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Abstract: During an international conference held in Vladivostok in 1996, a group of specialists discussed the status of the Far Eastern leopard and devised a comprehensive conservation plan to ensure the survival of the Far Eastern leopard in the wild. This document is a draft approved by the Russian government, which refers to the recovery plan developed during the international conference. It constitutes the base for the development of the National Strategy for Conservation of the Far Eastern Leopard in Russia (Pikunov et al. 1999). The plan includes a detailed status report with an analysis of threats. Goals and objectives for the survival of a self-sustaining leopard population in its natural habitat are formulated. Seven objectives of leopard protection are identified: 1) First steps 2) Nature use in leopard habitat 3) Establishment of a network of protected areas 4) Captive breeding 5) Reintroduction 6) Monitoring of leopard numbers and habitat conditions 7) Environmental education and public awareness.

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**STRATEGIES FOR SAVING THE FAR EASTERN LEOPARD  
IN RUSSIA**

**Contents**

**I. NATURAL HABITAT, POPULATION NUMBER, BIOLOGICAL PECULIARITIES  
AND MEASURES FOR THE PROTECTION OF THE FAR EASTERN LEOPARD**

- I.1 The Status and General Distribution of the Far Eastern Leopard
- I.2. Dynamics of the Habitat and Population in the Russian Far East: A Retrospective and Prospects for the Future
- I.3 Natural Threats to the Survival of the Leopard
  - I.3.1 Hunting
  - I.3.2 The Shortage of Food Resources
  - I.3.3 The Destruction and Loss of Habitats
- I.4 Biological Characteristics of the Leopard and their Effect on its Conservation
  - I.4.1 Biological Characteristics and Behaviour that Lower the Population's Ability to Survive
  - I.4.2 Biological Characteristics and Behaviour and Particularities of a Leopard's Habitat that Contribute to the Population's Survival
  - I.4.3. Reaction to People
- I.5 Existing Conservation Measures
- I.6 Breeding Far Eastern Leopards in Captivity

**II. STRATEGIC PRIORITIES AND MEASURES FOR SAVING THE FAR EASTERN  
LEOPARD**

- II.1. The First Steps in Saving the Far Eastern Leopard
- II.2. Developing an Optimal System of Nature Use in the Leopard's Habitat
- II.3. The Completion of a Network of Leopard Reserves -- Natural Areas      Enjoying  
Special Protection
- II.4. The Creation of a Self-Sustaining Population in Captivity
- II.5. The Restoration of Lost Populations in the Wild
- II.6. Monitoring the Numbers and Conditions of the Leopard's Habitat. Scientific  
Research

## II.7. Educational Programme on Saving the Leopard

### III. INTERNATIONAL COOPERATION TO SAVE THE FAR EASTERN LEOPARD

#### INTRODUCTION

One of the top priorities in the protection of rare species in Russia -- along with the Amur tiger -- belongs to the Far Eastern leopard, whose fate is even more dramatic. The Far Eastern leopard is one the rarest and most beautiful of the cat family. It inhabits an area that long ago broke away from the major part of the species' natural habitat, **and there are no more than 40-52 individuals alive today.**

There are only 10 pure-bred Far Eastern leopards in captivity. When one talks about threats to the existence of one or another species or subspecies, one usually is thinking merely of an approaching catastrophe, But the situation of the Far Eastern leopard can be considered a catastrophe right now, and calls for extraordinary measures.

In the Far Eastern part of Russia the leopard was always overshadowed by its powerful cousin, the tiger, and, in spite of its critical situation, was largely ignored by society and conservation agencies. From the beginning the number of leopards and the area of their natural habitat were much smaller than that of the tigers, and, while over the past 50 years the number of tigers has grown and its natural habitat is being restored, the leopard population has been steadily shrinking, along with the area in which it can be found.

At present, the number of leopards is 10-15 times lower than that of the tiger, and its natural habitat is just a small fraction of that of its feline relative. Over the past 20 years the natural habitat of the leopard has been reduced almost by half. The last refuge of the Far Eastern leopard in Russia is the extreme southern part of the Far East Primorski Krai (Maritime Territory), an area which may be integrated into large-scale economic development projects. All of this requires that the process of saving the leopard and its natural habitat be given special consideration.

From the beginning of the 1970s Russian scientists have repeatedly raised the question of the critical situation of the Far Eastern leopard, and have achieved a certain amount of success. In 1979, the First All-Union Conference on Rare Species of Mammals adopted a resolution creating the Barsovy Zakaznik (Wildlife Refuge) (106,000 hectares), for the protection of the leopard. In 1990 The Far Eastern Chapter of the Academy of Sciences drafted a "Long-Term Plan for the Protection and Rational Use of the Resources of Primorski Krai until the Year 2005," which was approved by the Regional Congress of People's Deputies in 1992. (Ecological Program). In 1995, a committee for the protection of the Far Eastern leopard was organized in Vladivostok, with the participation of specialists of IUCN – The World Conservation Union. But it was not until the end of 1996 that an international conference on saving the leopard was called in Vladivostok, on the initiative of the World Wildlife Fund and with the financial support of USAID. The conference designed a unified program of measures to accomplish its goals. A working group for developing a "Strategy for Preserving the Far Eastern Leopard in Russia" was formed at the conference.

