Georgian Carnivore Conservation Programme

Addressing Human-Carnivore Conflict in Vashlovani & Tusheti Protected Areas

Final Report

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ABBREVIATIONS USED

APA   Agency for Protected Areas

PA   Protected Area

VPA   Vashlovani PA

TPA   Tusheti Protected Areas

NACRES   Centre for Biodiversity Conservation and Research

FFI   Fauna and Flora International

EU   European Union

GCCP   Georgian Carnivore Conservation Project

HCC   Human-Carnivore Conflict

HCC-RT   Human-Carnivore Conflict Response Team

LGD   Livestock Guarding Dogs

NGO   Non-Governmental Organization

LTD   Limited Company

CzDA   Czech Development Agency

BACKGROUND

In 2009, NACRES and Fauna and Flora International (FFI) jointly initiated The Georgian Carnivore Conservation Project (GCCP) with the financial support of EU. The project aimed at conserving the unique and globally important biodiversity of the semi-arid landscape in Georgia and the Tusheti protected areas as the two sites are ecologically and culturally linked by the Tush transhumant sheep farmers that graze their sheep in and around Vashlovani PA while spending the summer in Tusheti highland pastures.

Vashlovani PA and surrounding winter pastures are the home of large carnivores (Brown bear, Grey wolf, Lynx) while the area is poor in wild (natural) prey. Hence interactions between large carnivores and humans inevitably create an intense conflict which threatens the sustainability of biodiversity and the wellbeing of local livelihoods. To address this situation, in 2011, NACRES and FFI established the Human-Carnivore Conflict Response Team (HCC-RT), the first of its kind in Georgia. The primary mission of HCC-RT is to act as a mediator between the VPA and other conservation initiatives and the local stakeholders affected by large carnivores by conducting studies of HCC, developing and piloting relevant conflict mitigation measures, working directly with the farmers and providing them with logistical and technical support.

After finishing the EU funded project, work of HCC-RT was continued under the project Addressing Human-Carnivore Conflict in Vashlovani & Tusheti Protected Areas which was funded by Acacia Conservation Fund. The current report covers the activities which were implemented under this project and which are grouped by previously defined expectations as follows:

1. Re-defined strategy for GCCP intervention in the Vashlovani and Tusheti Protected Areas
2. Effective HCC Response Team reacts to incidents and actively engages with Tush pastoralists
3. Pilot schemes to improve health of livestock during sensitive lambing period implemented at two farms
4. Pilot schemes to improve livestock protection through physical measures implemented at two sites
5. Feasibility studies to determine the potential for market-based incentive schemes completed

SECTION1. RE-DEFINED STRATEGY FOR GCCP INTERVENTION IN THE VASHLOVANI AND TUSHETI PROTECTED AREAS

Preliminary findings indicate the project strategy in place since 2009 is making progress. However, while positive impacts were evident, measuring outcomes at that stage had proved challenging. To ensure that our project strategy remained sound and would achieve the desired impacts and outcomes, it was decided to re-define strategy for GCCP. It was decided to organize participatory strategic workshop where all local stakeholders had chance to discus key topics of the strategy and using Theory of Change approach for GCCP to identify gaps and help to finalize the new strategy.

1.1.   PROJECT STRATEGY WORKSHOP

The workshop was held on July 3rd in Dedoplistskaro. More than fifteen participants from different organization were invited on the meeting. Although, many invited persons could not attend the workshop (Please find Appendix #1 for workshop hand-outs, participants list and schedule). Representatives of four key organizations took part in the meeting and discussed the topics elaborated beforehand:

- Cooperation between livestock owners/shepherds and the HCC-RT
- Improving protection of livestock (with a possible focus on LGDs)
- Research; what should we know in order to better manage large carnivores?
- Animal health; how can we support improving animal husbandry and veterinary care?
- What are the mid-term plans of the livestock owners in terms of the number of sheep?

1.1.1. Workshop results according to proposed topics:

Cooperation between livestock owners/shepherds and the HCC-RT

NACRES pointed that Cooperation between HCC-RT and livestock owners was not satisfactory and shepherds did not call after wolf attack on their flock. Based on the experience and results from the interviews NACRES members had feeling that livestock owners/shepherds not always have correct information about livestock losses. We proposed an idea to offer livestock owner to give exact figures of livestock loss at the end of the season if they would regularly call after each predator attack. That might raise their interest to become more cooperative in the future.

All livestock owners did not agree and noted that livestock owners have exact information about their losses, but they don't like to share this information to strangers. Every person coming out from nice all road vehicles and dressed not as shepherd, recognized as stranger - representative of government (even if you told them that you are from NGO). Therefore, they avoid giving proper information to the person.

According to participants there are several ways to improve the cooperation between livestock owners/shepherds and HCC-RT. It is essential to become a friend of those shepherds (take a wine to them and drink with them) and deserve their trust. Response team should implement some useful and practical activities (improve accessibility to water sources, providing good dogs etc.). This will raise the

trust from the farmers. If shepherds do not have motivation to call after wolf attack some minor price can be offered – for example top-up mobile balance with 3-5 lari after each call and provided reasonable information.

Figure1. Bejan Lorkiphanidze presents the project's work on wolf ecology

Improving protection of livestock (with a possible focus on LGDs)

It was mentioned that improving Livestock Guarding Dog (LGD) within the targeted farms was not very successful. Mainly because livestock owners did not followed dog rising recommendation provided by the project. As a result they got the Caucasian shepherd dogs that behaved more like pets rather than good working LGDs.

During meeting Tush livestock owners confirmed their common attitude toward the Caucasian shepherd breed. They think that dogs are not suitable for guarding sheep flocks and behave more like decorative breed. But they could not support the idea with any reasonable facts.

Beka Gonashvili (Georgian Shepherd Association) did not agree with Tush livestock owners attitudes and sad that Caucasian shepherd worked well at his farm. Although, he agreed to Tush livestock owners that short haired shepherd dogs (so called Georgian shepherd breed) are better for given environment.

Workshop participants agree that dog training requires more effort and time from shepherds and therefore they are not motivated to train dogs properly. NACRES members proposed the idea to rise and train dogs in special breeding farms and offer to shepherds already trained good livestock guarding dogs. Shepherds noted that it is very risky to introduce new adult dog to the existing dog packs. Shepherd dogs at farm might kill new dog. The alternative is to change whole pack of guarding dogs. In this case socialization problems between new LGD group and farmer/shepherds might occur. Amiran Kodiashvili suggested the idea to hire a person who could train LGD at selected farms.

Another issue is proper dog feeding. Farmers should not feed dogs with sheep meet or sheep carcass leftovers. This is the rule that many farmers know, but some farmers ignore it and feed dogs with sheep carcass leftover (intestines, skin, legs). That formulates dog's positive reaction to sheep meet or carcass remnants. In the situation dog can even become a predator (depredates on sheep or lamb). Livestock owners think that such dog, can even be motivated to allow wolf to kill a sheep. For dogs it can be very easy to understand that wolf kill means consuming on sheep carcasses. Hence shepherd think that such dogs can somehow "support" wolf (for example being inactive during an attack).

NACRES raised question regarding electric fence installation and livestock owner motivation to use them as a protection tool. According our experience livestock owners were not very enthusiastic to the new method. Beka Gonashvili tried to explain livestock owners' attitude toward electric fences. He thinks that 50% of livestock owners' expenses are shepherds salaries. Owner believes that electric fences cannot fully prevent livestock from wolf attacks and he still needs the same amount of shepherds. Hence the electric fence is just extra expenses for him, with not clear benefits.

Beka Gonashvili also noted that all livestock owners teach from the examples. If their neighbour shepherd will be successful in any new farming method, they immediately will try to do the same. They do not trust or believe anybody outside. For shepherds and livestock owners is very important that new method was presented by person from their social environment (good shepherds and/or successful livestock owner).

Livestock owners at the meeting noted that it is not fare that wolf is protected by law and shepherd cannot protect their flock from predators. It appeared that shepherds associations and livestock owners do not know that according Georgian legislation every person can protect themselves and their livestock from predator attack. It is only forbidden wolf sport hunting. Lack of the information among livestock owners probably facilitate bad attitude toward the governmental institutions and stimulates human-carnivore conflict.

Figure2. Temur Popiashvili presents the results and key findings of HCC surveys

Research; what should we know in order to better manage large carnivores?

Presentation on some aspects of wolf ecology raised big interest among the participants. There were many questions asked by participants. While talking on wolf and it attack on livestock, owners did not express very negative attitude toward a wolf. They say that around 14-16 individual per season, per farm is acceptable for owner. If farm has more damage from wolf it means that it is the livestock owners fault – he could not protect its flock properly. They call it nature taxes. It was quite surprise to hear the words from shepherds.

Amiran Kodiashvili noted that it would be good to have more information about wolf ecology, especially on wolf diet. More research should be done find a way of coexistence of shepherds/livestock owners with large carnivores.

Beka Gonashvili several times asked on wolf population number in the study area. Shepherds are really interested to know how many wolfs live around their farms and several time asked on wolf carrying capacity of the area. Sometimes they have their own understanding of wolf number that not always reflects reality. Therefore it might be useful to have clear data on wolf population density.

Georgian legislation allows killing wolf and other predator in the moment of attack on livestock or on the human. The law does not specify the area where the right cannot be used. Hence it is unclear whether people can be guided by law within the protected area or not. The collisions in law should be further investigated and some amendment for the law should be prepared with close collaboration of the relevant governmental organizations.

Animal health; how can we support improving animal husbandry and veterinary care?

At the workshop unsuccessful attempts of sheep vaccination were discussed. Beka Gonashvili thinks that there are two main reasons why it was unsuccessful:

(1) As mentioned above livestock owners' do not trust government and strangers, especially if they promise something. They think in a way that "if you are promising to do something for me, it probably means you would request more in the future." Hence it is better to stay neutral and do not allow any strangers be involved in their businesses. It can be avoided by improving personal relationship with the livestock owners.

(2) Livestock owners don't have good accounting system (although he mentioned opposite before, see cooperation section). As a result they cannot properly estimate livestock damage, or plan their businesses. Therefore they simply do not see need of vaccination. According to Beka's calculation 5 GEL per sheep is a mean cost of veterinary care, but it dramatically can lower sheep mortality. To improve the situation veterinary care (vaccination for example) should be mandatory for the livestock owners and establishing good accounting system should help livestock owners to see benefits of good veterinary care.

It was mentioned that there are very poor veterinary care system in Dedoplistskaro region. There are only two veterinarians and their knowledge are not fully reliable.

One of the most problematic issues that livestock owners have at winter pastures is lack of water close to their farms. They have to take sheep flock for long distances to drink water. On the road they cross other pastures and might transfer diseases between farms. The migration to water sources also increases chance of predators' attack. Improving access to water even for small group of farms can positively affect on cooperation between Response Team and livestock owners. They will see real benefit from "stranger" and will become more open toward future cooperation.

Beka Gonashvili thinks that pasture regulation policy outdated and need significant improvement. There is many problems that should be solved to support livestock owners in their businesses. He especially mentioned current high taxes on pasture lease. The taxes are not only high, but sometimes

discriminative - pasture lease prices are not correctly differentiated according districts and pasture productivity. It may happen that some shepherd pay more for low productivity pasture and some pay less for high quality pastures.

What are the mid-term plans of the livestock owners in terms of the number of sheep?

It appeared that in fact sheep number stays same when pastures are decreasing due to land privatization process. For example, pastures around village Iormughanlo, were bought by Iranian. The owner surrounded the land and do not allow grazing on the land. Hence, about 50 000 sheep and 15 000 cattle were left without pastures. Livestock owners had to find pastures close by, around Vashlovani for example. Due to the fact, farm and pasture leasing price increased tremendously, but the owners do not had choice and paid for the rent. But to compensate the high rent price they increased density of livestock per hectare. This will definitely cause pasture degradation. B. Gonashvili thinks that it's necessary to set grazing quota per hectare and strengthen low enforcement in this field.

 Talking about the future of sheep business, Mr. Gonashvili mentioned that without importing new breeds and proper stock breeding programs this business cannot be developed. He thinks that keeping only Tushetian sheep is not profitable. The Tushetian sheep is good for nomadic farming but is less productive comparing to existing sheep breeds. it's important to develop stable, barn based sheep keeping practices. He also noticed governments' role in regulating and/or improving the business.

Beka also mentioned that it is essential to keep small number of the Tushetian sheep as Tushs are very proud of their traditional breed and nomadic life style.

It was mentioned that wool business has good potential in Georgia, but lack of knowledge and experience are the major constrains the business development.

Figure3. Head of Georgian Shepherds' Association Beka Gonashvili talks about shepherds

1.1.2. Recommendations for future strategy, summarized at the end of workshop:

1. Popularization of LGD training practices and changing wrong stereotypes among livestock owners;
2. Rise shepherds and livestock owners' awareness toward carnivore regulation legislation. Although it should be underlined that the regulation is eligible outside protected area only;
3. Work with relevant governmental organization to refine the carnivore regulation law. It should be clearly stated in the law how can shepherd protect their flock within a protected area;
4. Improve access of key farms to water sources (at least have feasibility study results);

5. Carry out proper and comprehensive income/loss analysis at model farms. The analysis should include real expenses in sheep farming as well as non-material costs (time, energy etc.). It can also include ecosystem services (carnivore attract tourists); estimating results of overgrazing and desertification;

6. As the wolf research carried out within Georgian Large Carnivore Conservation Project raised big interest among the participants. It was advised to continue wolf ecology study and further present results to local community;

1.2.   THEORY OF CHANGE WORKSHOP

Participatory strategy workshop was followed by theory of change workshop and analysis. Process was leaded by Katie Lee-Brooks and Victoria Dauncey from FFI. Specific aims of workshop participants were to:

- understand if we are affecting the problem we are seeking to solve
- understand if we are achieving something
- understand if our approach is relevant
- understand how our project looks at a zoomed out level
- understand if there factors within our project that are stopping us from achieving our aims (i.e. reporting at critical times for field activities)
- understand if we can improve our opportunities to access funding (new and existing)

On the workshop project focus was re-assessed and following topics were addressed:

➢ **Long-term Goal** - A combination of grazing pressure, HCC, and unsustainable pasture management practices has serious impacts on herding livelihoods and biodiversity. To address these related threats, FFI and NACRES have been working with the region's pastoral communities to develop locally appropriate HCC solutions, improved animal husbandry practices, and a framework for sustainable pasture management that will benefit local communities as well as the area's biodiversity. The project's long-term goal, then, is **to ensure a maintained and tolerated wolf population in Vashlovani and Tusheti Protected Areas**.

➢ **Key Assumptions & Project Goal** - Based on the key assumptions that i) the project can influence the government, ii) that wolves are not being killed primarily because of either a market demand for wolf products or a basic emotional drive, that iii) an increased knowledge of wolves will lead to an increased tolerance of them and that iv) the wolves are driven to predate domestic animals due, at least in part, to a lack of natural prey, the projects goals are **to ensure that wolves are managed effectively by the government with lethal control as a last resort** and that **no wolves are killed in retaliation for livestock attacks.**

➢ **Interventions** - The project recognises that the main group of people impacted by the wolves of Vashlovani are the **Tushetian sheep farmers** that over-winter in the region and, so, a major approach is to work with this community to **improve their capacity for protecting their livestock from predators whilst** also working **to improve their, and the wider communities, understanding of and tolerance towards wolves.**

Equally, understanding that the loss of stock to disease and adverse conditions is also a major cause of economic loss to the Tush, the project works with them to improve animal husbandry and access to veterinary care. Finally, to address the issue of natural prey, the project is seeking to increase the natural prey base through reintroductions of the goitered gazelle and roe deer to the area.

➢ **What we can't address** - The resources available to the project are limited and so, whilst recognising the potential import of factors such as the emotional impact that depredation of livestock has on livestock owners and shepherds, this is not an area that we feel we can effectively address. Similarly, whilst the potential for wolves, and other large carnivores, being killed by "sports hunters" for reasons not at all connected to HCC, the lack of effective regulation of this interest group represents a serious impediment to addressing and requires a level of intervention that is beyond our current scope. However, as this is not our current target group, and as retaliatory killing exists independently of the existence of "sports hunters" this is not viewed as a significant barrier to achieving the project's long-term goal.

The government's apparent reluctance to commit to resolving this management issue is, we believe, primarily driven by a lack of funds within the annual state budget which, in turn, is the result of a whole gamut of priorities faced by the countries government as it proceeds with its transition from a centrally-governed Soviet state to an independent nation. While the cooperation of the relevant government agencies is preferred, progress towards the projects long-term goal can, we believe, be maintained with sufficient focus and external funding. As has been adequately demonstrated elsewhere (e.g. in North America with the Defenders of Wildlife and in Nepal with the Snow Leopard Trust) long-term and sustainable solutions can be achieved through non-government agencies.

