



# WILDLIFE VETS INTERNATIONAL

## Amur Leopard Project Update Autumn 2009 season

### Introduction

The Amur leopard is the world's most endangered large cat, with as few as 25 - 35 individuals now surviving in southwest Primorski Krai in the Russian Far East (RFE). This population is in grave danger of extinction due to numerous factors including ongoing development in the region, logging activity, hunters and poachers in the forests, forest fires, inbreeding depression due to low genetic diversity within the remaining leopard population, and the potential for disease transmission from domestic animals.



(Picture copyright Wildlife Heritage Foundation)

A coalition of foreign non-governmental agencies (NGO's) and regional agencies of the Russian Federation are working together to secure a future for this leopard, and WVI is responsible for providing most of the veterinary expertise in the process through the activities of its veterinary director Dr John Lewis. The future of the Amur leopard rests on vigorous *in situ* conservation activities to protect the existing small population plus an imaginative reintroduction scheme to establish a second population in former leopard habitat in the southern Sikhote-Alin mountain region of Primorski Krai. WVI is committed to providing veterinary support to all aspects of the project, and as a reintroduction process may take up to 15 years or more to achieve measurable results, our commitment is long term. A summary of our veterinary objectives with

respect to this project is given in the box below.

#### **WVI objectives re Amur Leopards**

1. To evaluate the health status of the existing Amur leopard population and identify any disease issues that may threaten their survival.
2. To identify any significant diseases in wildlife, agricultural or domestic species in the proposed release zone that may pose a threat to reintroduced leopards.
3. To avoid the introduction of any novel disease into wildlife, agricultural or domestic species of Primorsky Krai during attempts to reintroduce leopards into the area from captive stock..
4. To provide ongoing monitoring of the health of the existing leopard population in Southwest Primorsky Krai and that of any reintroduced leopards in the Southern Sikhote-Alin Mountains throughout the life of the project.
5. To develop and maintain a flexible disease risk management strategy for wild Amur leopards

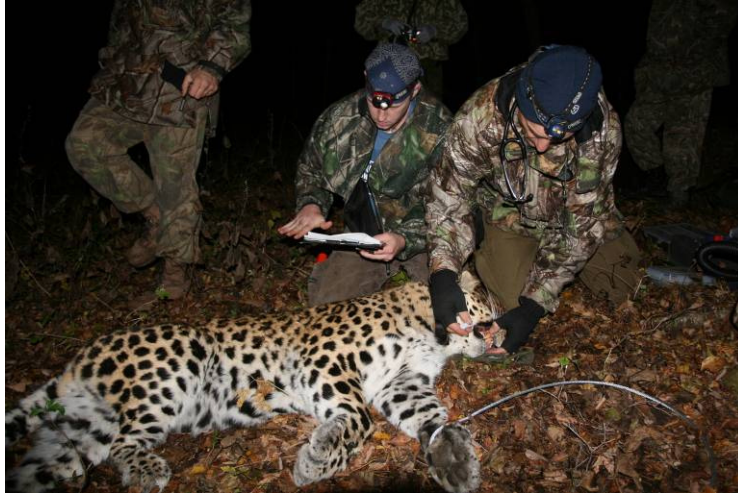
More detailed information of WVI's involvement with the Amur leopard to date can be found in our previous reports which can be obtained from WVI on request. For the sake of brevity these details will not be repeated here.

This report is an account of progress to date, our activities with captive Amur leopards in Europe throughout 2009 and the 2 month *in situ* field activities in the Russian Far East during autumn 2009.

#### **Health status of the existing Amur leopard population**

In order to focus testing effort on the infectious agents most likely to present significant problems to the wild leopard population, a theoretical disease risk assessment (DRA) was carried out by John Lewis in 2008. Refinement of this assessment is ongoing in the light of further disease screening data from wild leopards, other large carnivores and prey species in the area. In all disease screening efforts it is our policy to focus the most effort on the high risk infectious disease agents and other potentially significant non-infectious diseases (such as abnormalities attributable to inbreeding or environmental pollution for example). Finances available for veterinary investigations will inevitably be limited and it is essential that we use what money is available to greatest effect. However, it is also be our policy to take sufficient samples to allow future investigation of lower risk diseases or newly emerging diseases as and when further resources become available.