#### I. NATURAL HABITAT, POPULATION NUMBER, BIOLOGICAL

## PECULIARITIES AND MEASURES FOR THE PROTECTION OF THE FAR EASTERN LEOPARD

### I.1 The Status and General Distribution of the Far Eastern Leopard

Among the more than 20 subspecies of leopard *Panthera pardus* (Linn. 1758) that have been studied, the Far Eastern subspecies *P.p. orientalis* Schlegel, 1857, belongs to those most clearly defined (Nowell and Jackson, 1996). It is characterized by long, thick fur, especially pronounced in the winter, with a general yellowish-reddish tone and a thick mat of contrasting spots; the circular black spots on the body -- "rosettes" -- are comparatively large. While the taxonomic and evolutionary link of this subspecies with the neighboring *P.p. japonensis* Gray, 1862, which lives in the area south of Beijing, needs additional study, there is no doubt that geographically and ecologically they are very sharply different. The Far Eastern subspecies was formed in an area of broad-leafed and coniferous forests in the moderate latitudes of Eastern Asia, with the cold and snowy winters characteristic of that region. Its natural habitat takes in the extreme southern portion of the Russian Far East, the forest lands of the North-Eastern territory and the Korean Peninsula.

The leopard has now retreated from the seashores. But it is near the sea in Primorski Krai that the sika deer *Cervus japonensis* and goral *Nemorhaedus goral*, potential leopard prey, have their main habitats. Modern deer-farming enterprises have been organized in these areas.

**At the present time the habitat has been catastrophically reduced and now occupies only the extreme south-eastern part of Heilongjiang province and the eastern portion of the Jilin province in China; the extreme south-western portion of the Primorski Krai; and, possibly, the northern portion of the Korean People's Democratic Republic (North Korea). In the Republic of Korea (South Korea) the last time a leopard was seen was in 1969.**

In China, over the past 20 years the number of leopards and their area of habitation in the Jilin province has been steadily shrinking (Yang, *Dzhiyang THIS CANNOT BE THE CORRECT CHINESE SPELLING ?Jiyang?*, 1996). A number of leopards still lives in the extreme southern portion of the Heilongjiang province. The total leopard population in China has declined by 70 percent since 1960-70, and according to census data (Yang, *Dzhiyang*, 1996) now comprises no more than 15-20 individuals, living in the isolated mountainous regions on the border with Russia and North Korea. According to the latest data of an international group of specialists in Feb.-March 1998, in the Jilin province of China the leopard has been seen only in territories bordering Russia. There is no new information on the leopard population in Heilongjiang province, and there may be no more than 3-5 individuals there now. According to a study of three northern provinces of the Korean People's Democratic Republic (North Korea) bordering on Russia and China, there were no leopards observed at all.

So it turns out that the modern habitat of the Far Eastern leopard comprises only a limited mountainous-forest region with an area of 10,000-15,000 square kilometers at the border of three states: China, Russia, and North Korea. **The most optimistic estimates of the world population of the Far Eastern leopard are no more than 40-52 individuals (30-40 in the Primorski Krai, 4-7 in Jilin, 3-5 in Heilongjiang).**

## **1.2. Dynamics of the Habitat and Population in the Russian Far East: A Retrospective and Prospects for the Future**

At the beginning of the 20th century the leopard inhabited Primorski Krai and the Khabarovsk Krai. In Khabarovsk the leopard was found on the left bank of the Amur River, mainly in the area of the Lesser Hingan mountains (Heptner and Sludskii, 1972). But the area of constant occupation was significantly smaller, and comprised only the southern portion of Primorski Krai, approximately up to a line stretching from the Khanka lake to Olga Bay (Arsenyev, 1914). North of this line only occasional forays by individual animals were observed, from Manchuria up to the Lesser Hingan range, Vandashan, Laoling, and also in the southern regions of the Ussuriisk Raion (Region). These forays by leopards from Manchuria reached the Zabaikal area.

At the end of the 19th century the overall habitat of the leopard began to contract due to economic exploitation of the forest and steppe areas of the Prikhankaiskaya plain. These open areas are divided by two large mountainous-forest regions, where the leopard could be found -- the southern part of Sikhote-Alin and the Eastern Manchurian mountain spur in the western portion of the Primorski Krai. There were undoubtedly links between the two groups, but as humans began to exploit the territory the break between them grew and contacts ceased. As time went on, the western part of the habitat was further divided into two sections: the north-western (the upper reaches of the Kommissarovka River in the Pogranichny and Khankaisky Raions and the south-western (Borisovskoye plateau and the Black Mountains in the Ussuriisky, Nadezhdinsky and Khasansky Raions). There was almost no exchange of individuals among these groups. This had a very negative effect on the fate of the Sikhote-Alin population, which was totally cut off from the major habitat.

