Wildlife health in the Russian Far East

Current situation and possible future developments

Dr. Stéphane Ostrowski

Wildlife Conservation Society

February 2010

Summary

In the context of a generalized decrease of tiger populations and of an increase in humans and domestic animals encroaching their fast-fragmenting habitats, health problems are likely to threaten free-living tiger populations in the short term. It is therefore essential to understand, as soon as possible, which diseases could affect tigers and their main prey in order to develop appropriate prevention strategies. Amongst all tiger projects supported by WCS across Asia, the conservation initiative undertaken in the Russian Far East is the only one that includes regular captures of free-living tigers; and it is therefore the best candidate for the development of a health assessment component. Additionally, the Far Eastern leopard is perhaps that most endangered large felid in the world, and the existent population, as well as plans for a reintroduction, both require veterinary expertise. We have identified a number of possible activities that would help address health issues of tigers and leopards in their northeasternmost strongholds. They include an increased in-house and out-of-country capacity building of Russian staff, financial and technical support to the embryonic veterinary diagnostic laboratory in Ussuryisk, and fund–raising combined with mentorship to carry out health investigations on tigers and their prey and support the work of local field veterinarians. We propose at the end of the document a three-year work plan and a strategic causal chain.

Introduction

Following a joint request from WCS Global Health and Global Conservation Programs in New York, I participated between 17 and 23 November 2009 in a training course on wildlife health in Ussuriysk, Primorski Krai, Russia. The course taught four main topics: wildlife

immobilization, pathology, conservation medicine, and epidemiology. It consisted of four days of didactic lectures at the Primorskaya State Academy of Agriculture (PSAA) followed by three days of practice in wildlife immobilization, necropsy and clinical pathology in the private zoological collection of Dubovy Klyuch, located near Ussuriysk, and again at the PSAA. Lectures were provided by two Russian academics, Drs. Sergei V. Naidenko and Galina V. Ivanchuk, and five foreign lecturers; Drs. J Lewis (Wildlife Vets International), D Armstrong (Henry Doorly Zoo, USA), C Schoene (Friedrich Loeffler-Institut (FLI), Germany), D McAloose (WCS, USA) and myself. Didactic interventions were attended by 40–50 persons including veterinary and biology students, as well as academics. Following this first round of lectures a subset of 7 students and c. 15 academics and other people involved in tiger conservation were selected to follow a more practical course. Aside from this training course, I discussed with lecturers as well as Drs. D Miquelle (WCS country director) and M Goncharuk (ZSL) the extent to which a 'health component' could be developed to support the conservation of the Siberian tiger in the Russian Far East (RFE). The present document reports on this topic and synthesizes the outcomes of our discussions on possible further development of the health component.

The wildlife health training course

Background — The wildlife health training course hosted by the PSAA was funded in 2009 by a grant from the Trust for Mutual Understanding (TMU) foundation and organized by the Wildlife Conservation Society (WCS). Historically this useful and successful activity was developed to address tiger-human conflicts requiring occasional capture and chemical immobilization of free-ranging tigers but over the years has evolved to a broader initiative that intends to raise the capacity of Russian professionals in health issues relevant to the conservation of wildlife in the far east of the country. Since its inception it has provided a significant amount of information to Russian veterinarians and biologists in Primorski Krai. Yet interviews I have carried out among WCS staff, non-WCS lecturers at the training course, Russian academics and attending students suggest that a remodeling of its content could make it even more beneficial to the Russian audience. One of the main stated criticisms regarding the current content of the course was that it was technically too complex and too theoretical. Students, academics and biologists would rather learn more about the clinical and practical aspects of disease diagnostic than about the theoretical background of wildlife diseases. They also expressed the desire that the course provide more information than

currently offered on health issues of wildlife species present in the RFE other than the Siberian tiger and Far Eastern leopard, particularly ungulates and birds. They would like to be able to diagnose wildlife diseases as much as possible from clinical symptoms, to know which samples are needed to confirm the etiology of the suspected disease, and what management measures they ought to propose to their state or federal authorities in the event of a significant outbreak occurring in their professional practice area. In addition they also expressed the desire that further training would concentrate on diseases presenting a significant threat at the population level.

Although these wishes may somehow look reductive from the perspective of a modern and integrative conservation medicine approach, one has to keep in mind that students and academics attending the current wildlife health course are selected according to a largely obscure process that does not seem to consider a genuine interest in wildlife health as a compulsory criterion. Instead, the prestige of attending a course largely taught by foreign experts, the opportunity of improving their general knowledge and proficiency in English seem to be the three main reasons driving the interest of the majority of attendees. This process is certainly not to be criticized in a country where wildlife health science is at its infancy and where economical mechanisms are yet to emerge to support a wildlife health surveillance system.

