

Aramilev, V. V., Aramilev, S. V., Arzhanova, T. D., Darman, Y. A., Zhuravlev, Y. N., Kostyrya, A. V., Pikunov, D. G., and Fomenko, P. V. Strategy for conservation of the Far-Eastern leopard in the Russian Federation. Report: 1-92. 2014. Moscow, Ministry of Natural Resources and the Environment of the Russian Federation, WWF.

Keywords: 7RU/action plan/Amur leopard/biology/captive breeding/conservation/distribution /habitat/habitat requirements/hunting/legislation/leopard/*Panthera pardus*/*Panthera pardus orientalis*/population size/prey/protected area/strategy/threat

Abstract: The only existing population of the Far-Eastern leopard has its habitat in the south-western region of Primorsky Krai. The Far-Eastern leopard is included in the Red Data Book of the Russian Federation and the IUCN Red List of Threatened species. The conservation of the leopard is regulated by a number of laws: "Law on Environmental Protection", "Law on Protected Areas of Russia", "Law on the Wildlife of the Russian Federation" and "Law on the conservation of hunting resources and amendments on specific legal frameworks in the Russian Federation". The leopard is also covered by international agreements signed by the Russian Federation: the Convention on Biological Diversity and the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). The development of the south-western region of Primorsky Krai began in the 1930's-40s. The whaling and fishing industries were area exceeding 260 thousand hectares, and there is a now a functioning system of protection of the leopard and its prey. On top of that a project has been developed for the creation of a reserve population of the leopard, a comprehensive program of research has been conducted and we saw the establishment of an annual monitoring system of the leopard population. Finally, there was a campaign to raise public awareness about the issue. These steps, together with the structural changes that occurred in the field of governmental wildlife conservation efforts and amendments that were made to legislation, necessitate the revision of the Strategy on the Conservation of the Far-Eastern Leopard in the Russian Federation. At present, the habitat of the Far-Eastern leopard in the southwestern region of Primorsky Krai is being reduced due to the building of roads, pipelines and other industrial objects. A qualitative change of the habitat is occurring due to forest fires and agricultural development. At present, the military testing ranges continue to have a serious effect on leopard habitat. An increase in the anthropogenic effects on the habitat that results from recreational activities of an increased regional population has been noticed throughout the entire range of the habitat. One of the reasons for the decrease in the qualitative characteristics of the leopard's habitat is increasing competition with the Amur tiger population, which is rapidly growing in the south-western region of the Primorsky Krai. A revised version of the Strategy concentrates on the following priorities: The conservation of a sustainable population of the leopard in the south-western region of the Primorsky Krai. / The creation of a sustainable leopard population in the southern region of the Sikhote-Alin Mountains. / Increased multilateral leopard conservation efforts between Russia, China and North Korea. A decrease in the degradation of leopard habitats in the southwestern region of the Primorsky Krai and in the southern Sikhote-Alin region. This is to be achieved through an optimization of land-use planning systems and the development of a network of protected areas. / The optimization of the use of natural resources and the improvement of ecological sustainability in the field of forest and subsurface resource management throughout the habitat of the Far-Eastern leopard. / The improvement of hunting practices and regulations that would, on one hand, increase the leopard prey populations and on the other facilitate the resolution of conflict situations that arise with local inhabitants. / The provision of an unavoidable criminal penalty for any activities involving illegal hunting, storage and sale of Far-Eastern leopards and its derivatives. / The creation of an efficient monitoring system of the Far-Eastern leopards and its prey. / The limitation of research methods to only those that allow for the viability of each individual specimen. It is necessary to achieve every single objective outline in the revised version of the Strategy to assure the long-term conservation of the Far-Eastern leopard.

A close-up photograph of a Far-Eastern leopard's face, showing its distinctive rosette pattern. The leopard's eyes are visible, and green foliage is in the foreground, partially obscuring the face.

Ministry of Natural Resources and the Environment of the Russian Federation

STRATEGY FOR CONSERVATION

of the Far-Eastern leopard
in the Russian Federation

2014

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Moscow

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УДК 502.172:502.211:599.713(571.6)

ББК 28.688

С83

Appendix to the decree of the Ministry of Natural Resources
and the Environment of the Russian Federation from November 19,
2013 (№ 29-п)

ISBN 978-5-9904685-9-7

Cover photograph: © Vasilii Solkin / WWF Russia

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INTRODUCTION

The Far-Eastern leopard (*Panthera pardus orientalis*) is the rarest subspecies of the Felidae family. In the 19th century it had a vast habitat that included the northern region of Korea, eastern provinces of China and the southern region of the Sikhote-Alin Mountains (Primorsky Krai). However, by the 20th century, its habitat began to drastically shrink. By the mid-20th century, the Far-Eastern leopard could no longer be found in Korea. In our century, the Far-Eastern leopard can only be found in those Chinese provinces that border the Russian Federation. By the 1980's the existence of the Far-Eastern leopard could not be confirmed in the Sikhote-Alin Mountains and the north-western region of Primorsky Krai. The only existing population of the Far-Eastern leopard has its habitat in the south-western region of Primorsky Krai.

The Far-Eastern leopard is included in the Red Data Book of the Russian Federation and the IUCN Red List of Threatened species. The conservation of the leopard is regulated by a number of laws: “Law on Environmental Protection”, “Law on Protected Areas of Russia”, “Law on the Wildlife of the Russian Federation” and “Law on the conservation of hunting resources and amendments on specific legal frameworks in the Russian Federation”. The leopard is also covered by international agreements signed by the Russian Federation: the Convention on Biological Diversity and the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

The development of the south-western region of Primorsky Krai began in the 1930's-40s. The whaling and fishing industries were

developed, the construction of sea ports began roads and railways were built. On top of that, there was land given for agricultural use and forests were targeted for timber harvesting. After developments in the Khasan region and during the Second World War there were a large amount of military units stationed in the south-western region of Primorsky Krai. It was during this period that the anthropogenic effect on the habitats of the leopard and ungulate populations was the strongest. By the 1970's, the military presence in the region was minimized, the fishing and whaling industries were in decline, sea ports did not operate at full capacity and the agricultural activity was greatly reduced. It was during this time that the first survey on the number of Far-Eastern leopards was conducted. It showed that there was 25-27 specimens present in the region. In the 1990's, following the collapse of the Soviet Union, there was a large increase in the amount of timber harvesting, border control was reduced and the protection of wildlife was greatly weakened. These factors increased the anthropogenic effects on the habitat and the Far-Eastern leopard itself. These factors provided a real threat for the extinction of the subspecies.

The situation was changed largely due to the Strategy on the Conservation of the Far-Eastern Leopard in the Russian Federation which allowed for the consolidation of the efforts of governmental and international organizations. The successive implementation of the postulates outlined in the Strategy made it possible to avoid the direct annihilation of the leopard and to assure the conservation of the remaining habitat areas. This led to the stabilization and then to an increase of the leopard population in the area. Implemented in 1998, the Strategy on the Conservation of the Far-Eastern Leopard in the Russian Federation is largely completed. The conservation and restoration of leopard habitats has been assured, the national park "Land of the Leopard" has been established, which spans over an

area exceeding 260 thousand hectares, and there is now a functioning system of protection of the leopard and its prey. On top of that a project has been developed for the creation of a reserve population of the leopard, a comprehensive program of research has been conducted and we saw the establishment of an annual monitoring system of the leopard population. Finally, there was a campaign to raise public awareness about the issue. These steps, together with the structural changes that occurred in the field of governmental wildlife conservation efforts and amendments that were made to legislation, necessitate the revision of the Strategy on the Conservation of the Far-Eastern Leopard in the Russian Federation.

At present, the habitat of the Far-Eastern leopard in the southwestern region of Primorsky Krai is being reduced due to the building of roads, pipelines and other industrial objects. A qualitative change of the habitat is occurring due to forest fires and agricultural development. At present, the military testing ranges continue to have a serious effect on leopard habitat. An increase in the anthropogenic effects on the habitat that results from recreational activities of an increased regional population has been noticed throughout the entire range of the habitat. One of the reasons for the decrease in the qualitative characteristics of the leopard's habitat is increasing competition with the Amur tiger population, which is rapidly growing in the south-western region of the Primorsky Krai. A revised version of the Strategy concentrates on the following priorities:

- The conservation of a sustainable population of the leopard in the south-western region of the Primorsky Krai.
- The creation of a sustainable leopard population in the southern region of the Sikhote-Alin Mountains.
- Increased multilateral leopard conservation efforts between Russia, China and North Korea.

- A decrease in the degradation of leopard habitats in the south-western region of the Primorsky Krai and in the southern Sikhote-Alin region. This is to be achieved through an optimization of land-use planning systems and the development of a network of protected areas.
- The optimization of the use of natural resources and the improvement of ecological sustainability in the field of forest and subsurface resource management throughout the habitat of the Far-Eastern leopard.
- The improvement of hunting practices and regulations that would, on one hand, increase the leopard prey populations and on the other facilitate the resolution of conflict situations that arise with local inhabitants.
- The provision of an unavoidable criminal penalty for any activities involving illegal hunting, storage and sale of Far-Eastern leopards and its derivatives.
- The creation of an efficient monitoring system of the Far-Eastern leopards and its prey.
- The limitation of research methods to only those that allow for the viability of each individual specimen.

It is necessary to achieve every single objective outline in the revised version of the Strategy to assure the long-term conservation of the Far-Eastern leopard.

1. THE GOALS AND OBJECTIVES OF THE STRATEGY

1.1. The objective of the Strategy

The key goal of this document is the long-term conservation of a sustainable Far-Eastern leopard population. The population present on the territory of the Russian Federation is to be no less than 100 animals and is to have maximized genetic diversity. It is also crucial to create a reserve population of Far-Eastern leopards over the span of its historical habitat.

1.2. The goals

For the main objective to be accomplished, the following goals must be met:

- The conservation and growth of the current Far-Eastern leopard population to optimal levels.
- The development and implementation of additional Far-Eastern leopard conservation mechanisms in the context of growing anthropogenic impact on the ecosystems.
- The minimization of the negative effect that the anthropogenic factors have on the Far-Eastern leopard population.
- The creation of a self-sustaining population of Far-Eastern leopards of at least 50 animals (15 mature females) in the leopard's historical habitat in the southern Sikhote-Alin region (Primorsky Krai).
- The establishment of a single, continuous leopard population over the span of the Russian Federation, PRC and the DPRK.

2. THE CURRENT CONDITION OF THE FAR- EASTERN LEOPARD AND SPECIFICS OF ITS BIOLOGY

2.1. The systematic position of the Far-Eastern leopard

2.1.1. Russian, English and Latin names

Дальневосточный леопард, Far Eastern leopard, *Panthera pardus orientalis* Schlegel, 1857.

2.1.2. Taxonomic classification

Class: Mammalia

Order: Carnivora

Family: Felidae

Genus: *Panthera*

Species: *Panthera pardus* Linnaeus, 1758

Subspecies : *Panthera pardus* Linnaeus, 1758

2.2. The distribution of the Far-Eastern leopard in the Russian Federation

In the 19th century, preceding the active economic development of the Russian Far East, the Far-Eastern leopard was fairly well distributed across what was known as the Ussuri Krai (what is currently the combined territory of Primorsky and Khabarovsk Krai). Leopard sightings occurred, amongst others, on the left bank of the Amur River, primarily in the region of the Lesser Khingan Mountains. At the same time, the permanent habitat of the leopard population was

considerably smaller. It included only the southern region of Primorsky Krai and south of an imaginary line which stretched from Lake Khanka to Olga Bay. Outside of the Russian Federation, the historical habitat of the Far-Eastern leopard included the north-eastern portion of China (Manchuria) including the present-day provinces of Jilin and Heilongjiang as well as the Korean peninsula.

At the turn of the 19th and 20th centuries, the border of the Far-Eastern leopard's constant habitat within the Primorsky Krai stretched from Olga Bay to the south along the seashore including the basins of the Margaritovka and Milogradovka rivers. To the west, the habitat included the Ussuri river headwaters (southern region of the Chuguyevsky District). The border then stretched to the eastern hillsides of the Siniy Range. Extending around the range to the north, the border then turned south following the western hillsides of the Range and crossed the Ilistaya River which flows into Lake Khanka close to the Kamen-Ribolov village (Image 1). Leopard sightings also occurred to the north of Dzhigat Bay in the Terneysky District (meridian 44°)

By the beginning of the 20th century, the geographic distribution of the Far-Eastern leopard was substantially decreased. This was due to the industrial development of the region which led to the direct extinction of a portion of the leopard population and large populations of its prey as well as to the destruction of the animal's habitat. This period saw the beginning of the process of habitat fragmentation. There was an expansion in agricultural development and an increase in population in the region. These factors led to decreased leopard accessibility to the open regions that divided the two large mountainous forest regions: the Sikhote-Alin and the spurs of the East-Manchurian mountains in the west of the Primorsky Krai. The two regions became increasingly isolated as a result of expanding human settlement. The increasing separation of the two regions led to a rapid

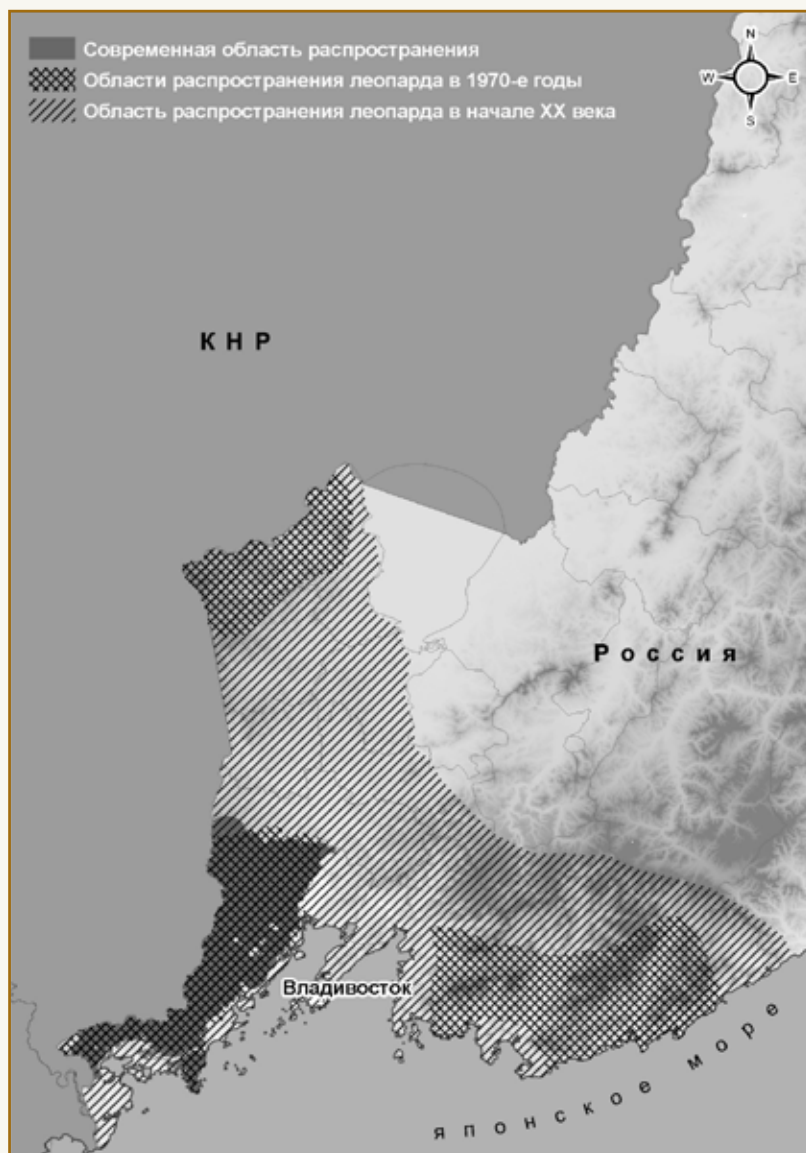


Image 1. The historical and present day habitats of the Far-Eastern leopard in the southern region of the Russian Far East (adapted from Gepter and Sludskiy, 1972. Abramov and Pikunov, 1974).