A census of the leopard in the winter of 1972-73 confirmed the presence of three isolated groups:

- in the southern portion of Sikhote-Alin, where the animals were most often observed at the shore of the Sea of Japan, but their numbers were no more than 8-10 individuals

- in the western portion of the Primorski Krai in the upper reaches of the Kommissarovka River, where 5-6 individuals were counted, regularly migrating across the Russo-Chinese border

- in the south-western portion of the Primorski Krai (Khasansky, western Nadezhdinsky and Ussuriisk Raions) where 25-30 leopards lived

On the whole, 38-46 leopards were counted in the Primorski Krai in the mid-1970s (Abramov, Pikunov, 1974). The maximum number was registered in the river basins of the Barabashevka, Narva, and Poima rivers, which formed the basis for the organization of the first national reserve in the Far East dedicated to the preservation of the leopard. The Barsovy Zakaznik, formed in 1979 with an area of 106,000 hectares, surrounded the Kedrovaya Pad Zapovednik (Reserve) in a wide defensive ring, creating, together with it, an extended natural preserve, where any kind of industry or sport was prohibited.

**The next census, in 1983-84, showed a complete absence of the leopard in the western Primorski Krai and in southern Sikhote-Alin. The population of south-west Primorski Krai has not changed much, and now comprises 25-30 individuals, approximately 10 of which live near the border with China.**

The results of the next three censuses confirmed that the number of leopards in south-western Primorski Krai remained constant: In the winter of 1990-91, 33-36 individuals were counted; in February 1997, in 60-70 percent of the territory of the best habitats of the Far Eastern leopard, 20-24 individuals were counted, and thus, counting the unstudied areas, the overall population of the was 29-31 individuals (Pikunov, Abramov, Aramilev, Korkishko, Fomenko).

In February, 1998 over the entire territory, including the border areas (370-400 thousand hectares) and using a different method than in earlier years, 40 animals were counted (Aramilev, Fomenko).

There are reports of leopard tracks in the southern portion of Sikhote-Alin, but there is no reliable confirmation of this information. Special research in the winter of 1988-89 failed to establish the presence of leopards in southern Sikhote-Alin.

**In the 20th century the natural habitat of the Far Eastern leopard in Russia has been reduced to a catastrophic degree. The animals have disappeared from the Khabarovsk Krai, and the only habitat for the subspecies in the Primorski Krai was divided into three isolated sections, of which two have now ceased to exist. At the present time there is just one region left in Russia where the Far Eastern leopard has been proven to live -- the extreme south-western portion of the Primorski Krai, bordered on the north and on the east by the Razdolnaya River, on the east and on the south by the Sea of Japan, and on the west by the border with China (Pikunov, Korkishko, 1992). The population of the south-western district has been crowded into a thin strip no wider than 45-50 kilometers, caught between territory that has been subject to human development and natural or artificial barriers that are all but insurmountable for the animals.**

The existence of the leopard in the western part of Primorski Krai and in the south of Sikhote-Alin is doubtful at the present time, but these territories could become the most viable alternative for a program of reintroducing the leopard to the area, and are in need of preservation.

**The total area of the natural habitat of the subspecies in Russia is now 370-400 thousand hectares, and the population is holding steady at 30-40 individuals, of which approximately 10 inhabit the border area with China, beyond our country's boundaries.**

The dynamic in the change of habitat and population of the leopard in Russia is highly negative. Even the final refuge of the leopard in Primorski Krai is not being adequately protected. Forests are being cut down, foliage is being systematically burned, roads are being laid or repaired. In a significant portion of the area inhabited by the leopard there is hunting and trapping, and uncontrolled harvesting of medicinal herbs, which is also a great cause for concern. The optimal habitats are being curtailed -- oak, broad-leaved, black-fir, pine-broad-leaved forests -- and in their place are scrub forests, inflammable hazel-bush, clover and

degraded oak woods, which the predators visit much more rarely.

**Nevertheless, the very existence of the south-western population and the recent relative stability of its numbers are hopeful signs.** Given the necessary measures for the protection of the animals themselves, favorable condition of their habitat and their food resources, this group could apparently exist for a fairly long time, although there is no certainty that such a small population can survive for a long period. In order to form a more exact picture of the chances for survival of the leopard in Russia, information is needed on the state of leopard populations in the border areas with China and North Korea. **In the long term, the prospects for survival of the subspecies depends on the consolidation of small groups of animals on different sides of national borders.**

In the existing situation it is necessary to provide for the development of projects to restore the vanished populations, and this could become the major focus of a long-term strategy for saving the leopard.

### **I.3 Natural Threats to the Survival of the Leopard**

#### **I.3.1 Hunting**

Leopards are killed by people mainly in the following instances:

- \* poaching, stimulated by the demand for the animal's pelt and body parts, which are used as raw materials in the preparation of various Eastern medicines; the wearing of animal skins is very fashionable;
- \* the destruction of animals that prey on herds of sika deer in deer farms
- \* animals which are caught in traps set for other kinds of fur-bearing animals.

It is difficult to estimate the scale of poaching. Judging by the large flow of residents of neighboring countries into the Primorski Krai, illegally and purposefully buying up unique biological resources, the demand for the bones and pelts of leopards can be considered fairly steady. Most often leopards are shot when they are encountered by accident; or when hunters go out with dogs; or when the animals fall into traps. Young leopards are often caught in traps set by local residents for badgers, foxes and racoon dogs. Once the leopard has been caught in the trap, the hunters kill it. Deer farmers also destroy leopards, since a leopard living near a deer farm preys on the herd. Besides this, deer farmers may have orders for leopards from middle-men. Poaching is also aided by the practice of hunting ungulates with packs of dogs. The dogs chase the leopard up a tree, and some hunters cannot resist the temptation to shoot it.