Figure4. Discussion at Theory of Change workshop. Left to right – Gareth Goldthorpe (FFI), Temur Popiashvili (NACRES), Bejan Lortkiphanidze (NACRES) and Irakli Shavgulidze (NACRES)

SECTION 2: EFFECTIVE HCC RESPONSE TEAM REACTS TO INCIDENTS AND ACTIVELY ENGAGES WITH TUSH PASTORALISTS

2.1. 5TH HUMAN-CARNIVORE CONFLICT SURVEY IN VASHLOVANI, 2013-2014

2.1.1. Methods

The methodology of survey was mainly based on baseline survey developed in 2009 within the Georgian Carnivore Conservation Project. Some minor changes were made during last years. This year we only updated datasheets and removed questions, which are not necessary to ask respondents every year (see appendix2). At the moment we have two versions of datasheets. One, shorter datasheet will be used every year and second full scale datasheet will be used in every third year of HCC survey.

Survey data has been entered into MS Access database. The analysis detailed within this report was carried out using the database in conjunction with ArcGIS and MS Excel.

Table1: Data collected during surveys

Year	Interview (End of season)	Attack event
2010	70	105
2011	56	72
2012	60	49
2013	65 (40)	143
2014	66 (49)	94
	317 (275)	**463**

Summarizing all survey results, we can see that there are a total of 84 potential farms in the study area. However, not all will be active permanently within winter season (for example, some farms are only used temporarily for lambing).

Usually one farm is shared by two or more livestock owners/flocks but in some cases one livestock owner/flock owns two or three farms. One flock not always means one livestock owner. Two livestock owners at the same farm can join their flocks (including shepherds and dogs), or keep them separately by dividing the pasture associated to the farm. Even one owner can have more than one flock/herd that can be distributed in several farms (mostly with different type of livestock, one at his farm and one at another) (

Figure). Shepherds try to use any unoccupied pastures available during the any period of winter season.

Hence flocks are often migrating within and out of project area. We got more clear picture after dividing the interview survey in two parts (beginning and end of winter season), as we were able to track the flock movements. Map 1 shows the flock migrations within the winter pastures during report period; Collecting data about migrations were occasional and it is just a part of whole picture.

Last three years livestock owners have big problems with pasture quality draughts in spring become more problematic every year. Current year was remarkably dry and grass cover was unusually low. Our survey showed that density of livestock was increased significantly which makes problem more visible. We can consider that next year sheep flocks will have more problems to overwintering in our study area

Figure5: Possible variants how can be distributed livestock owners and flocks/herds at farms
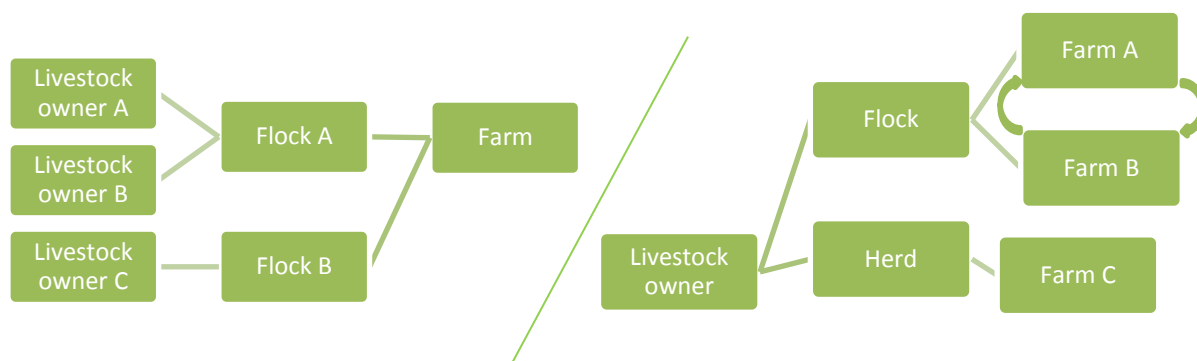
66 farms were surveyed at the beginning of winter season, compared to the 2013 (65), 2012 (n60), 2011 (n56), and 2010 (n70) surveys (Map3). Most of the surveyed farms are migrating to summer pastures; only six farms stay in study area year round;

Table2: Surveyed farms by regions in 2013

General Region	VNP	2km buffer	Sum
Western	3	25	28
Central	13	4	17
Eastern	19	2	21
	35	**31**	**66**

2.1.2. Results and Data Analysis

Socio-demographic characteristics of livestock owners

The average age of respondents was 42 (range 18-72, total number of answers =52). 1 (2%) respondent was less than 20 years old, 40% were aged 20-39, 45% were 40-59 and 13% were 60 and older. All livestock owners were male. All respondents were from one of five districts of Kakheti region. Respondents from Sagaredjo and Telavi districts usually are Azerbaijanians, mainly from two villages – Iormughanlo (Sagaredjo) and Karadjala (Telavi). The home regions of respondents are given in .

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Table3: Respondent's (n=64) number and percentage by living places

Akhmeta	Sagaredjo	Telavi	Tianeti

Tusheti		Pankisi						n	%
(73% of Akhmetians)		(27% of Akhmetians)							
n	%	n	%	n	%	n	%		
35	55	13	20	11	17.19	4	6.25	1	1.56

Livestock and husbandry

The overall number of livestock reported was 56,070 head with an average number of 850 head per farm (n66). Changes in average numbers please see in **Error! Reference source not found.**.

Regarding sheep and Goats we get important increase (19%). Total number of sheep was more than 52,000 head at 50 farms with sheep. The reason might be connected to sheep market issues. Last couple years shepherds have some problems with selling sheep. So they have to keep more sheep than predicted.

Number of cattle was slightly decreased to the figures of first two surveys. In 40 farms were kept cattle only, in 26 farms cattle share the farms with sheep.

Smallest number of horses was recorded through all five surveys. There were four farms without horses. Most farms (n43) keep 1-10 heads. 19 farms kept 11-50 heads. It is interesting to note that farms with many horses (approximately more than 50 heads) usually made a business of keeping horses from other farms during the winter.

Table4: Average numbers of livestock at farms (F1)

Survey	Sheep/Goat	Cattle	Horse	Donkey
2009/10	852.4	77.3	14.1	2.6
2010/11	1082.9*	77.6	15.7	3.0
2011/12	878.8	62.8	15.5	3.3
2012/13	901.0	83.0	16.0	2.1
2013/14	1042.4	76.7	13.1	3.5

during survey lamb number also included in the sheep count and that definitely influenced on the total number

Average number of donkeys was 3.5 head per farm. They were found only in 21 farms and mostly with Azeri people. For unknown reason mostly Chechens keep donkeys.

If we will discard the figure from winter season 2010/11 (as mentioned above lamb number were included in total sheep count) then we can see that number of sheep is increasing every year. Although there are some changes in average numbers of other livestock, it is not easy to see any obvious dynamics.

Number of livestock at farms was calculated using this formula: **Formula 1 (F1)**: livestock average=n of total/n of farms [if n of livestock > 0]

Table5: Numbers of livestock from 66 farms within the study area

Livestock type	n farms	Per farm		Total
		Mean	Range	
Sheep/Goat	50	1042.4	40 – 3000	52,118
Cattle	40	76.7	4 - 250	3,069

Horse	62	13.1	1 - 126	810
Donkeys	21	3.5	1 - 6	73
Total	**66**	**849.6**	**41–3079**	**56,070**

Figure6: Distribution of Sheep and cattle at surveyed farms in 2014

Sheep (overall) - 50 farms (76%)		
Only sheep – 24 farms (36%)	Sheep/Cattle – 26 farms (39%)	Only cattle – 14 farms (21%)
		Cattle (overall) - 40 farms (61%)

The average number of persons in each farm was higher than previous years (6.3) possibly because of increased number of sheep. Average number of livestock owners per farm was 2.7 (max=18). Average number of Shepherds/herders was 3.6 (max=12).

Number of persons at sheep farms is slightly less than at cattle farms (5.7 < 6.1). Average number of sheep per person is 205 head (Range 58 – 450) and cattle 29 head per persons (Range 11 – 55).

Usually each person has his function at farm; some are herding the flock, others stay at the farm, cooking or looking after sick and weak animals. This role at farm sometimes is permanent but sometimes shepherds had rotation scheme shifting for one person;

Number of persons at farms depends on period of time– during lambing there are more shepherds than in the beginning and at the end of the season. Most livestock owners are not always at farm, usually they go home after and before migration, but they spent time at farm during lambing.

During lambing season there are more shepherds at farms. We asked livestock owners how many shepherds will join them for lambing. According their responses, number of persons will increase up to 138%. So, if the average number was 5.7 persons in the beginning of season, for lambing there will be 14 persons per farm.

Almost half of the migrating farms arrived in November and others in December (

Figure). Only two farms were added in January and one in February. As usually most farms left winter pastures at the end of April. Only respondents from six migrating farms responded that they will leave winter pastures in middle of May. As our survey was done at the end of April we missed some farms, as they left earlier due to poor grass condition.

Generally the arrival tends to occur over a longer period than the return to summer pastures because the livestock owners aim to preserve winter pastures as long as possible by delaying their arrival. To do this, they will look for temporary pastures on route along the Alazani valley or harvested cornfields in Shiraki area. If they find a suitable place they will stay there until just before the onset of lambing season or weather worsening; if not, they will continue moving slowly, staggering the arrival of flocks in Vashlovani. In spring, when lambing season is finished all farmers will wait for news of the snow melting on the Abano pass. As the pass opens most will leave Vashlovani, giving a sharp drop in active farm numbers in May.

Arrival and departure dates often change between years, depending on prevailing weather conditions and the condition of the grasslands.

Figure7: Arriving farms at winter pastures and leaving to summer pastures in 2013-2014. Diagonal pattern shows farms that had not been interviewed before they left the area
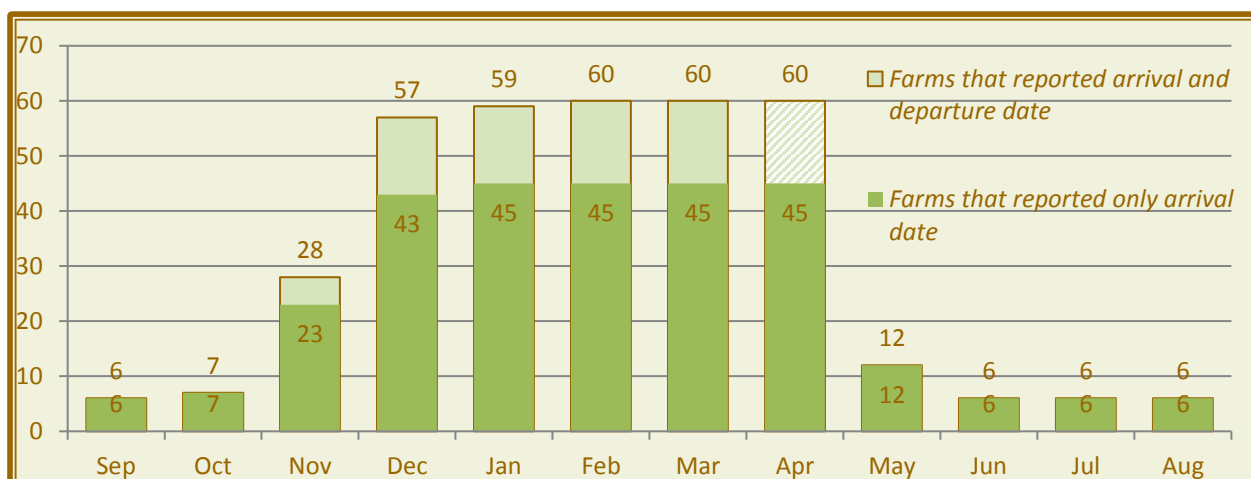
Losses to predators and other causes

Overall damage caused by predators in the winter of 2013-14 was 1.89% (table6). Through the five years of surveys damage level is changing slightly between 1.5% and 1.9% giving an average figure of 1.7%. We can say that there are not any real signs of increasing damage level and it's more or less stable.

Table6: Damaged livestock during 2013-14 winter season

Livestock attacked		Farms affected		Damage per farm			Total damage	
		n	% [1]	mean[2]	Max	%[3]	n	%[4]
Sheep	Killed	32	65%	18.8	178	**1.7%**	601	82.3%
	Injured	5	10%	3.4	7	**0.05%**	17	2.3%
Cattle	Killed	16	33%	4.1	12	**2.5%**	66	9%
	Injured	4	8%	1.5	3	**0.2%**	6	0.8%

Other	Killed	17	35%	2.2	7	**5.5%**	38	5.2%
	Injured	1	2%	2	2	**0.3%**	2	0.3%
Total	Killed	42	86%	16.8	-	**1.83%**	705	96.6%
	Injured	10	20%	2.5	-	**0.06%**	25	3.4%
	No damage	6	20%			**1.89%**	730	

[1] Interviewed farm/n of farms affected;

[2] n of damaged animals/n of farms affected;

[3] (n of damaged animals/total n of each kind of animals at interviewed farms)*100;

[4] (n of damaged animals/total number of damaged animals)*100

On January 1st, night, presumably wolfs killed 140 sheep at one farm. Shepherd got drank and lost about 250 sheep at pasture. The flock stayed outside during night and spread out on large territory. Next morning shepherds collected only part of sheep. They counted 140 killed and 5 injured sheep. Surprisingly in this case everybody blame the shepherd who let sheep stay overnight without protection. Nobody indicated that was classic wolf attack and primary reason of sheep death was shepherd's costly mistake. Excluding this extraordinary case we have lower livestock loss - 1.53%. But as such accidents may influence on the public opinion and on the shepherd overall attitude toward carnivore, we included the damage in the total count.

45 respondents from 49 visited farms rank causes of livestock loss. 77% of them had told us that predation is most problematic, while only 22% said that diseases are more problematic than predation (see table7).

Table7: Livestock owners' (n=45) rankings of causes of financial loss

Cause of loss	Sum of owners' (n=45) scores ranking sources of loss from most (1) to least (2) problematic		No Problem
	1	2	
Disease	22%	76%	2%
Predator	78%	22%	0%

We have idea that livestock owners' and shepherds' answered on this question are not based on any calculations and it is just their overall feeling. Calculating real financial loss may give different figures. Therefore we propose to add some more questions regarding veterinary costs and livestock losses from various diseases next season.

During interviews on financial loss we observed that livestock owners and shepherds talk about diseases as cause of death that could be avoided via proper veterinary care, vaccination and/or treating the livestock properly. But when predation is concerned, they have filling that that the problem is not manageable because government restricts wolf hunting and does not have campaign against wolf. They think that carnivore number regulation would solve their problems (as happened in Soviet time).

Majority of livestock owners think that predators are big problem for them (79.6%). This percentage had increased since the first assessment (see Table8). This season we almost the same percentage that we got years 2012/13.

Table8: Livestock owners' responses on question: 'Are predators a big problem for you?' through all surveys

Answer	2009-2010	2010-2011	2011-2012	2012/13	2013/14	Overall
No	21.43%	21.82%	13.46%	5.13%	11.36%	15.77%
Partly	27.14%	18.18%	11.54%	12.82%	9.09%	16.92%
Yes	51.43%	60.00%	75.00%	82.05%	79.55%	67.31%
Damage	1.5%	1.9%	1.5%	1.7%	1.9%	1.7%

Surprisingly, more than half of the same responses mentioned that they had less than usual loss during this winter season. Only 34% respondent replied that loss was more than usual (

Table9).

Table9: Responses on question: "Compared to the past 5 years, is this loss:

Damage level	2009/10	2010/11	2011/12	2012/13	2013/14	Grand Total
Less than usual	36.00%	24.07%	47.27%	26.47%	**52.38%**	37.45%
About average	16.00%	25.93%	23.64%	17.65%	14.29%	20.00%
More than usual	48.00%	50.00%	29.09%	55.88%	33.33%	42.55%
Damage	1.5%	1.9%	1.5%	1.7%	1.9%	1.7

This season overall loss was higher than previous years and it was expected that respondents expressed that in their answer. But as we mentioned above we have high loss result due to extraordinary case, when shepherds left sheep flock overnight at pastures and got very high loss (140 individuals). Without the particular damage the overall loss was quite low 1.5% and hence livestock owners and shepherds answerer becomes understandable.

According to livestock owners and shepherds February still appears to have seen a peak in wolf attacks. Figure shows that result of respondents' answers on this question is quite similar through all years of survey with only small differences. As we saw from previous surveys, respondents not always provide answers according to actual damage of wolf attacks. They do not write when, why and how many animals were died. During interviews some of them said that they have journals, but when we asked to show us they said that the journals are empty. Most popular practice is to collect ears of killed animals but this collection includes the ears of animals eaten by shepherds or livestock owners.

