares		12,545	26,222	29,459	
primary livestock	labor horse	2,064	4,579	3,000	
	cow	2,539	4,414	1,965	

*Southwest Primorye included 10-15% of Pokrovskii District and 50-60% of Suifunskii District

In the mid-30s, after replacement of the Koreans and repression of the Cossack remnants in the southwest Primorye, its south and central sections in particular, the type of economy and land use was drastically changed. Field-cropping was quickly lowered, in the former Korean residential areas in particular; deer farms and fur-breeding enterprises (which embryos were formed as early as in the late 19th century by Yankovskiy) became the major land users.

For all that criminal inhumanity connected with expulsion of Korean population from the territory, it is necessary to mention that incidentally broken type of land use resulted (and would result with high probability when intensively developed) in large environmental

problems. That is how M. Yankovski characterized its environmental consequences in the barrier of centuries: “Only sorrowful remnants of former oak groves survived, there is no trace of riparian thickets of gigantic ash, elm, walnuts, maples and others, which used to accompany river flow up to the very sea and form screens from the winter northern winds and summer fogs. The Koreans destroyed forest and plowed up lands instead of it. But now many arable lands are already exhausted, so the Koreans wander from place to place cutting forest again and plowing up the lands along all tributaries of mountain rivers, up to the border range”. (On Assurance of Natural Welfare from Destruction and Exhaustion. *Rubezh* Anthology, Vladivostok 1992, #1).

After 30s a type of land use based on deer and fur-breeding farming had been actively developed in the southern and central part of southwest Primorye. Domination of extensive deer-breeding on this territory for the last half-century is one of the reasons of keeping here relatively high level of biodiversity.

To the beginning of *perestroika*, this type of land use was the major one. As an indicator of its development, we can adduce data on the deer stock increase in Khasanski District from 1930 to 1991. During that period, deer livestock has been increased from 4.7 up to 16.7 thousand head; from four to six enterprises have been involved in deer-breeding at different time. Structure of agricultural lands within the boundaries of land users (Table 2) shows domination of ranges in Khasanski District and its high role in Ussuriiskii and Nadezhdinskii districts.

Table 2. Structure of agricultural lands in southwest Primorye within the boundaries of agricultural landowners (hectares)

Districts, areas	General land area of agricultural enterprises	Agricultural lands	Arable	Green ways	Fallow lands	Grassland (hay-fields)	Rangeland (meadows)
Nadezhdinskii (right-bank)	18,992	11,797	2,204	-	-	2,564	7,029
Oktyabrskii (right-bank)	21,965	12,542	8,863	-	-	834	2,845
Ussuriiskii (right-bank)	51,528	82,825	19,236	28	-	2,588	9,445
Khasanskii	72,584	41,531	3,862	-	125	13,762	23,782
TOTAL	165,069	148,695	34,165	28	125	19,748	43,101

Modern agricultural land use including deer and fur breeding enterprises is derivative from that system of land use, which was characteristic to Southwest Primorye in the early 90s. In 1992-1993, there happened to be incorporation of existing agricultural enterprises in this area, with partial allotment of individual farms. Besides, during that period there were actively allocated lands for creation of private farms from State Fur Husbandry. Therefore, initially, principal changes affected mainly kind of property and tenure, but not the type of land use. From the early 90s, serious crisis has started both in traditional agriculture and in deer and fur-breeding enterprises (a system of the former “Dalpushnina”). At present the very enterprises are in a sorry plight (Table 3).

Table 3. Structure of livestock in southwest Primorye (head)*

Districts, areas	Cattle	Cow	Pig	Horse	Goat, Sheep	Deer	Mink
Nadezhdinskii (right-bank)	<u>1,248</u> 1,969	<u>548</u> 864	= 25	= 10	= -	= -	= -
Oktyabrskii (right-bank)	<u>656</u> 2,677	<u>155</u> 635	<u>651</u> 3,272	= 72	= -	= -	= -
Ussuriiskii (right-bank)	<u>2,244</u> 12,443	<u>893</u> 4,950	<u>769</u> 1,798	= 239	= -	<u>500-</u> 1,500-	= -
Khasanskii	<u>566</u> 4,116	<u>363</u> 2,639	<u>311</u> 845	<u>139</u> 324	<u>655</u> 78	<u>3,623</u> 23,000	<u>26,360</u> 383,000
TOTAL	<u>4,714</u> 21,205	<u>1,959</u> 9,088	<u>1,731</u> 5,940	<u>139</u> 324	<u>655</u> 78	<u>4,132</u> 245,000	<u>26,360</u> 383,000

**Numerator – in 1999; denominator – in 1991

Besides subjective reasons, a crisis of deer-breeding enterprises has objective reasons as well. In the first place, one of the reasons is transition of seafood production industry into real prices (fish production used to be a foundation of forage basis for fur and deer-breeding husbandry) and lack of development of its own forage basis. The latter means that deer are not being grown, but they a great extent grow themselves in rangeland with natural forage. But there are periods of famine and lean years, when additional foraging is necessary. To conduct additional feeding one needs to have own forage basis, which has been poorly developed, since the last decade deer industry was abandoned and left to survive without any governmental support: the whole attention and resources were directed toward fur-raising industry. At this moment a number of successful in the past enterprises went bankrupt; some of them (for example, Gvosdevskii Deer Park) are liquidated completely.

One of the reasons of impetuous destruction of once successful type of agricultural land use is a gradual refusal of the idea of complexity and independence, which used to stipulate the effectiveness of those enterprises under Yankovski. The enterprises have transformed into the part of chain responsible only for growing of deer and mink; major functions (supplying, marketing, technological connections, etc.) were given away to the outside structures. When the outside structures are broken up, the enterprises turned out to be in helpless situation. Besides, instability increased because of refusal from complexity: in the late 80s almost all economy reduced to mink raising; deer became an additional burden.

