Conservation of Brown Bear (*Ursus arctos*) in Georgia (NBSAP Implementation Programme)

Final report

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Prepared for Alertis – Fund for bear and nature conservation.

Contents

INTRODUCTION

The Project *Conservation of Brown Bear (Ursus arctos) in Georgia (NBSAP Implementation Programme)* started in year 2004 and aimed to facilitation of brown bear conservation in Georgia through improving the effectiveness of protected areas and promotion of innovative (for Georgia) research techniques. The project continued almost five year and ended up in year 2008. Therefore these report described activities from January 2004 till the end of 2008.

Initially the project had three main objectives:

1. To conduct ecological research of brown bear populations in Georgian protected areas;
2. To prepare scientific-popular publication dedicated to brown bear promotion;
3. To propose recommendations to protected areas management for maximization of their effectiveness.

Due to Alertis flexible and convenient funding strategy, every November we applied for a next year funding. If we had any problems or constrain during last year we could address on them and slightly modified the objectives.

During implementation of the project we excluded Lagodekhi reserve from our study area and all our activity was focused on brown bear population in Vashlovani National Park (south-eastern part of Georgia). We also slightly modified third objective. Instead scientific-popular publication we attended 17th International Conference on Bear Research and Management, held in Karuizawa, Japan and presented our data on bear population status in the south Caucasus. Based on the presentation we prepared scientific article and submitted to international journal - URSUS.

During the project we carried out intensive ecological research of brown bear population in south-eastern part of the country and based on the data we prepared recommendation to the Vashlovani national park to improve its effectiveness. In addition we collected lots of data on other large mammals in the study area that gives us better overview on large mammal community in Vashlovani national park. We also elaborated scientific article on bear status in the south Caucasus and submitted to international journal.

All project activities during the last 5 years were summarized in three following chapters:

1. Brown Bear Ecological Research;
2. Scientific Article, and
3. Recommendations to Vashlovani National Park

CAPTER #1. BROWN BEAR ECOLOGICAL RESEARCH

1.1. Preliminary Assessment of the Study Areas

In year 2004 we had two study areas in the eastern part of Georgia – Lagodekhi Reserve and Vashlovani National Park (Figure #1). Initially we planned to study bear subpopulations in two protected areas and try to find out level of connectivity between them. In the first stage of the study we assessed number and overall status of bear subpopulations in Lagodekhi reserve and Vashlovani national park.

Figure #1 Project study areas

Lagodekhi Reserve

Lagodekhi reserve locates on southern slopes of the Great Caucasu Range in eastern part of Georgia (map #1). Lagodekhi is characterized with temperate humid subtropical climate. Main habitats found in the reserve include: broadleaf forest (from 450 m.a.s.l. up to 2,000-2,500 m.a.s.l.), **subalpine and alpine meadows (from above forest zone up to 3,400 m.a.s.l.)** (Image#1). The middle forest zone is dominated by beech. This species

comprises more than 70% of the reserve's forests. The forest is in general rich in mast species as well as in various berries providing food for bears and other species.

Image #1 Lagodekhi Reserve

We carried out four field studies in Lagodekhi Reserve. Unfortunately we were not able to obtain sufficient data on the bear population in Lagodekhi reserve. We could find only few bear signs (scats, two footprints and several bear diggings). This data did not allow us to make any credible assessment of bear population in the reserve. We suspected that due to high poaching and human impact bears density could be extremely low.

Due to political tension between Georgia and Russia access to the state border become more difficult. As Lagodekhi reserve borders with Russia, collecting of data were restricted and access to some places was not allowed.

Taking into account all abovementioned we decided to exclude Lagodekhi reserve from our study area and focused on the Vashlovani national park only. This park was newly established and comprehensive bear research had been never done before. Vashlovani bear population was meant as isolated or semi-isolated. Therefore we thought focusing on the territory we would be able to collect sufficient data on bear population and elaborate more adequate recommendation to the national park to improve its effectiveness in bear and wildlife conservation.

Vashlovani National Park

Vashlovani national park locates in the extreme south-east part of Georgia (Map #1) and occupied approximately 350 km². Local climate is characterized with dry hot summers with absolute temperature of 39 C⁰. Mean annual precipitation is 470 mm. The area features a mosaic of rugged and relatively flat terrain with planes, hills, clayey steeps and dry gullies. Light forests are mainly found on slopes of 11-20o. In the national park there are so called 'alesilebi' – precipices which can be as high as 70 m. The Vashlovani area represents typical badlands.

From October to May the territories are used as winter pastures for sheep and cattle. Therefore there are many farms around and in the Vashlovani national park. Some adjustment territories of the national park are used as agriculture fields.

We carried out three field surveys in the protected area. During the fieldworks all bear signs were located by GPS and placed on the map. Bear footprints were measured and compared to each other, for individual

Image #2 "Areulebi" in Vashlovani national park

identification. Based on data there were approximately 10 to 13 bears in the national park (approximately 3 individuals per 100 sq. km.). There was some variation in the number of bears recorded in different seasons. During the autumn the survey's bear numbers were estimated at 13, in spring at 10, and in summer at 6. This might be due to dry weather during the summer that makes the chances of finding animal tracks lower. On the other hand, the bears may have left the national park to feed in nearby agricultural fields. Bear scat analysis from the summer season showed that bears were feeding mainly on sunflower seeds and barley, both of which were available in the agricultural fields.

The results indicate that bears prefer the central and western parts of the park where so called areulebi (highly rugged and covered by bushes territories) is represented (Image 2). Indeed, when comparing bear frequency indices for different seasons, it is obvious that the central and western parts of the national park are the most important areas for bears. These sections of the park are relatively well protected. No bear signs were found in western part of the protected area which is hardly surprising as these sections are most affected by human disturbances.

Defined bear population number and some aspects of the special distribution of the animal prepared base for further research. We decided to use telemetry method and camera traps to monitor bear population in Vashlovani national park. These methods were first time used in Georgia and such comprehensive ecological research on bear had been never done in the country. We planned to obtain maximum information on bear population in the study area and prepare recommendation to the Vashlovani national park administration to improve the protected area effectiveness.

1.2. Preparation for Telemetry study - Procurement

During first years of the project we tried to purchase telemetry equipment. According to the project we had to purchase the following equipment: radio collars, a receiver, antennae, traps, immobilization equipment and drugs. Due to legislation *force majeure* and political events in the country that took place in November 2003 (so called Rose Revolution) and fundamental reorganization of state organizations (including of ministry of environment) procurement procedures took more time than it was expected initially. Instead of three month it took more than one year. Especially difficult was to purchase immobilization rifle and immobilization drugs. Due to too many bureaucratic procedures at custom house obtaining of other equipment was not easy also (please see Appendix #1 for details).

1.3. Bear Telemetry Study in a Vashlovani National Park

Trapping bear in Vashlovani National Park

Since year 2005 till year 2008 we conducted 7 long lasting (approximately 25 days each) fieldwork with primary aim to catch bear and fit it with radio-collar. During these fieldworks we had caught two bears (one male and one female) and attached collars on them (image #3 and #4). First bear (male) was caught in April 2006 and was monitored till the end of the summer. In September the bear was shot in the sunflower field. The second female bear was caught in July 2008 and she is still monitored. Third bear was caught in snare in year 2007, but the bear broke the handmade snare and managed to escape. (Please see Appendix #2 for catching details).