#### **I.3.2 The Shortage of Food Resources**

The high density of the populations of roe and sika deer is the basis for the leopard's survival in south-western Primorski Krai. In the 1980s the number of sika deer increased sharply. The deer to a large extent crowded out other ungulates, but it is difficult to maintain a high density of the sika deer population, and in low years the leopard may have insufficient food

resources. Over the past 40 years the density of the ungulate population, with the exception of the sika deer, has been below acceptable levels. Poaching, hunting for sport and forest fires could in the near future worsen the situation still further, and this would put the existence of the leopard in this region at risk. Poaching of ungulates has been especially widespread in the border area, along the line of engineering installations, where hunting inspectors and inspectors of nature conservation organs have limited access.

### **I.3.3 The Destruction and Curtailment of Habitats**

Although the timber resources within the leopard's habitat are extremely limited, unorganized cutting continues, including in the border areas. As a rule it is the conifers that lie along the approaches to the leopard's domain that are taken. The danger of forest fires is growing, and disturbance is also increasing. Mining also has a deleterious effect on the region.

In the south-west portion of Primorski Krai the practice of burning dry leaves has long been carried out. This uncontrolled, barbaric method of improving hayfields and fern beds annually turns the entire lower mountainous region of the Khasan district into a single, giant fire, enveloping up to 40 percent of its entire territory. As a result of these regular fires, the mixed forests are turned into scrub, sparse oak woods with a low yield, and these, in turn, give way to fields of grass and bushes. Such areas are increasing in size.

There is potential danger for the leopard in the full-scale implementation of the Tumen project: An increase in the human population and the development of infrastructure will lead to serious pressure on leopard habitat. Railroads and highways in Kraskino-Hunchun are already creating serious barriers to the animals' migration, and for the maintenance of contacts among the leopards in Russia, China, and North Korea. The only ecological corridor between these areas is being closed. Leopards have access to China and North Korea only from south-western Primorski Krai.

The rapid deterioration of the most important ecological characteristics of the leopard's habitat is already under way. **For this reason the implementation of any projects for the economic transformation of this region, linked to an increase in its population, or with a wider and more active economic exploitation of natural resources, will have an extremely negative effect on the fate of the leopard.**

## **I.4 Biological Characteristics of the Leopard and their Effect on its Conservation**

### **I.4.1 Biological Characteristics and Behaviour that Lower the Population's Ability to Survive**

The leopard inhabits mountainous and forested regions, and clearly prefers the black fir-pine-broad-leaf forests in the middle and upper reaches of river basins. It is much less likely to live in broad-leaf forests, and especially the inflammable oak woods, which are growing every year as a result of the practice of leaf burning. Even during extremely snowy winters, when the sika and roe deer are concentrated in the oak groves of the lower river basin, there has been no discernible increase in the leopard population in these regions.



At the same time it is necessary to note that the leopard is less adapted to heavy snow cover than other Far Eastern predators. In the winter it uses the tracks of ungulates as a guide when crossing plateau-like stretches; if there are not enough ungulate tracks, the leopard's migration becomes much more difficult, especially for young animals, or for females with cubs. Leopards' individual home ranges are not large (especially females, who keep to an area covering no more than 5-8,000 hectares) but the animals themselves are very territorial. Each grown animal has its own area, which does not intersect with the home ranges of other individuals of the same sex. For this reason during the winter the number of ungulates in a leopard's home range must be fairly high and stable.

**The territoriality of the leopard, given the restriction in the area of suitable habitats, allows for an increase in their numbers only if the density of ungulates increases.**

The leopard's habit of following its victim's tracks increases the danger of its falling into traps. This occurs most often along the tracks of racoon dogs and badgers, especially in badger communities, where the young animals love to roam.

Although the leopard is very conservative in its choice of a home range, using regular paths and crossing places, and choosing the same places over and over for giving birth, they will not long tolerate the presence of man in such places, especially if there is any kind of activity going on (the building of hunting cabins, roads, etc); leopards then leave their home ranges. So the disturbance factor is quite important for this very reclusive animal. But the conduct of leopards can change if they live near deer herds. These animals get used to easy prey, they begin to have conflicts with humans, and, as a rule, they perish.

#### **1.4.2 Biological Characteristics and Behaviour, and Particularities of a Leopard's Habitat that Contribute to the Population's Survival**

**The leopard is not extremely particular in its choice of food, and among its prey can be found almost all available vertebrates, which significantly increases its chances for survival.**

Most often the leopard preys on the sika and roe deer, but it is capable of killing an adult red deer or a wild boar as well. Racoon dogs, badger, hare and pheasant also make up a significant portion of the leopard's diet, and it also eats rodents and even fresh-water crabs. The leopard can also eat frozen meat and half-decayed animal carcasses, or scavenge among the animal graveyards of the deer herds. The leopard uses much more of its prey than the tiger; it returns many times to the remains, even if it is frightened away, and it hides the remains of its food from scavenging birds.