Since October 2006 a joint team from the Russian Academy of Science's Institute of Biology and Soil Sciences (IBSS), WCS-Russia and WVI has been involved in trapping wild leopards and tiger in Southwest Primorsky Krai for the purposes of radiocollaring and medical evaluation. Four (2.2) wild leopards have been caught on 7 occasions between October 2006 and November 2008. No significant problems arose as a result of the trapping or subsequent anesthesia.



Examining a wild male Amur leopard – copyright of J. Goodrich

The leopards caught so far were in good general condition, showed no evidence of suffering from or being exposed to major feline respiratory pathogens, but were found to have been exposed to toxoplasmosis, parvoviruses and feline coronaviruses. No cases of Feline Immunodeficiency Virus (FIV) or Feline Leukaemia Virus (FeLV) were detected. Parasite loads in these cats were judged insignificant. Heart murmurs were heard in all four leopards, but the significance of this finding is still under investigation\*. No evidence of serious congenital or genetic defects has yet been found.

\*Although heart murmurs in anaesthetized animals can be the result of major cardiac abnormalities, others are caused by artifacts resulting directly from the anaesthetic and as such are not of concern. In depth investigation of cardiac murmurs in the field is very difficult, but the current judgment is that these murmurs do not herald anything sinister. More detailed investigations are proceeding in captive animals in which murmurs are also heard (see below).

A degree of inbreeding in the free living Amur leopard population is likely given the size of the population, although the precise impact on population health has yet to be determined. Good progress has been made through 2009 in investigating the possible impact of such inbreeding on the immune system (in co-operation with Dr Lorna Kennedy of the Center for Integrated Genomic Medical Research (CIGMR), Manchester, UK. Dr Kennedy is investigating samples from both captive and wild animals to compare the diversity of genes thought to be responsible for basic immune functions. It is planned that a comparison will also be made with an outbred population of wild leopards from South Africa.

### **Field season in the Russian Far East, 17-Sep-09 to 18-Nov-09 inclusive.**

This year's field season in the Russian Far East was full of frustrations. No wild leopards were caught despite several being close to the camp. One Asiatic Black bear was trapped and serological investigation suggested that Lyme Disease is present in the area. *(Although such evidence has not arisen directly from leopards, it helps with the review of diseases in the area to which leopards MAY be susceptible)*

One tiger was caught\*, but due to a small flaw in the manufacture of the snare the cat was able to break out and attack one of the senior biologists shortly after capture. Fortunately his injuries were not life threatening and he has made a good recovery.

\*Although the focus during field seasons' is on catching leopard, it is also essential tigers are caught, assessed and radio-collared if we are to discover how tigers and leopards coexist, how they use the same habitat etc. Tigers are present in the proposed leopard reintroduction area and such information will inform the risk assessment for any leopards released there.

One large deer was also caught. Although snares are designed to avoid deer capture particularly large ones can become snared.

Towards the end of the season we experienced some very bad weather with snow storms at minus 24°C. To avoid injury to leopards, trapping is not advisable in these conditions and the team lost a couple of weeks catching time as a result.



Conditions in camp in November 2009

Despite these problems, John Lewis was able to pursue various other aspects of the veterinary programme. Working with the young Russian field vet Dr Misha Gonchuruk, it was possible to start exploring the Russian literature on infectious diseases in the area (these references are not available outside of Russia), detail all the Russian vet schools with their specialities\*, and provide practical training in the field anaesthesia of bear and deer. Furthermore it was possible to investigate regional veterinary associations as these could be crucial in the future in bringing together interested vets with relevant experience. However, to date no such organisations exist in the Russian Far East. As an alternative Drs Gonchuruk and Lewis explored ways in which a network of interested vets can be established – especially those working on deer farms and with domestic dogs and cats in the RFE.

\*In the long term it is essential that all disease screening for the Amur leopard project is carried out within Russia. Identifying the specialities of the twelve Russian veterinary schools is an important step in understanding the in-country capacity.