Figure #3 Male bear caught in year 2005

Figure #4 Female bear caught in year 2008

Initially we planned to have six radio collared bear and monitor almost half of the Vashlovani bear population (in year 2004 we estimated bear population as 13-15 individuals). The catching result was quite low and we were not able to catch 6 bears. Reasons of the low success are the follows:

- Lack of experience to catch bears (setting snares, finding appropriate places, using right equipment);
- Legal aspect – park administration limited trapping area (according to the law we are not able to catch bears in the strict protected zone, where the most suitable bear habitat exist);
- Bad equipment – on the initial stage of the project we purchased low quality equipment;
- Low number of bears in the region, which required much more effort comparing to the other areas with high number of bears.

Despite all the difficulties we have some positive results. Bear telemetry was never used in Georgia before and therefore this was somehow a pilot project for the region. First of all we received huge experience in bear catching. Now we can easily define trapping sites and set properly snares. We got more experience in bear immobilization and handling. None of the bear had any problem during the immobilization process and all two bears successfully recovered from the narcoses. We used several times the experience to immobilize captive bears around the country. We involved local rangers in bear trapping activities. They helped us in any stage of bear research. As we did the work together, they become more familiar on bear conservation issues in Vashlovani as well as in the country. In addition telemetry data (even as small as we have) indicates how large can be individual territories in the region and how vulnerable can be bears when they leave protected area.

Bear movement in Vashlovani National Park – the telemetry results

First caught bear was male and we monitored its movement during a half year. At the first stage of monitoring we tried to monitor the animal almost every weekend. But then we realized that weekends was very short time to spot bear in the rugged area and collect data on its movement. Therefore we changed our strategy and decided to extend duration of the fieldworks up to one week and more. After half year monitoring we lost bear signal. We carried out extensive fieldworks and searched every bit of the Vashlovani national park, but without results. We interviewed local population and they told us that a bear was killed with a collar on it in the sunflower fields close to the protected area. Locals said that the poachers destroyed radio-collar and that is why we could not get signal from it.

According the telemetry data male bear moves over quite a large territory. During spring time bear was mainly spotted within strict protected zone of the national park (in the central part of the protected area). Here bear could find fresh grass and good shelter in areulebi habitat (rugged terrain with bushes). When sunflower grow on the agricultural fields the male bear changed territories and he was often observed near the sunflower fields. It was obvious that bear often leave the national park's borders, fed in the agricultural fields and therefore are more vulnerable toward poaching (see figure #2). In summer, 24 hour monitoring of the bear showed that during the daylight the individual was resting in very narrow gorges within the strict protected areas. From 9:00 PM bear become active and went toward the sunflower fields. For a couple hours radio signal came from the place where areulebi habitat ends up and starts open habitat (field). It seems that the bear approached the agricultural field very carefully and probably it tried to assess threats. After that bear entered to sunflower fields and only in the morning around 5:00 am returned to the strict protected zone of the national park.

We do not have sufficient data to discuss on bear home range in the region, but we can calculate minimum home range size of male bear in Vashlovani national park. If we use simple polygon method we can say that adult bear have at least 40 sq. kilometer home range in the area. Of course we believe that male home range should be much more. This
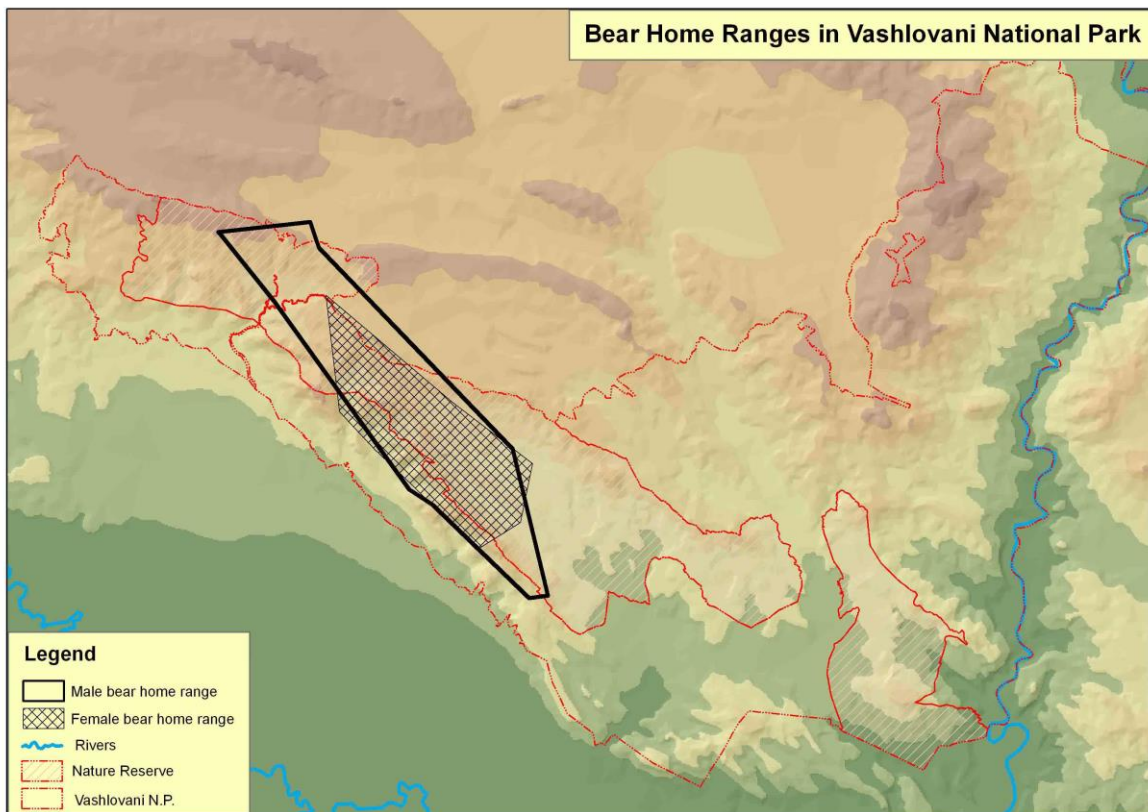

Figure #2

is the first reliable data ever collected on bear movement in Georgia.

We tagged female bear with GPS-satellite collar in July 2008. We hoped to collect four locations per day and receive it through the satellite. Due to unknown reason the collar did not work and we cannot get any location through the satellite. Thus we tried to periodically locate the female bear with radio signal (through triangulation method). Unfortunately the radio signal from the GPS-satellite collar is weaker than from normal radio-collar. Therefore spotting the bear location is quite difficult. During the one year monitoring we were able to get 12 locations only. According to the data she is also intensively using central part of the national park. We could not find her den site, probably collar's weak radio-signal was not able to come out from the den. In spring we spotted her again and we continued collection data on the bear. It appeared that in summer female bear changed it main location and she was spotted in the eastern part of Vashlovani national park. If we use the simple polygon method we can draw out minimum home range size of female bear (see figure #2).

Monitoring bear and other large mammals with camera-traps

We started bear population monitoring with camera traps in Vashlovani national park in year 2004 and continued till the end of 2008. First year we installed 3 TrailMaster cameras with active infrared trail monitoring systems. In year 2005 we added fourth camera in eastern part of the national park. In July 2008 we also added one digital camera trap with heat-in motion sensor.