Destruction of the deer-fur-breeding type of agricultural land use (once dominated major part of southwest Primorye and based upon extensive use of land resources) adversely affected (and will affect) biodiversity state of the District, and more important, leopard population. There are two connected reasons for it: reduction of leopard feed basis and increasing unemployment caused increasing poaching. That requires development of other economic activities, which are not so acceptable for leopard protection as deer husbandries.

Revitalization of deer husbandries as a dominating type of agricultural land use in southwest Primorye is one of priorities of biodiversity protection in this area. At that, overcoming the crisis in deer-breeding enterprises is possible in the first place on the way of increasing complexity of land use. The main components of complex enterprise based on the deer park territory should be the following:

deer-breeding,
 ecotourism,
 protection of biodiversity,
 growing and harvesting of medicinal wildlings on the territory of deer parks,
 processing of deer products,
 processing of medicinal raw materials.

Taking into account interests of nonprofit (Foundations) and governmental organizations in biodiversity protection and accordingly, in support of complex husbandries on the basis of deer parks within the leopard range, there are several possible financial organizational schemes for their support:

direct financial support by Foundation through the compensation of expenses on biodiversity protection;
 creation (by Government) of privileged regime for deer husbandries development in southwest Primorye;
 realization of environmental organizations interests in protecting leopard through their direct participation in the enterprises management (via purchasing asset share);
 organizing (by entities interested in biodiversity protection) of new enterprises, which will initially be oriented towards forms and economic directions compatible with biodiversity interests. There are some opportunities to create 2-3 enterprises from zero.

IMPORTANCE OF DEER FARMS TO THE ECONOMY OF THE COUNTY AND KRAI

**Yu. A. Nesmachny
 Khasanskii Raion**

The agricultural sector of Khasanskii Raion is made up of six agricultural enterprises and 53 private concerns at which 720 people are employed, or 10.6% of the region's labor force.

The total value of agricultural production in 2000, in 1995 rubles, was 24,000,000 rubles, which is 86.9% of the 1999 level. The six agricultural enterprises contributed 5.4%, or 1,320,000 rubles.

Table 1. Deer farms are represented by three enterprises with 3,125 head..

Enterprise Name	Herd Size		
	1989	2001	% (+/-) 2001 of 1989
Gamovski, OOO Park Gamov	7574	1750	-77
Amurskii, OOO Agro-Khasan	4362	1103	-75
Gvozdevskii KhGDRSP	2268	272	-88
Slavyanskii	3697	-	-100
Total	17901	3125	-83

There has been a sharp, 83% drop in the number of deer in recent decades. The main reasons for a decline in deer farm activities and for the decrease in the number of deer have been their privatization and the halt to government credit at low interest rates. The result has been that all commercial wildlife farms have gone through bankruptcy procedures and of the seven former enterprises, three, representing 42% of total production, were closed.

The shift of ownership during bankruptcy proceedings has not yielded positive results.

Table 2. Thus, production has declined by 89%.

Enterprise Name	Antler Velvet Production, in kilograms		
	1989	2001	% 2001 of 1989
Gamovskii, OOO Park Gamov	3430	365	10
Amurskii, OOO Agro-Khasan	2503	540	21
Gvozdevskii KhGDRSP	680	-	0
Slavyanskii	1922	-	0
Total	8535	905	11

Deer farm activities in 2000 were unprofitable, and the level of losses is currently being calculated.

The volume of deer farm production as a percentage of total agricultural production is 6.3%, whereas this figure was once 87%, with a return on investment of 40%.

The collapse of the industry is a reason for a marked increase in social problems in villages where these enterprises were the main industry. Over a 1,000 people have lost their jobs in villages where deer farming was the mainstay.

The consequence of a reduction in the production activities of these enterprises has idled agricultural lands: cultivated lands, hay field, deer farms that earlier were an artificial barrier to the spread of ground fires.

Village administrations are interested in restoring commercial wildlife and deer farm activities in the Raion and are pursuing measures to find investors since there are no funds in local budgets.

A preliminary estimate of the minimal cost of maintaining 1,000 head of deer, as of April 1, 2001, is 160,000 dollars, without accounting for labor costs, taxes and other assessments.

Cost Estimates

1. Acquisition of 15 km of fencing	– 52,000
2. Acquisition of lumber for constructing a enclosures	– 7,000
3. Purchase of 1,000 head of deer	– 51,000
4. Annual maintenance costs	– 52,000
Total	– 160,000
Revenues from the sale of antler velvet	– 45,000

The Administration feels that it is essential to reopen the deer farms that once operated to increase the percentage of deer production in the total volume of agricultural production in the Raion, to provide jobs in villages, to rationally use agricultural lands, and to increase regional budget revenues.

At the same time the deer parks could serve the purpose of feeding wild animals: leopards, tigers and black vultures in winter, with the signing of mutually beneficial contracts for compensation paid by foundations interested in preserving wild populations of Far Eastern leopards.

THE USE OF DEER PARKS FOR PROTECTION OF AMUR LEOPARD

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Introduction

Nowadays there are eight farms on sika deer-breeding functioning in the southwest Primorye. In accordance with instructions of Technology on Antlers Production (1987), optimal size of deer farm is about 4,000 hectares. It should keep 4,000 head under these conditions. If one needs to maintain more deer, one more deer-breeding site of the same area must be constructed. Of existing at present farms, each one covers about 4-6,000 hectares on average. During last years, deer stock greatly declined, but even nowadays 500–1,000 head per farm can be observed. In these conditions deer form population density not comparable with density of wild deer outside the parks. Because of this, deer parks have always been places of higher interest of large predators such as leopard or tiger. In spite of metal net, leopard and tiger rather easily get in deer parks using wooden poles, which reinforce netting, and kill domestic deer. During the era of socialism, despite official ban deer parks' rangers used to killing tiger and leopard with the help of weapon, metal loops and traps. At present, this process is slowed, but when private ownership for deer farms appears, extermination of large predators can be recommenced.