The leopard does not have seasonal mating rituals -- mating and birth can occur at any time of year.

**The leopard habitats in the south-western part of Primorski Krai have always been characterized by a high density of the ungulate population, especially roe and sika deer, and wild boar. The seasonal migration of roe deer through the area provided food for resident**

leopards in the winter period.

**The line of engineering structures along the border with China has played a definite positive role in the retention of the leopard's food resources in the area -- the leopard can overcome the barriers, but the ungulates cannot.**

This prevents the ungulates from leaving Russia for China, where there is a very small population. The results of studies in the Jilin Province (China) in Feb-April 1998 confirmed that the numbers and assortment of ungulates is analogous to that in Russia only along the border. Inside Jilin Province the density is 3-5 times less than in the south-west Primorski Krai.

**Deer farms play a special role in the life of the leopard**, where sika deer are held in fenced-off areas, and raised for their antlers, which are used in the preparation of medicines. Eight deer parks are located in the foothills of the Borisovskoye Plateau and the Cherny (Black) Mountains, which border the leopards' habitat on the north, east, and south. Some of the deer farms were created right in the leopards' habitat, some in the individual home ranges of females, who continued to give birth and raise their litters there, although the fate of these animals was predetermined.

**At the present time the significance of the deer farms for the leopard is ambiguous. On one hand, they provide the leopard with easy, unlimited food resources throughout the year. On the other hand, a leopard which lives near a deer farm and feeds on the deer is almost certainly doomed, since the managers and guards of the farm will do anything they can to destroy the predator.**

The Far Eastern leopard is apparently able to live in harmony with its major competitor for food resources, the Amur tiger, at least when there is sufficient food around. In the middle of the 1980s the number of sika deer on the Borisovskoye Plateau increased sharply. At this time the maximum density of both the leopard and the tiger was recorded in this area. The sika deer was the main prey for both predators, but their hunting habits were different: the tiger hunted mainly near river beds and in the foothills of the mountain ranges, while the leopard stalked its prey near watersheds and on mountain ridges. On more than one occasion a leopard was observed eating the remains of tiger prey. There are no known cases of a tiger attacking a leopard in the Far East.

#### **I.4.3. Reaction to People**

**The leopard is no danger to people.** Over the past 50 years there have been no registered cases of unprovoked attacks by leopards on people. There have been just a few cases where a wounded and hunted animal attacked someone. The leopard, having keen eyesight and hearing, detects the presence of humans and cautiously leaves (even if it is feeding), usually remaining unseen. A few young animals may follow human tracks out of curiosity, but they never show signs of aggression.

#### **I.5 Existing Conservation Measures**

The leopard is listed in the Red Book (of endangered species) of the Russian Federation,

hunting the leopard has been banned since 1956, and in 1966 a ban on trapping live animals was introduced. It is also included in the Red List of IUCN – The World Conservation Union and in Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The Kedrovaya Pad Zapovednik, located in the leopard's habitat, was created in 1916 with an area of 17,900 hectares, where all hunting and economic activity is prohibited; but the role of the reserve in the preservation of the leopard has been small, due to its small size. In 1979 the Barsovy Zakaznik was created at the state level, especially for the protection of the leopard; but it has two military training grounds within its borders, as well as intensive economic activity. In 1996, a regional reserve was created, the Borisovskoye plateau, partially encompassing the outer portion of the leopard's habitat, and playing a very limited role in the animal's protection. All hunting is prohibited in these reserves, and economic activity is limited.

An executive group of the "Tiger" division of the Primorski Krai Conservation Committee is working in the leopard's habitat, as well as an executive group of the Primorski Krai Hunting Directorate, and hunters of the Nezhinskoye, Borisovskoye, Slavyanskoye, Fauna, Khasanskoye, and Pavlinovskoye hunting organizations. Russian government decree No. 795, dated August 7 1995, "On the protection of the Amur tiger and other rare species of animals and plants threatened with extinction in the Primorski and Khabarovsk Krai" serves as a basis for the adoption of additional measures for the protection of the leopard.

**But the efficacy of existing measures is low and completely insufficient to guarantee the survival of the leopard.**

### **I.6 Breeding Far Eastern Leopards in Captivity**

Since the natural population of the Far Eastern leopard is small and very vulnerable, special attention must be given to preserving the subspecies in captivity. **Leopards in captivity may be used in the future both to supplement those populations that have survived, and to create new populations by reintroducing the animals into the places where they used to live.**

Far Eastern leopards have been held in captivity since 1961, and since 1974 international pedigree records have been kept. At the present time there are 195 Far Eastern leopards in 60 zoos and private collections (104 females and 91 males); all of the leopards born in captivity have come from 10 founding members which were trapped in the wild. But one of these - a male, listed in the international pedigree book as No. 2 -- is of uncertain origin, and a number of factors give cause to doubt that he was, in fact, a pure specimen of the *P.p. orientalis* subspecies. The problem of the origin of founder No. 2 is fairly important, since it is from him that the greater portion of Far Eastern leopards in captivity have come. European zoos now have only 10 individuals (6 males and 4 females) which can be considered pure-bred Far Eastern leopards. Out of these 10, six belong to the Moscow Zoo.