As we had only one camera on the each site we could only make picture of one side of an animal. Most of the cameras were placed in the strict protected zone on the most important areas of the national park (see figure #3). We set cameras on the trails that were intensively used by bear or other large mammals. The cameras were placed on the ridge, as well as in the gorges. Initially we visited the camera every month. As we understand that the cameras can operate longer we begun to visit the camera-traps once in two month. Thus cameras stayed undisturbed much longer and more pictures of the animals were taken.
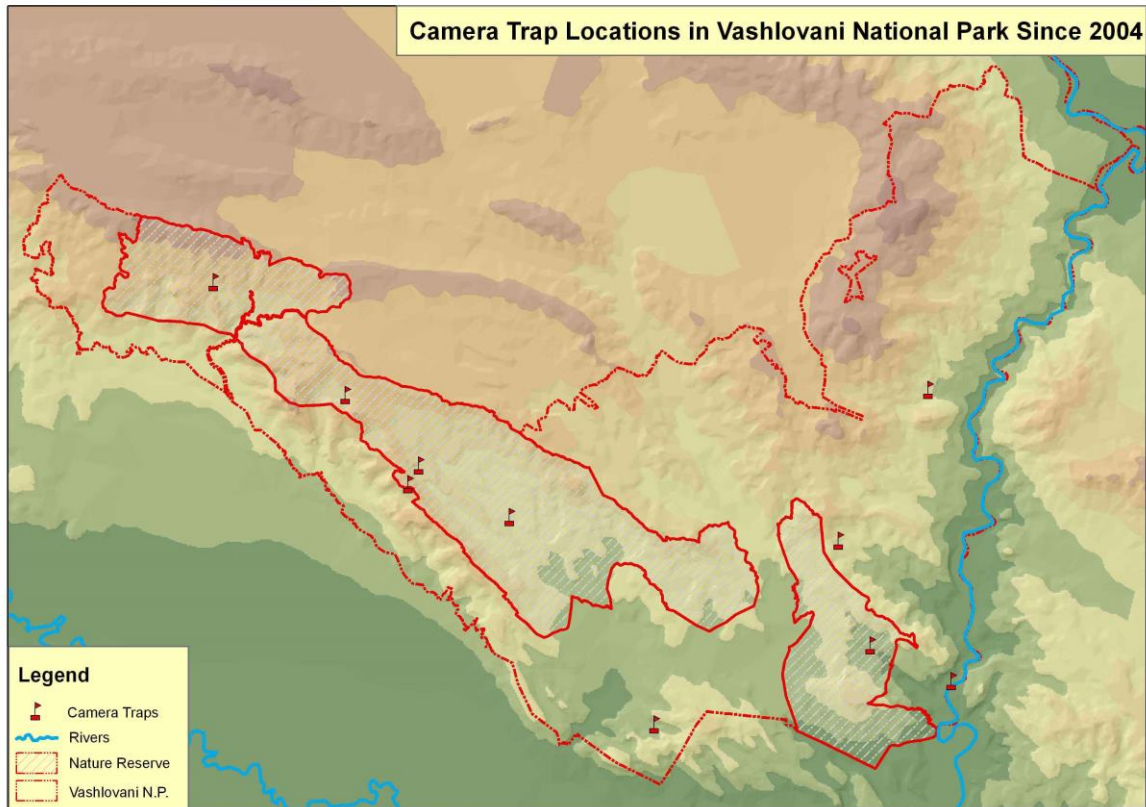
Figure #3

Initially we thought that flashlight can be bother mammals. Fortunately neither bears nor other large mammals seem to be bothered by the flash of the camera. Some species even became curious and stayed in front of the camera quite some time (Image #5).

During 5 year period of monitoring we get data from **3700 trap/days** and captured **65 bear pictures** (see appendix #3). In addition, as side effect of the bear monitoring we got lots of data on other large mammal in the park. We have approximately **354 pictures of other species**, such as: wolf, leopard, lynx, jungle cat, wild boar, porcupine, wild cat etc. Analysing bear data we got results of its population number, seasonal activity and day/night movement.

Image # 5 Lynx approaching camera traps

Image #6 Female bear is identified by ear mark

1.4. Bear population number

We found that due to a body marks some individuals were quite easy to identify on the photos (see image #6). Therefore we decided to try to use the data for bear number calculation. Unfortunately we have only one camera per trapping site and therefore we could see only one side of the individual on a photo. Therefore during the analysing the data we compared bear pictures of only one side. Some bears were almost the same size and did not have special marks and therefore it was hard to identify individuals. We thought that knowing height of the animal could help us to identify individuals. Therefore we placed a scale on the camera trap site and photographed it (image #7). By comparing animal photos to the photo of the scale we tried to estimate the height of the animal. It was helpful but not always. Some bears approached camera trapping site very carefully and therefore the individual height were changed (had dropped, front legs bended). Nevertheless by comparing bears on the photos we could estimate an approximate number of bears in Vashlovani national park for the each year.

Image #7 Photo of the scale

First year (2004) we got 8 bear pictures. We compared bear pictures for individual identification and found that we had at least three adult bear (and probably four) on the pictures and two bear cubs. During the year 2005 and 2006 we had more cameras and they were better distributed on the parks territory. Thus we got more data on bear and had already 29 bear images. We thought that these pictures belong to about 10 bears (we did not counted in three bear cubs in the total number).

In year 2007 we had seven bear pictures and we think it belongs to 4-5 individuals. The most productive was year 2008 when we had 21 pictures. According to data collected in 2008 we have approximately 10-12 individuals in Vashlovani national Park.

Thus we have the following result according to years:

Years	2004	2005	2006	2007	2008
Bear individuals caught by camera-traps	3-4	10	1	4-5	10-12

The most productive year was 2008. This is because we placed 6 camera-traps in the study area. The cameras were distributed throughout the national park and therefore we got the most complete information during one year monitoring. As a result we can say that in Vashlovani national park we have approximately 10 individuals. If we compare this estimate to the last assessment made in year 2005 it is obvious that bear population in the region is more or less stabile.
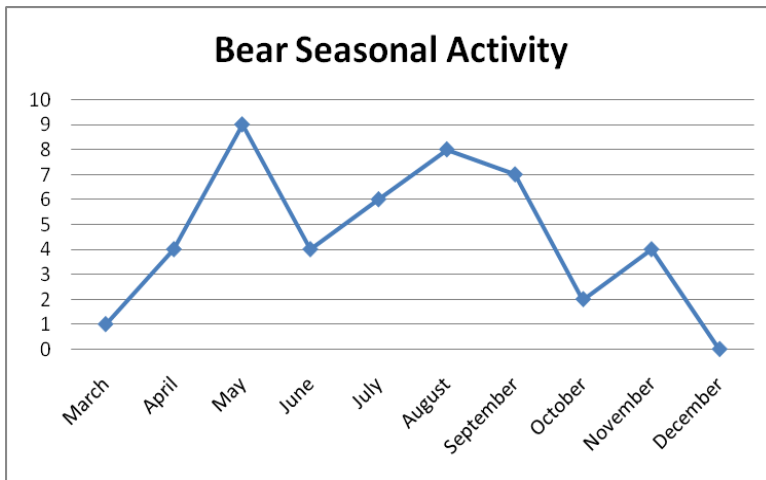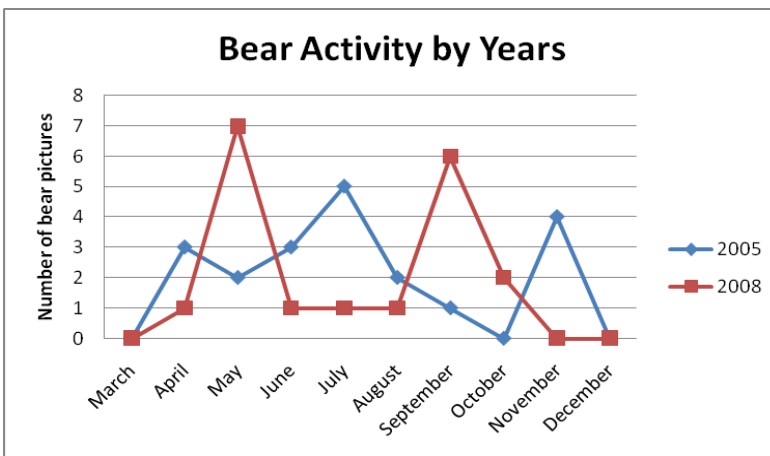
Figure #3

1.5. Bear seasonal and day/night activity in the national park

The camera-traps record date and time when the animal crossed the trail. Therefore we can speculate on the seasonal and diurnal activity of a bears in Vashlovani. We sorted our data by year, by seasons and by diurnal activities. We found that data for years 2005, 2007 and 2008 were the most complete for these analyses.