In the present time, deer parks with preserved deer livestock serve as a reserve feeding place for leopard and tiger, and some individuals prefer to inhabit deer parks territories or the areas in immediate proximity to them using deer parks as a hunting units.

In the last two years the types of ownership of deer parks has changed. All deer parks were bought up by nongovernmental organizations. New owners do not get any profit from their activities at present, but hope to get in. So a threat for leopard appeared again as rather real.

Thus, deer farms function as an additional feed for predators during winter hardship, on the other hand, they are a source of higher danger for tiger and leopard.

The Use of Deer Parks by Leopard and Tiger

Anti-poaching activities conducted in the last years have played a role in the reduction of poaching in deer parks too. Work of the “*Tiger*” Group of Krai Committee on Environmental Protection and Operation Group of Department for Hunting as well as the case of conviction of a poacher for 5 years deprivation of liberty for leopard shoot, gave local population a sense that the State keeps vigilant watch over environmental law execution and punish for their infringement. Besides, deer parks rangers at present are deprived of official weapon and do not receive compensation for the last several years, therefore there do not have almost any motivation to protect deer livestock.

As a result, in accordance with 1998 simultaneous inventory and monitoring, in the area of deer parks, concentration of leopard and tiger is observed. Thus, 6 leopards (female with three cubs, male and an individual of indefinite sex) were observed in the area of Kedrovskii Deer Park; 6 leopards (female with two cubs, male and two individuals of indefinite sex held together) were happened to be in the area of Peschanyi Deer Park; female with young leopard and indefinite sex individuals were met in the area of Bezverkhovskii Deer Park.

In accordance with single 2000 inventory data, high population density of leopard was recorded in the area of Kedrovskii Deer Park; there are some leopards in Gamovskii, Bezverkhovskii, Peschanyi, and Provalovskii deer parks. The absence of leopard in Slavyanskii Deer Park worries. In the same park, two years ago they found a cage set for large cats trapping.

As a result, inventories and monitoring in the area of deer parks show high density of leopard population. Thus, two leopards (female with a cub) are met near Kedrovskii Deer Park, one more female with one or two cubs were recorded in 5-6 km from the Park, a female with a cub was registered in the area of Peschanyi Deer Park; Bezverkhovskii Deer Sovkhoz in inhabited by a female with young cat, Gamovskii Deer Park – by two tigers and one leopard of uncertain sex.

During last two years deer parks were redeemed by private companies and persons, hence interest to deer stock preservation increased. Diminishing of leopard numbers in the area of deer parks is probably connected with these phenomena.

In the present time, deer parks with preserved deer stock serve as a feeding place for leopard, some individuals prefer to inhabit deer parks or stay in immediate proximity of it and use these areas as a hunting site. Therefore, importance of deer parks in leopard protection is nowadays hard to overestimate.

Discussion

Several environmental organizations at present tried to work with deer park owners and deer park employees on protection of rare predators. All projects were completed by money compensation to deer park owners, sometimes to rangers. But did it have any good consequences for leopard and tiger is unknown. The point does not concern the accuracy in the project implementation, the point is in the very principle of works. Rare wildlife species should be protected on our planet, we need to create conditions for habitat protection and preservation of predators feed basis in wild environment. According to the law of Russia, articles 22, 24, 28 of the Law on Wildlife, nobody has right to kill rare predators whatever

land they inhabit, except prevention of encroachment upon human life. So deer park owners should provide for their deer preservation through erection of good fence. If the fence is bad and leopard or tiger gets on the deer park territory, they do not have right to disturb him, they are to inform appropriate institutions, and if some damage is caused, it should be compensated by government which took responsibility on this rare species protection. Any intervention in the process of the Russia's Law implementation causes its discredit and stimulates failure to observe it.

On the other hand, it is hard to reckon that commercial enterprise aimed to receive profit will spend compensation for observing governmental obligations, in particular, when incomes from this activity are low.

There is one more mistake. It is usually considered that current deer park owners are land tenants in those areas where deer park is situated. In reality, deer park owners purchased only deer livestock, facilities and buildings, and land under these facilities. But for the land where deer pasture they have only Lease Contract with Government. In this Lease Contract, you can make in fact any provisions necessary to protect rare predators.

We consider that we need to act in two directions in current situation. First, we are to press deer parks for restoration of fence around them, which would prevent penetrating by leopard and tiger. Second, the most important for leopard deer parks must be purchased by environmental nonprofit organizations; there must be organized sites of regular additional feeding of leopard and their breeding. Deer Farm in the area of Peschanyi Peninsula and former Kedrovskii Deer Park are of the larger interest nowadays for organizing specialized leopard deer parks.

Organizing Principle of Leopard Deer Park Farm

Major task of such a farm is to breed sika deer to provide leopards inhabited these areas by sufficient feeds. This work should be oriented exceptionally towards protection of leopard population and do not create favorable conditions for tiger, since these two cat species are competitors (Seidensticker 1987, McDougall, ??, Aramilev, unpublished data).

As we observed one deer park has been visited by six leopards at the minimum. That means that at least ten leopards can be drawn to the park in the shortest possible term after appropriate preparation.