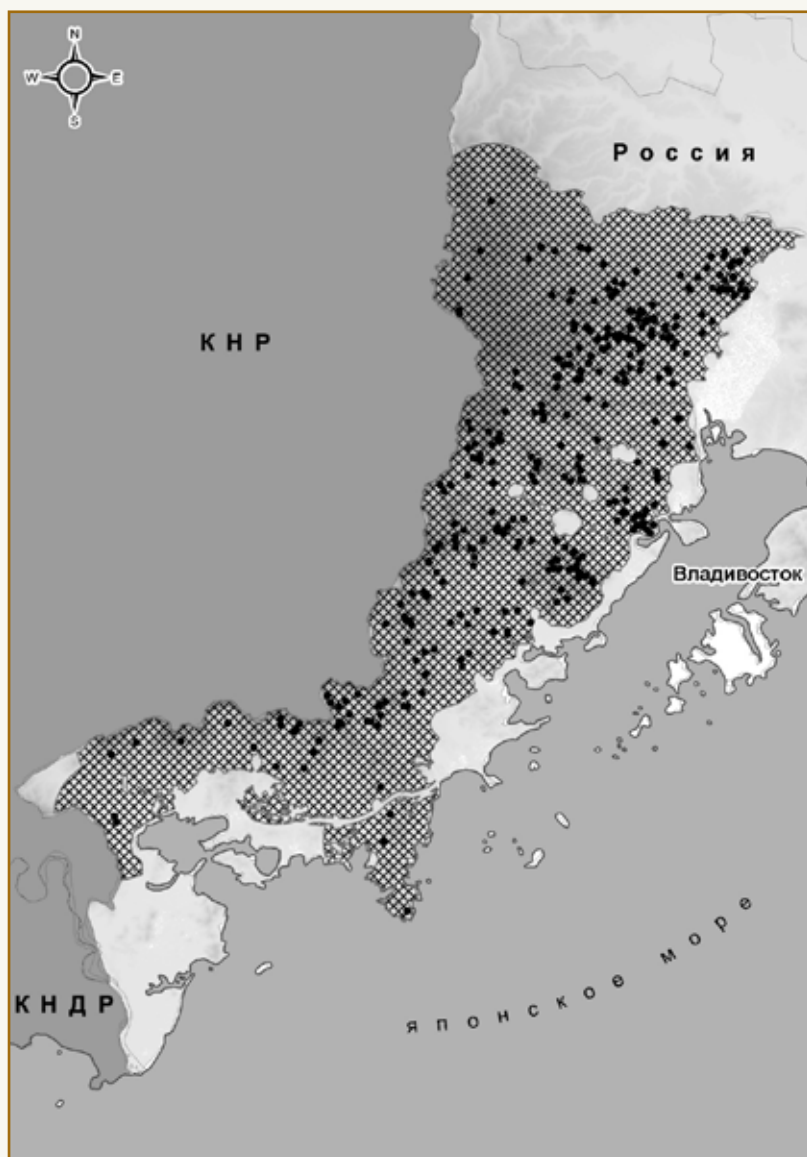


Image 2. Distribution of the Far-Eastern leopard in Russia according to data from the 1997-2007 surveys (black squares represent the sightings of leopard tracks).

decrease in migration between them. This, in turn, led to an isolation of the Sikhote-Alin leopards from the main population. This was followed by a division of the western region of the habitat into two separate components: the north-west (upper reaches of the Komissarovka River in the Pogranichny and Khankaysky districts) and south-west (the Borisovskoye plateau and Black Mountains in the Ussuriysk, Nadezhdinsky and Khankaysky districts).

By the end of the 20th century, the Russian portion of the habitat of the Far-Eastern leopard was reduced to present-day boundaries. The Sikhote-Alin population that disappeared first and it was then followed by the north-western population. Today, there is only one region in Russia where the Far-Eastern leopard can still be found. This is the south-west of Primorsky Krai, with its northern boundary at the Razdolnaya River, the eastern and southern boundaries are set by the Sea of Japan and the western boundary which lies along the Russo-Chinese border.

The current Far-Eastern leopard habitat fluctuates in size depending on a number of factors. These include the season (winter/summer), the location of deer farms, the frequency of natural fires and the areas that the latter affect. The leopard inhabits all forested areas in south-western Primorsky Krai. These exclude those that are south of the Khasan residential municipality, wetlands and those areas that are subject to heavy human development (which renders them inhabitable for large predators). (Image 2)

Currently, there is no reliable data indicating the existence of an independent leopard population in the north-western portion of Primorsky Krai or in the southern region of the Sikhote-Alin range. There have been sightings of leopard tracks in Lazovsky and Partizansky districts.

There is a lack of data concerning the size of the leopard population in Heilongjiang and Jilin provinces of China. The only exceptions are leopard sightings that have occurred on the Russo-Chinese border adjacent to the south-western region of the Primorsky Krai. Recent studies point to a very low number of leopards within China and to a lack of an independent Far-Eastern leopard population in the region. It appears that the leopard population has completely disappeared in South Korea. The last time a specimen was caught in the wild was in 1962 and the last leopard encounter occurred in 1969. There is a possibility of a remaining leopard population in the DPRK, in the largely inaccessible northern region of the country that borders China. This population could be supported by the migration of individual specimens from the south-western region of Primorsky Krai. However, there are currently no conclusive studies supporting this hypothesis.

At present day, the Russian portion of the habitat of the Far-Eastern leopard includes an area of approximately 4.6 thousand square kilometers (the maximum estimate points to 5.2 thousand).

2.3. Far-Eastern leopard population size in Russia

It is impossible to accurately evaluate the size of the Far-Eastern leopard population in the 20th century. The literary resources that address the topic of leopard hunting are fragmented and contradictory. It is clear that in Russia, the Far-Eastern leopard was a regular but rare subspecies, especially in comparison to the Amur tiger. The overall size of the leopard population in Russia by the end of the 19th and beginning of 20th centuries is estimated to be around 150 specimens. Before hunting limits that were imposed in 1956, the leopard was hunted all across the habitat. Rapid extermination, coupled with the destruction of habitats, led to a rapid decrease of leopard populations which were at their lowest numbers by the beginning of the 21st century. The first quantitative evaluation of the population was conducted by

V. K. Abramov and D. G. Pikunov in the winter season of 1972-1973. The data collected throughout the study supported the hypothesis that there were three isolated leopard population in the Russian Far East. The first was located in the southern region of Sikhote-Alin (no more than 8-10 specimens). The second was in the north-western region of the Primorsky Krai at the headwaters of the Komissarovka River (5-6 specimens which regularly crossed the Russo-Chinese border). The third was in the north-western portion of the Primorsky Krai in the Khasansky district and the southern portions of the Nadezhdinsky and Ussuriysk districts (25-30 specimens). The highest leopard population density was recorded in the basins of the Barabashevka, Narva and Poyma rivers. Thus, by the 1970's, the cumulative Far-Eastern leopard population in Russia was approximately 38-46 specimens.

Data collected from the next survey, which was conducted in the 1983-1984 season, did not support the existence of a leopard population in the western portion of the Pogranichny region and in the southern Sikhote-Alin. The number of leopards that inhabited the region did not change and included 25-30 specimens. Ten out of the latter existed in neighboring Chinese provinces. The data collected from following surveys (1991, 1997) showed the stabilization of the Far-Eastern leopard population in the south-west of Primorsky Krai. The 1990-1991 survey registered 30-36 specimens. In 1997, when 60-70% of the habitat was surveyed, there were 20-24 registered specimens. If one is to extrapolate to the unexplored territory, the overall population size was 29-31 specimens in 1997.

In the 1998-2011 period there were 3 surveys conducted according to a classic methodology which encompasses a step-by-step exploration of the basins of major rivers by a group of specialists. The results of this research demonstrated numbers that varied from 22-27 to 25-34 specimens (image 3).

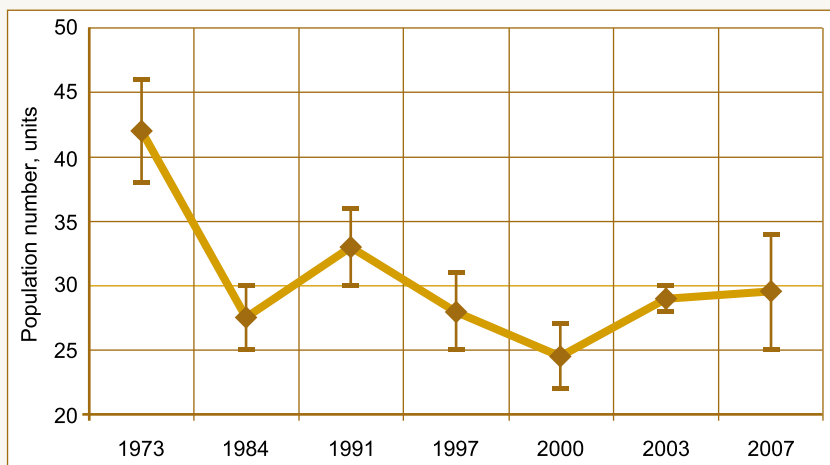


Image 3. The dynamics of the population levels of the Far-Eastern leopard in Russia. The data were collected in surveys conducted according to the classical methodology. This fact ensures data continuity from the periods 1972 until 2007 (Pikunov et.al, 2009).

On top of the evaluations described above, there were other surveys conducted in the period between the years 1998 and 2000. These were based on the principle of simultaneity and, methodologically, were closest to those surveys conducted on the Amur tiger. According to the data collected from these surveys, in 1998 the overall leopard population was 40-44 specimens. In 2000, 50% of the area that was targeted for surveying lacked a snow cover. This influenced the results and only 24-26 specimens were recorded. However, after extrapolating these numbers, researchers evaluated the overall population size to be 48-50 specimens.

The differences in numbers received according to the classical methodology and the numbers received in the simultaneity surveys can be accounted for in the differences in methodology and data analysis methods. It is important to note that the leopard population remained relatively stable throughout the observed period.

Another simultaneity-based study which used animal tracks in the snow that was conducted in February of 2013. The numbers received from the survey indicate that there is a minimum of 43-45 adult leopards and 4-5 young ones present in Russia. This allows us to safely state that there are no less than 50 Far-Eastern leopards inhabiting Primorsky Krai.

Since 2002, annual leopard population monitoring takes place through the use of automatic photo cameras. This occurs in the northern portion of its habitat over a region of up to 816 kilometers squared (in 2004 and 2005 the inspected area was 420 kilometers squared) in between the rivers of Pervaya and Narva (Image 4).

Name	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
«North»	8	13	14	9	14	8	9	11	16	16
«South»	8	*	*	7	7	8	9	7	12	10

Image 4. The Far-Eastern leopard population numbers in the “North” and “South” portions of the inspected area as indicated by automatic photo cameras (Aramilev et.al, 2012). A “*” signifies that there is no collected information in that category.

The received information supports the data received from other surveys concerning the population size of the leopard. It has also demonstrated a slight positive trend in the population size and allowed for observation of a number of important aspects of the ecology of the leopard.

2.4. Biological characteristics and premises for the conservation of the Far-Eastern leopard

2.4.1. Biological characteristics and reproduction rates

It is hypothesized that the modern leopard species (*Panthera pardus*) appeared and developed in Africa approximately 470-825 thousand years ago and dispersed into Asia 170-300 thousand years ago. As the leopard spread into the region that is now the Russian Far East, a new subspecies evolved – the Far-Eastern leopard. Today, it is one of nine leopard subspecies which inhabit the earth.

The body of a leopard male can range up to 136 cm in length for males and 112 cm for females. An adult male weighs up to 70 kg and a female up to 50 kg. There have been rare cases where individual specimens weighed more than the figures above. The winter fur of the Far-Eastern leopard is very long and thick, which allows it to survive in the harsh climate of the Russian Far East. The subspecies is characterized by lightly-colored fur and very large black rosettes or spots over the surface of the entire body. The fur coat on the body and the tail can be up to 7cm long. The Far-Eastern leopard has longer extremities than other subspecies which allow it to move through deep snow cover.

Like tigers, leopards live alone except for the period when the mothers nourish the cubs. Adult individuals live on a set self-marked territory. Radiotelemetry techniques demonstrated that the territory of an adult male leopard range up 300 square kilometers. For females this number is closer to 100 km². For both females and males these numbers may be less or sometimes more than the reality. According to data received from radiotelemetry and automatic photo cameras, the territories of several males and females intersect in one region. The territory of a resident male includes the territories of females. The size of the territory of an Far-Eastern leopard appears to depend on

the population densities of wild ungulates and the presence/absence of Amur tigers in the region.

The data received from the 2007 Far-Eastern leopard survey and regular automatic photo camera data indicate that there is an identified sex-age structure. Adult males compose 26% of the population and adult females 36%. Eighteen percent of the population is under two years of age. The remaining 24% is not yet identified as belonging to any of the three groups and can thus be of either sex or age group. According to existing data, 7-9 of the females participate in reproduction.

A wild Far-Eastern leopard does not generally live for more than 12-15 years. Sexual maturity is reached at 2.5-3 years after birth. Gestation requires 90-95 days. Far-Eastern leopard females breed throughout the entire year, most often during the spring period. Generally 1-3 cubs are born with a population average of 1.7 cubs. There are rare exceptions when a mother gives birth to 4 cubs.

During the first month, the cubs remain in their den which is usually located in cliff opening, a gap amongst tree roots or in the hollow of a large tree. The dens tend to be located in steep cliff areas which are highly inaccessible to humans and rarely visited by Amur tigers.

The litter disperses when the cubs reach an age of 15-18 months (16 on average) after which the individuals pursue independent lives. The dispersion of the leopard in the south-western region of the Primorsky Krai is limited due to a lack of appropriate habitats. Most likely, the increase in population is sustained by decreasing territories of individual leopards and by young leopards replacing those that have died of age or poaching. Young males can travel over substantial distances and can explore new habitats in China and possibly the south-

ern region of Sikhote-Alin. Young females tend to stay within the zone inhabited by their mother or move to bordering territories.

The average interval between litters is 15-16 months. If the female loses the cubs during the early months of their life, the interval between the next litter may be less. A female is in her reproductive age for 7-9 years which means that on average a female will bring 4-5 litters or 7-9 cubs. However, if we are to consider cub mortality then the productivity of a female is reduced to 5-7 cubs over her lifetime.

Under current conditions, the natural reproduction processes of the current population ensure its stable existence. The possibility of gradually increasing the overall population size requires further investigation.

2.4.2. Habitat Requirements

Regions that are inhabitable by the leopard are in the zone of mixed coniferous broad-leaved forests and broadleaved forests which begin in the coastal zone and extend up to 600-800 meters above sea level. The most appropriate are hill areas and low-mountain terrains which are contiguous with the Sea of Japan and which have abundant exposed cliffs. The habitats that are less appropriate for the Far-Eastern leopard are birch-aspen and secondary broad-leaved forests. Also, understocked stands that form in areas affected by timber harvests and forest fires are not a prime habitat for the animal.

The Far-Eastern leopard mostly inhabits rugged mountainous terrain at an elevation of 300-600 meters above sea level. These habitats are dominated by mixed Korean pine-fir-broad-leaved forests. These habitats are located in the headwaters and throughout the river basins along the Russo-Chine border including the Borisovskoye Plateau.