According the three year data none of a bears were

Figure #4

spotted from November till March. As we had no pictures during wintertime we concluded that despite very mild winter in the region and possibly enough food bears go into winter sleep.

We thought that number of bear picture per season (per month) could be correlated to species activity. Therefore all three year data where sorted by season and month. According to result bears mostly were active in May and August (Figure #3). We think that bears are more active in May because this is bear mate period and therefore individuals actively search partners. High activity in August could be explained by bear habit to feed in sunflower fields. During the night bear leave their shelter within protected area and move toward agricultural fields. In the early morning they go back to national park to rest during the daytime. As cameras were placed on the actively used trails they fixed these bear movements.

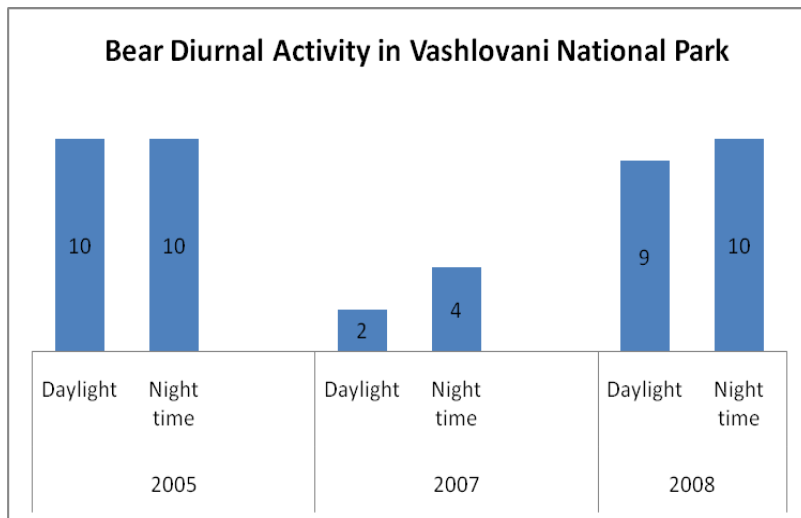To compare seasonal activities according to years we compared year 2005 and 2008 data (Figure #4). During these years data were collected using the almost the same number of camera traps and covered the same territories. In 2005 bear were more active in July and November, but in 2008 bears were more active in May and September. The reason of differences in high activity peak among the years could be probably the climate. As it was found out year 2005 was the hottest year in the world since 1890 (according to NASA official website – www.nasa.gov). Therefore we think that bear activity picks were switched due to food availability and weather conditions.

Figure #5

We also tried to find out whether the bears active mostly during the daytime or not (Figure #5). We defined daytime as from 8:00 AM to 8:00 PM. Based the result bears equally are active during the day and night. Bear are more diurnal in May and more nocturnal in August. The reason could be the same as we described above. In May they are searching for partners and daytime could be most appropriate. In addition in May sheep leave the winter pastures and therefore human disturbance become less in the region. In August bear fed on agricultural fields. Bears try to move under the cover of night especially in the open habitats (agricultural fields).

1.6. Data on the other large mammals

We got lots of data on other large mammal in the park (more than 350 photos) (see appendix #4). We even spotted the most cautious animals – wolf and wild boar. After we spotted these animals it becomes obvious that all animals habituated to our cameras. Unfortunately we did not get any stripped hyena (*Hyaena hyaena*) photos during the 5 year monitoring. This probably means that the animal does not exist in our study area any more.

Image #8 Lynx in Vashlovani national park

It is noteworthy that we obtained the first photos of a lynx from the semi-arid zone of Georgia. The individual is heavily spotted (image #8). Caucasus lynx is believed to have a much paler coloration with less conspicuous spots. We also showed the new photos to our colleagues from northern Caucasus. They also confirmed that the individual had a rather unusual colour pattern. The new photos give ground to many different ideas. There may be a great variation of colour pattern and spotting within the Georgian lynx population or the lynx population of the arid and semi-arid zone may belong to different genetic lines (or may be even subspecies). Either way it is an interesting fact especially considering the small size of the country.

As we already noted we were able to take picture of one side of the animal. Therefore we could calculate only a minimum population size of a lynx. According to our data we have at least 12 individuals in the study area, which is quite good number of the lynx for the 350 km2 territory.

We also monitored first appeared male leopard in the national park. We hoped that we would be able to spot female, but no results. As the individual stayed for 5 years on one place gives us hope that probably camera trapping was not so intensive to cover female territory and if we make the study more intensive (extend study area and place more cameras) we will be able to spot another individual.

CAPTER #2 SCIENTIFIC ARTICLE

As we mentioned above by mutual agreement between NACRES and Alertis we modified third objective and instead scientific-popular publication we attended 17th International Conference on Bear Research and Management and prepared an article: *Brown Bear status in the South Caucasus.*

In October 2006, 17th International Conference on Bear Research and Management was held in Karuizawa, Japan. Conference organizers gave us possibility to present our data on brown bear population status in Georgia and other countries of the South Caucasus (Armenia, Azerbaijan). Conference organizers partially financed Bejan Lortkipanidze's trip to the conference site, but the travel grant was not enough to cover all expenses. We applied to Alertis and requested to use publication budget to present data on the conference and after it publish them in URSUS Journal - an official publication of IBA. Alertis approved the modification and we were able to present data on the bear population status in the South Caucasus. In the oral presentation Georgian data was main subject as most sufficient data are only available from the country. Alertis project in Vashlovani national park was mentioned as the first bear radio-telemetry project in the South Caucasus and the source of valuable data on brown bear in the country. Based on the presentation we prepared article for publication and submitted to journal URSUS. The article has been accepted for publishing after several improvements in the text.

At the conference in Karuzava, Japan NACRES had also possibility to submit proposal to host 19th International Conference on Bear Research and Management. Council of International Bear Association discussed the proposal and approved the request. Thus in year 2010 Georgia will hold 19th International Conference on Bear Research and Management here in Tbilisi.

CAPTER #3 RECOMMENDATIONS TO VASHLOVANI NATIONAL PARK

When we started project Vashlovani national park was newly established protected area. At the beginning of the project we thought that based on our bear ecology study results we would be able to elaborate recommendation to Vashlovani national park to improve effectiveness of the protection area.