Deer farm should be organized on the self-repayment principle. Nonprofit organization can become a guarantor of proper resources spending for rare wildlife protection; in accordance with law it should spend money only on purposes listed in its charter. It is possible, under conditions of development of local pharmaceutical industry and leveling of Russia's price for production with world price, to find sufficient market for deer farm production. In accordance with instructions of Technology on Antlers Production (1987), standard deer farm should contain 4,000 head of deer in the area of 4,000 hectares. The farm is divided into three parks: one contains adult males, the second one – young adults, and the third one – females and cubs. Taking into account peculiarities of this industry and specific objectives of such a farm, it is necessary to construct wooden passages into the park with females and cubs, which can be used by leopard to penetrate the park without difficulties. But these passageways should be inaccessible for tiger. In immediate proximity of the park, there must be organized forage points to feed leopard in winter. Besides, the park should conduct

some works on maintaining high population of secondary leopard feeds - hare, badger, raccoon dog. Principal scheme of deer park is shown on Figure 1.

As provided by Pikunov, Korkishko (1992) data, leopard bag about 1,400-1,800 kg of wildlife meat annually; average daily intake is about 3.2–4.0 kg. In accordance with Moscow Zoo data, average daily intake standard is 2.5- 3.0 kg that means 912–1,095 kg annually. Data of Pikunov & Korkishko are based on the bag remnants found in winter season, when leopard energy consumption is much higher than in summer, therefore data of Moscow Zoo must be taken as a basis for calculations. Thus, we can consider that average leopard requires about 1,000 kg of meat per year; that is 25 deer per year counting on average deer. Therefore, we need 250 head of deer for 10 leopards annually. In accordance with Technology of Antlers Production (1987), net yield of cubs per one female is 60–70 percent, a number of females per one standard farm is about 1,000 head. Consequently, 600-700 head of young deer will be reproduced annually. Having this increase one can designate, by the culling process, 250 deer for leopards.

Since Technology... provides figures being calculated without taking into account leopard activity, we need to make provisions for compensation for leopard maintenance costs. This compensation can be received by development of tourism and hiking on the territory of deer parks. Tourists may be engaged not only in observations on sika deer, but on leopard and other wildlife as well under proper preparation. Besides, it is possible to arrange hiking and mounted excursions to observe landscape inside and outside park, lodging, camping, board, etc. Souvenir industry may be another article of income. Such a deer park can become a suitable place for organizing a center on leopard breeding and rehabilitation.

Conclusions

1. Deer parks should be considered as special territories for leopard protection in wild environment.
 2. Work policy with existing deer parks must be organized in accordance with the law of Russian Federation. Environmental limitations should be provided in a Land Lease Contract; compensation should be paid by government only in the case of natural disasters, which destroy deer park efforts to protect rare wildlife.
 3. Field inventory data show that deer parks are the place of high leopard population. Leopard use both deer from deer parks (for feed) and the area of deer parks (for birthplace and growing cubs).
 4. The most suitable variant to solve the problem of deer parks and leopard is purchasing of deer parks by environmental NGOs and organizing self-repayment enterprises on its basis, the main purpose of which should be leopard protection.
 5. Realizing this project, one needs to take into account antagonistic relations between tiger and leopard and develop a strategy on tiger protection in the southwest Primorye.
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**ORGANIZATIONAL AND ECONOMIC STATUS OF DEER FARMS IN
KHASANSKII RAION. S. Bereznyuk
Phoenix Fund**

In recent decades, in connection with the reduction of the natural prey for the Far Eastern leopard, deer farms have become an important factor in conserving the existing leopard population in southwest Primorskiy Krai. Although the number of sika deer in the region has declined over the period from the end of the 1980s to 2001 by almost five times, one can say with complete assurance that the deer from these farms are more and more often the leopard's ration. The Far Eastern leopard has not vanished from the face of the planet thanks to the existence of deer farms in Khasanskiy Raion and the unreliable fences around these farms make it possible, without any trouble, for large predators to penetrate their territories.

Of the four deer farms that once operated in Khasanskiy Raion, only three – Gamovskiy, Amurskiy and Gvozdevskiy, are still open. Leopards are reported at both Gamovskiy and Amurskiy. After the Slavyanskiy deer farm closed down, leopard tracks in the vicinity of this operation ceased to appear. This is because of a shortage of prey. The number of ungulates in this region is also not very large, lower than in other hunting areas. The remaining fencing hinders an increase because it fragments the wild ungulate population and makes promote poaching since it is very easy to shoot animals that have been driven into dead end fenced areas.

The Russian based Phoenix Fund and the Netherlands based Tigris Foundation pay compensation for damage inflicted by leopards and tigers. Two large deer farms – Gamovskiy and Amurskiy – participate in this program; their herds make up more than 90% of the all the sika deer in Khasanskiy Raion. Despite the efforts of deer farm operators, growth in herd size is not observed. Young deer die, first of all, from predator attacks. Predators have become significantly more dependent on deer farms in the last ten years, and at the same time, the herd sizes at these farms have declined drastically, making their operations economically unviable, and conflicts with predators occur, and ways must be found to resolve this situation.

The preservation of the existing population of Far Eastern leopards in Khasanskiy Raion requires the following measures:

1. Construction of special, impenetrable pens for females with young at the Amurskiy deer farm, and possibly, at other deer farms.
 2. Reopen the former Slavyanskiy deer farm immediately adjacent to the Chinese border, or immediately take down all remaining fencing.
 3. Continue and expand the compensation program for damage caused to deer park owners by leopards and tigers to motivate workers and deer park owners to find ways to peacefully coexist with wild cats.
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SESSION 5. Hunting Management and Anti-Poaching Activities

IMPORTANCE OF HUNTING LEASES FOR FAR EASTERN LEOPARD CONSERVATION

V. Yu. Vasilev
Wildlife Biologist

Aside from the game species found on hunting leases in southwest Primorye, these areas also contain rare and endangered species such as the Amur tiger and the Far Eastern leopard. Long-term data at lease sites indicates that the numbers of rare and game species are stable, with slight, annual variations.