Figure8: Livestock owners' responses on question: 'In which month(s) do you tend to lose most livestock to predators?' through all surveys
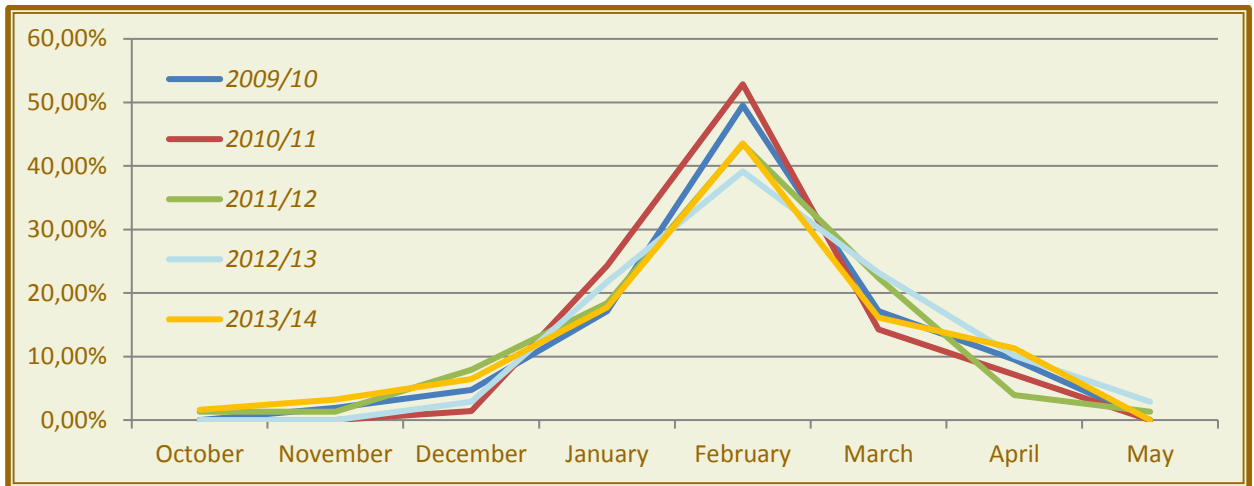
Usually (74% of respondents), a high number of attacks in February are linked to wolf breeding season (though there was often some confusion of when the breeding season actually starts). When they are asked about most problematic months, answer is mostly "during wolf breeding season"; but when they are asked again to say month, they start to think when wolves have breeding season. They think that wolves make packs during breeding season and they are hunting more intensively. Some respondents think that during wolf breeding season they become more aggressive. Some (13% of respondents) think that February is most problematic because of lambing (lambs are easy to catch) and others think that reason might be a bad weather (They say that when it is cold wolves need more food).

Those respondents who reported April and May as most problematic thought that reason is that wolves have cubs and they need more food; But again after question they don't think in which month they had more loss – they think when wolves have cubs.

We try to check whether the respondents' idea on most problematic month is true, or not. We compared wolf attack dates and interview collection dates (Figure). Although most respondents think that February is most problematic, we can see that attacks are almost equally distributed from December to April. Indeed, distribution of data collection also affects this data, but it's quite obvious, that according to recorded attacks we don't have such sharp lines in February. This kind of analysis needs further approval with next surveys. Unfortunately we cannot use data from previous surveys as they were conducted once a year and it is polarized to the end of winter season.

Figure9: Comparing results of responses on question: "Which month(s) do you tend to lose most stock to predators?" and collected attack data across all surveys

Figure shows the relation between the number of each livestock species attacked and the percentage of the total number killed for each species and shows us that, even though relatively few cows are killed each year, they represent a bigger proportion of a farmers stock. Subsequently, farmers raising cattle or horses will lose a larger portion of their income for each animal lost to predation. This might affect their attitude towards large carnivores.

Figure10: Number and percentage of each livestock type attacked

44% of respondents perceive the loss of livestock to predators as having a "big" impact on their income (Table10).This result is almost similar as results from all previous surveys except the second one when almost 65% of respondents said that they had big losses. This high result was caused by peak of predation that was recorded that time (1.9%).

Table10: Livestock owners' responses on question: "For your income this loss is" across all surveys

Economic loss*	2009-2010	2010-2011	2011-2012	2012/13	2013/14	Average
Big	46.2%	64.7%	47.7%	47.1%	44.1%	50.5%
Medium	19.2%	19.6%	31.8%	26.5%	35.3%	25.7%
Small	9.6%	5.9%	11.4%	23.5%	11.8%	11.7%
Insignificant	25.0%	9.8%	9.1%	2.9%	8.8%	12.1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

* During the first and second surveys we used an additional category "very big". This was dropped and so results here are pooled where appropriate.

12% (n=6) of surveyed farms did not have attacks. It's very interesting that from these six farms five are cattle farms. Farms that were not attacked presented on Map 4: Farms that reported no predator cause livestock lose to according to all survey years (please see appendices). The question is what more determines farms to be not attacked – livestock type or region? Or given results are occasional? Let's first look at distribution of not attacked farms through all five surveys. We will see that different years there are different clusters of farms without attacks but we cannot say that one region is generally less problematic than others. In case of livestock species, in most cases not attacked farms are cattle farms. Over five years 43 farms without attacks were observed and 65% of them were cattle farms. If we remind the fact that cattle are seldom followed by shepherds and dogs this result will seem to be more unexpected. We can only suppose that wolves prefer to attack sheep because it is easy to hunt and take.

Financial damage level at surveyed farms is presented on Map 5 (see appendix #2). There are five classes, two under average (≈2%) and two above average. One class is given for the farm which has lost 140 sheep at one single event. Calculations in this map includes coefficient for damaged cattle which is multiplied six times (average difference between sheep and cattle price) for valid comparison (Map 5). On this map we can see only one cluster of farms with high level of predation in the center of project area. Farms mostly affected by wolf depredation (more than 4% of financial loss per farm) during all survey years are presented on Map 6. Farms with high financial loss located mainly in north-east part of study area. Many of these farms are cattle farms. Wolf depredation on cattle causes higher financial loss comparing to sheep or goat depredation.

Details of attacks

Respondents from 42 farms provided details of 94 attacks in which a total of 314 individuals were attacked (282 killed and 32 injured)(Table11).These numbers include the case when 140 sheep was killed by wolves, due to highly irresponsible behavior of the inattentive shepherds.

Average number of killed/injured animalsper collected attack eventwas 3.34, higher than in previous year (1.51). Average number of provided attacks per farm was 2.21. Two attacks were recorded when predators tried to attack but could not even damage the livestock, we will call it unsuccessful attacks.

Sheep/Goats were the most attacked animals. Average number of killed/injured sheep/Goats per attack was 4.71.One unsuccessful attack was reported on sheep.

A total of 19 attacks on cattle were reported with 17 animals killed and 5 injured, with average number 1.16 killed/injured animals per attack. There was only one attack with more than one victim. One unsuccessful attack was reported on cattle.

16 attacks on horses and donkeys were described, with 19 killed/injured animals, average 1.19 victims per attack.

Generally average numbers of damaged livestock per attacks was higher this year than in previous year.

Usually respondents don't provide attacks without victims, sometimes they miss the moments when the predators' attack is not successful; because of this we cannot provide the percentage of unsuccessful attacks. Only two unsuccessful attacks were provided by respondents.

Table11: Predator attacks on livestock (n=94) in winter 2013/14, as reported by livestock owners and herders at 42 farms in and around VNP during semi-structured interviews

Livestock attacked[1]		Attacks		Damage per Attack		Total damage	
		n	%	mean[2]	max	n	%
Sheep/Goat	Killed	58	62.4%	4.28	140	248	78.98%
	Injured			0.43	7	25	7.96%
Cattle	Killed	19	20.4%	0.89	2	17	5.41%
	Injured			0.26	2	5	1.59%
Other	Killed	16	17.2%	1.06	2	17	5.41%
	Injured			0.13	2	2	0.64%
Total	Killed	-	-	1.73	140	282	89.8%
	Injured	-	-	1.69	7	32	10.2%
	No damage	2	-	-	140	-	-

[1] Calculations in this table excludes unsuccessful attacks

[2] Number of damaged animals / Attacks on each kind of livestock

The average size of flocks suffering from wolf attacks was 555 head (min=18, max=1500). Comparing to previous year this number is much higher (471 head). Possible reason might be increasing number of sheep in project area.

Distribution of collected attacks by date might also affect the size of flock. In the beginning of the winter season the flocks are not divided. During and after lambing season flock are divided into smaller parts.

Wolves were reported as responsible for attacks on livestock in 94% of all cases, in other cases carnivore species was not identified. However, in 37.6% of attacks, the predator was not actually seen. The average number of wolves involved in a single attack was 3.3 (max=15). These figures are very similar as in previous years.

60% of attacks occurred during the day (PM&AM) and 25% at night (Figure) with 0% of attacks occurring at dawn, when the shepherds are waking up and preparing to leave the farm and 16% of attack at dusk. We get very high number of night attacks (Average=16%) which is similar as it was in 2012. All other years this numbers are much lower (15%-2010, 11%-2011, 13%-2013). It is interesting what causes such big difference between years. Unfortunately we don't have enough data to answer this.

Figure11: Period of day at which predators attacked livestock in and around VNP during winter 2013/14 according to reports by livestock owners and herders (n=85)
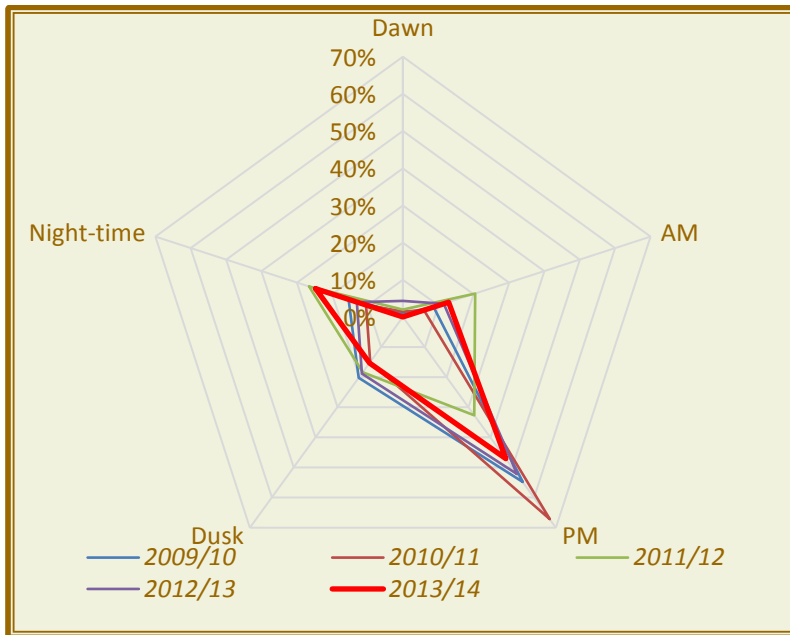
The peak time for attacks was from 13:00 to 16:00. Figure shows that it is not as concentrated as in previous years and it slid towards midday. It more or less got similar as it was in second survey.

Figure12: Time of day at which predators attacked livestock in and around VNP during winter 2013/14 according to reports by livestock owners and herders (n=67)
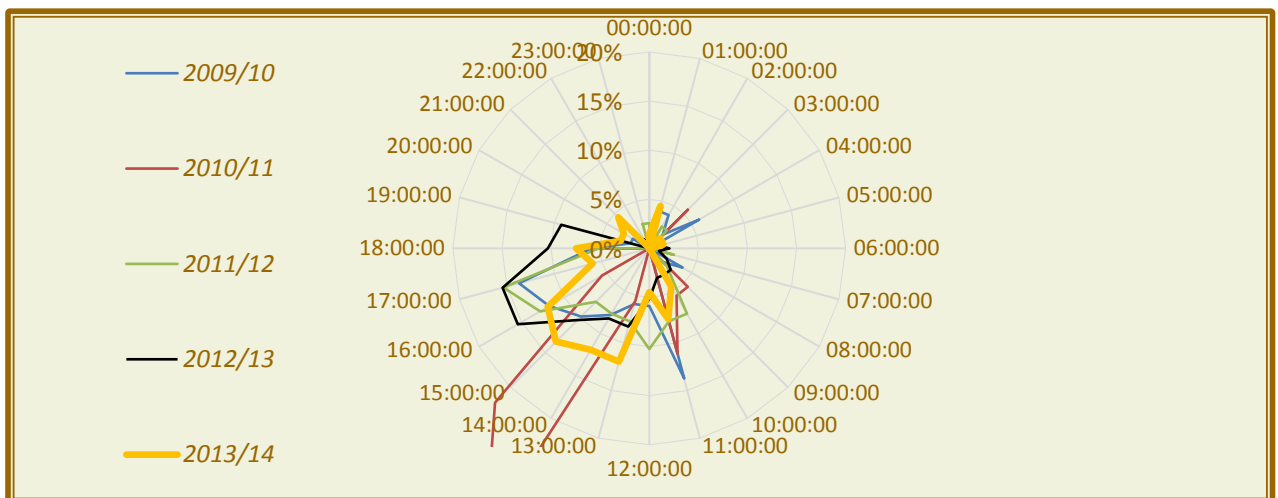
Data of livestock activity during attacks is very similar to previous years. Only difference is that this year we had more attacks when livestock was sleeping at farm. This data is connected to timing of attacks which we had already reviewed.

Most attacks occurred when the flock was grazing (Figure) which makes sense when one considers that this is where they spend more than half of their time(Flocks leave farms on dawn (approximately at 08:00) and stay on pastures till dusk, sometimes till night-time (approximately till 8-9 o'clock), so they spend 12-13 hours at pasture). If we compare it to another half time, which they spend at farm inside corral or barn where the flocks are more protected than at pastures where the typically larger numbers of sheep within grazing flocks as opposed to flocks at the farm may also make this a more attractive prospect for a wolf, whilst the difficulty of monitoring large, dispersed flocks at pasture means

opportunities for picking off stray animals may present themselves. This, compared to the smaller area of flatter terrain found around farms again makes the pasture a better place for predation.

Figure13: Livestock activity during attacks through all surveys
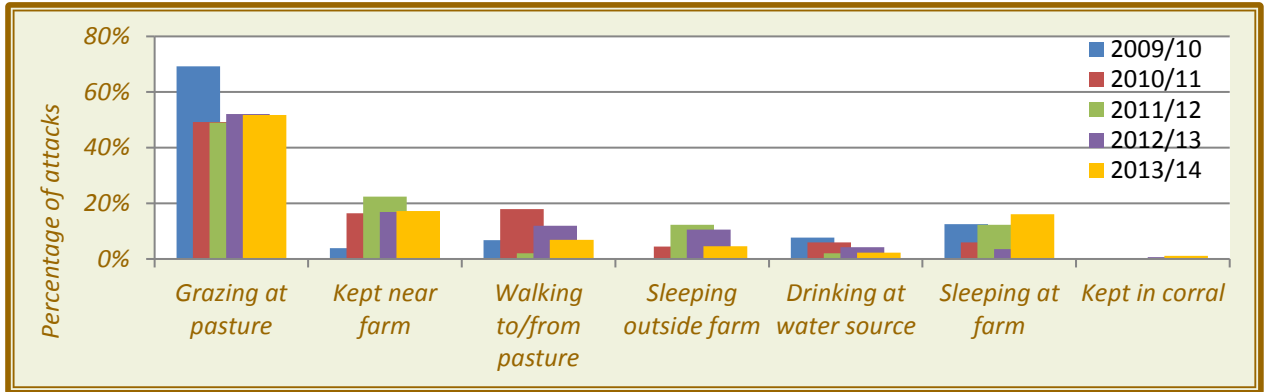
Flock that is kept near farm still seems attractive for wolves. Usually this is a flock of seek or weak sheep or newborn lambs which are grazing close to farm mostly without shepherd. The installation of electric fences near farm can solve this problem by protecting this kind of sheep and on the other hand giving shepherd more free time. On the base of this idea was decided to provide farms with electric fences. They were installed at two farms but did not work for a long time to be observed if they can help shepherds to decrease damage. The reason was that they were installed later and soon farms left winter pastures. We get enough practice of installation fences and will reinstall them after farms arrival.

Figure1: Sheep and lambs activity during attacks in 2013/14 winter season
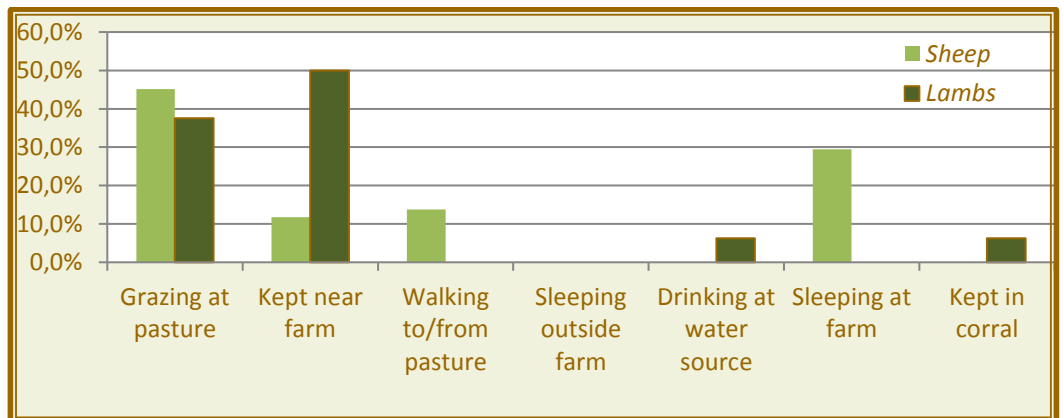
In 2010 there were more events when dogs and shepherds were present than in subsequent years. However, this may be more a product of how the interview was delivered and responses recorded. Sometimes, shepherds report that they were at attack place even if, for example they were inside the farmhouse, 200-300 m away. After 2011 such cases were recorded as not present. In this way, some of the records in the database show shepherds/dogs as not present whilst a precise figure for the number of wolves involved is given. This is important for analysis. If, for example, we want to investigate when and why wolves attack sheep, we would need an exact picture of the event. If we record a shepherd as present during an attack when, in fact, he was inside the farm and invisible to the wolf, we will falsely assume that the wolf actively ignored the shepherd, attacking the livestock anyway. Referring to

Table12&Table13, we can see that, from the 2011, 2012, 2013and 2014 surveys, both shepherds and dogs were absent when wolves attacked stock animals other than sheep.