After year 2004 Vashlovani national park's legal status and overall management system of protected areas has been significantly changed. Protected area management system became more centralized and the newly established unit – Agency of Protected Areas torn out to be a main decision making and control unit. Vashlovani national park as well as

other protected areas in Georgia becomes less independent. Therefore recommendation to improve Vashlovani national park efficiency was provided to the Agency of Protected Areas.

Based on project results and our work experience in Vashlovani national park we found that there are two main problems. Vashlovani national park has weak protection against poachers and there is no monitoring system of large mammals that will allow assessing

Image #9 Poacher in Vashlovani – Camera trap photo

effectiveness of protected area. Therefore we elaborated two major recommendations to address these problems:

1. Improve protection of Vashlovani national park through patrolling the territories and
2. Monitor large mammal populations as they are more vulnerable on a poaching.

3.1. Improve protection of Vashlovani national park

Despite many positive changes in Vashlovani national park (developing infrastructure for rangers and visitors; providing equipment and additional vehicles) some issues are still unsolved and qualification are on the low level. One of the big issue is a combat with poachers. During four years of working in Vashlovani national park we spotted many poachers (image #9) and heard many facts of illegal shooting large mammals in Vashlovani national park or adjacent territories (where hunting is also prohibited). Unfortunately we did not know any fact that the poachers were punished for hunting or at least for a wearing a guns in the protected area.

One of the reasons why the poachers can easily hunt is a bad protection system. Rangers mostly stay in the ranger's station and control main roads of the national park. They do not patrol the territory or do it occasionally. Poachers know how to avoid ranger station, enter the park and safely hunt there. Sometimes rangers hear voice of gunshot but as they do not have vehicle at the station they cannot chase the poachers that are better equipped. Rangers are not armed that is possibly why they sometimes avoid confronting with armed poachers.

In November 2008 at the meeting at the Agency of Protected Area we provided recommendation how to improve level of combat with poachers in Vashlovani national park. We recommended establishing the patrolling system in Vashlovani national park. At least 3-4 armed and well trained rangers with car should patrol all the important territories of the national park. Patrolling should be done systematically (twice a week). Patrolling should be intensified in autumn and winter, when poaching increases in the region.

Agency agreed that they do not have good protection system in the national parks, but due to lack of financing they cannot implement the recommendation yet. Patrolling of the territories needs more fuel, at least one additional vehicle and highly equipped and trained persons.

3.2. Monitor large mammal populations in Vashlovani national park

In year 2007 by the request of Protected Area Agency NACRES prepared document Biodiversity Monitoring Guidelines - for the protected areas in eastern part of Georgia (image #10). In the document based on the large working experience received during Alertis project and taking into account the results of ecological study of large mammals we outlined monitoring system for Vashlovani national park. We recommended annually monitor bear, wolf, leopard and lynx populations in Vashlovani. These species was chosen from deferent reasons: (1) Bear is represented with small population in the national park and it is very valuable against poaching. Bear was also considered as problematic species as it causes damage of agricultural field. (2) Wolf is the main problematic and conflict species in the region and as well as all over the country. Therefore monitoring of the species is important to effectively address human-carnivore issue. (5) Leopard is the most endangered species in the country and its monitoring is very important. (4) Lynx is red list species in Georgia and one of the least studied species in the country, therefore data on its population is very valuable.

Image #10 The book Biodiversity Monitoring Guidelines

Based on our experience we suggested using photo traps as an effective method to monitor these predator populations. The method provides not only data on population number of the target species; it can give valuable information on their activities and habitat use.
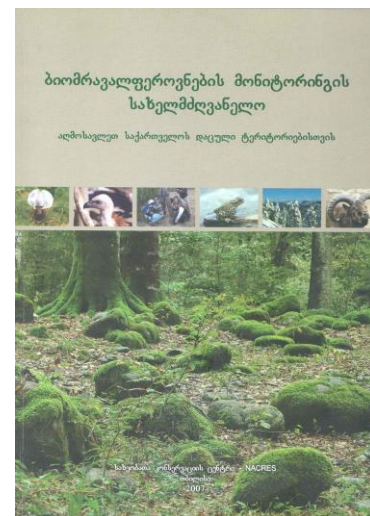
We also recommended using tracking method as cheep and effective method for calculation population indices.

In the document we also provided detailed guidelines how to properly plan and implement monitoring of proposed key species. Based on our large experience we described in details how and where to install camera traps and how to use the collected data in wildlife conservation.

COCNLUSIONS

Based on the abovementioned we can describe the main achievements and results of the project:

1. Telemetry method in brown bear research was the first time used in Georgia as well as in the south Caucasus. We caught 2 bears during the project and first time collected valuable data on bear movement in the region;

2. We monitored bear population during the 5 years with camera traps. We have data from 3700 trap/days and captured 65 bear pictures. We defined bear population number based on the photo trap data and discussed bear diurnal and seasonal activity in the national park;

3. Data on bear population status in Georgia and south Caucasus were presented to the international audience at the 17th International international Conference on Bear Research and Management held in Karuizava, Japan. Based on the presentation we prepared and submitted article to URSUS. The article is accepted and will be published soon.

4. Georgia will host 19th International international Conference on Bear Research and Management in year 2010. This event will significantly increase government and public interest in bear conservation in the country. Also the conference will focus on bear conservation problem on regional (the Caucasus) level and that strongly support bear research and conservation in the Caucasus.

5. Based on project data and large experience from the project we elaborated a strong monitoring system of large carnivores for Vashlovani national park. We proposed to monitor key species there and bear is one of them.

6. We identified poaching as the most severe problem in Vashlovani national park. We outlined recommendation how to improve protection of these territories and hope the government will consider our suggestions in the future.

7. As a side effect of the camera trap study we got lots of data on other large mammal in the protected area. We have approximately 354 pictures of other species, such as: wolf, leopard, lynx, jungle cat, wild boar, porcupine, wild cat, hare, badger and even eagle. Lynx, jungle cat and porcupine photos were most interesting because they were first time spotted on the photo.

8. Based on the photo trap data we could calculate lynx population number that has been never done before.
9. We monitored single leopard during 5 year period and as he stayed in the protected are we think that there is a chance to spot another female individual.

Appendix #1 Procurement and Fieldwork preparation details

At the beginning of the project we had to purchase the following telemetry equipment: radio collars, a receiver, antennae, traps, immobilization equipment and drugs. Due to legislation *force majeure* and political events in the country that took place in November 2003 (so called Rose Revolution) and fundamental reorganization of state organization (including of ministry of environment) procurement procedures took more time than it was expected initially.

Collars and Receiver

NACRES applied to the Department of Radio Frequency Regulation for renting a radio frequency range in the study area. They investigated target areas and allowed us to operate in the following range (MHz): 147.350 - 147.450. Bear collars and receiver was purchase from Telonics Inc. Shortly after we got the equipment we received a message from Telonics Inc. indicating about a possible manufacturer problem with the collars. We checked our collars and unfortunately all of them had been affected by the problem – the real time clock was out of order (the collar stopped transmitting in 5 hours after the magnet was removed). According to Georgian law all products that are purchased with grant's money are not permitted to be exported out of Georgia. We tried to find some legal ways to export the collars but without results. We had to somehow overcome this problem and we decided to send the collars to the company as private baggage. Collars were repaired and sent back to us.

Antennae

We purchased antennae from Televilt. The company had been highly recommended by our colleague - Sven Brunberg, an immobilization specialist of The Scandinavian Brown Bear Project.