Hunting leases in the southwest Primorye are mainly for sport shooting. Hunting pressure on the main game species is moderate.

The main difference between sport hunting and commercial hunting is the absence in its working cycle of environmentally destructive technologies. But this activity implies the removal of a portion of the animals from the wild that would appear to lead to uncompensated loss both among general species and, indirectly, among rare and endangered species. It is our view that proper management of hunting leases will not only increase regular game species but also rare species, including the Far Eastern leopard. The basis of these activities should be a set of measures whose goal is to increase the number of game animals, to support these populations in a viable condition through intensive bioengineering, to protect hunting lands from poaching and strict regulation of hunting.

For example, at the "Nezhinskoe" Hunting Society, for reproduction and protection activities alone, 80,000 rubles are spent annually. But most importantly, Society members voluntarily take part in improving land quality, its protection and reproduction. Members of the Society volunteer more than 1,000 man/days. All this is in compliance with the goals of the Society's Charter. This is the main, and principle, difference between hunting leases and protected territories (zakazniks and zapovedniks). The opportunity to manage wildlife populations, sika deer or, for example, wild boar help to maintain a balance between ungulates and forage capacity of their biotypes. This means it is possible to also maintain the eco-system of the "predator-prey" in state of active balance.

Project Implementation

Hunting leases in southwest Primorskii Krai must have a specific feature included in their activities. Where hunting with dogs is very popular in Siberia and the Russian Far East, here it must be prohibited. For example, hunting with dogs at the Nezhenskii Hunting Lease has been banned for more than 20 years. This makes it possible to minimize the disturbance factor for leopards. Similarly, hunting with leg-traps should be banned throughout the entire lease area. This is also justified from an economics point of view because the amount of furs skinned here in proportion to the total for Primorskii Krai is insignificant and their impact on the leopard population is mostly in causing the death of young cubs.

Protection and reproduction measures at hunting leases should be implemented primarily with organization funds, something that are in short supply at moment. It is thus necessary to

develop and introduce new revenue approaches, for example, ecological and educational tourism, recreation use of hunting bases. These bring in additional funds create new opportunities to expand the participation of the local population in wildlife conservation activities. For example, the majoring the hunters within the Nezhenskii Hunting Lease are united with the original collectives of the Pacific Navy Hunters Society that has a total of 152 members and who help the staff carry out wildlife protection measures. With additional funds from sponsors or wildlife conservation foundations it would be possible to provide hunting leases with modern communication equipment, vehicles and to improve the effectiveness of wildlife conservation measures.

**PRELIMINARY RESULTS OF ANTI-POACHER ACTIVITIES FOR THE
OPERATION GROUP "TIGER VOLUNTEER" IN KEDROVYA PAD RESERVE**

**S. V. Shaitarov
"Tiger Volunteer", Director**

"Tiger Volunteer" operation group for fighting poaching was formed on the basis of the non-profit organization "Primorskii Krai Society of Hunters and Fishermen" (PKSHF) in July of 2000. It consists of three inspectors; in addition, one policeman takes part in raids that substantially reinforces a status of composite group.

Patrols are conducted on the territories designated for Primorskii Krai Society of Hunters and Fishermen, as well as on the lands allotted for PKSHF in the Kedrovaya Pad' Zapovednik (Reserve) on the basis of Agreement on cooperation between PKSHF and Institute of Biology and Soil Sciences FEB RAS.

The project is sponsored by Japan Wildlife Conservation Society. Results are provided in the Table 1.

**Table 1. Number of Citations Written for Infringements in Kedrovaya Pad
Zapovednik, by year**

1996	1997	1998	1999	2000/10-12 2000*
23	47	37	31	14 / 30*

In accordance with the table, the effectiveness of operation group for 22 days during October-December 2000 is almost equal with anti-poacher activities of the Reserve Guard Personnel for year.

During three months, 21 violators were brought to court and fined 17,921 rubles and sued for 197,021 rubles or about US \$7,000 in total.

Commercial poaching, as well as poaching of high rank officials from the outside the region, was stopped on the territory of the Reserve.

Constraints: beginning from January 8, 2001, and up to the present, work is virtually stopped due to breakup of the car produced in 1987.

Departmental, bureaucratic barriers and absence of work agreement on territories of Barsovy and Borisovskoe Plateau wildlife refugees significantly lower the effectiveness of the group on leopard protection.

THE USE OF TRAPS IN FAR EASTERN LEOPARD HABITAT

S. I. Min'kov and E.A. Kuznetzov

**Director Department of Hunting Equipment, and Senior Staff Scientist
All-Russian Science Institute on Hunting, Trapping and Fur Industry
Kirov**

As is well known, the number of Far Eastern leopards is extremely low. Now the unpremeditated trapping of even several individual leopards in traps set for fur-bearing animals (badger, raccoon dog) can be critical for the conservation of the species in the wild.

It is clear that to provide accurate recommendations on the use of traps, one needs to understand field conditions. It is not inconceivable that a full ban on the use of leg-traps where leopards can appear may be the least expensive remedy. Acceptability of such measures depends on just how important is trapping for local residents. From a distance we can only propose general solutions to the problem, that is, provide recommendations useful independent of local conditions.

There are now animal trapping technologies that provide for a greater degree of discrimination. This is the use of killing traps instead of the well-known foothold traps.

Killing traps act "on the pass," that is they trap the animal at that moment when it passes through the frame of the trap that is set ahead of the bait or on the path. A limitation on animal size is set in advance by using a proper size trap. That is the most important distinction between killing traps and foothold traps that spring irrespectively of what kind of animals hit the trigger.