Secondary broad-leaved forests that contain the Mongolian and Daimyo oaks are frequented by leopards much less often. Low-density woodlands and steppe are often ignored by leopards except for when they raid deer farms or roe deer habitats. The main habitats during the winter include mountain ridges and steep south-facing slopes where the snow cover melts rapidly. In these areas the average perennial snow cover does not exceed 10-15 cm. One of the factors that limit the traveling capabilities of Far-Eastern leopards is the depth of the snow cover. This is especially imperative for young individuals and females with cubs.

Leopards are conservative in their choice of territory. They continuously use the same paths, passages and litter dens and they are very sensitive to human presence in those areas. They are especially affected by any sort of habitat-changing activity such as the construction of human dwellings or roads. If these take place, the leopard often quits the previously inhabited territory. At the same time, the behavior of a leopard can change if it begins to live near deer farms. They get used to the easy prey and may enter into conflict with humans.

2.4.3. Prey characteristics and hunting behavior

The Far-Eastern leopard has a large list of prey which includes all the vertebrates that inhabit the same ecosystems. The most important source of food for the leopard are ungulates. The composition of the list of species that served as a prey base for the leopard has changed throughout time.

According to research conducted from 1961 to 1976, the leopard diet was largely based on the roe deer population (up to 66%). Wild boars (up to 8%), Siberian musk deer (up to 9%), Sika deer (up to 6%) and other species (insignificant contribution) also served as

prey for the Far-Eastern leopards. The data collected from 1970 until 1985 demonstrated that the leopard diet was still largely based on roe deer but to a lesser degree (up to 54%). Sika deer now accounted for up to 12 percent of the calorie intake. Raccoon dogs, badgers and Manchurian hares together now accounted for up to 24 percent of the leopard's diet. Other species had an insignificant contribution in the overall food intake of the leopard.

The latest research shows that during the winter period, the Far-Eastern leopard diet is up to 65% composed of ungulates. The most important species are the Sika deer (up to 48%), roe deer (up to 39%) and the wild boar (up to 13%). The proportions of various species in the leopard's diet is primarily associated with the changes in specie populations and with changes that occur during the "winter" and "summer" diets. The changes can also be traced back to the disturbance of ecological links within the biological community. These include the mistakes that took place during ungulate population control activities. The latter led to circumstances where the Sika deer is now a dominating species in the ecosystem. Raccoon dogs, badgers and Manchurian hares play a significant role in the diet of young leopards. Together, they form up to 22 percent of the prey base.

An adult leopard can survive on the meat provided by a large prey species (a roe deer or a wild boar) for 5-7 days (2-3 days for roe deer). The intervals between hunting (regardless of the size of the prey) may be up to 10-12 days but are usually less. The average interval between successful attempts at hunting adult ungulates is 12-15 days.

In the past years, there has been a large increase in disturbance factors and other carnivores being present in the habitats of Far-Eastern leopards. These often cause a decrease in the amount of time a leopard

stays with the kill. In this manner, the annual leopard consumption of large ungulates is around 25-30 specimens. The rest of the food intake is achieved via the taking of smaller vertebrates. The current condition of the sika deer population allows for up to 25% of the animals to be killed annually. The roe deer, which has less phenotypic plasticity, can sustain a yearly population decrease of up to 15%. The most efficient prey population is that of the wild boar which can sustain up to a 50% removal rate. However, this species does not serve a critical role in the diet of the leopard.

Domestic animals (mostly dogs), small cattle and sika deer that are cultivated in farms also fall prey to the leopard. These incidences serve as a basis for conflicts between humans and leopards. There are individual leopards which specialize in hunting deer that reside near domesticated deer populations on deer farms. In most cases this leads to the leopards being exterminated by the human farmers.

The present-day state of the populations of wild ungulates which reside within the Far-Eastern leopard habitat is varied.

The conservation of the leopard population is impossible without large sustainable prey populations such of the roe deer, sika deer and small animals such as badgers, Manchurian hares and raccoon dogs. The smaller prey species compose a significant portion of the leopard diet, especially during the summer months.

2.4.4. Reaction to Humans

Unlike the other leopard subspecies, the Far-Eastern leopard is tolerant towards humans. Throughout the entire historical period of the settlement of the southern region of the Russian Far East there has never been a registered case where a leopard attacked a human. The Far-Eastern leopard leads a covert lifestyle. The chief areas of habi-

tation are those located in mountainous areas. The leopard usually notices humans first, at which point it attempts to avoid visual contact and exits the area. Accidental human-leopard encounters rarely occur in the wild. If it does happen, the animal does not demonstrate signs of aggression.

At the same time, the leopard is a large carnivore and the size of its prey often exceeds that of humans. This is why leopards can demonstrate aggression if they are pursued and when they are protecting their food or young. The aggression is characterized through vocalization (roaring) or through “fake” attacks. In a scenario where a human wounds a leopard, the latter is capable of attacking and causing potentially lethal wounds to the human. However, in Russia, there has not been a leopard-caused registered human death for over 150 years.

Because of the low population size and a secluded life style, the main cause of human-leopard conflicts is when the former attack pets or cattle. This can occur near human dwellings or on pastures. The numbers of registered attacks vary from year to year. This is largely due to suboptimal data-collection techniques. On average there are 5-7 registered Far-Eastern leopard attacks on human pets and cattle per year. The species that this takes the biggest toll on are domesticated roe deer and small cattle.

In the south-western region of Primorsky Krai conflicts between humans and leopards mostly occur on deer-breeding farms.

Precautionary measures, raising awareness amongst the local population, the introduction of new hunting regulations as well as more developed deer-breeding regulations will ensure a conflict-free co-existence between humans and Far-Eastern leopards. This would

decrease the human-caused anthropogenic effects on leopards to a minimum.

2.5. Limiting factors

The survival of the Far-Eastern leopard as an independent subspecies is highly reliant on the understanding of the factors that threaten individual leopards as well as the population as a whole, and the mechanisms by which these factors affect the species. These factors can be divided into three different categories: biotic (influences of other carnivores, changes in prey populations), abiotic (changes that occur in the ecosystem, most important of which are the climatic changes which influence the depth of the snow cover) and anthropogenic (humans and their economic activity). The anthropogenic factors have the strongest effect on the leopard population. Direct anthropogenic influences include poaching and accidental/necessitated killing of the leopards. Anthropogenic influences on the environment arise through mining, the harvesting of timber and other forest resources and the building of human infrastructure which inhibit leopard travel. The final type of anthropogenic influence is indirect and occurs as a result of human population increases, physical and chemical pollution of the environment and irrational use of wildlife resources.

2.5.1. Biotic factors

The impact of different carnivore species on one-another and the trophic competition between them leads to an increase in the percentage of natural deaths. The competitive relationship is especially prominent in the interactions between the Far-Eastern leopard and the Amur tiger.

In the south-west of the Primorsky Krai the tiger population has significantly increased from 2-3 individuals in the middle of

the 20th century up to 15-20 at present day. There have been 3 registered tiger-caused leopard deaths only in the past 20 years. In the 1970's the diet of the Far-Eastern leopard was based on the sika deer and doe deer and Amur tiger mainly preyed upon wild boars and Manchurian red deer. The two predators were thus spread into different areas and were dependent on different biotopes. At present day, the Manchurian red deer are almost extirpated from the region and the population of wild boars has drastically decreased. This has led to the sika deer becoming the main food source for both of the predators. In turn, this has forced the Amur tiger to frequent biotopes previously inhabited only by the leopards.

Trophic competition is also present with another carnivore species: the lynx. This animal has a diet of young roe and sika deer, Manchurian hares, badgers and murine rodents. The Amur forest cat and the fox also prey on the populations of Manchurian hares and murine rodents.

The population of the Far-Eastern leopard is characterized by a low genetic diversity which, coupled with low population numbers, leads a high risk of extinction as a result of various infections. There are a significant number of infectious and protozoan diseases that are able to target all of the sex and age groups of the Felidae family. Some of them are capable of killing them or preventing sexually mature Far-Eastern leopards from reproducing for the remainder of their lives.

The infection may occur after contact with infected individuals or through the consumption of small predators (raccoon dogs, badgers as well as domesticated and stray dogs). These are often carriers of a number of deadly diseases.

2.5.2. Abiotic factors

One of the key factors that lead to a worsening state of the leopard population is the reduction in prey populations as a result of unfavorable climate conditions. Every 7-8 years, sometimes more often, there are winters with higher-than-average precipitation. During these winters, snow cover can be over 40 cm in height for over a month, which leads to the mortality of most of the young sika deer population and up to 30% of the adult population. These conditions also cause the death of portions of wild boar and roe deer populations. The negative effects of climate-related factors are further quantified when these winters coincide with crop failures of certain plants which serve as a key calorie source for ungulates.

2.5.3. Direct anthropogenic factors

Factors that directly affect the population of Far-Eastern leopards include the extermination of individual leopards through malicious or accidental shootings, the catching of leopards through various forms of animal traps and the forced extermination of sick or injured individuals. The factor of increased disturbance decreases the percentage of killed prey that the leopard is able to efficiently utilize. The same factor leads to a decrease in the survival rate of young leopards which clearly has a negative effect on the entire population.

There is high annual variation in the quantity of leopards that are removed from their habitat. Not all animal death cases are reflected in official statistics. According to research data, there are 2-4 human-caused leopard deaths per year. The rates of non-human caused deaths are similar for leopards and other large predators. It is, however, less than the death rate of the Amur tiger and comprises no more than 10% of the entire population.

2.5.3.1. A retrospective analysis of Far-Eastern leopard hunting practices in Russia

Information concerning the hunting of Far-Eastern leopards in the 19th and early 20th centuries that can be found in scientific work and works of popular science is spotty. If one is to base their estimations on the amounts of animal skins that were taken then we can say that there were 5-7 Amur tigers killed for every leopard killed. Similarly to the Amur tiger, the Far-Eastern leopard was a prized hunting acquisition and was thus targeted by inhabitants of Primorsky Krai. We can estimate that there were 20-30 Far-Eastern leopards killed annually during the 19th century.

The unregulated hunting of the Far-Eastern leopard led to a drastic decrease in the population size and habitat range of the animal. By the beginning of the 20th century the leopard population was reduced to such a degree that there were only 10-15 leopards killed annually.

The state of the leopard population continued to worsen during the formative years of the Soviet rule. During the Soviet regime, the value of leopards as hunting trophies decreased. However, the rapid development of deer farms for the purpose of velvet antler collecting made the Far-Eastern leopard into an enemy of the local population. This fact led to an increased amount of human-caused leopard deaths via the use of traps, poison and dogs. According to official statistics, there were 39 leopards killed by humans in the period from 1934 until 1965. Other data show that this number was slightly higher.

There was a ban on hunting introduced in 1956 which was coupled with a prohibition on the trapping of live leopards in 1966. By this point the leopard population was on the verge of extinction.

2.5.3.2. The trapping of leopards for educational and scientific purposes

Because of their low population levels and friendly nature, Far-Eastern leopards are sought-after for zoos, circuses and private animal nurseries. The unregulated trapping of leopards was halted in 1966. From then on, the trapping of Far-Eastern leopards may only be conducted after obtaining specific permits.

Currently, the regulations on the use of wildlife species which are documented in the Red Data Book of the Russian Federation, including the Far-Eastern leopard, are guided by the regulations outlined in the Russian Federation Government Decree of January 6, 1997 #13: “On the approval of the trapping of wildlife species which are part of the Red Data Book of the Russian Federation except for water biological resources”. The second document outlining these regulations is the Decree of February 19, 1996 (№ 156) “On the procedures of attaining licenses which allow for the trade of wild animals that are recorded in the Red Data Book of the Russian Federation”.

The governmental decree of the Russian Federation issued on February 19, 1996 (№ 156) indicates that animals that are documented in the Red Data Book of the Russian Federation (which include the Far-Eastern leopard) may only be held in captivity for three reasons: for the purpose of species conservation, for breeding and for scientific-educational purposes. The release of these individuals into the wild is conducted for the purpose of conserving or increasing the current species population.

The trapping of the Far-Eastern leopard may only occur in special cases where a license from Rosprirodnadzor (Federal Service for Natural Resources Supervision) is first attained. They are given out

according to the administrative regulations of the Federal Service for Natural Resource Supervision of Russia on the granting of trapping licenses for species that are documented in the Red Data Book of the Russian Federation. The law was ratified by a decree from the Ministry of Natural Resources and the Environment of the Russian Federation on February 18, 2013 (№ 60 – registered by the Ministry of Justice of Russia on June 25, 2013 under the number 28880).

Licenses for the trapping of leopards for the scientific purposes have been consistently given out since 1992. The leopards were kept within their natural habitat and were subjected to medical treatment and were given radio-collars or collars that contained GPS or GLO-NASS devices.

2.5.3.3. Poaching

Despite strict anti-hunting regulations, regulations against trapping and the fact that the Far-Eastern leopard was added to the Red Data Book of the USSR, the illegal killing of leopards continued to take place throughout the later part of the 20th century. While the killings were not as widespread, they still took place when leopards were caught on deer farms, when they were caught in traps designated for other species or when they were killed by domestic dogs. The body of the leopard was generally left at the scene of the killing or was concealed via burying or burning. Leopards were very rarely killed as hunting trophies. The export and sale of body parts was practically impossible.

The fall of the USSR and the consequent reforms of law enforcement agencies coupled with harsh socio-economic conditions led to an increase in the cases of illegal killings of the Far-Eastern leopard. While this phenomenon was not as widespread as it was for the Amur tiger, it still took a toll on the leopard population. It

was also during this period that the demand for leopard skins rapidly increased throughout Russia. A loosening of cross-border trade controls led to an increased demand for leopard body parts amongst citizens of China and Korea. However, traditional Chinese medicine uses the bones and other parts of the Far-Eastern leopard only as a substitute for analogous Amur tiger body parts. In this manner, the demand for the Far-Eastern leopard is lessened and allows for its potential survival despite the small population size.

There are a number of factors that have led to a decrease in the amounts of illegal leopard killings. There are the relatively low prices of Far-Eastern leopard body parts, the low demand for leopard skins on the domestic market which is supplied by leopard skins exported from Africa, the stabilization of the economic situation in the region and a tightening of law enforcement activities.

Currently the main reasons for illegal leopard trapping are:

- The fact that some of the owners of agricultural and deer farms perceive leopards to be an “enemy” of their deer and cattle. These farmers purposefully try to get rid of leopards through shootings and trapping. These instances of poaching seem to make up the majority of illegal leopard killings.
- The uneducated hunting culture and the limited respect for regulations by local hunters coupled with the lack of a mandatory punishment increases the instances of accidental leopard shootings. These take place when leopards end up in uncontrolled “drive” hunts, are trapped or when a hunter is not able drive off the hunting dogs after they have treed a leopard.
- The fact that some humans perceive leopards as a threat during accidental encounters and shoot them out of concern for their own safety. Such cases are exceptionally rare as the

majority of the population has a positive image of the leopard population and there is a social taboo on the killing of these animals.

- Rarely, there are cases when leopards fall victim to poaching activities when hunters shoot at unclear targets during “drive” hunts. Killings may also take place during illegal night-hunts which use mechanized transportation methods and flashlights.

2.5.3.4. The forced shootings of conflict Far-Eastern leopard individuals

The shootings of large predators that are registered in the Red Data Book of the Russian Federation are only allowed after the attainment of special permits or in situations when life or safety humans are imperiled. Contrary to the situation with the Amur tiger, since the ban on hunting has been enacted, there hasn’t been a single legally registered incident of conflict Far-Eastern leopard shooting.