The international program for breeding Far Eastern leopards in captivity that is now being

carried out is aimed both at the further breeding of leopards that have come from founder No. 2, with the goal of breeding his genes out of the genotypes of future descendants and of lowering the degree of inbreeding in the group, and at the breeding of more pure-blooded individuals with the goal of maintaining a stable and genetically-pure reserve population of the subspecies in captivity. The second task is quite complicated due to the very small number of founders. This problem is aggravated by the sexual incompatibility of some pairs, something which is often observed in leopards. Artificial insemination could be a solution to this problem, but its application to leopards has not yet brought the desired results.

## **II. Strategic Priorities and the System of Measures for Saving the Far Eastern Leopard**

In Russia there are only 30-40 leopards living in a very confined territory. At the present time only 8-12 individuals have been observed in China, in the border area with Russia, and their natural habitat and their numbers are rapidly declining. It is possible that some leopards are left in North Korea, but nothing is known of them. Even from these facts it is clear that the preservation of this cat in Russia is a high-priority task. Unfortunately, **during a wide-ranging campaign to save the Amur tiger, the Far Eastern leopard was given much less attention, although its numbers are only 1/15 of those of the tigers, and its habitat is only 1.5 percent as large. Over the past two decades the habitat of the leopard in Russia has been reduced by half, and it is only now becoming clear what an irretrievable loss awaits us if this magnificent animal disappears from Russian territory.**

While the number of the Russian population has remained stable over the past few decades, this is no cause for complacency, since the stability of the population has been disturbed and its possibilities have been exhausted. Also alarming is the likelihood of increasing pressure on the leopard's habitat from economic development of the region. The immediate development and implementation of a system of measures is needed to keep the last natural leopard population from disappearing from Russia. Together with a plan for emergency measures, a long-term program must be developed for saving the leopard in Russia, which would include projects for restoring those populations that have disappeared. A standing working group should be created for the consolidation of efforts and the resolution of questions involving the protection, study and reintroduction of the leopard.

### **II.1. The First Steps in Saving the Far Eastern Leopard**

The major factor in the decline of the leopard population in the wild is the direct destruction of the predator and of its food sources (sika and roe deer). In order to reduce the chances of the animal's disappearance, it is necessary to:

- \* organize an effective guard of the reserves and hunting areas within the leopard's natural habitat, and to beef up the personnel and the material and technical base
- \* create a special executive group for the conservation of the leopard, based in the leopard's habitat; add qualified personnel to existing groups and provide them with transportation; coordinate the activities of the guards at the Kedrovaya Pad, Barsovy and Borisovskoye Plateau reserves with the hunting area guards; and exchange information and conduct joint raids
- \* petition the border guard command to allow hunting inspectors and conservation groups into the border area, and to stop poaching there

- \*prohibit the use of traps and the hunting of ungulates using dog packs in the leopard's habitat
- \*develop a system of compensation for the loss suffered by deer farms due to the leopard, and to identify sources of financing for such compensation
- \*invite leopard specialists and members of working groups to help settle conflicts, and to evaluate the degree of loss and to make recommendations on the fate of the predator
- \*abide by the recommendations of Primorski Krai administration on the minimum acceptable density of the ungulate population (Appendix to the Primorski Krai administration decree No. 182, dated 28 June 1993) when establishing quotas for ungulate hunting
- \*demand that the administration of deer farms include in their economic and technical founding documents articles that provide for the protection and breeding of the leopard and other rare animals and plants on their territory, in accordance with the law.
- \*conduct a wide-ranging advertising campaign to attract public attention, both in Russia and abroad, to the task of protecting the Far Eastern leopard

## **II.2. Developing an Optimal System of Nature Exploitation in the Leopard's Habitat**

**Long-term strategy for the exploitation of natural resources in the south-western Primorski Krai must be aimed at the conservation of the rich biological variety of this unique region, the pearl of which is the leopard.**

The Eastern Manchurian Mountain spurs, where the leopard lives, are characterized by the greatest variety of plant and animal life in the Far East, containing many rare species and endemic species. **For this reason the successful conservation of the leopard and its habitat will aid the conservation of the entire system of biological diversity in this most interesting region of the Far East.** Priority must be given to the maximal conservation of the natural habitat and range of the leopard.

Hunting areas in the leopard's habitat can provide reliable refuge for the leopard only if hunting restrictions are conscientiously observed: quotas are established for the shooting of ungulates; prohibition of trapping and hunting with dogs. Methods for preserving the leopard in these areas must be developed in collaboration with hunters. Besides this, in order to stabilize the leopard's food base a system of biotechnical measures must be developed to preserve and increase the population density of wild ungulates in the reserves and hunting areas.

**The most urgent problem is to regulate the relationship between the leopard and the administrators of the deer farms, to make their relationship mutually beneficial, and to make the administrators and workers in these enterprises partners in the conservation of the leopard.** This would be possible if a system is developed that would provide insurance to the deer farms against attacks by leopards. The main problem is finding a source of financing to compensate the deer farms for the losses suffered from leopards. Contributions from Russian and foreign funds, prepared to take part in saving the leopard, could be a possible source. The possibility of making these deer-farming enterprises the property of nature conservation organizations must be examined, as well as the creation of special

leopard-breeding areas within their confines, where it would be possible to conduct research into various aspects of biology, developing methods of trapping, census-taking, etc. These "leopard parks" could become extremely attractive for eco-tourism and could have a great cultural and educational significance.