For badger trapping, one can successfully use the following traps: KP 250 (Fig. 1), Conibear 330, BMI 330, LDL C 330, Belisle Super X 330, and Sauvageau 20001-11. The traps are set without bait, on a path, on the approach to a hole or feeding site. Badger paths are usually well visible. We know from experience trapping in the European part of Russia that the best place for setting traps is on paths in dense understory, grass or crossings through blockages and windfalls, and the optimal distance from the hole is 50-150 m. The trap's frame size - 250 x 250 mm - is large enough for a badger to pass through, but is an obstacle for taller animals on legs. The trap acts when an animal's head or body is inside the frame. This avoids unintentional trapping of animals larger than a badger.

In trap raccoon dog, traps with bait should be set in so-called "cubbies" or at some depth in a hole (Fig. 2). One can use the same traps as for badger, that is KP 250, Conibear 330, and others with the frame size 250 x 250 mm or traps of smaller size: KP 180, Conibear 220, BMI 220, LDL 220, Belisle 220, and Sauvageau 2001-8 of 180 x 180 mm size.

Typical track traps, when set at a depth of a passage or of a hole, will usually be safe for leopard as well.

Traps #1, designed for Siberian weasel and which occasionally trap young leopards (information by V. V. Aramilev) can be successfully replaced by killing pass traps KP 120, KPN 140, Conibear 120, Conibear 110, BMI 120, LDL 120, Belisle Super X 120, Sauvageau 2001-5.

In setting any traps for Siberian weasel, mink, or sable, with bait or without it, the probability of unintended trapping the foot of a larger animal is practically impossible (Fig. 4). In some cases, to trap above ground, one can instead successfully use traps # 1 break-back traps KA-2, which given their construction type, act very softly and do not present any danger for large animals

By the way, "care" in the use of its extremities is probably a characteristic of cats because we have hunter stories of lynx trapped by only for fingers or claws. As far as we know, cases of breaking or gnawing of feet of trapped lynx are also unknown.

In 1998, Russia signed an Agreement on International Standards on Human Trapping of Wildlife that is now at the ratification stage. The Agreement has been approved by the Primorskii Krai Administration and by a majority of the other subjects of the Russian Federation. So the replacement of foothold traps complies not only with the interest to protect the leopard, but also with environmental legislation in the Russian Federation. Prohibition of foothold traps is also prescribed in Article # 40 of the Federal Law "On Wildlife" and new draft Russian Federation hunting regulations now being discussed in Russia.

It would be expedient to conduct (with the participation of local specialists) a small study to develop detailed recommendations on the use of traps in the southwest Primorye and calculate the estimated cost of replacing foothold traps to prevent unintended trapping of leopards.

If replacement is expedient, we can conduct seminars for hunters on the use of new traps or train hunting specialists as instructors for further work.

Our Institute for Hunting, Trapping and Fur Industry (Kirov) has all technical documentation for production of recommended traps. Traps KP 250 and KA-2 are being produced in small series. Approximate price of the KP 250 trap is about 120 rubles, KP 120 or KPN 140 - 50-60 rubles, KA-2 25-30 rubles. Trap manufacture can be organized directly in Primorskii Krai. Analogous traps can be purchased in the USA or Canada: Conibear 330, BMI 330, LDL C 330, Belisle Super 330, Sauvageau 2001-11 \$8-12 per trap; Conibear 110, BMI 120, Belisle 120, Sauvageau 2001-5 \$8-12 per one trap.

A Non-Traditional Aspect Of Amur Leopard Conservation Activities
A. Martynov, E. Kuznetsov
GEF Project
"Protection of Biodiversity"

In April 1998, the Russian Federation Government signed an Agreement on International Standards for Humane Trapping of Wildlife, in the drafting of which Russian experts were involved. Preparations for ratification of this document are underway and this may occur in

2001. Implementation of this Agreement will save the trapping industry in Russia by protecting European fur markets and by supporting the way of life of indigenous people of the North, Siberia and Far East. The Agreement's conditions require reequipping the trapping industry in Russia by replacing the usual leg traps with others and by introducing corresponding changes in the trapping regulations.

Russian experts have significantly improved the kinds of traps that have been used in Canada and the US for more than 40 years. The necessary technical documentation is ready for mass production. The advantage of those traps is their high effectiveness (they almost completely exclude catch-failures or animal escape with trap in tow) and their "ecological purity", that is, a very low probability of trapping non target animals, for example, birds or large predators such as the Far Eastern leopard. Leopards caught in traps left for badgers or raccoon dog is a major reason for their demise since the animal usually makes no attempt to escape or is killed by a trapper who, in checking his trap lines, is unable to even help the large cat free itself.

Currently, when using leg-traps in taiga regions, for each trapped sable up to 300 other animals (mainly birds: wood-peckers, jays, gray jays, nutcrackers, goshawks, owls) are trapped. In tundra zones and along seacoasts, for example, in Kamchatka, several thousands or tens of thousand of large bird species, including endangered species in the Russian and IUCN red book (polar owl, white-tailed sea-eagle, white-shoulder eagle, golden eagle, peregrine falcon, gyrfalcon, rough-legged hawk) annually die in "leg-traps."

The new traps are distinguished by a principally different placement method that forces the animal to pass through or reach for bait through a small gate resembling a bowed arch. But even when the trap is open, large animals do not land in them because of a different type of behavior and the opportunity to simply get the bait from the other end of the trap.

Upon ratification of the Agreement, trappers will have to switch to new types of traps because of changes in trapping regulations. This process, however, could extend across a four to eight year period, long enough to cause significant from which there will be no recovery. This will affect, first of all, the Far Eastern leopard, whose survival in the wild in Primorskii Krai also depends on halting the use of leg-traps to catch badgers.

Investment in the production of a small number of traps with an arch length of 330 mm will make for more effective badger trapping and avoid trapping leopards in traps set for badgers as a result of the different method of setting traps described above. The investment in the production of new traps and the actual replacement of the trap parks set by Primorskii Krai hunters will reduce accidental leopard losses.