2.5.3.5. The disturbance factor

According to the most recent census, there are 74572 people living in the south-western region of the Primorsky Krai with a population density of 17.2 people/km². Compared to the bordering Chinese provinces, this territory can be considered as having a low population.

There are approximately 60 communities located within the leopard habitat. There are also a number of cities and towns that can be found in areas bordering the Far-Eastern leopard habitat. These include large cities such as Vladivostok, Ussuriysk, Artem and towns such as Razdolnoe and Volno-Nadezhdinskoe. The proximity of such large communities lead to an increase in the amount human activity within the habitat of the Far-Eastern leopard. The activities

which have the biggest leopard disturbance factor are hunting and recreational hiking and camping.

A serious disturbance factor during the springtime is the collection of edible ferns by local populations. To increase fern growth, the local inhabitants burn down large portions of forests that are located in Far-Eastern leopard habitats. This leads to a decrease of habitable land and decreases its quality. Controlled agricultural burns that spread into forest areas and the burning of land areas for the purpose of drug plantations also have serious consequences for the habitat.

There is a strong negative effect on the habitat of the leopard that is caused by the three operating military testing grounds that are present in the area. Their activity often leads to the creation of fires and the constant disturbance factor prompts leopards to leave the area.

At present day, there are no large-scale timber harvesting activities that are taking place within the habitat of the Far-Eastern leopard. In the areas where logging does take place, the disturbance factor is brought about by the presence of humans and the construction of roads. Without appropriate protection measures, in the future these roads can be used by poachers targeting ungulate populations which are crucial for the Far-Eastern leopard.

The hunters that are present on the hunting grounds during the hunting season are also a stress factor for the leopard population. The unsustainable hunting practices that are conducted in the region increase the negative impact of humans on the habitat of the Far-Eastern leopard. Large infrastructural projects also have a strong negative impact. The construction of the “Sakhalin-Khabarovsk-Vladivostok” gas pipeline, supporting infrastructure for the project

and the development of the road network of the region will lead to a sharp increase in the disturbance factor for the leopard.

The main portion of the Far-Eastern leopard habitat that is largely inaccessible to humans is located within federally-enforced protected areas in which major infrastructure projects are banned. This fact greatly decreases the disturbance factor in the region.

2.5.4. Indirect anthropogenic factors

Indirect anthropogenic factors have a serious impact on the population of the Far-Eastern leopards. The industrial and agricultural development of region can lead to the destruction of ecosystems which leads to the reduction and deterioration of the leopard habitat. The habitat destruction will also lead to the reduction of populations used by leopards as prey.

2.5.4.1. Change in leopard habitat

One of the key factors that worsen the state of the Far-Eastern leopard population is the decrease in the area of appropriate habitats which occurs due to a number of different causes.

Since the first explorations by settlers from the western portion of Russia and until today, the overwhelming majority of bottomland territories of the Russian Far East have been settled and economically developed. A portion of the animals' geographical range was overtaken by deer farms, the numbers of which peaked in the 1980s. During this period there were a total number of 12 farms with an overall deer population of 50 thousand. At present day, the total number of deer-breeding farms has decreased to 4, their total areas have decreased and the total deer head count has been reduced to 3 thousand.

The main factor that leads to a deterioration of the Far-Eastern leopard habitats is fires which, depending on the year, can affect up to 30% of the total habitat area. The main cause for fires is human activity and the amount of fires peaks during spring and autumn. Fires mainly occur as a result of uncontrolled grass burning activities in areas designated for hay-making and other agricultural activity. They may also take place to eliminate brush growth around railways, during hunting or recreational activities, as a result of military activities or due to other forms of human activity.

The burnt area index in the south-western region of the Primorsky Krai continues to be one of the highest in Russia. From 1996 until 2010 the annual area affected by forests ranged in size from 90 to 252 thousand hectares (12-34%) within the south-western portion of the Primorsky Krai. This included in between 22 and 104 thousand hectares (5-24%) of forest covers. Since the beginning of the new millennium, the area affected by fires has increased reaching its peak in 2009. Reoccurring fires lead to a decrease in the productivity and territorial coverage of forests. During the period from 1956 until 2006 the area of the most productive mixed coniferous- broadleaved forests has decreased more than by half. In the 1990s, the average yearly degradation rate increase three-fold (from 0.7% to 2.1% after 1996).

There is a fairly complicated system of land-use practices in the region of the Far-Eastern leopard habitat. This greatly complicates the efforts to fight fires. In the period from 1996 until 2010, the biggest portion of fires (75% of the entire area and 62% of the forest-covered territory) occurred outside of the state Forest Fund. 47% of the total burnt area and 32% of the forest fires occurred on land used for agriculture. 9% of the burnt land and 18% of forest fires occurred on lands belonging to the military. The lowest proportion of lands

affected by the fires was registered in the Kedrovaya Pad Nature Reserve and on lands belonging to the Forest Fund. During the period examined, 18% of the total area was affected and 29% of the forested area burned. These numbers are many times higher on land areas that fall under different categories. 88% of the forest cover was damaged by fires in undesignated lands, 79% on agricultural lands and 36% on lands belonging to the military.

In this manner, the most difficult question is how to fight fires on lands that are not currently being used (undesignated lands, unused agricultural lands) or on territories where land-use is inefficient (the majority of agricultural lands and unused deer farms).

The fires have transformed the rich Korean pine broadleaved forests into secondary and unproductive oak monocultures. When these oak forests are then, in turn, affected by fires, they transform into understocked stands and grasslands which are largely uninhabitable for leopards. The degradation of the habitat directly affects the population numbers of ungulates as they begin to lack the woody forage and the acorns that come from Daimyo and Mongolian oaks. This in turn decreases the population of leopards that the area is able to support.

The logging activities that are taking place throughout the habitat of the Far-Eastern leopard do not have as significant an impact on the species as they do for the Amur tiger. Nevertheless, the logging renders these forests more accessible to poachers as new roads are created.

The fact that a large portion of the habitat of the Far-Eastern leopard is located on federally-enforced protected areas largely decreases the negative effects of the factors described above. This allows for a viable Far-Eastern leopard population to survive in Russia.

2.5.4.1.1. Industrial development in the area

The Russian Far East is designated to play an important role in the economic development of the country in the coming years. This is outlined in the socio-economic Strategy for the development of the Russian Far East and the Baikal Region until the year 2025 which has been approved by a governmental decree on December 28, 2009 (№ 2094-p). The crucial economic role of the Russian Far East is also part of the Federal program “The economic and social development of the Russian Far East and Zabaykalsky Krai until the year 2013” which had been implemented by a governmental decree of April 15, 1996 (№ 480).

The Far-Eastern leopard has a fairly high phenotypic plasticity and can adapt to practically any anthropogenic landscape given a sufficient nutrition base. However, landscapes that are temporarily or permanently inhabited by humans and those that are subjected to mining are not viable habitats for the leopard.

Until the recent past, the main causes for the deterioration of the leopard habitat were logging activities. Throughout the 20th century, the majority of forest landscapes, except for those located on federal protected areas, have been subject to timber harvesting. This has led to the destruction of stable forest ecosystems. The latter could be seen through the reduction in the quantity of trees that provided a food base (such as acorns and nuts) for ungulates. The following reduction in ungulate population sizes led to a redistribution of the leopard diet to other species.

There is serious concern about the effects that a number of large-scale industrial projects will have on the habitat of the Far-Eastern leopard. The largest of the projects is the construction of a

side-route for the “Sakhalin-Khabarovsk-Vladivostok” natural gas pipeline which is designated to provide natural gas to China and other Asian-Pacific countries. The planned pipeline will follow designated corridors which were excluded from the “Land of the Leopard” national park at the time of its creation. Apart from the pipeline itself, there are a number of other secondary projects that will be constructed as part of the pipeline infrastructure. One such project is the construction of a gas liquefaction plant which will require a large labor force during both the construction and operating/maintenance phases of the plant. The project will have a negative effect on the leopard population for two reasons. First, because of the disturbance factor that will take place during the construction process. Second, the pipeline will be supported by a network of roads designated for operating personnel but which could be used by poachers to reach populations of ungulates.

At the same time there are a number of positive aspects that will be brought about by the construction of the gas transmission network: the demand for firewood will fall amongst the local inhabitants and that the roads will serve as mineral belts which will reduce the spread of forest fires

The rapid industrial development of the region has led to the building of new roads, the modernization of old ones, the increase in the speeds at which vehicles are able to travel and to an increase in safety. However, the migration routes of predators and ungulates have not been taken into account during this construction process. As the amount of traffic will continue to increase, there is a growing problem of animal deaths as a result of collisions with vehicles during crossing attempts. The construction of a road tunnel in the region of the Nervinsky pass in the Khasan region will partly alleviate the problem but will not solve it entirely. To mini-

mize the negative effects on the Far-Eastern leopard and ungulate populations (halting the fragmentation of habitats, decreasing the disturbance factor and preventing animal deaths on highways) infrastructure projects in the south of the Primorsky Krai need to include special facilities designated for wildlife use (underground and aboveground crossings, overpasses, bridges, etc.).

2.5.4.1.2. The influence of hunting

There are widespread hunting activities that take place throughout 45% of the geographical range of the Far-Eastern leopard. The overall area that has been designated as hunting lands spans an area of 282.4 thousand hectares. 21 thousand of these were later included in the “Land of the Leopard” national park and taken out of exploitation. The existence of rare carnivore species on hunting lands causes a change in the way they are operated.

The deciding factors for the conservation of a viable Far-Eastern leopard population are the attainment of optimal prey populations such as those of ungulates and the reduction of the disturbance factor.

It is crucial to enforce sustainable hunting practices so as to ensure the conservation of a viable leopard population. These practices need to take into account the leopard’s habits but should also not turn into a total ban on hunting as this will lead to widespread poaching activities.

The current situation poses a number of problems that stand in the way of achieving sustainable hunting practices:

- The highly inefficient system of federal-level governmental regulation of hunting due to a small number of hunting inspectors.

- The population sizes of species designated for hunting, especially those of ungulates, do not correspond to the carrying capacities of the hunting grounds.

This either forces the leopard to leave the given areas or to begin competing with local hunters which leads to conflict situations.

2.5.4.1.3. The effects of timber harvesting activities

Only 39% of the geographical range of the Far-Eastern leopard is located in the state forest und. The rest of the habitat lies on agricultural lands (32%), military lands (14%) and undesignated lands (8%). Approximately half (47%) of the forest land that is inhabited by the Far-Eastern leopard lies outside of the state forest fund (21% used by the military and 16.5% on lands zoned for agriculture).

The majority of the forest cover that is located within the jurisdiction of the forest fund and that lies within the range of the Far-Eastern leopard is registered as various forms of protected forests. These include forests located in protected areas and “valuable forests” (forests located in the foreststeppe and forests located along fish spawning rivers). It is generally forbidden to conduct clearcuts in these forests and only selective felling is permitted. Selective felling, when done according to the guidelines and regulations, has the capability of increasing forest productivity and thus improve the quality of animal habitats. According to regulations, loggers are permitted to harvest the most productive and commercially valuable tree species during non-clearcut harvesting. These rules apply to both Manchurian fir and mixed Korean pine broadleaved forests.

In the past years, the intensity of logging activities within the habitat of the Far-Eastern leopard has significantly decreased due to a number of reasons. The first is the creation of a number of new protected areas, then the addition of Korean pine to the list of tree

and shrub species that are forbidden for logging (approved by the decree of the Federal Forest Agency of Russia on December 5, 2011 (№ 513)) and finally the quotas on Korean pine felling in the habitats of the Far-Eastern leopard and Amur tiger.

On top of that, the south-western region of the Primorsky Krai lacks sufficient volumes of accessible commercial timber. This means that the majority of timber harvesting activities in the region are nonrecurring and take place to provide the local population with firewood or occur as a result of infrastructural construction projects. This leads to a small amount of felling and to a lack of a consistent population of loggers.

There were large projects conducted in the south-western region of the Primorsky Krai during the second half of the 20th century aimed at achieving man-made reforestation. During the 1960's, tree species (Korean pines) were planted over a span of 4 thousand hectares throughout the Khasansky region. Unfortunately, the hoped-for results were not achieved. According to the data collected over 2679.7 hectares during the period 1964-2008 in the Zanadrovsky, Slaviansky and Kraskinsky subunits in the Vladivostok forest management unit, approximately half of the new forests died. A large portion of the reforestation was done before the year 1990 and is in need of maintenance activity that is almost completely lacking. In the past years, on top of the official reforestation plans, there were approximately one million Korean pine seedlings planted on 515 hectares by NGOs and governmental organizations.

The implementation of sustainable forest management practices is crucial for the areas that are designated to host the leopard populations that will appear as a result of the reintroduction program. The negative effect of timber harvesting activities is similar for the Far-

Eastern leopard population as it is to the Amur tigers. The removal of tree stands and the destruction of valuable tree species which provide nutrition for ungulates (primarily the Mongolian Oak) leads to the degradation of the Far-Eastern leopard habitat. On top of that, a developed network of unsupervised roads leads to an increase in the cases of ungulate poaching and to an intensification of the disturbance factor. The accumulation of logging debris and the decrease in canopy density which leads to the drying of the forest floor both lead to an increased risk of forest fires.

The unregulated human presence of tourists, fishermen, and the collectors of berries, nuts and other forest resources within leopard habitats increase the disturbance factor and increase the chance of forest fires. The disturbance factor is especially noticeable for ungulates during their calving season and during the maturation period of their young.

3. CURRENT FAR-EASTERN LEOPARD CONSERVATION PRACTICES

Starting from the mid-twentieth century, the Far-Eastern leopard has been under threat of extinction. The ban on leopard hunting that was enacted in 1956 changed the animal's status from that of a pest that should be killed to being one of the nation's prized possessions. Russia was the first country that was hosts Far-Eastern leopard population to enact such measures. In 1966 a further ban on the trapping of leopards without a special permit was put in place. At the same time, the leopard became part of the IUCN Red List of Threatened Species. In 1978 the animal was included in the Red Data Book of the USSR. The Red Data Book of the Russian Federation was created in 1997 and the Far-Eastern leopard was amongst the first species to be included in it.

The Ministry of Natural Resources and Environment of Russia and the governmental biosphere Kedrovaya Pad Nature Reserve together with the “Land of the Leopard” national park are serving as the key elements in the Far-Eastern leopard conservation structure. The Ministry is responsible for the development of a national conservation program and the legal framework that facilitates research, utilization and reproduction of wildlife.

Under Provision 6 of the Federal law enacted on April 24 1995 (№ 52) the regional authorities of Primorsky Krai must also play a role in the conservation process. They are responsible for the organization and implementation of security and reproduction measures

for wildlife species, for the protection of wildlife habitats, for assessment of wildlife population numbers, for monitoring and maintaining a governmental wildlife cadaster within the bounds of Primorsky Krai.

Because the majority of the world's Far-Eastern leopard population is located within the south-western region of the Primorsky Krai, the Russian Federation must play the main role in the conservation efforts.

There have been two key steps undertaken by the Russian Federation in the area of wildlife conservation, including the Far-Eastern leopard, in Primorsky and Khabarovsk Krai. These serve to fulfil Russia's commitment under the Convention on Biological Diversity signed on June 5, 1992. The first step was a federal governmental decree signed on August 7, 1995 (№ 795) which targeted "the conservation of the Amur tiger and other rare or endangered fauna and flora species within Primorsky and Khabarovsk Krai". The second step took place in 1998 when the National Committee of the Russian Federation ratified the first Far-Eastern leopard Conservation Strategy.

3.1. Conservation Regulatory Structure

3.1.1. Key international environmental conventions and agreements

The Far-Eastern leopard is a subspecies that is under threat of extinction which is included in the IUCN Red List of Threatened Species under the category Critically Endangered ((CR) C2a(ii); D). Species in this category are classified as being on the verge of total extinction with a low population that continues to decrease and as having at least 90% of the mature individuals within one population. Furthermore, the species population size does not exceed 50 individuals and there is a high risk of the species disappearing from the wild.