As Dr Gonchuruk was present in the camp for the whole of the trapping season considerable time was available to analyse the two necropsy (post mortem examination) reports of wild Amur leopards which had been submitted to the local vet school in Ussurisk. Critical appraisal of such information is essential if value is to be derived from the limited investigations currently possible.

Although no leopards were actually caught, fresh faecal samples from leopard and tiger collected during the field season were suitable for viral analysis to search for pathogenic feline gut viruses. None were found. Other useful samples were submitted by Dr Gonchuruk from his studies of prey species in the proposed reintroduction site of Lasovsky. The latter comprised ticks taken from prey species and skin scraping samples from Raccoon dogs suffering from hair loss. The skin scraping samples turned out to be particularly important. Laboratory tests carried out in the UK following the trapping season confirmed a diagnosis of Sarcoptic mange in the Raccoon dog. This parasitic disease had been suspected in the Raccoon dogs before, but this is the first time a firm diagnosis was possible. Leopards can suffer from Sarcoptic mange and they prey on Raccoon dogs, therefore mange could be transferred from dogs to leopards. Measures must be taken to prevent this becoming a problem for reintroduced animals.

With a small specialised team of personnel working on the project, it is inevitable that everybody has to chip in with all routine tasks such as cooking, chopping wood, cleaning, snare signal monitoring, collecting water, maintenance of equipment etc etc. Nobody is exempt – not even the vet - so the days are never empty!

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Towards the end of the field season Dr Lewis was able to participate in a workshop at the Primorskaya State Academy of Agriculture (PSAA) in Ussurisk designed to teach vets and vet students about wildlife medicine. These workshops are very popular with the younger generation of vets in the RFE – which augers well for the future!

Ideally during field seasons more leopards are caught for radiocollaring & medical assessment, thereby increasing our data on the behaviour of these cats and the medical problems they face. The 2009 season was the first in which this aim wasn't achieved, although a lot of relevant work was possible. Frustrating though that must sound to the reader, WVI takes a long term view of the project. If we are trying to study the world's rarest big cat in relatively inhospitable conditions, we must expect to have failures sometimes but this does not affect our resolve to provide veterinary services to the project in the long term. No new information was gathered this year from the direct examination of wild leopards, but a lot of indirect data was obtained (see above) which is still extremely valuable in our assessments of what diseases the leopards face.

### **Publications on the Amur leopard project during 2009**

During 2009, a manual for the field capture and handling of large species in the Russian Far East was prepared by Dr Lewis and Dr Goodrich of WCS-Russia. ("Principles and Practice of Field Anaesthesia" – Lewis & Goodrich 2009). Translated into Russian for field staff working on leopard and tiger projects, this document summarises the combined expertise and experience of Drs Lewis and Goodrich and should be a useful reference for field biologists. Dr Goodrich is one of the world's leading tiger biologists and has worked in the RFE for 15 years.

Dr Lewis also wrote and submitted a summary of the veterinary programme & findings for the Amur leopard project for inclusion in the latest version of the reintroduction protocol to be submitted to the Russian Government.

### **Activities relating to the European captive Amur leopard breeding programme:**

Throughout the year, on behalf of WVI, John Lewis acts as veterinary consultant to the leopard project in the RFE run by WCS-Russia and The Institute of Biology and Soil (part of the Russian Academy of Sciences) and to the Zoological Society of London's Amur Leopard Wildlife Health Programme (ALWHP) which seeks to identify potentially dangerous infectious diseases in prey species at the proposed leopard reintroduction site around the Lazovzky Nature Reserve. In addition Dr Lewis acts as veterinary advisor to the European Amur leopard captive breeding programme (or EEP) which operates in a range of zoos across Europe from the UK to the Russian Federation. Part of this EEP advisory role is to encourage rigorous health screening of captive leopards according to a standardised protocol, and to collate and analyse the data once gathered.