The average number of dogs present at any attack was 4 (excluding attacks without dogs) as in previous year and the most common response by the dogs to a wolf attack was to bark and chase. Maximum number of dogs, present at attack was 10. If compare attacks, by number of attended dogs we can see difference in average number of killed animals per attack. 11 attacks were reported when 5-10 dogs were attended; 29livestockwere killed/injured (mean –2.63) which is very unusual because we get higher damage than attacks when dogs were not attended. Seven from this attacks were happened at night and that's why respondents provide high numbers of dogs (as usually dogs are near farm during night) but still if we remove this seven cases, damage stays high. Such unexpected relation between numbers of dogs and damaged animals was not observed in previous surveys. In that case everything seemed very logical. So we need to see next survey results to find out if it was just casual one.25 attacks were reported when 1-4 dogs were attended. Two were unsuccessful attacks and in other cases 38 stock animals were killed/injured (mean – 1.52). Average number of killed/injured stock animals when dogs were absent was 1.79 per attack. Two events were recorded when dogs fought to wolves. Both happened during night and one wolf was killed. There were nine cases when dogs were reported as present during attack but with late alert. Such cases are calculated as present in Table12&Table13.

Table12: Presence/absence of dogs during attacks through all surveys

	2010	2011	2012	2013	2014	Overall
Events with dogs present	58%	50%	37%	35%	39%	45%
Events with dogs absent	42%	50%	63%	64%	61%	55%

		2010	2011	2012	2013	2014	Overall
Dogs present during attack on sheep	Yes	57%	69%	47%	46%	48%	53%
	No	43%	31%	53%	54%	52%	47%

		2010	2011	2012	2013	2014	Overall
Dogs present during attack on other animals	Yes	65%	26%	32%	16%	23%	34%
	No	35%	74%	68%	84%	77%	66%

The number of shepherds present at an attack event was, in most cases, only one. But in eight cases attended two and in one case three shepherds. The most common response by a resident shepherd was to shout at the predator. In 22 cases they reported late alert. Six shepherds reported that they chased the wolves. One may think that chasing the wolves means that shepherds are following wolves when they run away, but actually it means to go towards the attack site by shouting.

Table13: Presence/absence of shepherds' during attacks

	2010	2011	2012	2013	2014	Overall
Events with shepherd present	77%	51%	45%	52%	48%	58%
Events with shepherd absent	23%	49%	55%	48%	52%	42%

		2010	2011	2012	2013	2014	Overall
Shepherd present during attack on sheep	Yes	83%	76%	63%	68%	65%	73%
	No	17%	24%	38%	32%	35%	27%

Shepherd present during attack on other animals	Yes	68%	16%	26%	22%	23%	34%
	No	32%	84%	74%	78%	77%	66%

We tried to compare attack timing when dogs were present or absent. This year we got absolutely reversed result from 2013 years one. That time most attacks were happened around 17:00 and when dogs were absent. We considered that dogs' absence which was caused by their early arrival at farm than flock could increase the number of attacks (See textbox).

Figure3 shows that dogs' presence was different in different time of day in 2012-13 winter seasons. We can see that most attacks which happened at 17:00 o'clock dogs were not presented. This data confirms shepherds' concern that dogs are hurrying to farms in the evening because they are hungry and often leave the flock. This could be a reason that most attacks (31%) happened between 16:00 – 17:00 o'clock. Changing this behavior of dogs by taking extra food to pasture or do not let them eat before flock returns at farm can decrease the wolf attacks.

According the new results (Figure2: Presence of dogs during attack by time in 2013/14 winter season), we can see that most attacks that happened from 10:00 to 12:00 dogs were absent.

Figure2: Presence of dogs during attack by time in 2013/14 winter season
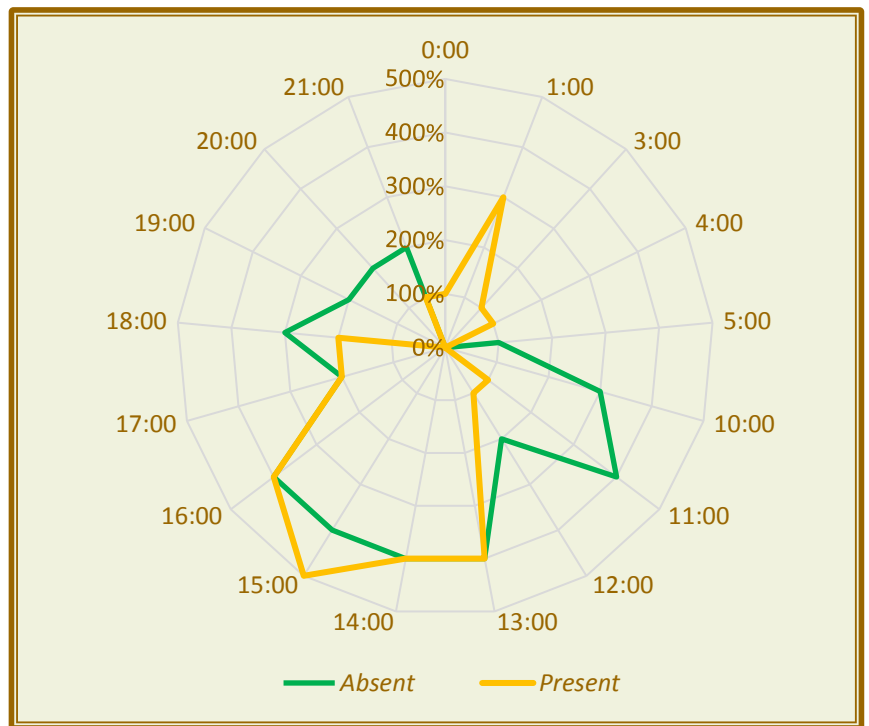
Figure3: Presence of dogs during attack by time in 2012/13 winter season
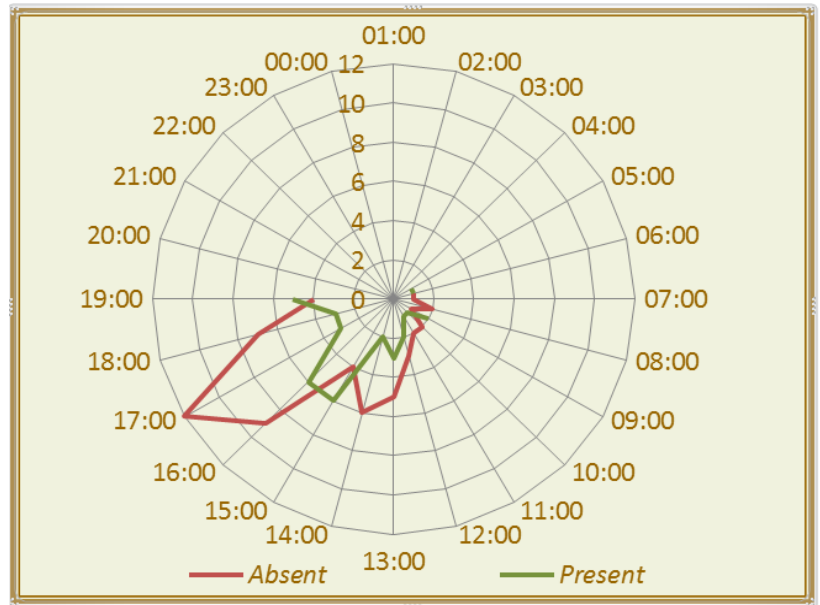
Although our data on predator attack locations are not very accurate, we tried to find wolf attack preference according to existing habitats. We selected 5 main habitats in our study area based on Vashlovani land-cover map. We used Neu Habitat Analyst to find predators preferred habitat for livestock attack (based on Chi Square method). The result showed that steppe and hills are the most preferred habitat for predator to attack the livestock (Figure4). Badlands are less preferable. Shepherds try to avoid badlands because there is less grass and believe that predators more easily attack their livestock.

Figure4: Distribution of wolf attacks on different habitats
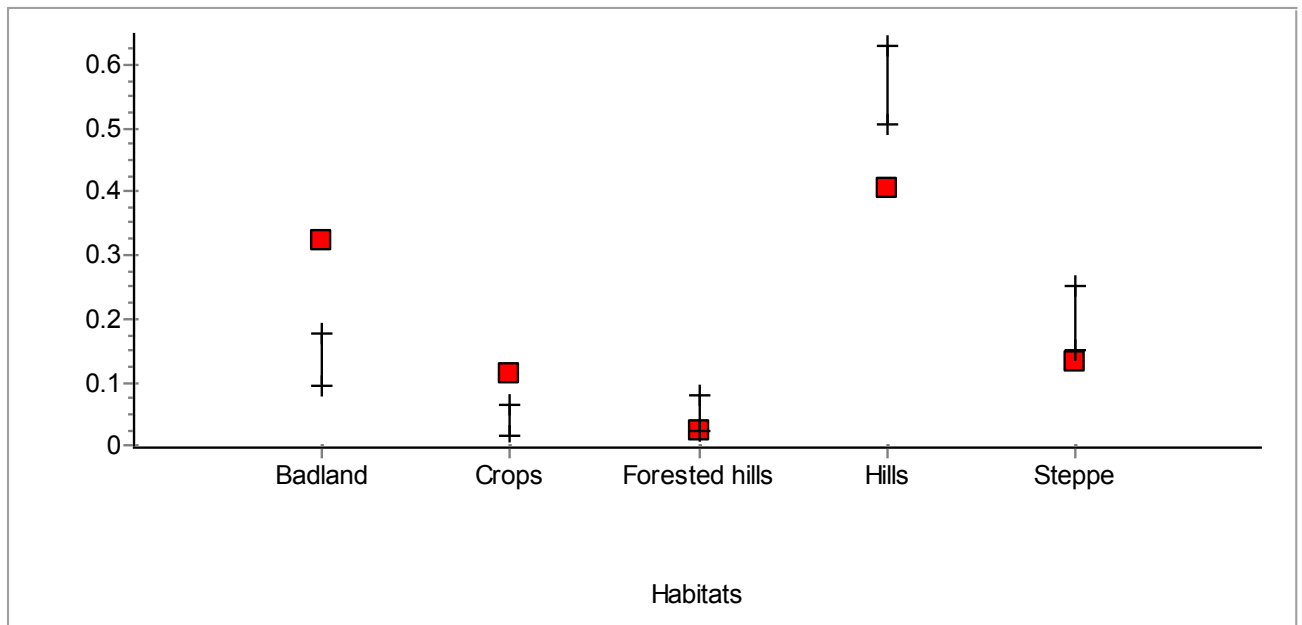
In terms of predator attack analysis we did not received unexpected results, although we should work further to get more accurate data on the attack locations and analysis of the robust data will give reliable results.

2.1.3. Conclusions and Recommendations

Looking through the livestock depredation monitoring results we see some clear tendencies such as: livestock overall loss according to surveyed years; timing of wolf attacks, shepherds attitude to wolf depredation, financial loss over five years, dog absent present/absent and etc. The data according to years are more or less the same and it is expected that continue with monitoring will give more or less the same results.

In addition data is mostly based on the shepherds ideas or perceptions. We think that their answers are rarely based on real calculation. For example shepherds and livestock owners think that most attacks happened in February (with various explanations). But data (although it is not accurately collected) suggest that attacks may be distributed more evenly than it was thought before. Another example - ranking financial loss shepherds do not have good accounting system and there is no sign that they do it systematically. Hence their respond on the questions is their attitude and believes and not necessarily reality. Such tendencies are seen in many results of the monitoring data (such as attack place, attacked species, loss level and etc).

Thus we think that it would be good to reshape our research strategy in a way that obtain more independent data and compare it to the answers provided by shepherds. It is possible to add some questions while skipping the others. We can sample from existing farms list, improve relation with the owner and shepherds to get better response after predator attacks. Responding on each predator depredation we might learn more about details (attack place, financial aspects, time, condition of the attack and etc.).

Changing the questioners and/or reshaping data collection strategy should be further discussed on the separate meeting. The meeting should be organized before the winter season 2014/15.

2.2. 6TH SURVEY OF HUMAN-CARNIVORE CONFLICT IN VASHLOVANI, 2014-2015

2.2.1. Methodology

The survey methodology was mainly based on baseline survey developed in 2009 within the Georgian Carnivore Conservation Project. Information was collected using semi-structured interviews and mostly all questionnaires not changed much during last five years.

Before the beginning of winter season we started to find potential candidates to hire as a response team leader's assistant. It appeared very difficult to find suitable person. We were looking for a motivated young guy with driving license, with experience and willing to intensive field works. In the end of February we found Beka Sabiashvili and he was contracted from March 9.

Before Beka's contract, volunteer – Levan Lataria participated in several field trips; he also helped the team with electric fence installation. As far as he is student he was not able to accompany us all our trips.

Before winter season 2014-2015 we decided to critically analyze our data, methodology and results. We found that we have enough data on some topics (such as shepherds' attitude to wolf depredation and dogs/shepherds presence/absence at attack, location of wolf attack) and every year we have more or less the same figures. Therefore we decided to exclude such question from datasheets (please find them in Appendix2). We used three main datasheets for data collection:

1. **datasheet for the beginning of the season interviews** – to collect background information about farm, livestock and preventive measures
2. **datasheet for livestock predation events** – to collect information about attack details
3. **datasheet for the end of the season interviews** – to collect information about livestock damage due to predation and diseases

We also found that very few data is available on wolf attack details. Mostly we collected data on wolf attack from shepherds that were not eyewitness (shepherds are often changed and are not available for interviews) or after several weeks that influenced on data quality. Hence we decided to change our approach and collect quality data on wolf attacks during this season. The data should be collected very soon after wolf attack and therefore we should found a way to response on wolf attack as fast as possible.

Based on the analysis of the data and result of the previous surveys we designed new survey that had the following objectives:

- Collecting data on livestock number, husbandry and overall situation on winter pastures;
- Determining wolf depredation rate;
- Calculating financial loss from disease and depredation;
- Assessing depredation rate in the season 2014-2015;
- Finding details of wolf attack (such as determining peak of wolf attacks during the winter season, dogs and shepherds attendance during wolf attack and etc.

- Increasing cooperation between farmers and HCCRT trough getting immediate response from farmers after each wolf attack;

We thought that it would be difficult to react on all wolf attack from our study area (there are about 70 farms) and decided to sample them. We thought 12 farms are affordable and selected them using the following criteria:

- **Farms are owned by Livestock owner**
- **Overall livestock damage in previous years** – equal number of farms with high, medium and low damage level were selected
- **Willing to cooperate with response team**

Use these criteria we selected the following farms: 03 – Emzar Iukuridze; 17 – Otar Phareulidze; 22 – Bato Ikaidze; 26 – Besik Gatsiridze; 32 – Rostom Gagoidze; 57 – Ilo Grishkashvili; 59 – Jijur Jijuridze; 60 – Gocha Betsunaidze; 67 – Shio Lekaidze; 70 – Aveto Tataraidze (for map see appendix #1). Selected farms more or less evenly distributed in our study area and data collected from the farms represent overall situation in Vashlovani study area.

We needed to motivate shepherds to call us shortly after the attack event. Previous years shepherds were asked to call us but we have not received any calls. Now we tried to motivate them by topping up the shepherds mob balance by 5 GEL after each proper information. We prepared special announcement describing the project objectives, survey goals and importance of their engagement and distributed at selected farms.

Totally, 17 trips were organized during winter season and response tem spend 34 days at project area. The maximal gap between field visits was 2 weeks.

Collected data has been entered into MS Access Database. The analysis detailed within this report was carried out using database in conjunction with ArcGIS and MS Excel.

Current survey was focused only on 12 farms out of 70 farms previously surveyed. We used the same farms from each year during comparative analyses.

2.2.2. Materials and Data Analysis

Livestock and Husbandry

The overall number of livestock at surveyed farms was 9673 head with an average number of 806 head per farm (n12). If only sheep are considered 928 head was kept per farm. The last figure is higher than previous year's one and the increase could be explained with several problems at sheep market. As livestock owners told us they had problems with selling sheep. Some of livestock owners who sold sheep could not receive money and others were afraid to sell in dept. This year we tried to separately count different kind of sheep in each farm. According to our calculation each sheep farm includes 68% of ewes, 27% of juveniles, 1.5% of rams and 4.5% of goats. Average numbers of cattle and horses does not show any significant change.

According to last years' data, which included sheep numbers from 50 farms, average number of sheep was regularly increasing. But data from 12 farms (Table) does not repeat similar trend, instead, it has more irregular character.

Ten farms out of 12 were sheep farms. Cattle were kept at four farms (at two in combination with sheep), and horses were at 11 farms although only one farm had horse keeping business (80 head), others used them for transportation (max: 21 head).

Table14: Average numbers of livestock species at selected farms (n12) through six surveys*

Survey	Sheep/Goat	Cattle	Horse
2009/10	962.8	39	12
2010/11	1113**	62	16
2011/12	920	43	14
2012/13	912	55	19
2013/14	844	51	12
2013/15	928	53	17

*calculation was done using following formula: livestock average=n of total / n of farms [if n of livestock > 0]

**during survey lamb number also included in the sheep count and that definitely influenced on the total number

Average number of persons at farms was 5.8 (2.6 for livestock owners and 3.2 for shepherds). Number of sheep per one person is 164, less than overall average which equals 187 head sheep per person (SD: 97).