The following conventions work to promote the conservation of rare and endangered species:

- Convention on Biological Diversity (Rio de Janeiro on June 5, 1992) which was ratified by the Russian Federation according to the federal law enacted on February 17, 1995 (№ 16-ФЗ). The law, amongst other aspects, targets the conservation of rare and endangered wild fauna and flora.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington on March 3, 1973). CITES was ratified in the USSR by the Council of Ministers on August 4, 1976 (№ 612). Since July 1, 1975 the Far-Eastern leopard has been included in Appendix 1 of CITES which forbids the commercial export, re-export and import of the species except for those animals that are second-generation inhabitants of nurseries (including zoos) that have been certified by the CITES secretariat. The Government of Russia has issued a decree on May 4, 2008 (№ 337) “On the measures taken to fulfil the obligations of the Russian Federation under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (March 3, 1973) in respect to endangered wild fauna and flora except for those fish in the Acipenseridae family (sturgeons)”.

3.1.2 National Legislation

3.1.2.1. Inclusion in the Red Data Book

The Far-Eastern leopard is entered in the Red Data Book of Russian Federation (first category – species disappearing from Russia’s territory) according to Order No. 569 “Approval of the list of the animal species included in and excluded from the Red Data Book of Russian Federation,” adopted by the Russian State Ecology Committee on December 19, 1997.

The trapping of the animal species, which are included in the Red Data Book of Russian Federation (in particular, the Far-Eastern leopard), is governed by the Russian Federation government's no. 13 decree "Affirmation of the trapping rules of animal species that are included in the Red Data Book, except for aquatic biological resources" of January 6, 1997. According to the Rules, extraction of the Far-Eastern leopards from their natural habitat is permissible in extraordinary cases with the aim of their preservation, monitoring of their population, controlling their population numbers, protecting the health of the population, removal of threat to human life, for preventing domestic and household animals from diseases, - by the order established by Administrative Code of Federal Supervision Service for issuing of licenses for the extraction of animal and plant species included in the Red Book of Russian Federation, approved by the order No. 60 of the Ministry of Natural Resources on February 18, 2013. (Registered by Ministry of Justice on June 25, 2013, No. 28880).

The commercial trade in the Far-Eastern leopard and its parts is governed by the decision of the Russian Government No. 156 "The order of issuing licenses for shooting wild animals that belong to the species listed in the Red Data Book of Russian Federation" of February 19, 1996. The licenses are issued by the Federal Supervision Service according to the order established by the Administrative regulations of the Federal Supervision Service that executes the function of issuing licenses for shooting of wild animals that belong to species in the Red Data Book of the Russian Federation, approved by the order no. 4 of the Ministry of Natural Resources on January 15, 2008. (Registered by Ministry of Justice on February 13, 2008, №. 11154).

The decree №. 107 of the Ministry of Natural Resources of April 28, 2008, established the methods of calculating the damage caused to the animal species that are listed in the Red Data Book of Russian Federation, as well as to other species not to be subjected to hunting and fishing. It also calculates the damage caused to their habitat. The order № 429 of the Ministry of Natural Resources on December 12, 2012, made corrections to the methods of calculating the size of the damage caused to the animal species that are listed in the Red Data Book of the Russian Federation, as well as to the other species not subjected to hunting and fishing, and to their habitat. In this manner, the damage caused by killing one Far-Eastern leopard is now evaluated at 1,100,000 rubles.

According to the regulation № 272 issued by the governor of the Primorsky Krai on May 14, 2002, “Affirmation of the list of animal and plant species in the Red Data Book of Primorsky Krai,” the Far-Eastern leopard was entered into the Red Data Book of Primorsky Krai.

As well, the Far-Eastern leopard is listed in the Red Book of Zabaykalsky Krai.

3.1.2.2 Legislative and other normative legal acts of the Russian Federation

The key legislative acts, which regulate the protection and use of animals and their habitat, are the:

- Federal Law “On Environmental Protection” of January 10, 2002 (№ 7-F3);
- Federal Law “On Wild Fauna” of April 24, 1995 (№ 52-F3);
- Federal Law “On Protected Areas” of March 14, 1995 (№ 33-F3);
- Federal Law “On Hunting and Hunting Resources and Legal amendments in Federal Laws” of July 24, 2009 (№ 209-F3);
- Forest Code of Russian Federation;

- Criminal Code of the Russian Federation (with changes made on July 2, 2013 (№ 150-F3));
- Government decree (№978) “Affirmation of the list of the most valuable wild fauna and aquatic biological resources that belong to species listed in the Red Data Book of the Russian Federation and protected by agreements. See articles 226.1 and 258.1 of Criminal Law” of October 31, 2013;

Besides the above-mentioned legal acts, the norms of conservation and use of animal species, including the Far-Eastern leopard, can be found in departmental and judicial acts from other branches (civil, criminal and administrative legislation).

The basic law is “On Wildlife,” which regulates the protection and uses of wildlife as a whole, as well as the preservation and restoration of its habitat. It also defines the right of state ownership of wildlife within the Russian Federation. The law defines the rights of the state agencies and subjects of the Russian Federation in the area of conservation and use of wildlife as well as rights of the local governments. The law establishes the right of citizens and legal entities to execute public control over wildlife conservation efforts and to partake in governmental conservation programs. The law establishes the entities and principles responsible for managing the protection and use of wildlife as a whole, as well as preservation and restoration of its habitat.

The law establishes the necessity of the governmental registration of animal species as well as state monitoring, programs of conservation of animal species and their habitat.

Numerous regulations and departmental normative acts provide the well-developed judicial basis for management and law enforcement

for protection of rare animal species and preservation of their habitat. They provide a fairly good mechanism with well-defined rights of different federal and regional bodies of government.

However, the efficacy of this system was essentially reduced by the lack or absence of experience in the enforcement practices. It is also greatly hampered by the presence of several legal gaps in the system.

Article 20 of the law on “On Wildlife” dictates a necessary state ecological expertise before making any decision that may influence animal species or their habitat. Article 24 forbids any acts that may lead to the death or reduction of the number of animal species listed in any of the Red Data Books.

3.2 Territorial Protection

At the present time, most of the key dwelling places of the Far-Eastern leopard are located in federally-enforced protected areas. The most important are: the state natural biosphere reserve “Kedrovaya Pad” and the “Land of the Leopard” national park. The two are under joint management. Less important for leopard preservation are the regional reserve “Poltavsky” and the “Khasansky” Natural Park. The two have a forest cover that does not exceed 20% of their total area.

The total area of strictly protected natural resources of federal and regional significance within the Far-Eastern leopard’s habitat is 306,000 hectares; therefore 60% of its habitat is under protection. A restriction on hunting in the 82,000 hectare area of the “Land of the Leopard” national park is also of great importance.

The resettlement of the Far-Eastern leopard in the border regions of China, which are covered with forests and are thus a viable

habitat, is progressing slowly due to the low populations of ungulate animals, intensive economic activity and insufficient security measures. At the same time, crossings of the Far-Eastern leopard, as well as Amur tiger, to the bordering Chinese provinces are regularly recorded. To secure the free migration of the Far-Eastern leopard to China, it is important to create a transboundary protected reserve. This could be based on the Russian territories of the wildlife reserve “Kedrovaya Pad” and National park “Land of the Leopard” as well as Chinese reserves “Khunchun”, “Vantzin” and “Suyan.”

Beginning in 2008, the Russian Far East is currently developing the concept of the “nature-protection” concession. This entails the lease of forests for the purpose of preserving coniferous-broadleaved forests in Far-Eastern leopard habitats. The first step in this process was achieved when a NGO took a 25-year lease of 45,000 hectares of

Table 1. The List of the Far-Eastern leopard Protected Areas (PAs)

Name of the PA	Area (hectares)	Location within the Primorsky Krai
State wildlife sanctuaries		
“Kedrovaya Pad”	18045	Khasansky region
National Parks		
“The Leopard Land”	261 869	A Khasansky, Nadezhdinsky, Ussuri regions and Frunzensky district of the City of Vladivostok
	82 000 (охранная зона)	
Regional wildlife sanctuaries		
“Poltavsky”	119000	Ussuri, Oktyabrsky regions
Natural Parks		
“Khasansky”	9500	Khasansky region

forest land within the Forest Fund but which were outside of the PA network (since 2012, more than half of the sector is located within the national park “Land of the Leopard”). Right now, the leased area is dominated by relatively low-productivity oak monocultures as a result of repeated fires. The project of forest recovery that is to be conducted in the leased area envisions measures for the prevention of the fires and artificial restoration of forests with Mongolian oaks.

It is important to provide real protection to the Far-Eastern leopard in the forest lands that are leased by individuals or organizations, which are located in the leopard’s habitat as well as in the region of its proposed reintroduction.

3.3 Breeding in captivity

Zoos play an important role in preservation of animals ex situ, and in attracting public attention to the problems of preserving endangered species. They also promote the necessity of their preservation in their natural habitats.

Taking into account that the Far-Eastern leopard is under threat of extinction, the European Association of Zoos and Aquariums (EAZA) developed a European Endangered Species Program (EEP) for the Far-Eastern leopard population. The aim is to support its healthy population in captivity and enhance projects for preservation of the natural population. This program provides educational outreach, accumulates useful information and skills, collects means for financing field projects and, most importantly, preserves the gene pool for the Far-Eastern leopard’s reintroduction in its natural habitat when this becomes possible.

In 2001, the leading Russian and world experts recommended creating a second population of the Far-Eastern leopard within the

limits of its historical habitat by using animals held in captivity. However, in this case, the EEP experienced difficulties due to the genetic contribution of “Founder 2” to the captive population. This was a leopard caught in the wild and which served as one of two genetic contributors to the current zoo population of leopards. The results of a morphological analysis as well as DNA analysis show that this leopard lived not in the Far-Eastern leopard Russian Far East historic habitat but in the neighboring Chinese territory and is part of the Chinese subspecies (*P. p. japonensis*).

Nonetheless, the genetic state of the zoo population is more representative of the genetic state of a single natural population of the Far-Eastern leopards that dwelled at the East-Asian continuous habitat some thousand years ago. Estimations of the evolutionary time for the divergence between the Far-Eastern and Chinese leopards show that the genetic exchange between them occurred within the last thousand years, possibly as late as 200 years ago. Therefore, the use of the stable and quite diverse zoo populations might be quite suitable and, actually, be the only possible way to reintroduce the Far-Eastern leopard into its natural habitat. The EEP experts suggested the necessity of reducing, as much as possible, the genetic material coming from Founder 2 for the purpose of preserving the genetic diversity of the population. The EEP recommended using only those animals that have no more than 10-20% of the genes of Founder 2.

By the end of 2010, the EEP supervised the program that included 114 leopards (68 males and 46 females) from 48 zoos. The number of actively reproductive animals grew slowly and, by November 2010, reached 88 animals (55 males and 33 females). The population is governed by the principle of producing cubs with less than 20% of their genetic makeup coming from Founder 2. At present, there are 37 such animals (17 males and 20 females) and they can be already

used in the breeding program. As a whole, the breeding program has been developing successfully - there are several young couples that can be used for reintroduction.

In addition, the American Association of Zoos and Aquariums (AAZA) identified several animals in the Russian Far East population that can be also used for reintroduction.

4. RECOMMENDED HIGH-PRIORITY MEASURES FOR PRESERVING THE FAR-EASTERN LEOPARD

The measures for the conservation of the Far-Eastern leopard are largely equivalent to those for the conserving of the Amur tiger, provided by the “Strategy of preserving the Amur tiger in Russia,” approved by Ministry of Natural Resources on July 2, 2010 (№25-р). But there are specifics, stipulated by the biological peculiarity of the Far-Eastern leopard and the influences of different anthropogenic factors. Apart from protecting the leopard and its prey and reducing the negative factors that lead to destruction of its habitat, it is very important to implement the reintroduction program by creating a second population of the Far-Eastern leopard.

4.1 A need in international cooperation

The conservation of the Far-Eastern leopard depends not only on the Russian Federation but also on activities of the neighboring countries, China and North Korea, as well. Because there are few appropriate habitat areas for expanding the leopard population within its contemporary range, international cooperation with all of Russia’s neighbors is of great importance. Cooperation with China is first on that list.

The high demand for organs of the leopard and ungulate animals in China resulted in the almost complete extinction of the leopard and led to a critical reduction of ungulates on Chinese territories. Nonetheless, experts estimate that there is an area of approximately 5,000 km² that is suitable for leopard habitats in the regions bordering with Russia. Russia’s experience in protecting the leopard and its

habitat can be certainly used during the species's reintroduction into China. However, without the joint effort of all neighboring states, it would be difficult to reintroduce the leopard in its historic habitat that includes Russia, North Korea and China.

It is most reasonable to develop international cooperation along the following guidelines:

- Creation of a joint protected area on the Russo-Chinese border. It would be located on the lands of the reserve “Kedrovaya Pad” and “Land of the Leopard” national park on Russia’s side and the reserves “Khunchun,” “Vantzin” (Jilin province) and “Suyan” (Heilongjiang province) on China’s side.
- Coordination of activities and information exchange to halt the smuggling of derivatives of the leopard and other endangered animals. Of most importance would be cooperation between the law-enforcing bodies of Russian Federation and China, which would allow developing a strategy and tools for pursuit and persecution of law violators hiding on the territory of another country.
- Continuous exchange of scientific information between two countries regarding the size and spread of the leopard population and its prey. Search for new non-invasive methods of investigation by specialists from both countries.
- Cooperation with the Global Program of the World Association of Zoos and Aquariums in the sphere of Far-Eastern leopard reintroduction.
- Development of cross-border cooperation with the aim of providing unhindered border-crossing for the leopards and ungulate animals.

International cooperation could facilitate the exchange of ideas and the use of the best world practices. It will also encourage the co-

operation of Russian and foreign experts in a joint effort to preserve and study the Far-Eastern leopard throughout its entire habitat.

4.2. Improvement of the legal framework

To increase the efficacy of Russian legislation targeting environmental protection as a whole and the Far-Eastern leopard in particular, it is deemed necessary:

- To establish administrative responsibility for providing internet resources for advertising the organs and derivatives of the Far-Eastern leopard and other endangered species, as well as for the fact of advertising itself;
- To consider possibility of amending the Federal law (№174-F3) of November 23, 1995, to require a mandatory ecological expertise in the case of any large construction projects in the habitat of the Amur tiger and Far-Eastern leopard.
- To monitor the international legal practices which introduce criminal responsibility for the poaching, trade and smuggling of Far-Eastern leopards as well as their parts and derivatives.
- To introduce normative acts which establish rules for trade in hunted animals.
- To amend normative acts that regulate the minimal density of ungulate populations for hunting management in the habitat of the Far-Eastern leopard and Amur tiger;
- To amend the Forest Code of the Russian Federation as well as the Administrative Violations Code to increase the rights and powers of the local governments in restricting the time that people are allowed to remain in the forests during high-risk fire seasons. It must also provide for increased accountability for causing fires.
- To amend the forest plans of Primorsky Krai and management plans of its forest management units to establish restrictions on felling throughout the entire habitat of the Far-Eastern leopard.

4.3 Improving the network of protected areas

A multi-functional system of protected areas is created in the Far-Eastern leopard habitat to protect the predator within 60% of its habitat. The system also accounts for socio-economic development of the Southwestern part of the Primorsky Krai.