### **Disease screening in captive Amur leopards across Europe**

Considerable progress has been made in the past few years in health screening the captive Amur leopard population throughout European zoos – a process that continued throughout 2009. This is of course necessary to maintain a healthy captive population within the European breeding program (EEP), but the level of health screening for animals that are candidates for involvement in the reintroduction program (by virtue of their genetic suitability) must be of an even higher standard. Not only is this a matter of good reintroduction practice, but it is especially important for this particular project as the introduction of any feline disease into the region could jeopardize the future of both the wild Amur tiger and the existing Amur leopard populations. As a result a screening protocol has been drafted by the veterinary advisor to the EEP (Dr John Lewis) and distributed to member collections. It is intended that no candidate leopard will be transferred to the Russian Far East until all tests within the protocol have been applied with a satisfactory result. The North American Amur Leopard breeding program is an earlier stage of its development, but Dr Doug Armstrong of the Henry Doorly Zoo, Omaha, has agreed to act as its unofficial veterinary advisor. The



EEP screening protocol will be discussed between Drs Armstrong and Lewis to ensure a uniform approach both sides of the Atlantic.

In general terms screening efforts are directed at establishing freedom from high risk infectious agents, physical abnormalities, known genetic abnormalities and specific problems that have arisen in the captive leopard population. Furthermore attempts are made to establish the degree of resistance to specified feline infectious diseases. To date, 36 cats within the EEP have been comprehensively or partially screened.

The process of screening leopards in Russian zoos has offered unique educational opportunities for veterinary students from the Russian Far East. For example, when 3 leopards at the Novosibirsk Zoo and 3 at the Moscow Zoo were assessed in June 2007 by an international team headed by Dr Lewis, veterinary students from Ussurisk were involved throughout.



Nasal swab for bacterial pathogen screening – Wildlife Heritage Foundation, UK

### **Amur leopard Veterinary Database**

Funded by Wildlife Vets International (WVI), progress towards developing a comprehensive database of veterinary information on captive and wild Far Eastern leopards has been considerable in 2009. Data fields of basic animal data, clinical matters, disease screening, routine clinical pathology, reproductive data and investigations, cardiac investigations, vaccinations, haematology and serum biochemistry profiles, necropsy findings and biosamples available for further study have been included so far. All original test results, necropsy reports, relevant pictures, cardiac ECG and sound recordings, etc are embedded in the database as pdf's. Information entered is moderated by Dr John Lewis to ensure consistency of quality and definition.

To date, data from approximately 300 cats (including 5 wild leopards) has been entered. Once data from all EEP leopards has been included and remaining software issues resolved\*, the database will be available for research purposes. For a wide range of students this process should be relatively simple given that the Microsoft Access program has been used thereby facilitating novel query design.

**\*Expert help with Microsoft Access programming is urgently needed! Please contact WVI office if you can help.**

### **Heart murmurs in captive leopards**

Heart murmurs have not only been detected in wild Amur leopards but also in a significant number of captive EEP Amur leopards examined by Dr Lewis - and in captive leopards of other leopard subspecies. Understanding the cause of murmurs in wild leopards may be facilitated by in depth clinical investigations in their captive counterparts – investigations which are impractical in free living wild animals. To date, detailed electrocardiographic and echocardiographic investigations have been conducted in 10 affected captive leopards in the UK by Professor Malcolm Cobb of Nottingham University and Dr Sarah Smith. Murmurs in these animals were found to be a result of relatively minor regurgitation of blood through the

right and/or left atrio-ventricular valves, or dynamic outflow tract obstructions – the latter being a direct consequence of an anaesthetized animal's position. No suggestion of significant cardiac pathology resulting from congenital or genetic defects is currently made. Similar findings have now been reported from Copenhagen, Omaha and Minnesota zoos who have investigated cats in a similar manner. These studies are continuing – both in anaesthetized leopards and more recently in trained, conscious leopards in an attempt to understand the impact of anaesthesia. Results from these studies will be published in the near future.



Echocardiography – Prof. Malcolm Cobb & Dr Sarah Smith

### **Biosample bank**

A centralised bank of biosamples taken from captive Amur leopards throughout the EEP has been established in the UK to facilitate future research. Samples stored in liquid nitrogen include serum, plasma, EDTA blood, urine, and anal gland material. Tissue samples from necropsied leopards are held in formal saline, and hair samples sealed in containers at room temperature.