One among surveyed farms was non-migrating. At three farms livestock arrived in November, seven in December and one in January. Nine farms reported that they would leave winter pastures till 5th of May, others were going to stay bit longer (Figure58).

Figure58: Number of active farms at study area
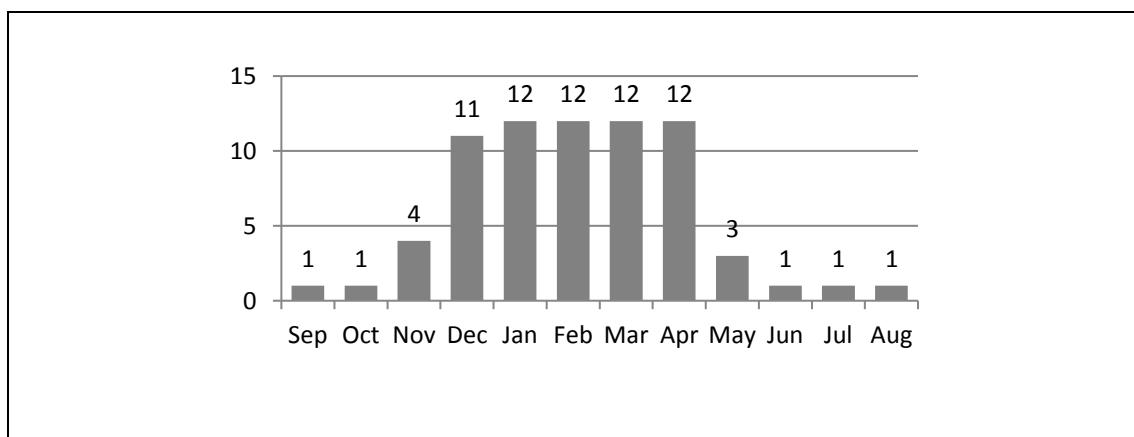
Farms spent 145 days at winter pastures in average (Min: 118; Max: 186). But they were monitored only for 134 days as they stayed several days at VPA after our last interviews. Our survey includes data of 1603 farm/day.

Figure19: Reed corral segment at farm #18

During the farms visits we made notes about corral details. They are built with different materials (concrete, iron net, reed, thorn etc.). Some corrals lack of sufficient height, which makes them easy for predators to jump over. To compensate the lack of corrals shepherds usually sleep in guarding cabins at night and dogs are nearby. Nevertheless, wolf attacks still happen in corrals.

From our point of view best corrals are made from reed (Figure19). The reed corrals are toll enough to prevent wolf jumping over the corral. The red corral is more solid and compact and does not have holes comparing to corrals made from other material. The reed corral fits in the environment and possibly more acceptable for Vashlovani national park as well as park visitors. In addition the reed is very cheap material as it grows nearby (along Iori River and close to Kasristskali village). Some farms already use it but they have only small reed segments rather than whole corral. It is very time consuming to cut the reed and made wall from it. It could be a very good example of goodwill and collaboration if VPA jointly with Association "Tushetian Shepherd" will investigate possibility of gradual displacement of existing corrals with reed corrals.

Average number of livestock guarding dogs was eight per farm (114 sheep per one dog). 11 respondents liked their dogs. Only respondent from farm #57 was unsatisfied with them. He said that none of his dogs (n=5) were reliable, particularly two of them. According to owner dogs cannot protect sheep from wolf as they afraid it. Without shepherd the dogs cannot stop wolf at all.

31 animals were affected by diseases at surveyed farms, 27 of them died and 4 of them not fully recovered and become disabled. Main disease which led livestock death was bradzot. It killed seven sheep at one farm. In other cases death was either caused by helminths or disease was not identified. Generally, bradzot, sheeppox and helminths were reported as the most problematic diseases.

Livestock depredation rate

In VNP severe drought started in already in the beginning of year 2014 and continued all autumn. Due to drought in VNP, pastures were in a very bad condition and coming winter was perceived to be fatal for livestock. Fortunately, rainy autumn and soft winter let several annual plants to grow up which helped livestock to survive. Furthermore, spring rains made the pastures unusually grassy and diverse so, that livestock owners decide to start milking sheep at winter pasture which is very rare phenomena.

During report period ten farms out of 12 suffered predator attacks. 43 animals reported to be attacked by predators (34 killed and 9 injured). Overall damage was 0.44% of total number of livestock which is a significantly small figure comparing to previous seasons which varied from 1.5% to 1.9% giving an average of 1.7% (Table).

Table15: Total damage at all surveyed farms vs total damage at 12 farms sampled in 2014/15 winter season

Survey	N of surveyed farms	Total damage (%)	
		All farms	12 farms
2009/10	70	1.5	1.54
2010/11	56	1.9	1.89
2011/12	60	1.5	1.22
2012/13	40	1.7	1.87
2013/14	49	1.9	0.74
2013/15	12	-	0.44
Average		1.7	1.28

Farm #57 and #79 passed the season without attacks. Both farms kept cattle but farm #79 also had 500 sheep. Both are located outside the protected area but in different regions - #57 near Vashlovani Rangers' Station (western part of PA) and #79 near Black Mountain (Map9).

Farm #57 was sampled as low damage farm (based on previous census). But protection measures are not well organized here. During most of our visits cattle were grazed without protection. The farm lost 9 cattle last summer due to wolf attack. Shepherd got drunk and leaved the herd unattended. This case was not considered while we were sampling the farms and as in the winter season it had one of the lowest damage. The farm owner was the one who did not liked his dogs and reported to us that they are useless during wolf attack.

Farm #79 had about 500 sheep and 25 cattle. Only three persons worked at the farm which normally is not enough for keeping the amount of livestock. The pastures are very bushy and it makes difficult to manage the livestock in such environment and keep an eye on predators. During survey 2013-2014 we thought that the bushy graze land was the main reason why they had one of the highest losses from wolf depredation.

Hence, it is quite obvious that both farms did not have any specific characteristics that give us clue why they survived from wolf attack this year. It might be pure luck.

Possible explanation for low damage in season 2014-2015

It is quite difficult to make any conclusions without limited data on some aspects of wolf ecology (pray base population status, wolf diet and pray importance in the diet). But we try to provide several speculations about possible causes of damage decrease this season. There are the factors that might be influence on the result:

- Survey method
- Number of wild prey
- Number of wolves
- Number of livestock
- Livestock protection measures

Survey Method - One may think that this could be a matter of selected farms' disposition to few attacks, but as we have already said, selection was done so that include equal number of farms with high, medium and low attacks according to previous surveys. Table also approves that sampled farms showed absolutely adequate image of overall situation till 2014. Thus, when trying to find reason of damage reduction we think to focus more on the external factors, rather than survey methods. Particularly, this reduction was even notable without data analysis as shepherds all over the study area mentioned that they not only had a few attacks but they had not even seen wolves at all. None of the shepherds had any explanations why.

Only two respondents from sampled farms said that they had more loss comparing to past years. According to our data, one of these farms had average loss comparing to previous years and another one even significantly less than average loss. Hence, we think that received responses more likely show how the respondents' perceive the losses than actual loss trend.

Number of Wild Prey - We should consider the environmental conditions of past year which was the hottest on the entire planet after 130 years of measurements. Spring 2014 was extremely dry in VNP, it prevented plant growth and hot summer had dried out even high amplitude plants such as *Artemisia lerchiana*. According to local agricultural farmers and VNP rangers due to this drought number of rodents decreased significantly, mass death of tortoises was observed and mosquitos had disappeared even from floodplain forest. We also saw many dead tortoises in the field and observing grassless Vashlovani it was very easy to believe that many animals suffered from drought. It is possible that wild boar and hare populations also suffered from the drought and food shortage influenced on the generation of this year. Based on preliminary wolf dietary analyses carried out in 2009-2012, within the "The Georgia Carnivore Conservation Project", these species should be important pray species for wolf during summertime in Semi-arid ecosystem of Georgia. Therefore the drought should negatively affected on wolf population too.

Number of wolves - Some shepherds think that during last years' wolves' number significantly increased in mountains. They do not necessarily say that this happened sharply in 2014 but such idea became more popular last couple of years (and that coincide to draughts last years).

During HCC baseline survey in 2010, 88% of respondents considered that wolf attacks happened more often on winter pastures than on summer pastures. In August this year we planned to carry out HCC baseline survey in Tusheti this year. This is a first survey on summer pastures. The survey will possible give very interesting indications about validity of above mentioned theory as well as about general status of human-carnivore conflict in the mountains.

Figure20: Shot wolf found shelter at ranger station

Illegal Hunting - Illegal wolf killing might also affected on low depredation rate. During the report

period, two killed wolves were seen by us and even more could be missed (Figure16). Unfortunately, we do not know how many wolves are being killed every year which, in fact, represents the one of the main measurable of the conflict and which is the one of the major gaps in our knowledge.

Number of livestock - Dynamics of livestock numbers could also cause pseudo change of damage level. Of course, this change will be very small but in combination with other factors can become considerable. For example, in 2015 number of sheep was increased by 10% comparing to the previous year. This means that even if number of killed animals would not change, the overall percentage would decrease by 0.07. Of course depredation level can be measured by number of attacks on the livestock, but (1) number of wolf attacks not always represents damage level and (2) we were able to record only 65% of wolf attacks, that limits it use for damage level measurement. Therefore percentage of the damage is still most reliable measure.

Preventive Measures - At three selected farms we tried to introduce new livestock protection measures. These farms are:

- Otar Phareulidze – Electric fence for "sheep hospital"; Operated from February, 2015 to the end of winter season;
- Aveto Tataraidze – Solar lamps; Operated from the end of February, 2015 to the end of winter season;
- Besik Gatsiridze – Livestock Guarding Dogs; Only one active dog remained for report period;

The new protection measures were used for only small portion of livestock or very short period of time, and therefore their impact on wolf depredation level should be minimal.

Taken into consideration abovementioned we think that most likely the severe drought with combination of illegal hunting influenced on the result. Severe drought must have limiting effect on wolf pray species that influenced on fitness of wolf generation this year. On the other hand illegal killing of wolf that always happened in and out of Vashlovani protected area had additional limiting effect on the wolf population. Both, drought and illegal hunting should affected on young wolfs and therefore we can speculate that wolf number decreased this year. As a result we had farms that are not good in livestock husbandry, but had no loss from wolf depredation.

Monitoring of the conflict in the region is important to prove the hypothesis described here. Especially, it is important to have good knowledge on wolf diet and pray base condition in the study area.

Financial loss

By beginning of survey we decided to calculate and compare the financial losses caused by predation and diseases. We collected more details about killed livestock and approximately estimated price for each. For calculation we used average market prices as provided by Georgian Shepherds' Association for sheep and by farmers for all other livestock (Table).

During the study period financial loss due to predation was **10 240** GEL (8 520 killed and 1 720 injured livestock[1]), with an average of 853 GEL (max: 2 800; min: 0). Financial loss caused by diseases was **6 120** GEL (5 400 died and 720 disabled animals), with an average of 510 GEL (max: 1960; min: 0).

Table16: Comparison of financial loss caused by predator attacks and diseases

Type of Damaged Livestock	Price (GEL)	Predation		Disease	
		Kiled	Injured	Killed	Disabled.
Sheep	200	3000	1600	3200	600
Lamb	120	1320	120	1200	120
Cattle	1000	1000	0	1000	0
Horse	800	800	0	0	0
Foal	400	2400	0	0	0
Total:		8520	1720	5400	720

Table16 shows that even if predation related damage was significantly low this year, its financial loss was notably higher than loss to diseases. We did not record horse disease this year that significantly lower the figure. It is possible that the next year the result might be different if some disease spreads across the area. Therefore more data is needed to see real ratio between predator damage level and loss from diseases and come up with firm conclusions.

Currently direct protection expenses include only food for dogs (max: 90 GEL per dog per winter season). Some farmers try keeping dog expenses as low as possible and as a result livestock guarding dogs stay hungry, untrained and without proper vet care. We do not know how much each farm pays for corral maintenance, but think that it is not much.

Based on the data we can say that each farm have about 1000 GEL per winter season (with consideration that it is only one season data). Hence we think that by farmers can invest more in the livestock protection such as training dogs, electric fences, lamps and maintain corals in good condition. That might significantly lower the damage.

We tried to calculate approximate cost of veterinary care for one sheep. As it was expected, health prevention seemed to be addressed very occasionally. Livestock owners do not often prevent all main diseases in advance, instead they start threating sheep after appearance of symptoms. Thus, most of them were not capable to provide reliable figures even when we asked to calculate all costs with us. Only three livestock owners could list the main diseases with corresponding expenses with average of 9 GEL which is absolutely same as a figure provided by Value Chain Analysis for Sheep Market, 2014[2]. But again, this is a cost that is needed for proper veterinary care and it does not mean that it is spent by all livestock owners.

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[1] In calculations of financial loss cost of injured animals are taken into the consideration even if they could have a chance to be survived

[2] Funded by Heifer Projects International (HPI), 2014; Authors: Irakli Kochlamazashvili; Loredana Sorg; Beka Gonashvili; Nino Chanturia; Dr. Phatima Mamardashvili;

Wolf Attack Details

We had provided information to each farm that each shepherd who will call us about wolf attack will receive 5 Gel on his mobile phone balance. During the first interviews shepherds seemed to be very promising and open for cooperation. But when we did not receive any calls a week after interviews, we decided to visit the farms again. We found that several attacks were happened but none of them call us. We tried to find out why they did not call us. Some shepherds try to avoid providing clear answer. Some of them gave irrelevant explanation, such as "we don't want to bother you" or "it was too late". Regardless of our effort to persuade shepherds to cooperate with us, we only received two calls from farm #3. Even if reporters from this farm were reworded with promised balance, they did not call when they suffered attack again. As idea of current survey was based on collecting all attacks and having fresh information we tried to visit farms as frequently as possible. Due to low attack reporting from the farmers we could collect details of only 65% of total number of killed animals (comparing to total loss provided by livestock owners interviewed at the end of the season).

Table17: Numbers of killed/injured livestock species as described using Datasheet of Livestock Predation Events

Type of Damaged Livestock	Killed	Injured
Sheep	5	6
Lambs	10	1
Cattle	1	0
Horse	1	0
Foal	3	1
Total	20	8

Respondents from seven farms provided details of 19 attacks in which 20 animals were killed and 8 injured (Table).

Average number of killed/injured animals per attack was 1.47. Sheep/goats were most attacked livestock with an average number of 1.29 head per attack. Only one attack on cattle was reported where one individual was killed. Five attacks on horses were reported with one victim in each.

Most attacks happened during daytime but important portion of attacks happened at night (Figure21). It is interesting that this year we received the highest percentage of night attacks (31.58%) which is about twice as big as overall average (16.8%).

Quarter of attacks happened at 15:00 fitting within the limits of overall trend (from 13:00 to 15:00), with other small peaks at 2:00, 4:00, 11:00 and 12:00 o'clock (Figure22).

One of the goals of this survey was to find out if

Figure21: Period of attacks as reported by respondents
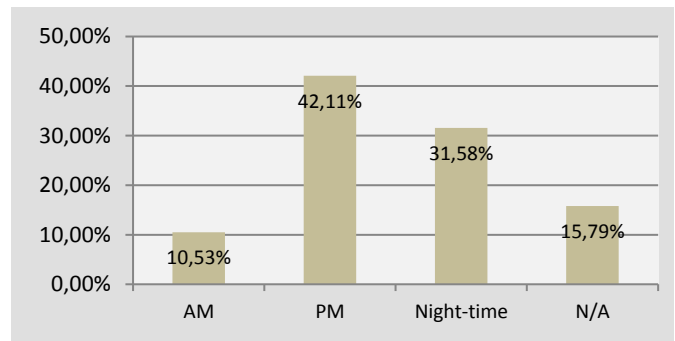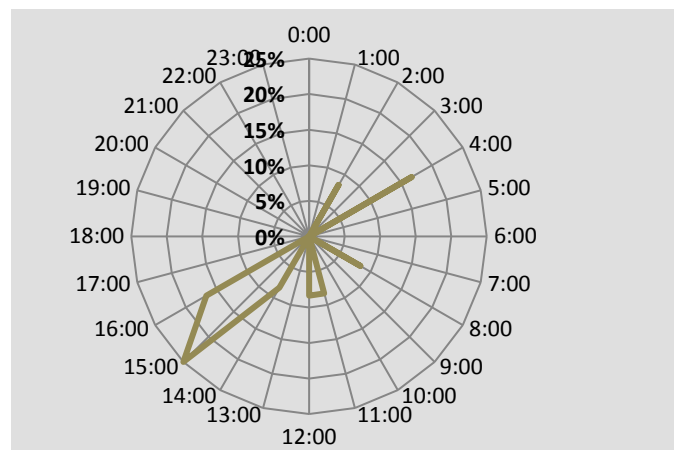

Figure22: Timing of attacks of 12 cases in which exact time was provided by livestock owners

wolf attacks really mostly happen in February. During previous surveys our visits at farms were not regular; dates of collected attacks were polarized towards our visit dates. This year our visits at farms were distributed equally, so we can now rely on our figures according which most problematic month was March and this is true at list for report period (Table18). We have several explanations: 1. In March there are more lambs which are very attractive for predators and out of 15 individuals killed/Injured by wolf 8 were lambs. 2. Number of sheep increases at "sheep hospitals" which are also attractive for wolves; 3. Flocks are split in smaller ones in March as different categories of sheep (Pregnant, Lactating, Juveniles and Lambs) should managed in different ways. Sometimes dogs are following one flock an others stay without them.