To increase the efficiency of the PA network we recommend:

- To provide a strict protective regime in the buffer zone of the “Land of the Leopard” national park.
- To conclude an agreement between the governments of Russia and China on creation of a joint protected area on the Russo-Chinese border (see 4.1).
- To develop and implement a medium-term plan of management of the state reserve “Kedrovaya Pad” and “Land of the Leopard” national park that facilitates the following activities:
 - preserving and enlarging the population of the Far-Eastern leopard;
 - enlarging the population of ungulates and preventing their death in cases of adverse weather conditions;
 - preserving habitats. Primarily, in the sphere of fire prevention and extinguishing;
 - restoring the original ecosystems of coniferous-broad-leaved forests;
 - avoiding habitat fragmentation and providing for the possibility of movement of predators and their prey across the motorway and other forms of infrastructural;
 - optimizing the use of agricultural land based on leopard conservation;
 - involving local communities in the work of the national park to minimizing social conflicts.

4.4. Improved protection of the Far-Eastern leopard outside of the protected areas

Outside the federally-enforced protected areas, the administration of Primorsky Krai, (particularly to the Department for the protection, control and regulation of use of fauna of Primorsky Krai, which is a specially authorized state body for the protection, control and regulation of the use of wildlife and its habitats in Primorsky Krai) is responsible for the conservation of the Far-Eastern leopard.

Wildlife protection is complex, and its efficacy depends on the interaction of the above mentioned public authority with other agencies. These agencies include the Primorsky Krai Office of the Ministry of Internal Affairs, the Primorsky Krai Department of FSB, the Primorsky Krai Office of Russian Nature Surveillance and The Russian Far Eastern Customs Directorate of FCS. Only subdivisions of the FCS and FSB have the authority to prevent the illegal transfer the objects of wildlife and their derivatives, including the Far-Eastern leopard, across the border.

The conservation of the Far-Eastern leopard and its habitat depends on the awareness of local land-users, as well as the local populations living in the Far-Eastern leopard habitat. In order to ensure the effective protection of the Far-Eastern leopard and its habitat outside protected areas it seems appropriate:

- To ban, within the leopard habitat, the use of leghold traps (designated for capturing any types of any species) and other devices which can injure or kill a leopard. The following step is to determine the carrying capacity of game farms and to ban the use of traps within those grounds.
- To ban hunting with the use of dogs in the area of the proposed reintroduction of the leopard;

- When signing hunting agreements, it is vital to identify the limiting factors which determine dynamics of game animals for planning the necessary biotechnical and hunting activities to increase the number of ungulate animals in the leopard's habitat;
- To establish close interaction of the Forestry Department of Primorsky Krai, the Ministry of Emergencies, the leaseholders of forest areas, hunters and land users to ensure effective prevention and elimination of forest fires;
- To create a database for collecting, storing, processing and analyzing information on illegal procuring the Far-Eastern leopard and other animals, that should include:
 - cases of actual removal of the leopards from their habitat;
 - cases of trafficking in illegally produced products from the leopard and other animals;
 - cases of illegal trafficking in body parts and derivatives of the Far-Eastern leopard and other animals;
- To monitor and prevent the illegal export and sales of the body parts and derivatives of the leopard inside Russia as well as abroad;
- To establish, within the State Experimental Hunting Estate "Orlinoe" and with the support of the Ussuri reserve, a Rehabilitation Center of the Far-Eastern leopard for the rehabilitation of the animals captured due to disastrous weather events. They will be subsequently released into the wild.

The following measures must be implemented throughout the Far-Eastern leopard habitat regardless of the mode of protection of the area:

- To provide an effective system for the prevention and suppression of fires in leopard habitats. To achieve a reduction in

burnt areas in Southwest Primorsky Krai to no more than 10% of the total area, mainly outside of the valuable forest areas. To achieve the latter it is necessary:

- To create firefighting teams of farmers, hunters, leaseholders and other users of forest areas;
- To implement regular maintenance of the fire breaks to prevent fires in the most valuable forest areas;
- To establish constant monitoring the forest fires through the use of modern technology, such as satellites, MODIS scanners, and cameras mounted on mobile communications towers in areas with the greatest fire hazard;
- To take steps aimed at restoring the coniferous-broadleaved forests by artificial regeneration with subsequent mandatory care for the planted trees;
- To ban, in the area of leopard habitat, all types of timber harvesting, other than restoration logging reconstruction in the secondary forests (oak, white birch, aspen), where there is a second story of planted trees, or where their planting is scheduled. The logging in such areas can provide locals with wood.
- In order to reduce the negative impact on leopard habitats and to provide control of public access to the forest to transfer control of the forest roads within the boundaries of these areas to the users (including leaseholders).

4.5 Scientific Research

Targeted research of the Far-Eastern leopard population began in the 1970s. In the 1990s, the use of advanced equipment and modern techniques (remote sensing, satellite and radio tracking, the use of automatic cameras, DNA analysis) elevated research to a new level.

The study of the Far-Eastern leopard population is complicated due to the extremely low population size that requires a special

approach using predominantly noninvasive research methods. Studies, based on trapping the leopards without removing them from their habitat, showed the satisfactory physiological state of the population and revealed inter-population patterns. The gathered data provided sufficient grounds for making decisions on its long-term conservation. Given the small size of the existing leopard population, any intervention may lead to the death of individuals and to the genetic degradation of the remaining population. Therefore, in order to preserve the maximum possible population size, we must stop withdrawing individuals from nature even for scientific purposes. The reintroduction program should use only animals kept in zoos.

Particular attention should be paid to the study of the leopard's prey, its habitat, anthropogenic impacts on the leopard population and the habitat, its interaction and competition with other predators of the Russian Far East.

When developing and implementing a research program, it is necessary to explore the following directions:

- Studying the age and gender, spatial and social structure of the leopard population and trends of its change, as well as its seasonal and daily movements with help of automatic tracking cameras and molecular genetics methods. We must also include an analysis of the mitochondrial DNA via noninvasive methods, such as collecting its fur, saliva and feces.
- Studying the “summer” and “winter” diet spectrum of the leopard population via tracking as well as studying feces using morphological studies and DNA analysis.
- Studying the reproductive capacity of the leopard population and its changes, using tracking, questionnaires, data from automatic cameras installed in the leopard habitat throughout the year and other methods.

- Studying the interaction and competitive relationships between the Far-Eastern leopard and Amur tiger.
- Improving the methods of assessment of the leopard population using DNA analysis and other advanced techniques.
- Creating an international collection of DNA samples of the big cats and other rare animals within the Russian Academy of Sciences.
- Studying the physiological state of animals, including the physical and reproductive parameters via the hormonal analysis of animals (analysis of substances derived from urine and feces).

We should ensure the overall coordination of research. In particular, we must create and maintain a single database of the Far-Eastern leopard's images obtained via automatic cameras and other methods. We must also conduct annual field work. For the effective implementation of the research program, it is crucial to involve academic institutions, as well as their structural divisions in the Russian Far East. It is no less important to build upon the international partnerships that will help to ensure the exchange of scientific ideas and best international practices and to promote joint scientific work of Russian and foreign experts as well as financial support.

4.6. Monitoring the state of the Far-Eastern leopard population

The state of the Far-Eastern leopard population requires close attention and constant monitoring of the situation to timely identify, analyze and predict possible changes in population parameters due to natural processes and anthropogenic factors.

Together with the monitoring of the state of the leopard population, monitoring of the ungulate populations, the main prey of the leopard, should be carried out. Research must also address the condition of their habitat and the anthropogenic impact on the latter.

The basic methods of counting and monitoring the leopard population are similar to those of the Amur tiger:

- The leopard population census is held every five years within the Russian portion of the leopard habitat;
- Partial censuses (monitoring program via automatic cameras) are held annually on permanent pilot areas covering 35% of the present leopard habitat;
- The census and identification of various population parameters, including genetic diversity, can be carried out with the use and other non-invasive methods - via collecting samples of feces, hair and other body tissues and their subsequent DNA analysis;
- The census of the ungulate animals can be carried out by the winter route tracking, as well as by other methods approved in the established order;
- A specially authorized body of Primorsky Krai should ensure the monitoring of the illegal trade in the derivatives of the animals listed in the Red Data Book of the Russian Federation and / or included in the CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) Appendices. The body must also track the value of these derivatives.

4.7. Prevention and resolution of conflicts

In order to prevent the Far-Eastern leopard's attacks on domesticated sika deer it is appropriate:

- To develop measures aimed at streamlining operations of deer farms located in the area of the Far-Eastern leopard in order to preserve the leopard;
- To continue the implementation of the program of compensatory measures to farmers who suffered losses due to the leopard's attacks on their domesticated animals.

When implementing the reintroduction program for preventing and reducing the likelihood of conflict we should follow the «Guidelines for the reintroduction and other environmental movements» (version 1.0), published by the Species Survival Commission of IUCN in 2013.

To resolve the conflicts that arise from the leopard reintroduction it is mandatory:

- To establish coordinated efforts which identify the amount of and time for compensation payments and domestic animal insurance. Creating a hotline for communication with the public and performing the preventive outreach Compliance safety program. The other aspect is to provide maintenance for the program and to graze animals in the habitats of large predators. We must also familiarize the public with the program of compensatory measures and those measures that should be taken in case of a conflict.
- A specially authorized body of Primorsky Krai should implement a decision and response scheme aimed at conflict resolution.
- Those animals that are forcibly removed from the natural environment, if their subsequent return wildlife is possible, should be released within the current habitat or should be transmitted to other countries for reintroduction. The withdrawn predators that are not suitable for release into the wild should be transferred to zoos within the breeding program of the Far-Eastern leopard.
- The animals, withdrawn from the wild or from illegal trafficking, as well as carcasses or remains of the dead leopards, should undergo mandatory veterinary and zoological forensic examination using a common protocol and standardized methodology to determine the cause of death or possible diseases.

- All animals released after their rehabilitation or for reintroduction should be equipped with radio collars or with GPS / GLONASS beacons.

4.8. Ecological Outreach

Without the support of the local population any measures to save the Far-Eastern leopard will be of limited efficacy. Promoting tolerant attitudes toward the leopard and the measures for its protection among the local population is a task of paramount importance. The aesthetic and educational value of one of the most beautiful and rarest cats in the world must be understood by all social and age groups of the local population. This is one of the main objectives of public organizations. Advocacy by hunters and local action groups is also crucially important. Advocacy plays a special role in the framework of the reintroduction program.

Areas of environmental education and outreach activities in this sphere are:

- Continuation of the program “Protect each animal,” initiated by a coalition of NGOs and aimed at informing the public about the fate of specific animals followed during the annual monitoring with automated cameras.
- Inclusion in school curricula of special lessons to familiarize children with the unique nature of their native land, rare animal species, including leopards, and methods for their protection.
- Organization of widespread support for leopard conservation in the media.
- Promoting conscientious hunting via widely publicized results of the fight against poaching in all its stages (including court decisions).

- Issuing attractive specialized publications, raising sympathy for the leopard;
- Holding the annual traditional festival “Land of the Leopard”;
- Cooperation with the staff of the Border Guard Service of the FSB. They should be invited to different leopard conservation activities, including joint anti-poaching raids.

4.9. Reintroduction of the Far-Eastern leopard in southern Sikhote-Alin

To implement the task of creating a viable population of the Far-Eastern leopard within the historic habitat in the southern Sikhote-Alin Mountains (Primorsky Krai) it is necessary to adopt and implement a program of its reintroduction. The following provisions must be taken into account:

- The creation of “reserve” group should be regarded as an auxiliary mechanism for the conservation of the Far-Eastern leopard and cannot be considered as the main way to save it.
- A breeding group of the founders of the “reserve” population in the area of reintroduction should be formed using only the individual animals from the artificial environment created in the framework of the Global Program of the World Association of Zoos and Aquariums for the Far-Eastern leopard.
- The Amur leopard reintroduction program in the southern Sikhote-Alin Mountains in the Lazo region of Primorsky Krai, on the territory of the Lazo State Natural Reserve, should include breeding adult leopards taken from captivity. Their offspring should be released into their natural habitat.





ACTION
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ACTION PLAN

for the period until 2022 for the implementation
of the first-priority measures to implement
the Strategy for Conservation of Far-Eastern Leopard
in the Russian Federation

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Moscow

2014



This Plan was adopted on 13/12/2013 at the enlarged meeting of the Working Group on rare species of large mammals of Primorsky Krai, chaired by the vice-governor of Primorsky Krai Sidorenko S. P.

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Top-priority measures on Far-Eastern leopard conservation	Indicators of performance	Schedule time	Proposed implementors
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1. Development of international co-operation			
1.1. Continue transboundary co-operation between Russia and China on Far-Eastern leopard conservation, including under the Agreement between the Government of the Russian Federation and the Government of the Peoples' Republic of China on the tiger conservation (10/11/1997, Beijing).	Joint action plan on Amur tiger and Far-Eastern leopard conservation to the Agreement on transboundary co-operation.	2014 – 2015	Ministry of Natural Resources and Environment of Russia (MNRE), Federal Service for Supervision of Natural Resources (Rosprirodnadzor), Ministry of Foreign Affairs of Russia, Primorsky Krai Administration, "Land of the Leopard" national park authority, autonomous non-governmental organization (ANO) "Far-Eastern leopards", NGOs, Russian Academy of Sciences (RAS).
1.1.1. Optimize efforts under the Agreement between the Government of the RF and the Government of PRC on the co-operation on environmental protection (27/05/1995, Beijing) and the Protocol between the Government of the RF and the Government of PRC on tiger conservation (10/11/1997, Beijing) at the national and regional levels.	1. Joint symposiums, workshops and other events on leopard conservation. Final documents of the working meetings and workshops conducted by both sides in co-operation, with participation of scientists, technical and other experts. 2. Sharing information and materials about the research, technologies, implementation processes, policies, legislation, rules and other issues related to leopard conservation.	2014 – 2022	MNRE, Rosprirodnadzor, Primorsky Krai Administration, NGOs, RAS.

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1.1.2. Enhance co-operation in the work of state authorities of different levels, scientific, international and non-governmental organisations to find mutually appropriate solutions to serious issues of leopard conservation through the creation of Russian-Chinese expert group on Far-Eastern leopard conservation with participation of representatives of state authorities, scientific, international and non-governmental organizations, which will effectively react on up-to-date information on the changes in the leopard population and its habitat conditions.	1. Continue creation of Russian-Chinese expert working group on Far-Eastern leopard conservation. 2. Annual scheduled meetings of the expert group and non-planned meetings of the working group based on need.	2014 – 2022	MNRE, Rosprirodnadzor, “Land of the Leopard” national park authority, Primorsky Krai Administration, NGOs, RAS.
1.2. Ensure regular co-operation at the regional level on the basis of direct connections between the regions.	Enlarge the list of issues noted in the Agreement between Primorsky Krai and Jilin and Heilongjiang provinces on the conservation of the Far-Eastern leopard and Amur tiger, their food resources and habitats. Annual meetings with summaries and approval of a one-year working plan.	2014 – 2022	Primorsky Krai Administration, “Land of the Leopard” national park authority, Rosprirodnadzor, NGOs, RAS.
1.3. Strengthen co-operation on research of the leopard, other wild animals and their habitats through the establishment of direct scientific and technical connections between Russian and Chinese organizations and scientific and research institutes, universities, scientific and production associations.	Direct agreements between Russian and Chinese organizations and scientific and research institutes, universities, scientific and production associations on the co-operation on science and technology providing for fundamental and applied research, introduction of their results, environmental monitoring, sharing scientific and technical information, joint Russian-Chinese projects and programmes with participation of third parties.	2014 – 2016	Ministry of Education and Science of Russia, RAS, universities, departmental scientific and research institutes, “Land of the Leopard” national park authority, IUCN Species Survival Commission, NGOs.

