TECHNICAL PROGRESS REPORT

PART 1: GENERAL NARRATIVE REPORT

Project Title:	Snow leopard population status and its relation to livestock predation in Bhutan, and population connectivity across its global range
Reporting Period:	January 2008 – April 2009

1. Project successes

All potential snow leopard range within Bhutan has been covered under this project. This allowed us to delineate an updated range map of snow leopard in Bhutan. While this was not very different from what we expected, the eastern and western limits were unclear previously. With this new data, we can confirm that snow leopards in Bhutan are found in Torsa Strict Nature Reserve, JigmeDorji National Park (JDNP), the newly established Wangchuck Centennial Park and Bomdeling Wildlife Sanctuary while it is absent from alpine regions of JigmeSingyeWangchuck National Park, Thrumshingla National Park and Sakteng Wildlife Sanctuary. JDNP is the snow leopard stronghold for Bhutan and is crucial for its conservation. Evidence of Tibetan wolf was confirmed in Wangchuck Centennial Park, near Gang RinchenDzoe at 5300 m. We observed a clear west-to-east gradient in snow leopard and prey density. Starting from JDNP densities became lower as you moved eastwards. Co-incidentally livestock densities also follow this pattern. In the western most and eastern most range (Torsa and Bomdeling respectively) snow leopard, prey and livestock densities were comparatively lower than in JDNP.

[*At the moment, DNA extraction, PCR, and genotyping are being carried out. Only after these processes are completed can we use these data for abundance estimates and for distribution. Obviously all our gene-flow questions can also be answered only after completion of these processes.*]

Five teams of 5-6 field staff each (including local guides) were trained from JDNP in snow leopard survey techniques, particularly in the identification of snow leopard scat, signs and relic sites. During the course of 4 preliminary surveys and the main surveys, the participants were also exposed to prey survey and livestock predation data collection techniques. Numerous relic sites and snow leopard hotspots have been identified in the field. All this information and the skills imparted will be utilized in a continuing long-term monitoring program for snow leopard, tiger and prey, and elephant in various protected areas in Bhutan. Field personnel were also trained in collection of fecal samples for non-invasive genetic analysis. During the field surveys we collected a total of 287 fecal samples, putatively identified as snow leopard scat, which I am currently analyzing at the University of Montana Genetics Lab. After they are analyzed we hope to establish abundance estimates for JDNP and a measure of gene flow across populations within Bhutan, and across some of its global range, including China and Mongolia.

A major success of the research project is that enough interest and momentum was generated for establishing a snow leopard and tiger conservation program for Bhutan in collaboration with various Bhutanese and external partners. This coincides with the cabinet-approved mandate for the new UgyenWangchuck Institute for Conservation and Environment (UWICE) for research on

snow leopard, tiger and Asian elephant, among others. In June/July 2009, various stakeholders in Bhutan, including government agencies, NGOs and Institutes met together to lay out the details of a longer-term snow leopard and tiger conservation program. A preliminary meeting was held in partnership with the Bhutan Foundation and Panthera Foundation in New York in April, 2009. Government and NGO representatives from Bhutan also attended the meeting. The Bhutan meeting is a follow-up to this.

2. Progress on Activities and related financial issues

a) All field training, coordination and surveys have been completed for the snow leopard range in Bhutan. While the fecal samples have been collected, they are in the process of being analyzed at the genetics lab at the University of Montana. Information on predation and prey has also been collected, but data analysis has only just begun.

Since the fund transfer occurred in early 2008, activities picked up mostly after that. However, as this research is part of my PhD dissertation much of the data and sample analyses had to be carried out in collaboration with technicians at the laboratory - this caused some delay in this process. It is, however, expected to pick up rapidly after August 2009.

For the range-wide analysis, collaborations have been made with researchers at Texas A&M University (Dr. Jan Janecka), and an MOU will be signed shortly between the American Museum of Natural History (NY)/Panthera Foundation/Snow Leopard Trust, Texas A&M University and the University of Montana on sample sharing and technical collaboration in non-invasive genetic techniques. Additional samples are at the moment being collected from China and Mongolia.

b) There has been no major deviation in the financial outlay. There were minor modifications in the expenditure heads, but no expenditure exceeded the outlined amounts overall.

3. Problems and constraints

There were no major problems and constraints. Coordinating the final surveys was logistically challenging, as many people were involved. Since the area covered for the intensive survey was spread out over 3200 km^2, five groups had to simultaneously survey the sampling blocks all across JDNP. The last surveys in Torsa could only be carried out in November due to major holidays in between. By then it was already very cold for field surveys in the high mountains.

Unexpected time delays occurred due to conflicting schedules and constant changes in lab technicians for the genetic sample analysis at the University of Montana. As much of the analyses depend on genotyped information, this caused delays in data analysis and final synthesis of information. However, we are now back on track and we hope to complete all lab analyses after the summer when we will get additional fecal samples and supplementary data.

4. Unexpected effects

There were no major unexpected effects. There is no doubt the field staff are very dedicated and can be easily trained. They are very familiar with the areas they work in – and can easily reach even the most difficult survey sites. Many snow leopard relic sites have been identified and these areas will be valuable should we need to set camera traps or to capture snow leopards for future behavioural studies. The use of non-invasive sampling is becoming more popular and can be

easily expanded for many other species. We intend to employ this technique for studies of the tiger and Asian elephant in the near future.

5. Learning and sharing

The local yak herders have proven to be excellent addition to our field crew. Not only do they know the area and all short-cuts along the ridges and cliffs, they are also excellent trackers capable of identifying even the faintest signs of snow leopard.