Average number of dogs attended to predators' attack was 3.8 (max: 6) almost similar as previous years. Only in five cases out of 19, dogs were with livestock. In other cases either dogs had left the flock due to inattentive character or single livestock was left out of flock. Dogs as well as shepherd vigilance this year stayed as weak as in previous years. Once, dogs even could not notice about wolf attack at all.

Table18: Number and percentage of attacks by date

Month	Collected attacks	
	N	%
November	1	5.26%
December	4	21.05%
January	2	10.53%
February	4	21.05%
March	8	42.11%
Sum:	19	100%

We found that more livestock were killed by wolf (1.6 individual in average) when dogs were not attended the sheep flock, comparing to cases when dogs were present during wolf attack (1 individual in average). That is more logical results comparing to previous season when we got opposite result.

Shepherds were not with livestock during 10 cases of predators' attack (during these cases livestock were left unattended). On four events shepherds did a late alert, once they did not notice anything and found missing sheep next morning and livestock were accompanied by shepherds only in fore cases.

Predator was seen during nine attacks and in all cases it was wolf with an average number of 1.8 individuals per attack.

This year we tried to measure approximate mass of killed livestock which was eaten by wolves. As we could not respond on all attacks very quickly, we only have 7 reliable cases that can be used in calculation. According to these cases, 60% of sheep bodies were eaten by wolves directly after attack. Unfortunately, given data is not enough to make reliable statistics and to extrapolate to other years.

2.2.3. Conclusions and Recommendations

As we said in the beginning of the report our main goal was to address new questions about human-carnivore conflict by engaging livestock owners and shepherds in survey. Due to livestock owners' and shepherds' low motivation we did not received sufficient number of responses from them. Hence, we had to increase number of field visits to acquire as accurate information as it was possible. Nevertheless, we have first time collected information about killed livestock due to diseases and made some measurements of financial loss. We saw that most damage occurred in March and provide explanations that can be addressed by livestock owners to minimize the current loss. It was also very interesting to measure the minimal damage since six years of surveys even though we were not able to provide too

much scientific explanations. We think that it can be somehow interconnected to the situation at summer pastures thus it is very important to understand conflict status at Tusheti as well.

Although, six years of surveys has accumulated reasonable knowledge about HCC at Vashlovani, there are still some gaps that we can fill. For this, several studies are needed:

- HCC survey at Tusheti
- Financial analysis of livestock husbandry
- Study of some aspects of wolf ecology (diet, population number)
- Study of wild prey animals (population status)
- Further monitoring of existing trials (electric fences, scare lamps, licking blocks).
- Cooperation with farmers

2.3. SURVEY OF HUMAN-CARNIVORE CONFLICT IN TUSHETI PROTECTED AREAS, 2015

2.3.1. Overview

HCC survey has being conducted for six years in VNP and its surroundings. These territories represent the winter pastures thus our surveys were focused only on a half of the problem. Herewith, during the last HCC surveys, we noticed that livestock owners often mentioned that level of damage due to predation increased at summer pastures. To have better understanding on human-carnivore conflict level in the mountains we decided to conduct a survey at summer pastures and compare data to results of the winter pasture surveys. With survey we were going to answer the following questions:

- What are the main differences in husbandry approaches between winter and summer pastures?
- What is the damage level at summer pastures?
- What are the main causes of predators' attacks at summer pastures?
- What portion does this period pay for conflict genesis and negative attitudes towards predators?

2.3.2. Methods

Survey consisted of farm visits and information gathering from livestock owners or shepherds using semi-structured interviews. Two datasheets were prepared for the survey (appendices2):

- **Datasheet for livestock owner interview** - to collect the background information about farm, husbandry and livestock damage due to predation and diseases;
- **Datasheet for livestock predation event** - to collect information about attack details.

Expedition was started on August 31 (slightly later than the original plan because of landslide on the road) and continued to September 7, eight days in total. First day was dedicated to making detailed plan for farm visits through the meeting with representatives of Tusheti Protected Area Administration. According to initial plan, 20 farms were visited during the expedition (Map10), all of them winters in or near VNP, seven (58%) of them participated in our last survey. Farms were selected so that we covered all four main gorges of Tusheti: Chaghma, Pirikita, Gometsari and Tsovata. One person was interviewed in each farm and hence we have 20 complete interviews in total.

Main focal group for interviews were livestock owners but during the expedition the hardest period, milking the sheep, was already finished and some livestock owners had already started carrying cheese and luggage or just had a "vacation" in Alvani. In such cases, we interviewed shepherds. Also not every predation event was reported by eyewitness as in most cases they were not available during our visits to the farm. Due to these issues, some information was not as accurate as it could be but it was absolutely sufficient to meet the goal of the survey.

Collected data has been entered into MS Access Database. The analysis detailed within this report was carried out using the database in conjunction with ArcGIS and MS Excel.

2.3.3. Results and Data Analysis

Livestock and Husbandry

Livestock owners' and shepherds' life at the summer pastures significantly differs from their life at the winter pastures. After arrival they split the flock into three groups: lactating ewes, lambs, and all others (often called "mshrali", or dry sheep). All three flocks are herded different ways and to different places:

- **Lactating sheep** – stay at the main farm (Figure23) which is mostly (but not necessarily) located near a road to make it easier to transport cheese. This type of farm includes:
    - One or two shacks for shepherds, food and cheese;
    - Very simple corral, which only serves to handle a flock but could not prevent predators' penetration;
    - Sheep milking facility (sheep are milked twice a day early in the morning and in the afternoon);
    - Sleeping cabins for night guarding.
- After arrival at summer pastures **lambs** stop lactation and it is not necessary to keep them with ewes. They are kept at high elevation (higher than 2,200 m.) and stay there until the winter migration. These flocks are mainly kept without a corral and the site often has only a tent for the shepherds' shelter and to store food for the shepherds and their dogs. Livestock owners say that the main reason to take the lambs to such an elevation is that the grass and weather conditions are better for the lambs than at lower sites.
- **"Mshrali"** are located and herded in a different way in each farm. Sometimes they stay at the main farm but in this case shepherds should control to avoid mixing them with the milking sheep.

Figure23. Typical farm in Tusheti with corral and milking facility (right to the building)

At the end of August, most farms stop milking and all sheep become dry. After that it is not necessary to keep them separately and the two flocks of adults reunite. Lambs are only herded once to the main farm for shearing and are returned back to high elevation until beginning of migration.

Arrival and departure dates vary each year, depending on the weather conditions. This year, most farms arrived during the second half of May with an average arrival date of May 23rd (range = May 10th - June 10th). All interviewees reported that they will leave summer pastures by the end of September or in the beginning of October, depending on weather conditions.

The average number of livestock owners and shepherds during milking period were 2 and 3.6 per farm respectively. Later, the number of shepherds decreases as the main activities, such as milking and cheese making, will already have finished. Shepherds often shift their responsibilities. At some farms shepherds duties are more organized. Shio Lekaidze told us that at their farm the cheese maker is always the same person and he stays at farm all time. In this way, the cheese maker participates in the milking process but does not herd the animals. Herding shifts every 10 days among other staff.

17,589 head of livestock were kept at surveyed farms with an average of 940 sheep per farm (Table19). It is about the same as overall average figure from six surveys at winter pastures – 947 head; It might seem strange as numbers from Tusheti includes sheep which should be sold before their arrival to VNP surroundings, but the other hand, usually there are more flocks united at one farm in winter as winter pastures are less than summer pastures. 38% of sheep are milking sheep.

Table19. Number of livestock at surveyed farms (n=20)

Livestock species	Total	N of Farms	Average	Max	Median	Min
Sheep	16915	18	940	1500	1000	306
Cattle	462	8	58	100	54	3
Horse	207	17	12	60	8	1
Donkey	5	3	1.7	3	1	1

Losses to predators and other causes

55% (n=11 where N=20) of respondents considered that predation is a big problem, while 25% partly agree and others think that it is not a big problem.

70% (n=20) of surveyed farms suffered predator attacks during the summer. Two interviewees who had attacks this summer said that predators are not a big problem and two others, who did not have any problems during report period said that generally it is a big problem.

Table20. Figures of damaged livestock at surveyed farms

		N farms affected	N of Damaged animals	Total Damage
Sheep	Killed	10	188	1.1%
	Damaged	5	9	0.05%
Cattle	Killed	2	2	0.4%
	Damaged	0	0	0.0%
Other	Killed	1	1	0.5%
	Damaged	0	0	0.0%
Total Killed		12	191	1.09%
Total Damaged		5	9	0.05%
			200	**1.14%**

200 head of livestock were reported as killed or injured by predators (Table20). This is 1.14% of the stock at surveyed farms. We compared the data to the results in Vashlovani protected area and fount that this figure is lower than the average damage at winter pastures through six years of surveys, which

averages as 1.65%; Of course this comparison should be made with caution because (i) Our data is collected from the smaller period of summer season (about three and half months) than data from winter season (almost five months); (ii) Most respondents noted predation become intensive in September before flocks leave the summer pastures (Table21) and (iii) on summer pastures we collected data from ethnic Tushs only and when in winter pasture other nations were also involved in the interviews. Anyway, 70% of respondents still think that winter pastures are much more problematic in terms of predation (Table22).

Table21. Respondents' answers (n=20) on the question "In which month(s) do you tend to lose most stock to predators at the summer pastures?"*

	N	%
May/Jun	3	15
May/Jun and Sep/Oct	5	25
Sep/Oct	8	40
Same	4	20

* Respondents did not identify months, instead they reported the periods of the summer season

30% of respondents think that current damage levels were lower than in previous years; 25% think that damage stayed the same and only 20% considers that it has become more. Five respondents did not answer this question - some of them said that they were first time at that farm and did not know the previous damage levels; others said that they just did not have an idea about it.

Table22. Respondents' answers (n=20) on the question "In which season do you lose more livestock due to predation?"

	N	%
Winter	14	70
Summer	2	10
Same	3	15
No Response	1	5

It is important to note that 44% of damaged livestock comes from one farm in particular, located near village Kvavlo. We will describe details of this exceptionally high loss below (Page47).

Most farms (80%) reported dogs as the best preventative measure against predation. All farms had at least two dogs. The average number of dogs was 5.8 per farm. According to our observations we got feeling that dogs are not always distributed properly between different types of flocks. We think that the fact that a dog accompanies sheep flock or not mainly depend on the shepherd and dogs relations.

Generally, in Tusheti livestock seem less protected. During our visits we saw many flocks which were not accompanied, either by shepherds or livestock guarding dogs. At many places livestock are chased towards the pasture and shepherds collect them in the evening so that livestock spend the whole day

alone at remote pastures (Figure24). We also noticed that the dogs are not as well maintained in mountains as they are at winter pastures. Although livestock owners provided us with some figures about the amount of food which is required by dogs, it was clear that they were not necessarily feed like that. As we were told by respondents, the main food during the sheep milking period is the whey that remains after cheese making. At some farms dogs get additionally 0.5-1 kg dark flour, bran, milled corn or combination of these three ingredients which are boiled in whey. And finally, dogs will only be fed raw meat if a predator kills sheep. As we have already mentioned in previous reports, such approach can become a good motivator for dogs to let predators to kill livestock.

Figure24. Cattle graze without shepherd and dog near the forest

Guns were reported by six respondents as another way of protection. It seemed that livestock owners and shepherds were more open to talking about shooting predators than they tend to be in VNP. Possibly their boldness is a result of being in their homeland whilst VNP may be more perceived as others' land. It also may be indicate that Tusheti protected area are less active to control poaching on their territories. Five respondents said that they use lamps and two farms uses scarecrows.

Figure25. Bear footprint on the road to Tsovata

We tried to estimate the numbers of stock lost to disease but we may get very rough figures as livestock owners do not use an exact accounting system. Initially, respondents provided the number of sheep that they had consumed or thrown out. This figure included animals that were attacked by predators, diseased, damaged by falling stones, fell down from steep slopes, damaged during shearing or even during treatment with medicines (sometimes the sheep's throat is damaged when inexperienced shepherds puts the pill using medical pincers). Later we were able to sort the data and found out that 184 sheep suffered from various disease and 44 animals died. Owner mentioned that helminthes are the

most problematic sheep health issue in mountains. Generally, livestock owners consider that there are no diseases in Tusheti unless you do not treat them properly in the lowlands, before migration.

Details of Predators' Attacks

As we have already said above, a total of 200 head of livestock were killed/injured at surveyed farms during the current summer season. Using the second datasheet we tried to collect more details about each particular predation event. Finely, we were provided with details of 15 attacks where 128 head of livestock were damaged (120 killed and 8 injured). It means that we were able to describe 64% of the total damage (N=200 head) happened at surveyed farms this summer season. The median number of killed/injured animals per attack event was six, much higher than the figure from winter pastures (one head per attack).

Mostly attacks were equally distributed through the portion of the summer season covered by the survey, although four attacks were reported for the middle of June (Figure26).

Figure26. Distribution of attacks through the summer season
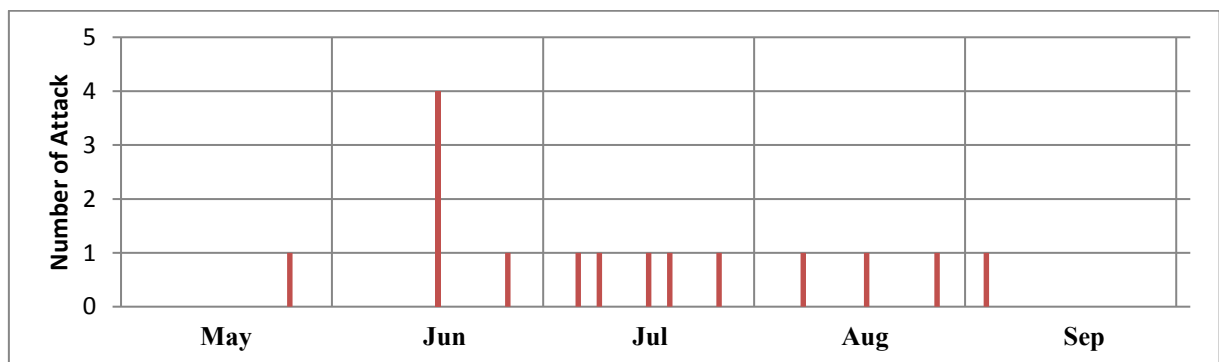
As most of the reported attacks happened weeks, and even months ago provided dates and locations are approximate.

73% of attacks happened during the night, mainly when livestock were kept near the camp either in a corral or not. Only two out of 11 night attacks happened outside the farm; one flock was accidentally left outside and, in the second case, a foal was killed. Usually, foals and horses are not kept at farm.

Bears were considered to be the culprit in six cases and wolves in five. However, it should be noted that most of the attacks were not actually witnessed by those making the reports with, in most cases, the respondents speculating based on the wounds on the carcasses. But their skills to identify predator based only on the wound on the carcasses is questionable. For example two respondents, who did not see the predator, considered that it might be either wolf or lynx. These species leave very different wound on the carcass and experienced person should easily identify culprit species.

In most cases, there was only one individual involved in the attack. Only one shepherd reported that he saw two wolves. Tushetian farmers think that lynx are very dangerous animals that can kill up to a hundred sheep. They also believe that there are hyenas in Tusheti which can be even more deadly. Usually, when shepherds describe the hyena in Tusheti it becomes obvious that they mean large lynx, but some of them describe hyena correctly and still affirms their existence in Tusheti.

In its contrast with VNP the wolf is almost universally blamed for all attacks at winter pastures. It is quite strange because we have quite high number of lynx in Vashlovani. We cannot exclude the fact that lynx might attack sheep in Vashlovani too. If so, it is very strange that shepherds reject any idea that lynx can attack their flock in Vashlovani. It is possible that shepherds mostly cannot (or do not) distinguish species according wounds on a carcass and they have already formulated general understanding what species where attack livestock.

During nine attacks, dogs were with the livestock, with the average number of dogs present being 2.6. Some respondents thought that dogs were not very effective against bears because this carnivore often scare them. Although, Koba Tataraidze from Pirikita gorge told us that a bear came to his farm but dogs surrounded it and did not let attack the farm.

Livestock were accompanied by shepherds in only 35% of attacks (n=15). Presumably, the attendance could be even worse if attacks were not happening at night when shepherds sleep at the farm therefore they have to be near the flock.

Generally, many details provided by the respondents were quite vague and we noticed that, even if details were provided they did not seem confident in what they said. This may be because of the high rate of attacks at night, when shepherds cannot see what is happening and can only speculate on details. However, collected data includes valuable information which gives possibility to see conflict characteristics in Tusheti and lets us make some conclusions.