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1.4. Establish Russian-Chinese transboundary reserve to ensure unobstructed passage for the leopard and other wild animals across the border at the Black Mountains – Changbai, including: from Russian side – state natural biosphere reserve “Kedrovaya Pad” and national park “Land of the Leopard”; from Chinese side – national reserve Hunchun, provincial reserves “Wangqing” and “Suian”.	1. Intergovernmental Russian-Chinese Agreement on the creation of transboundary reserve. 2. Addition to the List of Measures to implement the Concept on transboundary co-operation in the Russian Federation adopted by the Decree of the Government of the Russian Federation #907-r on 03/07/2003. 3. Decree on the creation of Russian-Chinese Commission on the transboundary reserve “Land of the Leopard”. 4. Ensure free and unobstructed passage for the leopard and other predators, as well as ungulates, across the border.	2014 – 2015 Annual meetings of the Joint Commission	MNRE, Ministry of Foreign Affairs of Russia, Rosprirodnadzor, relevant federal executive authorities, “Land of the Leopard” national park authority, NGOs, RAS, Primorsky Krai Administration.
1.5. Enhance coordination of custom services work between Russia, China, North Korea and South Korea, aimed to cease the illegal export and trade in rare and endangered species of animals, their parts and derivatives, including Far-Eastern leopard.	Appeal from Russian Ministry of Natural Resources and Environment to the relevant custom services. International workshop.	2014 – 2015	Federal Customs Service of Russia, MNRE, Rosprirodnadzor, Species Survival Commission.
1.6. Continue co-operation with the European Endangered Species Programme (EEP) and Species Survival Plan under the projects on leopard reintroduction in its historical range.	Existence of Far-Eastern leopard population in captivity, with pure genotype and breeding capability of breeding, consisting of at least 37 individuals (17 males and 20 females). Use of these individuals in a breeding population.	2014 – 2015	MNRE, Rosprirodnadzor, Moscow Zoo, Primorsky Krai Administration, IUCN Species Survival Commission, NGOs.
2. Improvement of the legal framework			
2.1. Ensure implementation of the Strategy of Far-Eastern leopard conservation in the Russian Federation	Implement the Action Plan on the conservation of Far-Eastern leopard in the Russian Federation	2014 – 2022	Primorsky Krai Administration, RAS, NGOs.

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2.2. Reduce allowed timber harvesting volume in especially valuable oak stands in the South-Eastern Sikhote-Alin (proposed area for Far-Eastern leopard reintroduction)	1. Determine up-to-date forest inventory characteristics of forest stands with Mongolian oak and adjust allowed timber harvest volume for Mongolian oak. 2. Amend the Forest Plan and forestry regulations of Primorsky Krai accordingly.	2014	Primorsky Krai Administration, Federal Forestry Agency, MNRE, Rosprirodnadzor, Ministry of Defense of Russia, forest areas leaseholders, "Land of the Leopard" national park authority, NGOs.
2.3. Establish specially protected forest areas within the leopard range, including in the South-Eastern Sikhote-Alin (proposed area for Far-Eastern leopard reintroduction), in accordance with sub-programme "b" of paragraph 3 of article 102 of the Forest Code of the Russian Federation, on the basis of the recommendations on forest management in habitats of the Amur tiger and other rare predators developed by the Federal State Authority "Far-Eastern Scientific and Research Institute of Forest Management".	1. Set of background documents for specially protected forest areas established in the key habitats of Far-Eastern leopard. 2. Draft departmental order on the establishment of specially protected forest areas.	2014 – 2016	Primorsky Krai Administration, Federal Forestry Agency, MNRE, Rosprirodnadzor, Ministry of Defense of Russia, forest areas leaseholders, "Land of the Leopard" national park authority, NGOs.
2.4. Restrict all types of logging within state natural sanctuaries in Far-Eastern leopard habitats and proposed reintroduction area, including the national park "Land of the Leopard", excluding logging as a part of biotechnical measures and reconstruction harvesting in secondary forests, in which underplanted forest plantations exist or their planting is planned.	1. Amendments to the Regulations of the regional natural sanctuaries "Poltavsky" and "Vasilkovsky". 2. Forest management Regulations of the "Land of the Leopard" national park. 3. Amendments to the Forest Plan of Primorsky Krai. 4. Recommendations on the amendments to the existing articles of the Code of Administrative Offences of the Russian Federation.	2014 – 2015	Primorsky Krai Administration, Federal Forestry Agency, MNRE, Rosprirodnadzor, Ministry of Defense of Russia, forest areas leaseholders, "Land of the Leopard" national park authority, NGOs.

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2.5. Expand the rights and powers of local authorities to ensure fire safety and restrict citizens' presence in forests during the fire-hazardous period.	Amendments to the Federal Law from 13/10/2003 #131-FZ "On the general principles of local governance arrangements in the Russian Federation", defining the powers of local authorities related to fire safety and restrictions of citizens' presence in forests during the fire-hazardous period, as well as to the Code of Administrative Offences of the Russian Federation.	2014 – 2016	Federal Forestry Agency, Ministry of Emergency Situations of Russia, relevant federal executive authorities, Primorsky Krai Administration, NGOs.
2.6. Establish legal framework to prosecute individuals providing Internet resources for and placing announcements of the sale of body parts and derivatives of rare animal species, including Far-Eastern leopard.	Amendments to the relevant articles of the Code of Administrative Offences.	2014 – 2015	MNRE, Rosprirodnadzor, relevant federal executive authorities, Primorsky Krai Administration, NGOs.
2.7. Ensure criminal liability for the killing, illegal transportation, storage and sale, as well as illegal transfer across the custom border of the Russian Federation, of rare and endangered species of animals, their body parts and derivatives, including Far-Eastern leopard.	1. Ensure enforcement of article 258.1 of the Criminal Code of the Russian Federation. 2. Ensure enforcement of article 226.1 of the Criminal Code of the Russian Federation.	2014 – 2015	Federal Customs Service of Russia, Ministry of Internal Affairs, Federal Security Service, MNRE, Rosprirodnadzor, relevant federal executive authorities, Primorsky Krai Administration.
2.8. Ensure enforcement of amendments defined by the Federal Law from 23/07/2013 #201-FZ "On the amendments to the Federal Law "On the hunting and preservation of game resources in the Russian Federation" and the Code of Administrative Offences of the Russian Federation".	Ensure inevitability of administrative punishment, in the form of forfeiture of hunting rights of the persons engaged in illegal hunting of ungulates or persons committing repeated violations of hunting regulations (at least twice in one year), which also leads to the cancellation of weapon licenses (permits).	2014 – 2015	MNRE, Rosprirodnadzor, relevant federal executive authorities, "Land of the Leopard" national park authority, Primorsky Krai Administration, NGOs.

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	Ensure maintenance of records of the aforementioned persons in an information database and effective information sharing to track recidivist poachers (regional databases of violators of environmental legislation).		
2.9. Strengthen the full-scale hunting control provided for in Article 41 of the Federal Law #209 “On the hunting and preservation of game resources and amending certain legal Acts of the Russian Federation”, by giving game management staff the right to conduct inspections and draft administrative protocols.	Amendments to the Code of Administrative Offences of the Russian Federation and Codes of Administrative Offences of the entities of the Russian Federation, defining the authorities of the game management staff in relation to protocol drafting and inspections as part of the full-scale hunting control implementation.	2014 – 2016	MNRE, Rosprirodnadzor, relevant federal executive authorities, NGOs.
2.10. Provide an opportunity for the authorized regional authority to audit hunting users based upon need, and not only once in three years.	Amend the Federal Law from 26/12/2008 #294-FZ “On the protection of legal entities’ and individual entrepreneurs’ rights during the execution of the state control (surveillance) and municipal control”.	2014 – 2016	MNRE, Rosprirodnadzor, relevant federal executive authorities, NGOs.
2.11. Ensure environmental expert assessment for project documentation for any capital construction within the habitats of red-listed animals, including Far-Eastern leopard, to inspect whether the composition and content of such documentation meet environmental requirements.	1. Draft Federal Law on the amendments and additions to the Federal Law of 23/11/1995 #174-FZ “On Environmental Expert Assessment”, providing that the project documentation for any capital construction in red-listed animal habitats, including Far-Eastern leopard, must pass the state environmental expert assessment. 2. Conclusions of the state environmental expert assessment.	2014 – 2022	MNRE, Rosprirodnadzor, relevant federal executive authorities, NGOs.

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2.12. Develop proposals on the mechanisms of taxation benefits for legal entities and individuals making donations for the conservation and restoration of biodiversity in Primorsky Krai.	Proposals on the mechanism of taxation benefits for legal entities and individuals.	2014 – 2015	Primorsky Krai Administration, NGOs.
2.13. Make amendments to the Federal Law from 24/07/2009 #209-FZ “On the hunting and preservation of game resources and amending certain legal Acts of the Russian Federation” aimed at the preservation of leopard’s prey base.	<ol style="list-style-type: none"> 1. Develop and adopt the Rules of the possession, transport and sale of products received result of game resources harvesting. 2. Amend hunting legal Acts regulating minimum allowable density and limits of ungulate take by hunting users during the hunting activities. 3. Other. 	2014 – 2015	MNRE, Rosprirodnadzor, relevant federal executive authorities, NGOs.
3. Improvement of the protected areas (PAs) network			
3.1. Ensure effective functioning of the state natural reserve “Kedrovaya Pad” and national park “Land of the leopard”, through the production of management and development plans for the “Land of the leopard” national park authority and allocate funds needed for their implementation in the state budget.	<ol style="list-style-type: none"> 1. Management and development plan for the “Land of the leopard” national park authority. 2. Transfer of the forest lands within the national park “Land of the leopard” into the status of lands of protected areas. 3. Re-registration or cancellation of contracts with leaseholders for forest and game areas within the national park “Land of the leopard”. 4. Upon the release of forest lands of the military forest lands of Russian Ministry of Defense, ensure their assignation to the national park “Land of the leopard” and transfer into the lands of protected areas. 5. The lands of deer parks are used for their assigned purpose or are transferred to the national park and to the category into the lands of protected areas. 6. Allocation of the needed funding in the state budget. 	2014 – 2015	MNRE, “Land of the Leopard” national park authority, Primorsky Krai Administration, ANO “Far-Eastern leopards”, NGOs.

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3.2. Ensure enforcement of the regime of the buffer zone of the national park "Land of the leopard".	Ensure coordinated actions of the inspectors of the "Land of the leopard" national park authority, Department of Hunting Supervision of Primorsky Krai and game husbandries' staff on the control of the buffer zone.	2013 – 2014	Primorsky Krai Administration, MNRE, Rosprirodnadzor, Ministry of Defense of Russia, forest areas leaseholders, "Land of the Leopard" national park authority, NGOs.
3.3. Create Russian-Chinese transboundary reserve "Land of the Leopard" (refer to 1.4.).	<ol style="list-style-type: none"> 1. Agreement between the Government of the Russian Federation and Peoples' Republic of China on the creation of Russian-Chinese transboundary reserve. 2. Decree on the creation of Joint Commission on Russian-Chinese reserve "Land of the Leopard". 3. Allocation of an additional article of expenditure for the "Land of the Leopard" national park authority to ensure international co-operation. 	2014 – 2016	MNRE, Ministry of Foreign Affairs of Russia, "Land of the Leopard" national park authority, Primorsky Krai Administration, ANO "Far-Eastern leopards", NGOs.
3.4. Ensure conservation of Far-Eastern leopard and its habitats in regional protected areas.	<ol style="list-style-type: none"> 1. Management and development plan for "Poltavsky" natural sanctuary. 2. Management and development plan for the regional resort area "Yasnoe". 3. Management and development plan for the zone of sanitary protection of the drinking water aquifers of the "Pushkin Depression". 4. Management and development plan for the natural sanctuary "Vasilkovsky". 	2014 – 2016	Primorsky Krai Administration, Rosprirodnadzor.

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3.5. Ensure habitat protection and increase in number of wild ungulates within protected areas under the implementation of the Programme of Far-Eastern leopard reintroduction.	1. Create buffer zones around Lazovsky natural reserve. 2. Ensure coordinated actions of the inspectors of Lazovsky natural reserve authority, Department of Hunting Supervision of Primorsky Krai and game husbandries' staff on the control of the buffer zone. 3. Ensure enhanced protection of Vasilkovsky regional natural sanctuary.	2013 – 2014	"Lazovsky" state natural reserve, Primorsky Krai Administration, MNRE.
4. Enhancing effectiveness of Far-Eastern leopard protection within protected areas and outside of them			
4.1. Strengthen prevention and response to forest fires in the habitats of Far-Eastern leopard	1. Develop and introduce the system of prevention and extinguishing of wild fires into practice. 2. Train local residents. 3. Enhance anti-fire infrastructure.	2014 – 2022	Federal Forestry Agency, Ministry of Emergency Situations of Russia, MNRE, military forestries, Primorsky Krai Administration, land and game resource users, ANO "Far-Eastern leopards", NGOs.
4.2. Ensure restoration of destroyed habitats of Far-Eastern leopard through special system of forest restoration.	1. Plan of activities on forest restoration. 2. Annual planting of Korean pine and Manchurian fir.	2014 – 2022	Federal Forestry Agency, MNRE, military forestries, Primorsky Krai Administration, ANO "Far-Eastern leopards", NGOs, land and game resource users.
4.3. Provide for the construction of tunnels, elevated crossings and underpasses for wild animals to reduce the number of collisions of animals with transport.	Projects of tunnels, elevated crossings and underpasses for wild animals. Environmental expert assessment of all linear structures under construction to ensure free movement of Far-Eastern leopard, Amur tiger and wild ungulates.	2014 – 2022	Ministry of Transport of Russia, MNRE, Rosprirodnadzor, Primorsky Krai Administration, NGOs.

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4.4. Implement model projects on the development of eco-tourism in Primorsky Krai as an alternative to other directions of social and economic development of the region.	Model projects on the development of eco-tourism in Primorsky Krai. Tourist product – developed tourist routes in the model regions. Arranged advertising of the developed tourist routes.	2014 – 2022	Primorsky Krai Administration, Federal Agency for Tourism, MNRE, Ministry for Regional Development of Russia, RAS, ANO “Far-Eastern leopards”, NGOs.
4.5. Contribute to the attraction of investments in manufacturing in settlements and creation of workplaces to ensure employment of the population and prevent the reasons of poaching.	Developed investment and business proposals.	2014 – 2022	Primorsky Krai Administration, Ministry for Regional Development of Russia, RAS, NGOs.
4.6. Prepare a Programme and Action Plan on the involvement of local people in sustainable natural resource use with a minimum impact on the environment and Far-Eastern leopard population.	Plan on the involvement of local people in the development of eco-tourism and support to the local people’s activities on sustainable forest and game management.	2014 – 2015	Primorsky Krai Administration, Federal Agency for Tourism, MNRE, Ministry for Regional Development of Russia, RAS, ANO “Far-Eastern leopards”, NGOs.
4.7. Develop a regional action plan on the restoration of wild ungulates population within the range of Far-Eastern leopard and Amur tiger.	Action plan of Primorsky Krai on the restoration of wild ungulates population within the range of Far-Eastern leopard and Amur tiger. Mobilization plans for game husbandries and protected areas within the range of Far-Eastern leopard for the prevention of ungulates death in snowy winters.	2014 – 2015	Primorsky Krai Administration, game resource users, ANO “Far-Eastern leopards”, NGOs, RAS.
4.8. Create the conditions for economic incentives for game husbandries where Far-Eastern leopard and Amur tiger live, including through investments and other extra-budgetary funds, for which to test biotechnical measures aimed to increase the populations of ungulates in the model game husbandries.	Reports on the biotechnical measures undertaken.	2014 – 2022	Primorsky Krai Administration, ANO “Far-Eastern leopards”, relevant entrepreneurship, NGOs.