There appears to a west to east snow leopard density gradient – higher in the west, and lower in the east. This correlates with blue sheep density and livestock density as well. While we were not focusing on this, there appears to be a positive correlationbetween livestock presence and blue sheep abundance, and therefore indirectly with snow leopard abundance. This is contrary to popular belief that livestock competes with blue sheep for forage and may thus negatively affect them. Further detailed investigation on this relationship may provide new insights.

Within the snow leopard range in Bhutan, human-wildlife interactions cannot be qualified as "conflict." A conflict would denote that people are ready to exterminate the predator. This is hardly the case. From preliminary data, on an average, about 3 yak calves per herder in the area surveyed are killed by snow leopard. They lose far more to disease and other causes such as harsh winters. Loss to snow leopard has always been part of their livestock herding system and hence anticipated. Due to this tolerance is quite high. So, an effective strategy of dealing with the issue of livestock predation could be from bringing in benefits from conservation to the community through innovative measures (tourism, handicrafts, income-generation, improving public health are some examples) as a way of rewarding their tolerance of snow leopard. Through such activities this tolerance may even be elevated to appreciation.

[*Quantification of livestock predation, prey density, livestock density and their relationship is one component of the research for which more information will be available in due course of time. Upon completion of data analysis more quantified information would be available on these.*]

6. Adaptive management

The range-wide population structure and gene flow assessment is taking longer than anticipated, as samples have to be collected from different countries with varying degrees of bureaucracy surrounding transport of fecal samples. Since no one has any proven technique to age scat, we will have to resort to setting up an experiment to physiologically do so in the field. Often, we have to depend on other biologists whose main task is not to collect snow leopard fecal samples – and such samples have to be collected opportunistically. Optimising primers and PCR processes also take up additional time. So, we have resorted to collecting additional samples in the meantime to add to our samples.

7. Communications/stories

One communication story would be that tiger tracks (identified form their relative size) were recorded at 4600 m, close to a glacier. A yak was killed at 4200 m and a herder witnessed part of this incident in 2007. While this information is not new for Bhutan, it is certainly interesting within the conservation community. Bhutan is the only place where the tiger and snow leopard habitat has some overlap.

With the declaration of the Wangchuck Centennial Park in 2008, almost all of the snow leopard range in Bhutan falls under legal protection. We are trying to confirm if the snow leopard population in Bomdeling Wildlife Sanctuary is isolated from the population in JigmeDorji National Park, or if there is population genetic connectivity among them.

8. Future issues/challenges

The immediate challenge is to put in place a regular monitoring program for snow leopard and its prey. We hope to expand this to other species as well, namely tiger and Asian elephant, as part of a regular government program. We are working towards building capacity in Wildlife Biology at the UWICE. As a continuation and follow up of this research we will be setting up a basic non-invasive genetics laboratory at UWICE. This facility is expected to facilitate research andmonitoring of other elusive and endangered species in Bhutan.

Starting August 2009, a full time laboratory technician will be on the team to assist with processing the rest of the samples and additional ones. Once PCR is completed, it should not take very long for the rest of the analysis. After we complete all data analysis a reliable baseline for snow leopard abundance and distribution will be established, along with information on livestock predation and prey density. Combining this with genetic information, we hope to use this information to guide snow leopard conservation in Bhutan. The biggest challenge is, that since this is all part of a PhD program, this process is taking slightly longer than expected.

The meeting in Bhutan in June/July will allow us to build an actual conservation program where a strong focus would be on research, monitoring and capacity building. Specific monitoring protocols will be implemented soon thereafter. The other component would focus on conservation intervention including law enforcement and working together with local communities.

9. Overall assessment of progress

The field survey component of the program has concluded successfully covering most of the snow leopard range in Bhutan, providing useful insight into the different areas in terms of prey density, snow leopard sign abundance, and livestock predation. A total of 287 fecal samples have been collected, putatively identified as snow leopard scat in the field. However, from other studies (e.g. Janecka et al. 2008) as much as 50% misidentification has been known to occur. Still this is a fairly reasonable sample size.

The genetic and other data analysis is taking a lot longer than expected. However, we are using this time in between to collect more samples, collect supplementary data, and also work towards establishing a snow leopard conservation program on the ground.

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Objectives	Project Outputs	Indicator	Current Status
Bhutan			
1	Biological information on snow leopard distribution and abundance, including metric of gene flow and genetic variation generated	Data made available to government and management authorities, journal publications	Some data presented to government, but mostly being analyzed
2	Information on livestock depredation collected, and a plan to mitigate conflict drafted, ready for implementation	Livestock depredation maps and conflict mitigation plan made available	Some maps prepared, but most under preparation
3	Field staff in two protected areas trained in key species survey and monitoring techniques	Monitoring plan in place for snow leopard, manned by trained staff	Underway
4	Genotype database of snow leopards created to assist in anti-poaching globally	Database which is accessible and shared globally	Underway
Range wide			
1	Biological data on population structure and gene flow collected	Data made available to government and management authorities, journal publications	Lab analysis underway
2 (similar to 4 above)	Genotype database of snow leopards created to assist in anti-poaching globally	Database which is accessible and shared globally	Not done

Note: delay in the synthesis of information mostly stems from the fact that genetic analysis of the samples has not been completed at the moment. As soon as the genetic data is processed, we will be ready for publishing reports.

This project was jointly funded by the Snow Leopard Network small grants program, the MacArthur Foundation, a National Geographic Society/Waitt Grant, the University of Montana, and the Royal Government of Bhutan.