Immobilization Equipment (rifle, accessories and transport case)

We purchased immobilization equipment from Dan-Inject (recommended by Sven Brunberg). We submitted an official request of a permit for the import of immobilization rifle along with required documentation to the Department of Justice. Later they requested additional documents namely a Certificate of origin and company license to sell the equipment. These documents had to be legalised by the Georgian embassy in the exporting country. The company is based in the Denmark, but Georgia does not have an embassy there. We have applied the Ministry of Foreign Affairs for assistance. They replied that the Embassy of the Ukraine in Denmark should legalise the documentation (according GUUAM convention). We passed this information to Dan-Inject. They agreed to fill out the document for additional price. One and a half month we waited for the

answer. Finally the company told us that embassy of Ukraine requests a letter of the Georgian Minister of Foreign Affairs where he/she requests attesting the documents. Therefore we asked the Ministry of Foreign Affairs to clarify the situation. They sent an official letter to Embassy of Ukraine and asked them to confirm submitted documentation. The Ukrainian Embassy legalised the documents and Dan-Inject sent them to us. As soon as we received the documentation we submitted them to the Department of Justice. After these constrain and difficulties we obtained the import permit for an immobilization rifle and ordered CO_2-Injectionsrifle Model E.M. and accessories.

Immobilization Drug (Zoletil 100; Domitor, Zalopine, Antisedan)

We have submitted an official application to Ministry of Heath to give NACRES a permit for the import of immobilization drugs. Therefore we asked the pharmaceutical companies to provide us with additional documentations. One of the companies (which produce Domitor, Zalopine and Antisedan) did not agree to register their drugs because of the small quantity we wished to purchase. On the other hand we could not import drugs without registration. At some point we decided to use only Tyletamin/Zalozepam (Zoletil 100) for brown bear immobilization as it is described in *Handbook of Wildlife Chemical Immobilization*. According to the literature we needed more of Zoletil 100 than expected before, therefore we decided to purchase 50 vials of Zoletil 100, after the Ministry of Heath will give us the license.

After 10 days we submitted all the documentation we were told that our organization was not allowed to import drugs because we are not a licensed pharmaceutical company. In the meantime Irakli Shavgulidze, NACRES' Conservation Program Coordinator was visiting the Netherlands and we thought we could use this opportunity to purchase and bring immobilization drugs. With great help of Dr. Margje Voeten, Head of Alertis Office Irakli could bring the immobilization drugs from the Netherlands.

Bear Traps

Shipment price of Margo Supplies products were increased (by approximately 35%) and hence we started negotiations with another company namely Adirondack Outdoor. The company was not operating worldwide and it could send their products outside the United States. Therefore we asked them to send our equipment to one of former NACRES member who is currently living there. We paid DHL in advance and they pick up the package for us.

Permit to Trap Bears

License on capturing wild animals should be issued by the Ministry of Environment. We supplied documentation to the Ministry to allow us to trap up to 10 bears in the target areas (Vashlovani National Park and Lagodekhi Reserve) during the next three years. Due to structural reorganisation in the Ministry, the Board responsible for issuing licenses on wildlife was suspended until June 2004. In June the Board considered the issue and allowed us to trap brown bears in the research areas.

Appendix #2 Bear trapping and immobilization details

Year 2005

We carried out two fieldworks with the primary to catch bears and fit them with radio collars. First fieldwork began in April and the second was resumed in June and continued till August.

Georgian legislation (Law on Protected Areas, 1996) prevents catching wild animals on strictly protected areas. Consequently bear traps had to be placed outside the core zone of the Vashlovani national park. In Vashlovani the strictly protected zone includes most suitable bear habitats. It is also best-protected part of the national park. Therefore it was quite difficult to find suitable sites that could meet the above criteria.

The fact that there are leopards (at least one male individual) in Vashlovani has created additional problems to the project. We had to make special efforts to exclude the possibility of catching leopards instead of bears. The leopard is a protected species in Georgia. We do not have a permit to catch a leopard and above all we were not sure if we could handle a leopard in a trap. We decided to modify our actively triggered leg hold snares to construct passively triggered foot snares described in an article "*A passively triggered foot snare for American Black Bears to reduce disturbance by non-target animals*" by S.R. Reagan *et. al*., URSUS 13:317-320 (2002). This article gives the design and make-up of passively triggered foot traps in great detail. All necessary parts were readily available and we easily constructed such snares. We tested them and they seemed to work perfectly well. The traps are practically wolf and jackal-proof but there still was a chance that a leopard might have triggered them if we had used bait that was attractive to this animal. We have been using plant food such as sunflower pulp, different fruits as well as honey with honey-comb.

We had four traps during the first fieldwork. We decided to select two sites, with two traps on each site. After several days searching appropriate trapping places we found one suitable site and set two traps there. To find the next place took more time, but finally we set the additional two traps as well. Finding the places was difficult in this period because of sheep and caws, which still remained at the winter pastures (within and outside of the National Park) and we did not want to set traps in the actively grazed territories.

We checked traps every evening and early morning. Unfortunately there has been no success in catching bears. No fresh bear tracks were found at the trapping sites, which indicate that bears did not even approach the traps. That might have been because of the bait or simply because low trapping effort (26 trap/days). It is known from the literature as well as from personal communication from bear experts (Dr. Djuro Huber and others) that it may be many weeks before a first bear gets in. The catching success positively

correlates with trapping effort and the density of bears in the area. Bear density in all semi-arid zone is believed to be low.

During the summer fieldwork we increased the trapping effort (the number of trap/days) by constructing additional snares. However it was also obvious that we also needed to change or enhance the bait. We sought additional advice from Alertis. After consultations with Dr. Margje Voeten and John Goodrich it became clear that attracting bears to the trap sites with strong smelling bait (e. g. rotting meat or fish) could be helpful. Using meet as the bait rise a chance to catch the leopard. But we decided to collar leopard in case the animal would be caught.

The second set of the fieldwork of bear trapping and immobilization began in the end of June and continued all July. During first days we checked the camera traps and changed films there and started to search additional new sites. It should be mentioned that old places did not work because bears moved to other territories where food become available. Based on local rangers experience and our observation it become obvious that bear should be near water sources (during the summer water is limited) and near corn fields (in the beginning of July in bear excrements corn was dominated). We set 7 traps on 3 places and used different bait to attract bears. During the fieldwork we twice changed number of traps and places in the study area. The changing was based on bear movement, changes in bear diet and cancelling some places due to high human activities.

Unfortunately we could not catch bear; despite the fact that we enlarge number of trap/day (124 trap/days in total). Twice bear visited traps and once even pulled out snare but it was not caught. There were different reasons of failure and by finding the mistake we can improve our trapping success in the future.

It was extremely hot in the area and the time period during which animals were active was really shortened to a minimum. Although the area is within the national park there was a lot of human presence. There was no illegal hunting (late autumn is the high season for bear poaching) but there was a lot of illegal fishing hence intensive human movement. Earlier studies in the area have shown that large mammals are very shy mainly due to poaching and most animals simply avoid any interaction with any people with guns or not. Therefore we noticed that the bears were extremely cautious.

We used meat, fish, fruit, honey, sunflower press as bait as well as combination of honey with fruits and sunflower press. We had bears coming and eating the bait from the traps but the traps did not work. We think there could have been two possible reasons. One that we can easily put right is that the metal net at the bottom of the trap was probably too weak for the bears and for the overall weight of the trap. The bear simply tore the net to get to the bait instead of lifting the whole trap (as you might remember the trap works when it is pulled out). On the other hand the bait still seems to be a problem. Meat for

example was completely useless, it seams that bear do not like meet in Vashlovani at least in summer. On the other hand there was a bear tried to take fish from the trap but it had probably been badly shaken by other animals and it did not work.