Replacing traps in the south of Primorye will require not only technical solutions, it will also require changing the skills and knowledge of a significant portion of the local population. This means developing propaganda, advertisement, and popular explanations on why the changes are necessary. This raises the issue of a multidisciplinary program that combines solving the manufacturing issues, the environmental activities and the advertisement and propaganda campaigns. This project should include the following features:

(a) Prepare and publish a series of alarming and even scandalous articles in national and local newspapers about the threat of a final loss of Far Eastern leopards in the wild.

(b) Prepare, with participation of Communicative Group "Maxima", of publications on the leopard, using the photographs by Yuri Shibnev and others, for magazines for the political and business elite: Profile, Itogi. These first articles can focus attention on the uniqueness and urgency of the situation.

(c) Develop for business-publications and local media materials that expand public awareness of the major reasons for leopard death in the wild as a consequence of leg-traps set for badgers, raccoon dog and other trap animals. This material can be easily linked to the humanization of the trapping industry, to the loss of an entire segment of the European fur market, to the search for business oriented solutions to the problem.

(d) Using the materials developed, Far Eastern environmental organizations (WWF, "Zov Taigi", etc.), together with the Communicative Group "Maxima", can propose to consolidate efforts and opportunities for partnership between different sectors of the economy and society.

(e) Initial partnerships, through local and national media, can propose to factories and plants in the RFE that they prepare investment schemes to produce new traps that will eliminate the trapping of non target animals, including leopards, when hunting for badgers or raccoon dogs.

(f) Engineers developing new trap models are ready to provide necessary technical documentation to any plant or even to small repair shops.

(g) Department of Environmental Protection and Ecological Safety of the Federal Ministry of Natural Resources MPR, together with the Primorskii Committee on Natural Resources, is ready to support investment proposals and present them to international or Russian investors.

(h) To gain the attention of the public and businesses sectors on the issue of a constructive partnership, a one day round table of ecologists, local government representatives, local science and culture can be organized in Vladivostok. Participation of VIPs ("Maxima" can arrange this) will further "heat up" the topic and help to get this problem into the local and national media.

(i) Production of a new type of trap is not, in and of itself, capital intensive; the main problem is high quality metal for a spring. Success of the project will critically depend on promoting the new traps as a means to protect non target animals, and in particular, the leopard, and as a way to certify that furs offered for sale on European markets are in compliance with the international Agreement. This activity will make by the investment made by advertising partners.

(j) Advertisement and promotion can occur at several levels: in the central press (explanations of leg-traps, loss of the European fur market, role of new traps in preventing incidental death of leopards); in local media (the campaign should have a more applied and practical aspect and must explain to trappers the features of trapping with a new type of trap, advise on purchasing, trade in benefits, public awareness and educational demonstrations on how to use new traps).

(k) The last two directions can be activities for regional environmental organizations participating in the project (WWF, "Zov Taigi", etc.). In addition to training and a trap exchange program in leopard habitat, environmental organizations can intensify awareness activities by issuing leaflets and setting up warning signs on roads entering into areas known leopard habitat.

(l) To produce new traps, public service ads focusing on the environmental aspects of a trap exchange program will promote their movement onto the market. Moreover, the trap exchange is a term of the international Agreement to be signed by Russia. Besides environmental aspect, this process will also have a social importance since it will be a means to revive trapping among indigenous peoples and a source of necessary revenues to restore Russian fur exports.

SESSION 6. International Cooperation

INTERNATIONAL CO-OPERATION

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Introduction

The range of the Amur leopard population covers the territories of at least 3 countries. The Amur leopard can only be saved from extinction by a significant collaborative effort by the authorities from these countries in co-operation with international NGOs. This paper focuses on the co-operation between international NGOs. An international NGO is defined as an *'NGO that finances projects in several countries or raises funds mainly outside the country where projects are implemented'*.

Not one single international NGO is equipped to cover all necessary aspects of Amur leopard conservation. Differences in knowledge, experience, interests, networks and financial contribution make co-operation an absolute *must*.

This paper provides:

- An overview of international co-operation
- Problems limiting the extent and effectiveness of international co-operation
- Proposals for solutions to improve international co-operation

An Overview of international co-operation

This workshop is, in itself, an example of effective co-operation by government representatives, scientists and NGOs from different countries. Since the first international workshop on the Amur leopard in 1996 the network of organizations that is involved in Amur leopard conservation has grown. Some examples of international co-operation between organizations are described below. Unfortunately it is impossible to cover all areas and parties involved.

- Hornocker Wildlife Institute (now part of the Wildlife Conservation Society) played an important role as the first international NGO that started to co-operate intensively with Russian and Chinese authorities and scientists. They are active in many areas including monitoring, research, land-use planning and the organization of international meetings.

- WWF is involved in many projects including anti-poaching, monitoring and land-use planning.
- Russian authorities and the Russian scientific community, of course, are involved in almost all areas of conservation. Russian organizations that play key roles include the Ministry of Natural Resources, Inspection Tiger (involved in anti-poaching), the Primorski Krai hunting and forestry departments, the Institutes of Geography and the Institute of Biology and Soils from the Russian Far Eastern Academy of Science, and many more.
- A total of 30 zoos from Europe and America that take part in the EAZA and AZA breeding programs for the Amur leopard have started to support conservation projects in the field through Tigris Foundation. Projects that Tigris Foundation finances include anti-poaching, fire-fighting, compensations and education.
- Siberian Tiger Support Coalition. A number of NGOs form the STSC and co-operate closely with Phoenix (its partner on the ground in Vladivostok). NGOs within the Siberian Tiger Support Coalition are; WildAid, IFAW, 21st Century Tiger, David Shepherd Conservation Foundation and International Bear Foundation.