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4.9. Conduct a thorough monitoring of the status of populations of wild and domestic animals, screen all the killed or captured individuals of Far-Eastern leopard and other carnivores for various diseases.	Control measures	2014 – 2022	Primorsky Krai Administration, local governments, Ministry of Agriculture of Russia, MNRE, Rospirodnadzor, Primorskaya Academy of Agriculture, NGOs.
4.10. Create and maintain a unified center for autopsies of dead large carnivores and ungulates, including Far-Eastern leopard, on the base of Primorskaya Academy of Agriculture.	Departmental Decree defining Primorskaya Academy of Agriculture as the single facility for autopsies of dead large carnivores and ungulates.	2014	Rospirodnadzor, Ministry of Agriculture of Russia, Primorsky Krai Administration, Primorskaya Academy of Agriculture, NGOs.
4.11. Train local veterinarians, teach them to use modern medical methods for saving the lives of wild animals.	1. Qualification upgrade courses 2. Workshops 3. Trained specialists	2014 – 2022	Ministry of Agriculture of Russia, Primorskaya Academy of Agriculture, Primorsky Krai Administration, local governments, NGOs.
4.12. Ensure the work of operational groups of the Department of Hunting Regulation of Primorsky Krai on poaching control in South-Eastern Primorye and in the operational area of the Programme of Far-Eastern leopard reintroduction.	Established groups constantly patrolling Far-Eastern leopard range and the South-Eastern Sikhote-Alin (proposed reintroduction area), fully supplied with transport, equipment and fuel.	2014 – 2015	Primorsky Krai Administration.
4.13. Organize annual training for state inspectors on the identification of offences and drafting of the inspection Acts, Protocols and Resolutions on administrative violations in accordance with the Code on Administrative Offences of the Russian Federation. Introduce	Reporting documents	2014 – 2022	Primorsky Krai Administration, Primorskaya Academy of Agriculture, ANO "Far-Eastern leopards", NGOs.

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a training system for newly employed state inspectors, as well as retraining for existing inspectors.			
4.14. Ensure collection of operational information about the illegal trade in rare and endangered species of animals, parts of their bodies and derivatives, including Far-Eastern leopard, including involvement of local people in this work. Block the channels of illegal transfer out of the Russian Federation.	1. Operational information. 2. Reporting documents.	2014 – 2022	Ministry of Internal Affairs of Russia, Federal Service for Supervision of Natural Resources, Federal Customs Service of Russia, Federal Security Service, local governments, NGOs.
4.15. Prepare reviews of the enforcement of Russian Federation's legislation for the state inspectors to increase their professional level and effectiveness of work considering judiciary practice.	Prepared reviews.	2014 and 2018	Ministry of Natural Resources and Environment of Russia, Federal Service for Supervision of Natural Resources, Primorsky Krai Administration, NGOs, RAS.
4.16. Restrict possibilities to create enclosure-type game husbandries within the range of Far-Eastern leopard.	Absence of enclosure-type game husbandries within the range of Far-Eastern leopard.	2014 – 2022	Ministry of Natural Resources and Environment of Russia, Federal Service for Supervision of Natural Resources, Primorsky Krai Administration.
5. Scientific research			
5.1. Create a unified database about the condition of the Far-Eastern leopard population in Russia, with the inclusion of all information about the current distribution, population numbers, biology and ecology, as well as data on the state of habitats, including the state of the populations of main prey species.	1. Structure of the database. 2. Interface of the database. 3. Created database. 4. Operational use of the database by state authorities.	2014	RAS, "Land of the Leopard" national park authority, Primorsky Krai Administration, NGOs.

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<p>5.2. Develop and implement a Programme of scientific research on the Far-Eastern leopard in the following research areas:</p> <ul style="list-style-type: none"> • Study of the range dynamics and numbers, research of the role of natural and anthropogenic factors; • Identification of the key habitat areas for breeding; • Clarification of the population structure with the use of molecular and genetic and other up-to-date methods; • Study of gender, age and demographic indicators of the population, as well as spatial structure of the populations, character of the use of space; • Study of the interactions with other species of mammal predators; • Study of the feeding range, dissemination and population dynamics of its main forage objects in different parts of the range; • Study of the reproductive biology; • Zoological and veterinary survey, monitoring of possible diseases (distemper, toxoplasmosis, pyroplasmosis, etc.). 	<p>1. Programme of scientific research.</p> <p>2. Reports on the results of implementation of programme areas.</p>	<p>2014 – 2022</p>	<p>RAS, “Land of the Leopard” national park authority, Primorsky Krai Administration, NGOs.</p>
<p>5.3. Continue scientific and applied research aimed at the development and implementation of measures to minimize conflicts between Far-Eastern leopard and humans.</p>	<p>Reports on the results of scientific research.</p>	<p>2014 – 2022</p>	<p>RAS, NGOs.</p>

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5.4. "Issuance of passports" to Far-Eastern leopards and study of their spatial distribution with the use of maximum possible network of automatic cameras.	Individual "passports" for the majority of leopards and data on long-term tracking.	2014 – 2022	"Land of the Leopard" national park authority, Primorsky Krai Administration, RAS, ANO "Far-Eastern leopards", NGOs.
6. Monitoring of the Far-Eastern leopard population			
6.1. Create a unified centre for keeping and processing Far-Eastern leopard population data (refer to p. 5.1.).	Centre of data keeping on the base of the "Land of the Leopard" national park authority and Primorsky Krai Administration with access for all stakeholders.	2014	Primorsky Krai Administration, "Land of the Leopard" national park authority, Far-Eastern branch of RAS, NGOs.
6.2. Ensure a unified survey of tracks in the snow within the whole range of Far-Eastern leopard each five years or more frequently based on need. Improve the methodology given the current realities and results of "passport issuance" (refer to p. 5.4.).	Results of the survey.	2018 and 2022	Primorsky Krai Administration, "Land of the Leopard" national park authority, Rosprirodnadzor, RAS, NGOs.
6.3. Ensure annual monitoring on the permanent model areas encompassing at least 35% of the current range of Far-Eastern leopard, with the use of automatic cameras.	Results of the monitoring.	2014 – 2022	Primorsky Krai Administration, "Land of the Leopard" national park authority, Rosprirodnadzor, RAS, NGOs.
6.4. Ensure census of ungulates on the permanent sample plots representing the whole range at least once every three years: method of double counting of perimeter after driving ungulates out, or modified method of counting on sample plots, or with the use of aviation.	Census reports.	2014 and 2017; 2020 and 2022	Primorsky Krai Administration, "Land of the Leopard" national park authority, Rosprirodnadzor, RAS, ANO "Far-Eastern leopards", NGOs.

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7. Preventing and resolving conflicts			
7.1. Maintain stable populations of Far-Eastern leopard prey species at the level ensuring sustainable existence of a viable population.	Results of prey species census (refer to p. 6.4.).	2014 – 2022	MNRE, Rosprirodnadzor, "Land of the Leopard" national park authority, Primorsky Krai Administration, ANO "Far-Eastern leopards", NGOs.
7.2. Develop and introduce into practice a system of compensations to cattle owners (including deer farms) affected by Far-Eastern leopards, in cases when the loss of the animals was not caused by violations of the rules of their keeping.	1. Continuation of the existing NGO programme on the compensation of losses caused by Far-Eastern leopards. 2. Introduction of insurance of farm animals from predators and the state compensation programme.	2014 – 2022	MNRE, Rosprirodnadzor, "Land of the Leopard" national park authority, Primorsky Krai Administration, NGOs.
7.3. Develop rules and procedures for deer farm management, development of technical requirements on the technical characteristics of farm fences, control mechanisms for the activities of deer farm administrations (or refer to p. 3.1.).	Rules and procedures for deer farm keeping. In case the mechanisms of control and surveillance cannot be implemented, closure of deer farms within the leopard range and further rezoning of their areas for Far-Eastern leopard conservation purposes.	2014 – 2018	MNRE, Rosprirodnadzor, "Land of the Leopard" national park authority, Primorsky Krai Administration, ANO "Far-Eastern leopards", NGOs.
7.4. Ensure the dissemination of the recommendations on human behaviour in Far-Eastern leopard habitats in the case of encounters with them, as well as on the keeping of domestic animals to prevent conflict situations.	1. Publicly available and clearly visible recommendations. 2. Information spread through the TV and other media. 3. Informational materials.	2014 – 2016	MNRE, Rosprirodnadzor, "Land of the Leopard" national park authority, Primorsky Krai Administration, NGOs.
7.5. Provide the necessary technical equipment to the special group of the Department of Hunting Supervision of Primorsky Krai to frighten off, catch and immobilize large predators, train and improve qualification of their staff.	Staff of the special group are trained and equipped with technical equipment.	2014 – 2015	MNRE, NGOs, Primorsky Krai Administration.

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7.6. Ensure veterinary survey of captured conflict leopards and autopsy dissection of dead animals with the use of single protocol, unified methodology of the collection of biological samples from the captured and deceased animals and analysis for the identification of diseases.	1. Acts on the autopsy of dead animals. 2. Unified methodology for the collection of biological samples from the captured and deceased animals. 3. Analysis of the identified diseases.	2014 – 2022	Rosprirodnadzor, Ministry of Agriculture of Russia, Primorskaya Academy of Agriculture, Primorsky Krai Administration, NGOs.
8. Outreach and educational activities			
8.1. Continuation of the programme “Save each of survivors”, initiated by a NGO coalition and aimed to inform people about the story of particular leopard individuals observed under the annual monitoring, including with the use of automatic cameras (refer to p. 5.4.).	Increase in civil responsibility for the future of each leopard.	2014 – 2022	MNRE, “Land of the Leopard” national park authority, Primorsky Krai Administration, NGOs.
8.2. Ensure implementation of the following measures: • Organization of large-scale support for leopard conservation in the Media (radio, TV, newspapers, Internet); • Raising consciousness of hunters, broad coverage of the results of anti-poaching efforts at all stages, including court decisions; • Release of attractive targeted publications that increase sympathy for the leopard; • Informing local people about the status of Far-Eastern leopard and legal liability for its poaching, sale or keeping.	Information presented	2013 – 2022	MNRE, “Land of the Leopard” national park authority, Primorsky Krai Administration, ANO “Far-Eastern leopards”, NGOs.

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8.3. Develop ecological paths for the national park "Land of the Leopard" (including its buffer zone) and regional protected areas to contribute to environmental education in Far-Eastern leopard habitats.	Information placed on the ecological paths (on stands, in accompanying booklets, etc.).	2014 – 2022	MNRE, "Land of the Leopard" national park authority, Primorsky Krai Administration, local governments, ANO "Far-Eastern leopards", NGOs, RAS.
8.4. Ensure arrangement of thematic workshops, special courses, roundtables, scientific and practical conferences.	Summary documents of the thematic workshops, special courses, round tables, scientific and practical conferences.	2014 – 2022	Department of Education of Primorsky Krai, RAS, Far-Eastern Federal University, Primorskaya Academy of Agriculture, Primorsky Institute of Retraining and Professional Development of Educators, local governments, NGOs.
8.5. Arrange publication of student newspapers, bulletins on the Far-Eastern leopard conservation issues.	Student newspapers, bulletins	2014 – 2022	Department of Education and Science of Primorsky Krai, Far-Eastern Federal University, Primorskaya Academy of Agriculture, NGOs, RAS.
8.6. Organize the work of student conservation groups and volunteer movement.	Working reports	2014 – 2022	Department of Education and Science of Primorsky Krai, Far-Eastern Federal University, Primorskaya Academy of Agriculture, local governments, ANO "Far-Eastern leopards", NGOs.

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8.7. Arrangement of the traditional annual festival “Land of the Leopard”.	Annual festival	2014 – 2022	“Land of the Leopard” national park authority, Primorsky Krai Administration, local governments, ANO “Far-Eastern leopards”, NGOs.
8.8. Develop and introduce into pre-school and school programmes special lessons to make the children familiar with unique nature of their homeland, rare species of animals, including leopard, and methods of their protection.	Programmes of pre-school and school education	2014 – 2022	Department of Education and Science of Primorsky Krai, Far-Eastern Federal University, Primorskaya Academy of Agriculture, local governments, NGOs.
8.9. Provide outreach to the employees of Russian Border Guard Service, involve them in particular conservation measures, including joint anti-poaching patrols.	Working reports, joint working plans and their implementation.	2014 – 2022	Federal Security Service of Russia, “Land of the Leopard” national park authority, Primorsky Krai Administration, NGOs.
9. Reintroduction of Far-Eastern leopard in the South-Eastern Sikhote-Alin			
9.1. Creation and maintenance of a second (“reserve”) population of Far-Eastern leopard in the South-Eastern Sikhote-Alin (Partizansky, Lazovsky and Olginsky regions of Primorsky Krai).	1. Adoption of the Programme of Far-Eastern leopard reintroduction in the South-Eastern Sikhote-Alin; 2. Creation of a self-sufficient population in the South-Eastern Sikhote-Alin, amounting to 50 individuals, including at least 15 adult females.	2014 – 2022	MNRE, Rosprirodnadzor, Moscow Zoo, Primorsky Krai Administration, IUCN Species Survival Commission, RAS, ANO “Far-Eastern leopards”, NGOs.
9.2. Implementation of the first stage of the Programme of Far-Eastern leopard reintroduction in the South-Eastern Sikhote-Alin.	1. Adoption of the Programme of Far-Eastern leopard reintroduction by the MNRE; 2. Conduction of an outreach and educational programme: public opinion research and informing local people about the programme; 3. Building of the Breeding and Reintroduction Centre, including at least two breeding enclosures in Lazovsky region of Primorsky Krai;	2014 – 2016	MNRE, Rosprirodnadzor, Moscow Zoo, Primorsky Krai Administration, IUCN Species Survival Commission, RAS, ANO “Far-Eastern leopards”, NGOs.

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	<p>4. Selection of at least two breeding couples of the leopard or 4 young individuals of the leopard 3–6 months old from the European Endangered Species Programme (EEP) and Species Survival Plan (SSP);</p> <p>5. Transportation of the breeding couples of the leopard or young individuals 3 – 6 months old to the Breeding and Reintroduction Centre.</p>		
9.3. Implementation of the second stage of the Programme of Far-Eastern leopard reintroduction in the South-Eastern Sikhote-Alin.	<p>1. Undertaking educational measures;</p> <p>2. Enhancing protection measures over the main areas of the leopard dissemination;</p> <p>3. Obtaining offspring from at least two breeding couples of the leopard or start of the preparation of young individuals 3 – 6 months old;</p> <p>4. Raising and preparing young individuals for release;</p> <p>5. First release of young leopards;</p> <p>6. Building adaptation enclosures.</p>	2016 – 2018	MNRE, Rosprirodnadzor, Moscow Zoo, Primorsky Krai Administration, IUCN Species Survival Commission, RAS, ANO “Far-Eastern leopards”, NGOs.
9.4. Implementation of the third stage of the Programme of Far-Eastern leopard reintroduction in the South-Eastern Sikhote-Alin.	<p>1. Monitoring the released leopards;</p> <p>2. Continuing implementation of the educational programme and habitat protection measures;</p> <p>3. Obtaining offspring from 4 – 6 new breeding couples of the leopard or bringing 4 – 6 young individuals of the leopard 3 – 6 months old;</p> <p>4. Raising and preparing young individuals for the release;</p> <p>5. Release of young leopards into the adaptation enclosures.</p>	2016 – 2018	MNRE, Rosprirodnadzor, Moscow Zoo, Primorsky Krai Administration, IUCN Species Survival Commission, RAS, ANO “Far-Eastern leopards”, NGOs.