Honey is something all bears like of course but it appears that it is less effective (compared to fish) in respect of attracting bears from a distance. Once a bear came up to the trap with honey and sunflower press in it but the trap did not work again. It was probably because of the metal net. Also, it should be mentioned that that honey attracted many insects, which try to take and eat the honey. At some places, wasps, ants and bees within several hours totally emptied the trap with honey.

A short fieldtrip (four days) was carried out in Vashlovani in December 2005 with the primary aim to check camera traps and choose suitable sites for bear trapping. We changed films in the photo traps and found fresh bear tracks in eastern part of the national park. There was no disturbance and people visited the area very seldom. So we thought the site would be appropriate for bear trapping.

Year 2006

In the beginning of February Drs. Djuro Huber and Dr. Jon Swenson, visited Tbilisi to elaborate first draft of the Using this opportunity we asked Dr. Djuro Huber to evaluate our snares and to give us advice regarding bear trapping. He evaluated our traps (spring activated and passively triggered snares) and unfortunately his opinion about them was not positive. Djuro Huber thought that our spring activated bear traps were more suitable for black bears and the snare cables were too weak for European brown bears. The spring was not strong and the loop of the snare was smaller comparing with snare loops used in Croatia. He did not trust the passively activated snares either, which were designed according to the article from journal URSUS. Djuro noted that it would be quite difficult to "force" bears to put their legs into the passively activated snares and moreover to catch them. In addition, we had a half-day-training in setting the spring activated snares. We set one spring activated snare on virtual bear trail and Djuro gave us excellent tips how and where to set the traps. He also shared his experience how to place bait near the trap and also many other useful details so important for capturing live animals. According to Djuro's advice we modified our traps and replaced some of the parts to enhance their quality as much as possible (we installed bigger loops, thicker cables etc.).

We went to Vashlovani National Park and started to search for fresh bear track, where we found fresh bear footprints last time. Unfortunately we could not find any fresh bear tracks there. It was obvious that bear did not come out from their dens. Thus we had to return to Tbilisi and wait for a few weeks.

The fieldwork was resumed in March. We went back to the Vashlovani on the 20th of March and began searching for fresh bear tracks again. We first tried to find evidence of bear presence in the eastern part of the national park, where the park administration permitted bear trapping. Unfortunately we could not find any fresh bear tracks despite our attempt to scan all suitable places. There were many sheep and cattle there even grazing in areas where it is not allowed. It was obvious that bears were confined to sections of the park free from livestock. We complained with this problem to the Vashlovani National Park administration and asked for permission to trap bears near strictly protected zones. They could not argue against it and allowed us to set traps near strictly protected zone where fresh bear track had been found.

After 12 days searching for bear footprints and discussing with the administration, we found a suitable place where at least one bear was active. We set 10 traps (4 spring activated and 6 passively trigged) and checked them every morning. By tracking we knew that the bear was visiting the trap sites but nothing happened. On the 10th day the bear pulled out passively trigged snares from the ground and ate the bait. It also came close to the spring-snare, triggered it but the animal was not caught. We set the traps again. After three days the bear came back, ruined everything, ate the bait and walked fee. Having inspected the tracks we learned that he had dug around the traps and then pulled them out. It was obvious however that the bear did not avoid the spring snares. It had come close to the site, carefully dug around the loop and then triggered the snare from a side, so it safely ate the bait. It was obvious that this particular individual knew that there were traps and how to handle them. We decided to put an additional spring activated snare rather close to the previous one so that the bear could not have known about this new trap. After two days the bear got caught in the new spring activated snare.

We estimated bear weight as approximately 150 kg. We prepared appropriate drug dose and darted the bear from a 10 m. distance. We left the site and waited for the bear to get completely immobilized. After a while the bear was still sober and we had to administer additional drug dose. Later we found that, the plunger had gotten stuck probably due to hot weather and it had not pushed all of the drug into the animal.

After additional drug administration the bear was sufficiently immobilized and we could do all the necessary manipulations. We quickly took some measurements and attached a radio-collar on the animal. During the whole time we carefully monitored the bear's breath and temperature. The bear was breathing a little too intensely as it got too hot (the temperature reached 40 C^0). In order to control the bear's body temperature, we had to put water on the bear's paws and fortunately it helped. Unfortunately we could not weigh the animal. We had to leave the scale in the car because it was too hard for two persons to carry all the equipment. The trap site was a kilometer away from the car. After all the procedures we gave the animal some antidote. The bear woke up shortly and slowly retreated up the gorge. It was a young male bear of a rather large size. The same evening

we caught a first radio signal and we found that the bear was leaving the gorge where he was caught.

In July we carried out fieldwork with the aim to trap new bears. We thought it would be good to catch a female bear to keep sexual balance. Therefore we checked gullies in the national park where we had earlier found tracks of a female bear. In one of the gullies there was a water hole at which we found many fresh bear tracks. On the fifth day of the fieldwork, we went to set bear traps in the gully, but unfortunately we were not allowed to the site. The site is located near the state border with Azerbaijan and the border control people did not allow us to pass through their block post. The Vashlovani National Park is located on the border to Azerbaijan and there are two border control block posts on the Park. We never had any problems with the border guards before. We had never been refused access to any area of the park before. It turned out that they had recently received a new order according to which anyone had to have a special permit to work in the border zone. Therefore we had to return to Tbilisi to apply for the permit. We submitted an official letter to the Ministry of Internal Affairs asking for a permit to work in the Park's border zones. After one month, we were allowed to work in the border zone and it took also some time to receive the permits.

Year 2007

From our previous experience we could not expect to catch new bears in relatively short time because we did not have enough spring activated bear snares (we only had 4 leg hold snares designed for black bear). We decided to make a few more traps in Tbilisi. One of the important details of the snare is spring that throws the loop up on a bear's leg. Therefore we had 10 new springs, exact replicas of the original spring made for us. Although it was quite difficult to find appropriate material the new springs looked quite alright.

We went to Vashlovani on 29th March. We started searching for fresh bear tracks in the southern part of the national park, where the last one was caught. We found bear footprints in a few gorges and set traps there. During March and April sheep are still there grazing on winter pastures. Therefore we tried to set traps in sites least accessible to or rarely visited by domestic animals. In the beginning we set 11 spring activated snares in three gorges and checked them every morning. In addition we placed an alarm system on each trap – when the snare was activated a radio signal would be transmitted that to our receiver.

First 6 days there was no sign of bear activity near the traps. From tracking we knew that badgers and foxes had tried to get the bait (fish and pressed sunflower) and sometimes triggered the snares. After one week, fresh bear tracks appeared in one of the gorges. The foot prints were small (front leg was only 10.5 cm. wide) and probably belonged to a

two-year old bear cub. After 8 days of trapping, we saw that the bear triggered the snares but the animal escaped. We set the traps again and waited. The same small bear came again, ate all the bait and escaped. It was obvious that this cub got used to the snares. Also it was clear that something was wrong with our snares, because none of them captured the animal. We tested the snares and found that the new snares (springs) had become too weak and they would not throw the loop fast enough to catch a bear.