Among the recounted attack events, one in particular stands out; at the end of July, near the village Kvavlo, in Pirikita gorge. Here, the milking sheep were being kept near the village, in a very simple corral and with no dogs present at the camp (these were with another flock). A young shepherd stayed with the sheep but he left the camp and went to the village, leaving the sheep unattended. The next morning, when he returned, the corral was empty and the loose sheep were spread over a huge area. When they counted, 77 sheep were missing and three more were accounted for but injured. The predator responsible was not seen by anyone but the livestock owner assumes it was either wolf or lynx. As we were told, many sheep were found dead in nearby gorge. The livestock owner could not provide a number for the amount of sheep killed directly by predators.

2.3.4. Main Findings and Conclusions

Generally, **in Tusheti livestock seem less protected**; shepherds are less vigilant and/or often not accompany sheep flocks. Corrals have barely made barns which not protect sheep from predators neither keep sheep inside when predator attack is happened during the night. It is also interesting that the same people almost never keep flocks without corrals during the night at winter pastures. Even if livestock owners relocate the flocks to new pastures at the end of winter season, they always build temporary corrals with thorn.

There seems to be a clear difference between the two sites (summer and winter pastures) in the average number of animals killed or injured during attacks by predators. But we should consider that more complete study should be done to prove this difference.

According our data it is obvious that night-attacks happen more frequently In Tusheti than at the winter pastures (73% vs 17%, respectively). In Tusheti predators try to depredate sheep in a corral and in most

cases sheep run away from the shelter and sheep dispersing widely so that shepherds cannot collect them until daylight. Wolf or other predators have enough time for consuming their pray and/or surplus killing. Sometimes, panicked sheep can run over the edge of cliffs and this serves to increase the level of damage suffered during a single attack event (Kvavlo case). Therefore, we can conclude that **predators are more successful in mountains; because night attacks allow predators chaise the sheep outside the corrals and surplus kill the livestock.** By making more stable and higher fences livestock owners could prevent all attacks which happen at the campsite (60% of all attacks).

According to shepherd's reports bear attack more often than wolf. If we compare bear and wolf attacks according to time we see that bear always attacked during the night, when wolf attacks mostly happened during the day. So, based on respondents' information, it would seem that **bears, unlike wolves, prefer to hunt during the night. Bear population is bigger in Tusheti and farms tend to suffer more night attacks from bear attacks.** As far as respondents have not seen predators in most cases, we cannot perceive this as an unerring conclusion. We know that shepherds lack of identify predators according the wounds on the carcass. Hence further investigation is needed to proof this theory.

If respondents were right and bear often attack livestock in Tusheti then the last month of the summer season should be indeed most problematic. Bears are excessing period of eating (hipperphagia) and give their preference to high nutritional foods. Therefore it is very logical that bears would intensify their attack in September.

However, **when livestock owners and shepherds discuss their opinions on predators, they are still more positive towards bear than wolves,** seeing them as more conscientious as they take only one or two sheep unlike wolves which kill as much as possible. This is supported by our data which shows that, **even if wolves participated in less attacks, they still cause more damage (27 head in 5 attacks) than bears (16 head in 6 attacks)**. Again as shepherds mostly did not see attacked animal we can speculate they tend to think that attacked predator was bear because only one sheep was lost. When they had lost more sheep they automatically blame wolf or lynx.

The frequency of night attacks, and especially the case from Kvavlo village, provides a very clear lesson that every livestock owner should learn. Kvavlo case financial damage (calculated even very roughly) was at least 13,000 GEL (according to price of milking sheep). The actual damage is much more because from 80 milking sheep owner derives cheese and lambs following winter season. **The loss is much more than enough to justify an investment in constructing reliable corrals for all three flocks**. Especially when we know that this is not only case in Tusheti and more high damage attacks is not a rear there (due to absent of eyewitnesses we could not obtain details of the attack).

It was obvious that shepherd behave more relax in the mountains comparing to the lowland. It is difficult understand why. One of the possible explanations is that they have wrong perception regarding depredation level in the mountains and do not see necessity of properly guard their flock. The reason of wrong understanding of the depredation level could be based on the fact that they try control predators in Tusheti. Hence, shepherds might believe that wolf and other predators should depredate less in the mountains.

2.4. AWARENESS RISING AND COMMUNICATION

2.4.1. 2015 Calendar – Georgian Carnivores

In collaboration with National Geographic Georgia was prepared the calendar with Georgian carnivores (**Error! Reference source not found.**). 1000 copies were printed from which 400 copies were distributed in Dedoplistskaro at following organizations: Local government; Educational Resource Centre; Border guards; VPA Administration; Friends of VPA; Police; Banks; Shops; Farms; Clinics; Editorial office of local newspaper etc. 100 copies were sent to Administration of Tusheti Protected Areas. Others were distributed in Tbilisi and Borjomi.

Figure27: 2015 Calendar – Georgian Carnivores
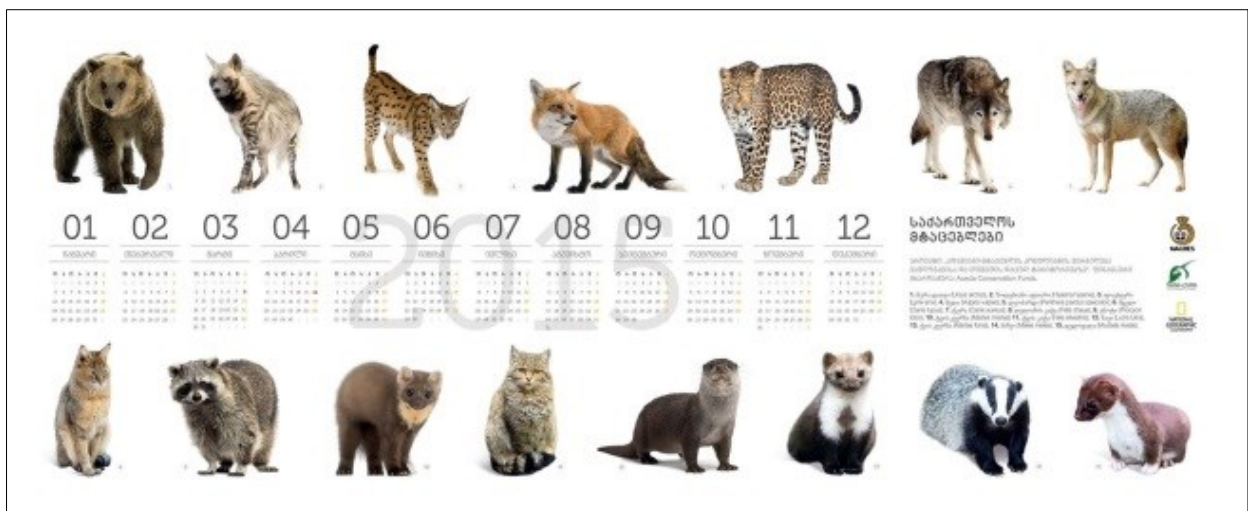
2.4.2. Contest of paintings

The idea of contest announcement was to familiarize carnivores of Georgia to Dedoplistskaro school pupils. They were asked to paint the animals as they see them. Children had possibility to attach some message to the panting. Contest was announced on February 9 through Facebook page, local newspaper, Educational Resource Centre and local art school. Totally 21 painting were received but seven were rejected due to irrelevance to contest terms. Others were scanned and disseminated among jury and uploaded on Response Team Facebook page. According to contest terms, one winner was selected with Likes on Facebook. Facebook winner became Papuna Papuashvili who collected 1286 likes. Other two were selected by jury. Jury winners are Phati Natroshvili and Nino Kikilashvili.

Figure28: "Bears" by Nino Kikilashvili

On April 23, award ceremonial was organized at VPA administration meeting room. After small presentation about HCC, winners were awarded with field guides: Carnivores of the world by Luke Hunter and Priscilla Barrett. They also were invited on open air activity which was planning by response team in May. Additionally, each participant received special certification of attendance.

2.4.3. Open air activity

The one day activity was organized by response team around Khornabuji castle, near Dedoplistskaro. Activity were compiled by several small games and lessons which serves to improve participants' knowledge about Georgian carnivores and HCC, gain leadership and collaboration abilities. Children learned how to use GPS navigator and they have possibility to use new knowledge in the game.

Eight pupils were participated in game; among them were three winner of the contest of paintings. At the beginning children were divided into two groups, they were asked to name themselves and select the team leader. After that one group received the initial coordinate and tasked to find the hiding-place with hint and coordinate to the next place. The goal of team was to collect four hints which were hided in different, "mystic" places. The places could be reached only with GPS coordinates which sometimes were accessible only if team members correctly answered some questions. Same time when one team was searching hiding places using GPS, another one was trying to get the hint by collecting enough points in several games.

Pupils successfully found all hints; Next step was to find main hiding place using collected hint but do this jointly. This task was also solved successfully and they found the envelope with deeds in the caves on top of the castle.

After that children had barbecue and in the evening returned in Dedoplistskaro. Nevertheless, hot day and lot of mosquitos they seemed to be very happy with the activity.

Figure29: Facebook winner – Papuna Papuashvili receives the deed

Figure30: Teams are trying to guess the trip to hiding place

Figure31: Soso Kikilashvili finds the envelope in the cave

Figure32: Team "Maximus" is returning successfully with four hints
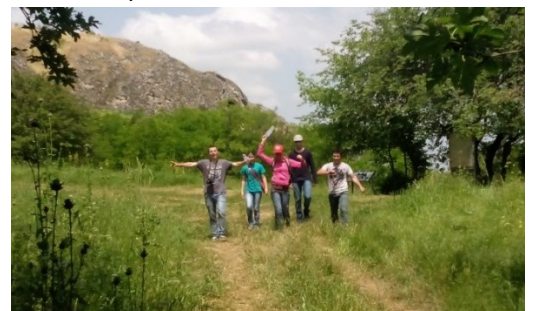
2.4.4. Facebook Page

Facebook page was actively used for outreach activities. The page stays very useful tool for awareness rising and communication. Through Facebook we advertised several project activities (such as contest of paintings), info on project development and carnivores. One of our Facebook post received the most attention. The post was based on poster prepared by Wolf Conservation Centre and underlined positive about wolf facts in USA (Figure33). This post has reached more than 9,000 Facebook users and it had mostly negative responds. Facebook users, in their comments try to oppose the facts and expected their concern on permanently increasing wolf number. They commented that wolf did not need protection (although there was no proclamation to do so) and NGOs spent money on very useless topics. They blamed Georgian NGOs that they support wolf population protected and that is how local people receive tremendous damage NGOs comparing to ordinary local people. They believe that wolves (as well as other carnivores) are reason of decreasing ungulate populations in the wild.

As it was very difficult to answer on increasing number of question and comment we developed separate document where we described our thought and approach toward each important topics and comments raised Facebook users (kind of FAQ). The document was published on Facebook. It should be mentioned that the document was accepted with great interest and clarified many uncertainties. Overall the post was very successful as lot of people had chance to re-evaluate their attitudes towards wolves. The page liked increased very rapidly and at the end of the project we had up to 2000 friends.

Figure33. Poster about wolf facts by Wolf Conservation Centre
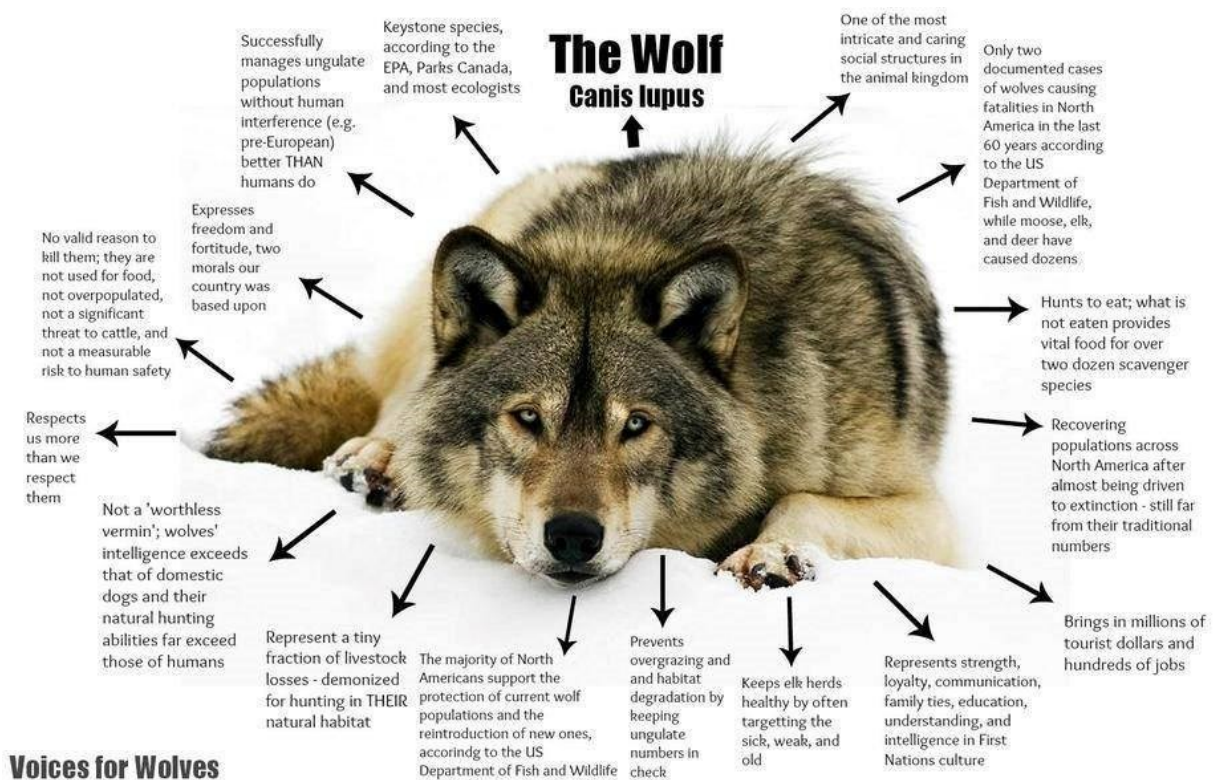
CHAPTER 3. PILOT SCHEMES

3.1. ELECTRIC FENCES

3.1.1. Overview

Although early stages of electric fence evolution caused some doubts, nowadays they are considered as one of the promising non-lethal predator exclusion systems which protect the livestock as well as predators. Working on VNP the project could not recommend using of huge fences covering whole pasture as it would become a barrier for wild animals. Instead, we decide to make small electric fence for particular type of sheep. As previous HCC studies on VNP has shown, important portion (~14.4%) of predation caused sheep damage comes on flocks with sick or lame sheep that are kept near farm house. Livestock owners do not have extra shepherds for these flocks so person who stays at farmhouse called "mebinave" is responsible to watch over them; but in fact he has many other duties and flock often stays without attention, resulting either wolf approach to the farm or flock withdrawal. Installing electric fences near farm could reduce the damage and same time free up the mebinaves' time.

"Lazareti" or hospital in English is a flock with sheep that are not able to walk far distances due to disease and/or weakness and are kept near the farm for rehabilitation.

3.1.2. Past experience

In 2014, first electric fence trial was done at project area. Two farms were provided with energizers, plastic posts and ground rods to install one hectare fence. One fence was installed in Samukhi valley and another in Kumuro. Soon after installation we noticed that both fence had problems – they were not providing enough voltage to prevent livestock from passing through them, especially Samukhi fence was unsatisfactory. Searching the reasons of such malfunction, we found that problem was dry, sandy soil as fence worked quite well in Dedoplistskaro where soil was also dry because of drought but not as sandy as in Vashlovani.

Figure34: Electric fence installed in 2014 with only plastic post at Samukhi lowland

Samukhi fence was also damaged by horses soon after installation; it was located in the middle of lowland where horses from several farms were running without control; during night they have run through the fence causing damage of wires and about 70 posts out of 100. We decided to remove the fence from that farm as it was impossible to train all horses from whole lowland; in addition, farm owners did not express high motivation to rehabilitate and maintain it particularly when they could not see effectiveness of the fence. Although another fence did not have enough voltage, it worked better and in some cases it provided enough shock to scare sheep, especially after small rain in spring it got better.

3.1.3. Recent results

According to our experience from last year, we decided to modify the fence to make it more stable and reliable. We bought fence tester, insulators, gate springs, gate handles and wooden posts. The fence was installed on 11 January in Kumuro area at the same farm as last year. One hectare was fenced in front of the farmhouse on the smooth, north faced slope as such places provide more moisture therefore more grass for sheep as well as more current in wires.

Wooden posts were installed in every six meters using so called Hole Digger that provides narrow and deep holes thus makes posts more stable. Between acacia posts we used one or two (according to relief) plastic posts to keep needed distance between wires. Six wires were attached using screw insulators. Ten warning signs were attached around the fence.

From the first trial we saw that sheep passed through the wires easily if they did not touch it with nose or other less hairy parts such as foot and ear. Usually, grazing sheep moves so that puts head under the wires and first contact happens on the back which is covered with long wool. This makes barrier for current to jump from wire to sheep skin and prevents to provide enough shock. To avoid such cases we made first wire as ground one and all others as live.