At the present time raising deer to harvest their antlers -- a traditional form of land use in southern Primorski Krai -- is undergoing a crisis. If this industry is destroyed, the food base of the leopard will be curtailed, and the number of unemployed will increase sharply, leading to a rise in poaching. For this reason the support of deer-farming must be looked at as an alternative to other methods of developing the region, aimed at industrial expansion and population growth.

**All of the above stresses the urgency of developing a general plan for the exploitation of natural resources in south-western Primorski Krai, aimed at preserving the unique biological diversity of the region and an economic regime that will spare the environment as much as possible.**

This plan should provide for the development of ecological tourism. It is a hopeful sign that at the present time there are no plans for a fundamental transformation of the leopard's habitat, and the government of Primorski Krai understands the necessity of protecting this animal.

**The path of economic development of south-western Primorski Krai will, to a large extent, determine the fate of the last population of the Far Eastern leopard in Russia.**

In order to provide a secure future for the natural population of the Far eastern leopard it is necessary to:

- \*conduct a detailed ecological analysis, concentrating on rare animal species, of economic development plans that impinge directly or indirectly, on the habitat of the Far Eastern leopard

- \*develop a general plan for the exploitation of natural resources in south-west Primorski Krai, providing for the preservation of its biological diversity, an economic regime that spares the environment as much as possible, and support for deer farming

- \*establish and enforce a full ban on logging in virgin forests or those forests that are largely untouched within the leopard's habitat

- \*develop and implement a system of measures of defence against spring and autumn fires, to prevent their spreading to the forests

- \*develop and implement norms for hunting within the leopard's habitat, and to coordinate them with the hunters themselves

- \*develop all of the above measures on the basis of nature conservation programs in the region -- a system of natural areas enjoying special protection.

### **II.3. The Completion of a Network of Leopard Reserves -- Natural Areas Enjoying Special Protection**

At the present time the natural areas designated as being "under special protection" encompass only 40 percent of the leopard's habitat, and do not form a whole system. There is almost no possibility for a significant increase in their size in the future. For this reason

efforts must be directed at raising the effectiveness of these territories by raising their status, and coordinating the various special areas, strengthening their financial and technical bases. **A plan should be developed to unite all of these special areas into one network under common direction, and to follow this with the creation of a single reserve, which in the future could become a part of an international Russo-Chinese reserve.**

**The completion of a network of specially protected areas in the south-west Primorski Krai will necessitate:**

- \*an evaluation of the effectiveness of each of the existing protected areas, their location along the border in relation to the location of the leopard population and threats to its existence
- \*if necessary, an adjustment of the border to neutralize the threats so identified
- \*creation of ecological corridors
- \*the organization of a united international reserve on the basis of existing and future specially protected areas in the border regions of Russia, North Korea and China.

This last, it is assumed, will play the decisive role in protecting the Far Eastern leopard in the long term.

#### **II.4. The Creation of a Self-Sustaining Population in Captivity**

The high risk that the Far Eastern leopard will disappear altogether in the wild raises the significance of work on breeding the leopard in captivity. Unfortunately, the number of pure-bred animals of this subspecies, concentrated in various zoos, is still very small. In order to increase the chances for success in creating a self-sustaining population of leopards in captivity, it would be desirable to bring in animals captured in the wild periodically. The group of leopards in captivity could, in turn, serve to supplement or create natural populations.

Concrete measures in this area amount to the following:

- \* continuation of the work done by Russian zoos within the framework of the European program for captive breeding, to maintain and increase the population of pure-bred Far Eastern leopards in captivity
- \*supplementation of this group with animals that have to taken out of the wild because they have been wounded or injured in some way
- \*if the number of Far Eastern leopards in the wild increases significantly, the group of leopards in captivity should be supplemented by animals caught in the wild
- \* a study of the feasibility of returning animals born in captivity to the wild, with the goal of supplementing the natural population, or the re-establishment of populations that have disappeared
- \*planning and creation of an experimental centre in Primorski Krai for breeding animals under conditions as close to nature as possible, as well as for maintaining them and preparing them for release into the wild. If these experiments are successful, the centre could become a productive enterprise. The individuals which cannot live in the wild for various reasons could be returned to zoos.

#### **II.5. The Restoration of Lost Populations in the Wild**

The area inhabited by the leopard is, at present, extremely small, and to guarantee its survival in the long term it is necessary to develop a special program to restore lost populations.

The implementation of such programs for large carnivores is, as the still scant world experience in this area shows, a complicated and expensive undertaking, demanding multi-faceted scientific and methodological preparation. Priority must be given to the protection of the "base" population in the wild and in captivity, capable of providing for the expansion of plans to reintroduce captive animals into the wild without serious damage to existing populations.