Problems limiting the extent and effectiveness of international co-operation

The growing international network of parties involved in the conservation of the Amur leopard is a very promising development. However, the network is not yet functioning as effectively as it could. Two problems are discussed below.

1. Lack of information and co-ordination

There is a clear need for more information exchange and co-ordination of conservation activities.

Five years ago the situation was simple but now so many organizations are involved in the conservation of the Amur leopard that no-one group has a complete overview of what is being done. This creates a risk that efforts are being duplicated. A few years ago, for instance, Tigris Foundation invited a proposal for genetic research from Russian scientists in Vladivostok, not being aware that comprehensive genetic research into the status of the Amur leopard had already been carried out in the USA. In another instance, two NGOs both provided support for anti-poaching activities in a reserve in the leopard range, without being aware of this fact.

2. An atmosphere of competition

Although many NGOs work together, there is still an atmosphere of rivalry in some quarters. Small NGOs tend to work together better than larger ones.

Co-operation between other NGOs and WWF is improving, but still relatively poor. WWF is the largest foreign sponsor of nature conservation in the Russian Far East. It has a good global reputation but there are many local instances, during the last 6 years, where WWF was given full credit for projects that were actually partially supported by other NGOs.

This jeopardizes the relations between WWF and other international NGOs and forms an obstacle to effective co-operation.

Proposals for solutions to improve international co-operation

Information collection and processing. One organization should be responsible for collecting and then disseminating information relating to all activities/projects in the field of Amur leopard conservation. These data could cover Russia and then China/Russia in the longer term. Data should be collected and presented in a format that is agreed at the outset by all parties and published in a yearly overview to include the following:

- Background – general situation, political changes, visits, meetings etc.
- A review of current projects – outline of projects, dates, participants, financial arrangements, a discussion of success, value for money, future development
- An assessment future projects that are already planned or need to be considered – outline of projects, dates, participants, budgets and funding, proposed outcomes and future development

Amur leopard conservation priorities . During the meeting in Vladivostok the delegates will develop a program for the conservation of the Amur leopard. In developing that program it is vital that agreement is reached on the priority of activities. Projects for re-introduction must not create competition and jeopardize the funding of projects for the existing leopards in the wild. In my opinion, existing conservation activities such as existing monitoring, land-use planning, education, compensation, fire-fighting, and anti-poaching should have priority over new projects.

Suggested order of priorities:

- 1) Continuing and expanding the protection of the existing population in Russia
- 2) Establishing effective conservation in China and North Korea
- 3) Exploring of the possibilities for re-introduction

Amur leopard conservation board. A small board of not more than 6 members should be formed to represent all the NGOs interests and to instigate, manage and co-ordinate the implementation of the program that will be developed during the Vladivostok meeting.

This board will use the information generated for the annual report to evaluate the implementation progress. Based on this progress, the board will decide on the priorities for the future and makes recommendations accordingly. The board should meet as a minimum once a year but preferably twice a year. The same NGO that prepares the data should also be responsible for organizing the meetings.

The board should play a role in initiating co-operation between NGOs as well as between NGOs and Russian government agencies. The board would co-operate with, and may even include, representatives of government to foster a greater degree of clarity and co-ordination

of activities with the Russian authorities. This will allow both donors and receivers to have a greater input into the overall conservation picture as well as a better accountability of the flow and use of funds.

The board should also initiate and support joint proposals to international donor organizations like the European Union and the World Bank in order to broaden the financial base for Amur leopard conservation.

Changing mentality. It is imperative, for the good of the total conservation effort, that a new spirit of genuine co-operation is developed, where each NGO benefits both in terms of publicity and success.

All NGOs must focus more on co-operation. Although this process will take time for full implementation there are concrete steps that can be taken now:

- NGOs participating in this workshop must agree that no NGO should portray itself as the only organization involved in Amur leopard conservation.
 - All NGOs should agree to give credit to others whenever this is due. This should be the case when information is provided to journalists, to film crews or to sponsors (during field trips as well as in other situations). It should apply to information provided in brochures, reports or in any other way.
 - It would be beneficial if information about co-operation with other NGOs was also provided on websites (with links to the other NGOs involved).
-

OTHER POSITION PAPERS NOT FALLING UNDER 6 DEFINED CATEGORIES

STAFFING WILDLIFE CONSERVATION PROJECTS WITH SPECIALISTS

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Primorski State Agricultural Academy

Successful implementation of wildlife conservation projects, including conservation of the Far Eastern Leopard, depends, to a large extent, on the experience of protect personnel and managers. They must have adequate training and knowledge to carry out these projects. At present, the professional level of wildlife conservation personnel, especially of field teams, is inadequate and needs improvement. For example, brief training programs are needed to improve managerial skills. The Russian higher education system has yet to develop a curriculum to train such a category of specialists. We especially need to improve training in the Russian Far East given the range of the region's wildlife conservation protects and possible development patterns.

Program 26.04.00, a multidisciplinary curriculum that trains forestry engineers as wildlife biology specialists by combining general education with flora and fauna studies, is the best training program for potential environmental protection and conservation specialists. The Institute of Forestry of Primorski State Agricultural Academy is capable of providing training for specialists, both on campus and through open entry extension courses, for interested organizations and agencies. There is also the Academy for Advanced Learning that can offer courses in wildlife conservation management.

The Workshop on Conservation of the Far Eastern leopard is being held to adopt measures that will require special facilities (breeding enclosure, enclosure for releasing) that will require various specialists: pelt and deer farm engineers/specialists, veterinarians. Their training, according to specialized, coordinated programs, can be carried out here at the Institute of Animal Husbandry and Veterinary Medicine.

The best of the undergraduate project on wildlife conservation and biology of rare animals can be furthered expanded by graduate students in biology as part of their Master's thesis work.

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