Recommendations — One solution that would allow teaching the largest possible audience and still providing a training of high specificity would be to develop a training course in two phases. Phase 1 would focus on veterinary and biology students as the priority but would also be open to academics and professional biologists with a desire for continuing education. It would be a two-day long didactic course on diseases specific to wildlife in the RFE, and would focus on clinical diagnostic, descriptive epidemiology, availability and suitability of treatments, as well as management issues. At the end of Phase 1, involved teachers would perform a selective evaluation of the students willing to attend the second phase of the training, presumably those interested in being regularly involved in wildlife health activities. Phase 2 of the training would be a 3-4 day long 'specialist training' course. It would involve the students selected at the end of Phase 1 (max. 4), and between 2 and 4 academics and post-graduate students likely to be immediately involved in wildlife issues in the province. For this phase participants will be separated based on their specific interests/current activities in three subgroups and offered practical training in clinical and anatomic pathology, wildlife immobilization, and data-processing/epidemiology.

Compared to the current training:

1. Phase 1 will no longer teach capture immobilization, conservation medicine, epidemiology or pathology, all technical knowledge that are of little use to the vast majority of the audience. Instead, it will provide a broader and more applicable teaching on wildlife diseases in the fauna of the RFE. Documents supporting this training will have to be translated into Russian and provided to the attendees at least one week prior to the course in order for them to familiarize themselves with its content.
2. Students willing to attend phase 2 will undergo a transparent and selective evaluation process through which participants for phase 2 will be chosen.
3. More time will be devoted to phase 2, with fewer attendees (10 max.) instructed by foreign experts in anatomical and clinical pathology, immobilization and epidemiology.

The content of the whole course will therefore be structured in a different way than that provided in 2009, but the current time frame of roughly one week and the number of involved foreign experts (4-5) will remain the same.

One may argue that delivering lectures to non-selected people, such as during the first part of the proposed training might not be very cost-effective and that only a 'specialized' training would be of value. But I believe that it is still useful to carry out a set of lectures to a wider audience because it offers a rare opportunity for Russian veterinarians and biologists to interact in a largely segregated educational system. In addition the continuing effort at infusing wildlife health knowledge via training courses (six during the last decade) to a largely unselected audience has contributed to create a network of 'informed multidisciplinary professionals' which constitutes de facto an embryo of wildlife health surveillance network.

Providing such a remodeled training course would certainly attract the largest possible audience, raise the interest of future veterinarians who do not intend to specialize in wildlife health, but also more efficiently build the capacity of the few who intend to dedicate some of their time to wildlife medicine. It will also be more accessible and comprehensive to biologists, and continue raising public awareness on the socio-economical importance of wildlife in Primorski Krai.

The veterinary diagnostic laboratory

Background — The old veterinary laboratory of the PSAA situated 10 km north of Ussuriysk on the original premises of the Veterinary Faculty and consisting of four rooms, was partially restored in 2008 under a Darwin initiative fund grant from the Zoological Society of London (ZSL). The smallest of the four rooms was fully restored in terms of plastering, fitting, and flooring including a biological hood that allows safe handling of a number of pathogens. After the termination of the Darwin grant, laboratory furniture and diagnostic equipment, including pieces of material as remarkable as a hematology cell counter and at least one modern light microscope equipped with a digital camera, have been added to the laboratory thanks to Prof. Irina P. Korotkova's personal initiative.

Currently the laboratory has very limited diagnostic capability, because of a lack of both equipment and human expertise. In particular it does not have any adequate equipment for long-term storage of frozen samples (i.e. a -80°C deep freezer) for diagnostic purposes and the necropsy room planned to occupy one of the two remaining rooms is still waiting final restoration. Dr Korotkova, who directs the laboratory seems very eager and enthusiastic to develop her skills in clinical pathology and would definitely deserve some support in this respect. At the same time, Dr Ivanchuk has also expressed a genuine interest at developing her skills in anatomic pathology. She is currently responsible for post-mortem investigations of Siberian tigers and in the absence of appropriate facilities at the veterinary diagnostic laboratory performs the necropsies in the laboratory of Anatomy located in the PSAA main building in Ussuryisk. Despite these drawbacks, the embryonic veterinary diagnostic laboratory retains the potential to become one of the very few laboratories in this part of the world with some level of wildlife disease expertise.