On the 11th day we saw that one of the trapping sites was totally ruined and everything around was destroyed. The bear cub was caught in one of the new snares but the trap must have been too weak to hold the animal until we arrived at the site. After a short examination of the broken snare we found that the part connecting the loop with the anchor cable had been too weak to hold even a small bear. In addition we learned that the bear was caught with the hind leg and therefore the animal could use all its force to free itself (No sign of bleeding or any serious injury was detected on the site during the immediate inspection or the following days. No part of the snare was missing either indicating that the animal had completely freed itself from the trap).

After the above incident we made the connection between the loop and the anchor cables stronger and continued trapping in other gorges of the protected area. The Park administration allowed us to set snares even in the strict protected zone, but unfortunately no bear came close to the traps. One month of a continuous fieldwork ended with no results.

Vashlovani national park rangers were actively involved in the fieldwork activities. Every day they accompanied us and help with all kind of work (carry the equipment, searching tracks, setting up snares, checking the camera-traps, etc.). They were very motivated and helpful. To the end of the fieldwork we decided to encourage and in appreciation of their work we donated a small amount of money (about 100 EUR in total) to them.

Second fieldwork conducted in late summer. On August 21st we went to Vashlovani and started searching for fresh bear tracks. It is notable that during this period sunflower and other agriculture fields outside the protected area attract bears and wild boars. The animals fed there during the night and in the morning returned to badlands for shelter and water. Therefore in the summer animals always consecrate in the gorges where springs and pools are available. Hence we tried to find bear activity in the gorges where small pools where available. In several gorges bear track were found and we set 10 new snares in southern part of the protected area. On each trap alarm system were also placed and as in previous fieldworks bear snares were examined daily. Unfortunately we do not find any bear activity around the trapping sites during 10 days of fieldwork. It is notable that due to dry season tracking down of an animal is not easy. Therefore we might not detect bear movement there. But possibly they were active in different parts of the protected area. In addition this period plenty of food is available for bears (crop, junipers and some

fruits). Food availability reduces probability attracting of bears to trapping site. But it is obvious that bear density in the study area is very low and possibly this is the main reason of capture failure. After unsuccessful 10 days we returned back to Tbilisi.

<u>Year 2008</u>

We planned to carry out bear catching fieldwork in April. Spring is the best time to catch the bears in Vashlovani because it is easier to attract them to trapping sites. In March, Ilia Chavchavadze Tbilisi State University and North Star Science and Technology, LLC offered us to use two GPS-Satellite collars in the Alertis bear research project. These latest models can collect precise data and huge number of animal locations. A GPS unit records the location of the animal on every preliminary determined periods of time and sends the geographical coordinates through a satellite to the manufacturer's website. As we had website password we could easily get data on bear movements.

We gladly accepted the offer and started working with the manufacturer on the design of 2 collars. These collars typically have very short adjustment range (only 7.5-10 cm.). Hence we had to know approximate neck size of an adult bear in Georgia. As we did not have much data on this, we asked Dr. Djuro Huber for advice. Croatian climate is more or less similar to Georgia and presumably bear sizes are more or less the same. Dr. Huber sent us very good data and excellent article on Croatian bear body measurements. These data helped us to define approximate size of the collars. We also defined working schedules of the collars. According to the schedule we would receive 4 locations every 24 hours.

We expected to have the collars in the middle of May (as manufacturer said that they would be ready in 5-6 weeks), therefore we planned to start the fieldwork in late May. But unfortunately designing, constructing and shipping of the collars took much more time. We received the GPS-Satellite collars in late June and therefore we went to Vashlovani National Park in the beginning of July.

In the beginning of July it rained a lot in Vashlovani. With wet ground we could easily determine the areas and specific gorges that were actively used by bears. The rain also filled water holes that were the only water sources in Vashlovani during the summer period and we could easily predict bear movement in the area. We found bear footprints in southern parts of Vashlovani national park and set snares there. We placed two snares near a sunflower field in the northern part of national park too. Thus our traps were distributed over almost half of the national park territory.

We monitored our traps daily. We tried to keep the bait as fresh as possible, therefore we renewed it regularly. We used various baits: pressed sunflower, various fruits, honey and fish. We also mixed honey with chopped fruits, corn flour and vanilla. This mixture had

very strong aroma and we hoped that bears around would be attracted. Following Dr. Jon Beecham's advice we also placed pieces of sponge soaked in anise oil. The oil has a very strong and sweet smell and according to Dr. Beecham experience it attracts bears very well.

After 5th day of trapping one of the snares was triggered by a bear, but the animal was not caught. We set the snare again and thought that the bear will come back soon. But during the following days none of the snares was triggered by bears. We monitored bear tracks around the natural water holes (small ponds). It was obvious that time to time bears visited the gorges but they did not show great interest in the baits. After several days the ponds dried out. To keep bears in the gorges we made artificial water holes. We dug 5 litter containers in the ground and filled them with water. It worked, bears visited the water sources.

After two weeks there was still no sign of a bear coming back to the traps. But on July 29th we found a female bear caught in one of our traps.   It was obvious that she had a cub, because we found bear cub tracks in the gorge and she had milk in her breast. We did not see the cub, probably it was scared after the mother got caught (naturally she fought vigorously to free herself and destroyed everything around) and was hiding somewhere nearby. It was around 10 a.m. but it was already very hot. We assessed bear weight and decided that it was approximately 100 kg. We made appropriate drug mixture (Zoletil + Domitor) and with our dart gun injected it in the back of the bear.

The bear was immobilized very quickly and we started handling the animal according to our immobilization protocol. First we moved the bear over to shade. We tried to operate as quickly as possible to minimize stress and avoid overheating of the immobilized bear. During all the immobilization process we monitored the temperature of the bear and tried to cool her down by wetting her feet and body with water. We weight the bear and she turned out only 75 kg. According to teeth condition she was an adult of 5-6 years of age. We attached a GPS-Satellite collar on the bear and switched it on removing the magnets. We tested VHF radio signal and it worked. As we did not have access to internet we could not check whether the GPS-Satellite unit was working alright.

After all the procedures we injected an antidote and left the bear in the shade. We observed the animal recovery process from a safe distance. The bear slept for 2 hours. Apparently because the drug dose we had given her was for a 100-120 kg animal and the female bear was actually only 75 kg. As the bear was breathing quite normally we did not have to worry. After two hours the bear raised her head. This was a clear sign of recovery and we left the site. The gorge was very narrow and we did not want to restrict her movement in any way.

We returned to our camp and called NACRES office in Tbilisi for them to check the website on which a new bear location should have appeared.. Unfortunately we received very sad news – there was no location on the website for our bear. We then located the bear with radio telemetry and we learned that the collar was still on the animal. According to VHF signal that we received the female bear had left the gorge in which she was immobilized and obviously spent the night on a ridge called Didi Chrdili having moved 6 km. Therefore we came to the conclusion that the GPS-Satellite device of the collar was not working.

Later, after the fieldwork, we discussed the issue with the manufacturer and they told us that in a very few cases it happens that after removing the magnet the collar does not switch on. For the future they recommended that we switched the collar on, checked if it were functioning before attaching it to the animal. We could then only complain that we would rather if someone had given this recommendation before we actually started bear trapping fieldwork. There is also a chance that some mechanical impact can turn the GPS-satellite unit on and we begin receiving data.

We continued our field work till 5th August. One time a bear came to one of the traps, ruined it and ate the bait. The bear did not come again and we could not catch it. We periodically monitored the female bear, but as we were busy to check traps every day we could not collect significant amount of data on the bear movement.

Appendix #3 Photo-Trap Images - Bears (Selected photos)

Appendix #4 Photo-Trap Images – Large Mammals (Selected photos)