The program of restoring lost populations into leopard habitat demands that the following questions be resolved:

- \* detailed analysis of the reasons for the disappearance of the leopard in southern Sikhote-Alin and in western Primorski Krai
- \* the division of the program into consecutive stages with detailed development of the content of each stage in order to minimize the risk of accidental death of the animals during the reintroduction phase
- \* the selection and preparation of a group of animals -- the founders of the new population -- in a special centre, or the selection of places where they can be trapped in the wild for a rapid redeployment to a new location without being held in captivity
- \* the selection of a specific region for the reintroduction, where conditions are optimal for the survival and growth of the animals thus released (at the present time the choice is limited, for all practical purposes, to southern Sikhote-Alin)
- \* the release of animals fitted with radio-collars, and detailed monitoring of the situation afterwards
- \* the organization of a reliable system of protection of the animals in the places where they are released -- not only for the leopards themselves, but for their potential prey; constant monitoring of the situation, and, if necessary, the implementation of special measures to provide the leopard with prey
- \* wide-ranging educational efforts among hunters and the local population

## **II.6. Monitoring the Numbers and Conditions of the Leopard's Habitat. Scientific Research**

The critically low numbers of the subspecies in the wild and the extremely limited area of the leopard's habitat make it necessary to conduct constant monitoring of the surviving population and of its habitat, including:

- \* special winter censuses of the leopard throughout its entire habitat, at least once every three years
- \* yearly observation of model sections -- in reserves, sanctuaries, and hunting regions -- which would allow scientists to follow the development of base population groups, and the behaviour and breeding of individual animals
- \* the study of the biology and behaviour of the leopard by traditional methods (tracking) as well as with radio-collars, not only in the Kedrovaya Pad reserve, but beyond its borders
- \* the completion of current and new census methods, and of research on the biology and



behaviour of leopards in the wild

\*the collection of information on the leopard by questionnaires and surveys throughout its entire habitat

\* an analysis of changes in the leopard's habitat, including the use of long-range methods such as satellite and aerial photography

\* special research into the genetic diversity of the natural population of the leopard compared to the leopards in captivity

\* research into the relations of the leopard with other large predatory mammals

## **II.7. Popularizing Methods for Saving the Leopard**

Without the support of the local population it is extremely difficult, and often useless, to undertake measures to save the leopard. For this reason the development of at least a tolerance for the leopard among the local population is of primary importance. **The aesthetic and educational value of one of the rarest and most beautiful cats in the world must be explained to all social and age groups in the local population.** Among the first measures to be undertaken should be the following:

\* development and introduction into pre-school and school programs of special lessons to acquaint children with the unique natural features of their home environment, with the rare species of animals in it, including the leopard, and with measures to protect them

\*organization of a wide-ranging campaign to support the leopard in the media (radio, television, newspapers)

\* publication of bright, attractive specialized publications that will arouse sympathy for the leopard and the desire to help

\* a campaign to publicize the results of the fight against poaching in all its stages, including the verdicts of courts

\* the design of routes for educational tourism in the leopard's habitat

\* campaign to acquaint people with the rules for behavior when people meet large predatory mammals

\* development of a plan for a special "leopard park" designed for ecological tourism

Special attention must be given to explanatory work among the border forces, in order to incorporate them in concrete protection measures, including joint anti-poaching raids

## **III. INTERNATIONAL COOPERATION TO SAVE THE FAR EASTERN LEOPARD**

The distribution of the Far Eastern leopard in border areas, and the extremely small area of its habitat, as well its low population numbers gives special significance to international coordination of measures to protect the animal. Supporting stable contacts of the remaining populations across state borders is becoming the most important condition for the survival of the subspecies as a whole.

It will be very difficult to preserve the Russian population without uniting the efforts of Russia, China and North Korea.

Considering that the habitat of the Far Eastern leopard encompasses mainly the remaining mountain forests at the juncture of three countries, it is expedient to begin preparation for a

tri-lateral intergovernmental agreement on the protection and preservation of the unique biological diversity of this region. First of all, it is necessary to establish immediately close contact with China on an inter-governmental level for the development of a coordinated policy for the preservation of the border leopard population. Responsibility for the development and implementation of this policy could be assumed by a bilateral working group.

**One of the most pressing goals must be the drafting of a plan for a cross-border international reserve for the preservation of the Far Eastern leopard, the Amur tiger and other rare species living in the border territory.** Work on the restoration of the lost areas of the leopard's habitat by means of reintroduction of leopard populations must also, undoubtedly, be conducted through international cooperation. Mutual understanding of the necessity for joint efforts on saving the leopard will ease the exchange of information, the coordination of scientific research, the unification of census-taking methods and monitoring of the state of the population and its habitat; such understanding will also aid in the increasing the efficacy of measures to stop the illegal trade in biological resources across borders.

The implementation of a program for reintroducing the leopard by providing for the breeding of animals in captivity, would be next to impossible without the aid of foreign zoos. A set of measures on saving the leopard in Russia will require investment, and with the support of foreign and international ecological funds the implementation of these measures will be more successful. The international conference in Vladivostok demonstrated the great interest of foreign scientists in the problem of saving the Far Eastern leopard and their desire to help Russia in this noble effort. However, this is not yet the case with public opinion abroad: there is very little information about the alarming fate of this spotted cat which still roams the snow-covered hills of the Far East.

## NOTES

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