Recommendations — Efforts at developing the laboratory capacity should be articulated at two levels. The first would consist in raising funds to continue equipping the laboratory. Needs are vast and potential funding restricted, so it should be prioritized. In my opinion investment should concern in priority 1. a large capacity deep freezer (-80°C), 2. a safety generator for the deep-freezer, 3. at least two large-capacity liquid nitrogen containers, 4. a variety of sample storage containers (cryovials, cryo-boxes, micropipets), and 4. a powerful desktop computer for databasing purposes. The second level of development of the laboratory should concentrate at raising concomitantly the technical ability of Drs. Korotkova and Ivanchuk, and possibly two additional technical staff preferably recruited among the youngest generation of post-graduate students (or skilled laboratory technicians). Recently, Dr.

Claudia Schoene who was involved between 2006 and 2008 through the Darwin/ZSL initiative in raising wildlife health capacities in the RFE has negotiated the granting of a two-year (2010-2011) technical exchange program between her Institute in Germany and the PSAA. This is a very promising initiative that will hopefully help raise the capacity of lab personnel in the short term. The WCS Global Health Program could also provide additional training at the pathology laboratory, Bronx Zoo. Format and content of such training would have to be coordinated with what is intended to be delivered at the FLI, Germany and challenges of language will need to be addressed.

Local field veterinarians in the Russian Far East

Background — During the visit I have met two academics with some knowledge in wildlife health (Drs. Korotkova and Ivanchuk), whose willingness to learn and enthusiasm were unquestionable. Aside from the members of WCS capture teams who had good technical experience in large carnivore chemical immobilization, I have also met a young graduated veterinarian, Dr. Mikhail Goncharuk, who was very motivated to work with wildlife and had a very decent level of knowledge in wildlife medicine as well as good proficiency in English. Dr. Goncharuk has been rightfully identified by the foreign staff working under WCS and Darwin initiatives as one of the most promising young Russian veterinarians in the field of wildlife health in the Russian Far East. As such he was hired by ZSL and benefitted from the mentorship of foreign experts involved in big cat conservation projects. Undoubtedly Dr. Goncharuk has one of the highest levels of knowledge in wildlife medicine of all Russian people I have met during this trip. My understanding is that funding coverage for Dr. Goncharuk has unfortunately ended in January 2010.

Recommendations — It seems vital to the ultimate goal of expanding the wildlife health expertise in the RFE to continue raising the capacity of Dr. Goncharuk and possibly of another field veterinarian, and to secure appropriate funding for their work. Capacity building could be offered via visiting experts but also by fostering access to practical learning experiences abroad. For example training possibilities exist at WCS NY and at Henry Doorly Zoo, Conservation and Research Center. Funding for travel could perhaps be covered by a TMU grant. Of greater concern is securing long-term funding for activities of local wildlife veterinarians in Russia. As a matter of fact there are currently no economical mechanisms that would allow in-country perennial funding and it is likely that in the short term, funding

will still have to be sought from foreign donors until new opportunities arise, perhaps via the currently emerging wealthy community of sport hunters.

Health of Siberian tigers, Far Eastern leopards and their main prey in the Russian Far East

Background — Health problems have never been considered as main threats to tigers or leopards across their range. From a perspective of global conservation and in the current state of knowledge it is unquestionable that poaching, retribution killing and habitat degradation are on the short-term of higher risks to tiger survival than health problems. Yet in the context of decreasing tiger populations and increasing domestic animal encroachment and habitat fragmentation, it is likely that health problems will ramp-up quickly in the future. It is therefore essential to understand as soon as possible which pathogen agents are susceptible to affect populations of tigers and their main prey in order to develop appropriate prevention strategies. Among all the tiger conservation projects developed by WCS across Asia, the one in the Russian Far East includes regular tiger captures; and is therefore the most appropriate at developing an investigative health approach.

Since 2000 there have been four known cases of fatal canine distemper in free-living Siberian tigers. Although only one of these cases has been thoroughly documented, there is a valid concern that the disease could play a role in the population dynamics of Russian tigers, perhaps in combination with contributing factors (such as hemoparasites in lions of East African savanna ecosystems). Yet until now, relatively little is known about infectious agents occurring in free-ranging tigers in the Russian Far East. In particular it seems that little information has been collected during occasional necropsies of dead animals certainly because of the lack of capacity of investigators but also because of the weak technical support. This situation is particularly unfortunate considering the conservation status of the species, which would qualify almost every single fatality case for an in-depth pathology examination. Using data-driven assumptions Dr. Damien Joly and colleagues at WCS have developed a computer model that evaluated demographic fluctuations of Siberian tigers exposed to canine distemper under a variety of epidemiological conditions. Their analyses suggested that canine distemper is unlikely to impact significantly the demography of the tiger population in the Russian Far East in the most likely scenarios of canine distemper infection in the ecosystem. Yet, this important prediction would need to be revisited should novel information on the status of canine distemper (or closely related morbilliviruses) in carnivore populations be discovered. In particular the existence of other carnivore species, aside from the domestic dog, propagating

the virus across the tiger ecosystem could change significantly the level of risk the disease poses to the tiger population. The model developed by Dr. Joly and colleagues is extremely useful at demonstrating to Russian partners the importance of developing a chain of activities ranging from sampling to prospective modeling in order to better anticipate health conflicts between tigers and their regular or occasional preys. It also highlights why and to which extent field investigations on diseases could be immediately of interest to wildlife managers.