### **Miscellaneous studies in captive leopards**

Not only are leopards within the EEP and North American breeding programs a potential source of animals for reintroduction purposes, but they also represent a valuable research population through which it may be possible to answer questions germane to the reintroduction process. As an example of this potential a project is already underway in the UK to conduct a simple investigation into how captive Amur leopards react to the inevitable stress of moving between facilities. Measuring faecal cortisol metabolite output in leopards before, during and after a move between collections within the EEP should allow us to determine the length and severity of any clinically significant stress experienced. This will provide valuable information for the management of animals in any captive facility established in the reintroduction area.

*(Project undertaken by Ms. Louise Bell, supervised by Dr John Lewis)*

### **Summary**

Excellent progress has been made during 2009 even without trapping more leopards. Being able to work with and train Dr Gonchuruk over the whole of the season was particularly productive, not only on the

practical side but also in exploring new avenues of information relevant to the ongoing disease risk assessment for leopards. Disease screening of captive EEP leopards continued apace and progress with the veterinary information database and biosample bank is significant. Detailed investigations into the heart murmurs in captive leopards have been most informative and reassuring.

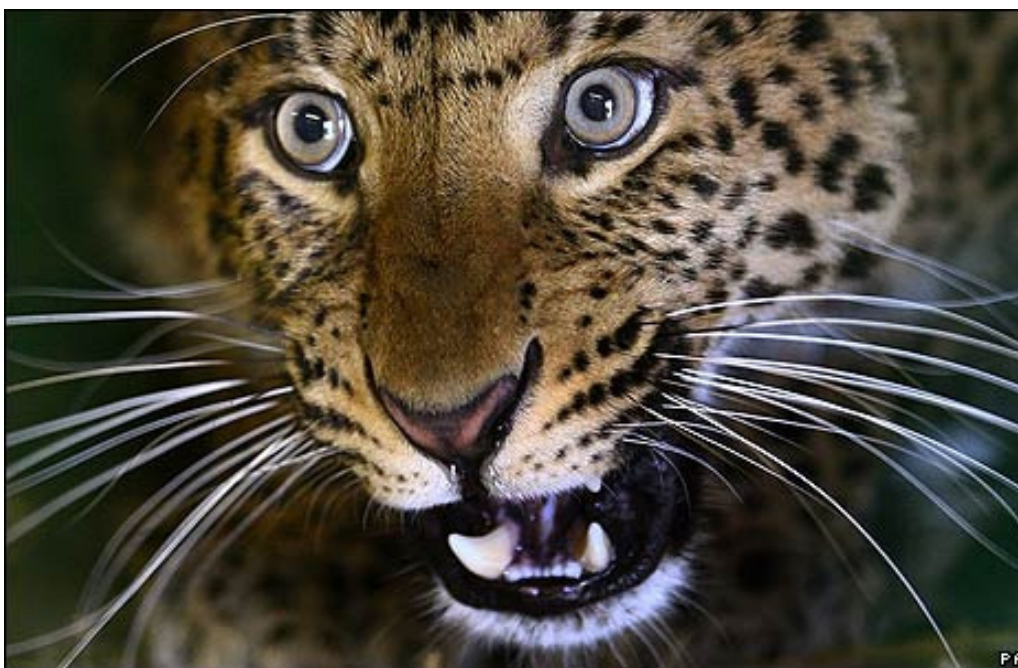
It is crucial that WVI is committed to this important programme for the long term. Not only is this necessary to ensure the health of the existing and any reintroduced leopard populations, but it is also hoped that the training of keen young Russian field vets like Misha Gonchuruk will provide the Russian Far East with its own veterinary capacity in the future. Lessons learned from the Amur leopard project will undoubtedly be useful in the veterinary support for other endangered cats such as the Arabian and Javanese leopards, which may require our help in the near future.

Dr John Lewis  
Veterinary Director,  
Wildlife Vets International

### **Previous reports on WVI activities with Amur Leopards**

These reports are all available on request from WVI:

1. Report on Wildlife Vets International activities in the Amur Leopard Project, Russian Far East, October 2006
2. Wildlife Vets International Amur Leopard Project update - Spring 2007
3. Wildlife Vets International Amur Leopard Project update - Autumn 2007
4. Wildlife Vets International Amur Leopard Project update - Autumn 2008





**We would like to thank our sponsors for their generous and continued support of the Amur Leopard Project:**

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