In contrast to the Siberian tiger, which numbers some 400-500, the lone remaining Far Eastern leopard population is estimated at around 30 individuals. In addition to the potential genetic challenges of such a small population, disease outbreaks could be disastrous. Despite this fact, until recently, virtually no attention has been paid to disease risks of this population. Now, an intensive study is underway to study basic life history requirements of leopards, and captures allow sampling for health and genetic investigations. Simultaneously, a plan for reintroduction of this subspecies to create a second population in southern Sikhote-Alin is underway. The disease risk management of the reintroduction, as well as the sampling and disease assessments for the existent population, are presently being led by Dr. J Lewis. Mikhail Goncharuk, mentioned above, is working with Linda Kerlye of ZSL on the disease risk assessment in the proposed reintroduction zone (Lazovski Zapovednik), and has assisted in capture efforts.

Almost nothing is known about the occurrence of diseases that may affect the tiger main prey species (essentially cervids and wild boars) at the population level. However local specialists, including Dr. Miquelle, have mentioned that significant population fluctuations occur periodically, particularly in wild boars. The causes of these demographic perturbations are unknown but may involve the expression of density-dependent disease agents. As such, investigating diseases of cervids and wild boars would be immediately relevant to tiger and leopard conservation and also to human health (eg. tuberculosis in cervids).

Recommendations — The main recommendation is to foster the development of disease investigations in tigers, leopards, and their prey base in the RFE. Unfortunately disease investigations in the RFE encounter a number of difficulties, including lack of expertise, dedicated funding, and in-country testing capabilities, but also difficulties to organize large-scale investigations and legally export samples. Expertise will have to be developed through appropriate capacity building efforts such as described in previous paragraphs. Large-scale sampling operations could involve local hunters and commercial farms of cervids and would benefit from developing easy sampling methods that do not require refrigeration (such as

filter paper blood sampling). Difficulties in exporting samples could be bypassed by accessing in-country testing labs, developing testing capabilities at the veterinary laboratory of PSAA or bringing the testing expertise and equipment into the country for targeted investigations. Funding for these investigations will certainly have to be initially covered by foreign granting, yet efforts should be targeted at getting international and local sport hunters to cover testing expenditures for their game species.

Conclusion

The Siberian tiger project in the Russian Far East deserves more investment at addressing health problems for a variety of reasons: 1. The tiger is threatened with disappearance across its range, 2. Canine distemper currently affects the Siberian tiger population, possibly at a threatening level, 3. Other health disorders may also affect tigers, leopards, and prey, 4. Thanks to the efforts of the WCS country director and collaborating partners (eg. ZSL) a group of dedicated Russian professionals exists and is in need of additional capacity building, 5. The tiger is a Global Priority Species for WCS.

Acknowledgements

I thank D Miquelle, D McAloose and C Schoene who reviewed this document and provided useful comments. The financial support of the Trust for Mutual Understanding foundation and enthusiastic collaboration of Russian professionals at the Primorskaya State Academy of Agriculture have been invaluable to achieve this work.

Appendix 1. Proposed work plan for the health component of the Wildlife Conservation Society's Big Cat Projects in the Russian Far East

	Year 1 (2010)	Year 2 (2011)	Year 3 (2012)
Training course	Remodel current course and propose a new version	Deliver course and work on a field guide of wildlife diseases	Deliver course and publish field guide in Russian
Veterinary diagnostic laboratory	Seek additional funds	Deliver sample storage equipment and technical expertise	Deliver sample storage equipment and technical expertise
Russian experts	Raise capacity during training course in clinical and anatomic pathology, chemical immobilization, and foster out-of-country training, seek additional funds	Raise capacity during training course in clinical and anatomic pathology, chemical immobilization, deliver out-of-country training.	Raise capacity during training course, provide out-of-country training in clinical and anatomic pathology, chemical immobilization, deliver out-of-country training
Tiger, leopard and prey-base health	Seek additional funds	Sample and test	Sample, test and start modeling

Appendix 2. Strategic plan for future development of a wildlife health component in the Russian Far East (RFE).