Figure35: Electric fence gate from 2015 trial

Though after installation tester showed about 6.5 kilovolts in wires, which is enough to scare sheep, we saw that some sheep managed to escape. Considering that fence charger provides pulses in every one second, leaving small gap when animal can safely touch wires, we observed that in some cases sheep managed to put head under wires safely but after receiving shock they pushed forward instead of retreating. Nevertheless, after such experience sheep never approached the wires and in case of well-trained flock the fence looked absolutely reliable as sheep enclosure facility.

However, above mentioned example raises the question - What if predator manages to penetrate even if it receives shock? Unfortunately, we do not have enough experience to exclude such cases. We can only speculate that by maintaining enough voltage (min. 5000 volts) predator penetration will be reduced to the minimum, as wild animals are more careful and they will investigate the fence by smelling the wires. Even if after shock they appear inside fence the pain must be strong enough to motivate them to leave territory immediately.

Shepherds tried to save grass inside the fence and started regular use only from the middle of February and continued to the end of March when grass became insufficient. During this period (approx. 45 days) in average 20 sheep were kept inside.

During operation period only once was observed decrease of voltage to 4 500 volts. Possible reason could be long rainy period when charger could not accumulate enough energy and same time wet

environment caused leakage of current. No other significant failures were observed nor reported by shepherds.

Generally, livestock owner was happy with electric fence: "Sheep learns to avoid wires very easily, we can keep them inside and do other work freely" – said Otar Phareulidze - "I will increase the fence in future by one hectare or more"

3.1.4. Conclusions

Although, Livestock owner was happy with electric fence and was motivated to maintain and even expand it in future, it is doubtful if reduction of damage will pay for the costs of electric fences. At the moment we do not have enough data to measure cost effectiveness but at least shepherds' time that was freed out due to sheep captivity is quite significant outcome.

Table shows the budget for one hectare solar powered fence with total cost of 1492 USD which is quite expensive for Georgian livestock farmers. Given parts are necessary to have well-functioning electric fence with basic comfort. It is also possible to make economy by using handmade parts (e.g. water pipes as plastic posts, water pipe connectors as insulators) with cheaper materials but quality very likely to be corresponding.

Table23: Budget for one hectare solar powered electric fence (in USD)

Electric Fence Parts	N	Unit Cost	Transport Cost	Total Cost
Fence charger –Parmak Magnum Solar-Pak 12	1	264	92	356
Wood Post Insulator	500	6.4	70	198
Plastic Posts	70	2.5	224	399
Fence Tester	1	29	2	31
Poly wire	6	45	12	282
Gate Spring	5	9	20	65
Gate handle	5	4	7	27
Gate handle hook	5	2	2	12
Wooden posts	70	1.7	-	252
			Gran Total (USD)	1492
			Grand Total (GEL)	3431

As time by time solar energy becomes popular among Tushetian farmers, economy can be done also with fence chargers - farmers who have personal solar system, can buy cheaper, AC powered fence chargers instead of below listed one with integrated solar panel and 12v battery. Considering given alternatives, very simple fence can be done much cheaper, but before livestock owners should know about benefits of fencing. We think that our trial can serve farmers motivation especially if low cost equipment will be available.

It is also important to understand how predators perceive the fence. Do they prefer to get under first wire of they will step over it? Do they approach slowly by smelling wires or run through or jump over it? To answer these questions we tried to make experimental fence with bait (sheep carcass) and with camera traps. During two months of operating we could not monitored any attempts from predators to approach the fence. The possible reason might be small size of fence that makes it visually more notable

and therefore more disturbing as well as noise of charger impulses can be heard from all perimeter of the fence.

Thus we decided to install another experimental fence. We bought the stronger energizer and install experimental fence with camera traps to capture at least one attempt of predators' penetration and check if wire spacing was adequate.

Figure36: Measuring voltage in wires at experimental fence with bait and camera traps

Electric fence was installed on June 2 at one of the corner of existing electric fence at Bugha-moedani. Initial plan was to make 10x10m fence but as camera traps did not worked at such distance we made 6x6m one. Camera traps were attacked to the corner posts and directed to the bait located in the middle of the fence. We used cattle skin, bones and meat as bait.

Figure37. Experimental electric fence installed in summer at Bugha-moedani

Fence was maintained during one month. Bait was added once a week three times after installation. Each time we visited the fence the bait was untouched and no tracks were noticed around the fence. Unfortunately, cameras only captured small birds that were sat on wires.

Although we could not capture the carnivores, what we get is also valuable information. When there is an option to have food with high nutritive value in the middle of nowhere, with smell that could attract the carnivores from quite big area and still it stays untouched for whole month – we can suppose that the fence worked at least as a psychological barrier.

3.2. SOLAR LAMPS

Scare devices are regarded as an alternative non-lethal predation control tools. Most scare devices that are used in project area are scarecrow located around the farm. They can be more effective at the beginning but it is agreed that carnivores easily adapt them.

Solar lamps are very useful scare devices that can be used to protect corralled sheep during night time. Our initial idea was to buy lamps with blinking light to minimize carnivore adaption but unfortunately we could not find one with adequate specifications and price. Finally, we bought solar powered lamps with motion sensor (Figure). The lamps automatically switch on in the evening with dim light and provide bright light when detect motion (sensor range 3m.). Initially we bought ten units and installed at the farm in Samukhi lowland. Farm was selected based on following criteria:

- Aspect (lamps cannot be faced to the north)
- Owner's enthusiasm to cooperate with the team
- If the farm had experienced that wolfs entered in the corral.
- Location (To make the trial more visible for other farmers).

Farm has not suffered any attacks after the lamp installation, although it does not necessary mean that they are effective. Only observation that pays to lamps goodness belongs to the livestock owner who said that lamps keep dogs calm during night and they bark less. If this is correct, it probably means that 1) predators do not come close to the farm, 2) thus dogs rest better during night therefore they should become more attentive next day.

Figure38: Solar lamps are attached to the posts around corral

Whether or not, livestock owners are very interested with solar lamps, this year several farms have installed lamps by their own initiative. Lamps have different prices, sizes and original functionalities. One farm uses even head lamps to deter predators. According to him it is very expensive as he changes batteries in every four days. We were asked by him for help to find proper lamps. As he is motivated to use the method we decided to buy 10 more lamps and provided him at the end of the winter season.

3.3. LICKING BLOCKS

3.3.1. Overview

During HCC surveys we noticed that sheep health can influence on level of predation. Shepherds often mention that sheep that have health problems is more likely to be left behind the flock or can also be easily caught by thorns. If such cases are not seen by shepherd, the sheep becomes prey with high probability. Also, as we previously said, "sheep hospitals" are attacked very often.

3.3.2. Introducing licking blocks at farms

To improve sheep health and thus reduce the predation we decided to introduce mineral licking blocks at farms. Blocks were bought in Tbilisi, from Agro Development Group which is the one of the leading company that imports wide range of production for rural husbandry. The blocks (Figure) contain list of wholesome minerals and vitamins which help sheep to keep healthy, strengthen body after pregnancy and during lactating period.

Figure39: Providing licking blocks at Guram Rainauli's farm

Total of 450 licking blocks were purchased and transported to three farms in and around Vashlovani National Park. Farms were selected by following criteria:

- Have approximately 300 ewes
- Livestock owners are enthusiastic to improve husbandry approach
- Livestock owners are known and respected in their community.

Two from selected farms locate in national park (Guram Rainauli, Kako Shortishvili) and one is outside protected area, in Samukhi lowland (Gocha Betsunaidze).

Beneficiaries were informed about basic rules how to use the licking blocks. After one week farms were visited again to see how they have managed to give the blocks to livestock. Guram Rainauli and Kako Shortishvili noticed that salty blocks make sheep thirsty. As they have no permanent water source close to the farm they decided to give blocks every second day – before taking them to water source. But later Guram stopped giving blocks at all until arrival in Tusheti. He said that the pond near the farm was dried out after last summer's drought and he had to herd flock very far; after licking sheep became so thirsty that it was impossible to keep them together. He said that they do not have water related problems in Tusheti and he will continue giving block there.

Kako Shortishvili continued giving the blocks till departure. He said that his flock survived winter without diseases or weakness owing to the blocks. *"It is widely considered that salt makes sheep stronger; that's why sheep from Samukhi is always in better conditions than mine or sheep from less salty areas"* – said Mr. Shortishvili – *"But this year livestock owners from Samukhi were amazed when they saw my sheep*

being in better condition than theirs. Usually, we have to transport some sick individuals by car during migration but this year only one goat with two kids was not able to pass the Caucasus". He still has some blocks for next autumn and he is going to buy more for winter.

Samukhi farm has water source nearby, so they continued giving blocks to the end of departure. Livestock owner Gocha Betsunaidze said that the blocks improved sheep health although he could not show any evidence.

Figure40: Licking blocks in feeding trough at Gocha Betsunaidze's farm in Samukhi lowland

3.3.3. Conclusions

Generally, all livestock owners were happy with blocks itself. They all agreed that giving blocks is one of the proper ways to maintain livestock health, but they were bit concerned about price and that's why they do not normally provide livestock with them. One block costs GEL 6, weighs 3 kg and is enough for two sheep to lick 1.5 months (estimated time from lambing to departure to summer pastures). Farms which have 300 ewes (as our beneficiaries do) should spend GEL 900 (plus transportation cost from Tbilisi to the farm).

According to Agro Development Group, as well as we can speculate, the blocks should support sheep to recover after leakage of minerals due to lambing and lactating, make them stronger for migration and maintain quality and amount of milk therefore support lambs' growing. All these benefits are not easily measurable without special observation and it is difficult for livestock owners to calculate if these benefits will economically justify the cost of the blocks.

However, the trial must be considered as successful, as livestock owners had tried the blocks first time and saw that this is an option to keep the livestock healthy. If farmers will not be able to make advanced calculations to estimate cost efficiency of the blocks, possibly response team can plan experiment in future.

CHAPTER 4. FEASIBILITY STUDIES TO DETERMINE THE POTENTIAL FOR MARKET-BASED INCENTIVE SCHEMES COMPLETED

In 2012, FFI commissioned a study to explore ways in which our work could increase impact by interacting with the existing market system within which the Tusheti community operates. Within the project, we tried to assess the feasibility of transforming two of the study's key recommendations into pilot projects for near-term implementation. One recommendation would introduce a levy on overnight tourist stays. The second recommendation would investigate whether the currently under-utilized wool market could be made more accessible and attractive to Tush farmers through the provision of modern sheep-shearing equipment, in an easily accessible location, and training in its use and accessing the market.

As for the second recommendation we found that The Czech Development Agency (CzDA) within the project *Support of the Traditional Livelihood Systems in Tusheti* is already implementing activities that are focused on wool market development. Project provided material and technical support for the development of the traditional livelihood system of farming including cultivation of agricultural crops such as potatoes and processing of wool in mountainous areas of Tusheti (Kakheti region, district Achmet). One of the activities of project included providing technical support for producers of wool in Tusheti. Namely, the CzDA's supplied equipment for sheep shearing to shepherds and also they purchased a truck for wool transportation. In addition they provided series of training for locals in using the sheep shearing equipment. The project is under way and final results will be available at the end of year 2016.

Therefore we obviously decided skip the activity in the project. After consultation with donors funds for the activity was used for SURVEY OF HUMAN-CARNIVORE CONFLICT IN TUSHETI PROTECTED AREAS described above in the chapter 2.3.

4.1. FEASIBILITY STUDY FOR INTRODUCING CONSERVATION LEVY IN TUSHETI PROTECTED AREAS

The feasibility study was conducted and report was prepared by Giorgi Rajebashvili, an independent expert hired by the project.

4.1.1. Purpose

Purpose of the feasibility study was to find out attitudes and position of local guesthouses owners, association Tusheti Guide and APA toward introducing conservation levy in Tusheti. Furthermore, the study's aim was to provide different strategies and ways for introduction a levy on overnight tourist stays to guesthouse and campsite bills. Later on the revenue generated from the conservation levy would be used to benefit shepherds, for example by subsidizing the use of dietary supplements provided to ewes during the lambing period (also a peak period for depredation by large carnivores).

4.1.2. Introduction

Nowadays many countries are facing degradation of the natural environment; we are discussing from the global warming to depletion of key resources, and it is believed that degradation of the natural environment will have potentially broad consequences for humanity.

Nature provides a range of benefits so called ecosystem services, for example; healthy natural systems regulate our climate, pollinate our crops, prevent soil erosion and protect against natural hazards. They also help to meet our energy needs and offer opportunities for recreation, cultural inspiration and spiritual fulfilment. However, many of the benefits provided by nature and the associated economic values do not taken into consideration by a range of stakeholders including politicians, administrators, businesses, communities and individuals. To put it differently, nature is invisible in the individual and political choices we make, which finally draws down our natural capital (e.g. MA 2005).

Humans have inhabited the Caucasus for many millennia, legions of rules and government regimes have vied for control of the region and its rich resources. Since the humans have transformed almost half of the land in Georgia, any strategy for conservation of the rich biodiversity of the region will have to take the human factor in to consideration, for example; seeking alternative ways to boost local economies through sustainable practices of natural resource use and including local communities in conservation programs. Therefore, it is vital to know local people's attitudes toward the natural resources, toward the any new project which will affect them. Consequently before initiating project regarding introducing conservation levy in Tusheti was held research.

Main idea of this study is to find ways for the introduction of conservation levy, or introduction of donation boxes which will be installed at local guest houses. The revenue generated would be used to benefit Tushetian shepherds on the winter pastures in Vashlovani.

4.1.3. Brief overview of Tusheti region and tourism structure in Tusheti

Tusheti is one of the most wild and scarcely populated mountain areas of Georgia. Ironically, this is one of few parts of the country that lies on the northern slopes of the Greater Caucasus, i.e. in Europe in a physical– geographic sense. The area lies in the upper reaches of the river Andis Koisu that flows through Daghestan (Russian Federation). This is an age–old shepherding region, covered with coniferous forests in river valleys, subalpine and alpine meadows, and alpine tundra.

Except beautiful villages and exciting local lifestyle important attractions of the area are large scavengers, birds of prey and mammals. One can observe; bearded, cinereous and griffon vultures, and golden eagle. Birds native to the Caucasus are Caucasian snowcock, Caucasian black grouse, and Caucasian chiffchaff.

Important attractions of the region are East Caucasian tur and bezoar goat, the area is the only stronghold of bezoar goat in Georgia. Other mammals to watch are brown bear, chamois, roe deer, wild boar, wolf, lynx, wildcat, wood and rock martens and badger. Locals believe that a few leopards still survive there. At small mountain brooks, one can observe Caucasian toad and Asia Minor frog. Interesting reptiles are endemic Caucasian and Dagestan lizards. The area is covered by mostly coniferous forest dominated by pine.

To get to Tusheti one needs to drive over the Abano pass which is around 2860m above the sea level, road is in poor condition and it requires four wheel drive vehicle. Because of the harsh weather conditions road to Tusheti is open for visitors only from second part of the May till October. Furthermore, after every heavy rain roads need to be cleaned from the land slides or from the rolling rocks which can be obstacle for tourists. Access to Omalo is limited to adventure travellers because of rough road conditions, but from my visits and interviews with travellers and tour operators, the limited access helps ensure a sense of special travel experiences.

In last few years quantity of tourists start growing, so was growing quantity of hotels or guesthouses. There are around twenty Guest houses only in Omalo, six guest houses in Shenako, one in Diklo, one in Dartlo, two in Chesho, one in Girevi and two in Jvarboseli. Visitor centre of Tusheti national park also has hotel which is one of the luxury in region, so one can find accommodation starting from very basic till the 3-4 star hotel.

Service and food is fine in Tusheti, although it is in general problematic in almost every touristic place in Georgia. Some NGO's such as Elkana and Tusheti Guide are doing trainings for local guest house owners in hospitality management but still service needs to be improved. Most of the guest house owners are offering organic food from their garden which can attract many tourists especially from the Western countries.

Figure41. Visitor statistics in Tusheti NP from 2010 to 2014
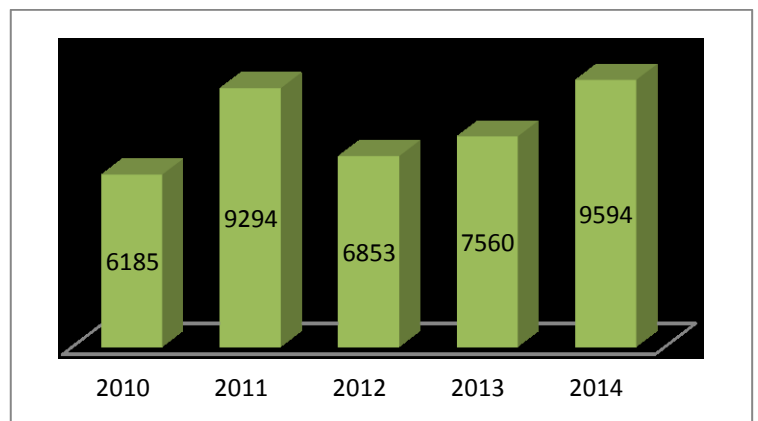
Based on APA's visitor statistics (Figure41) one can observe quite big jump from 2010 to 2011 and then little drop in 2012-2013 which can be caused by the decrease advertisements on international level. For example, for two years 2010-2011 Tusheti was in tenth world's destination places which of course plaid big role for promotion of Tusheti as an attractive destination.

Another issue which I would like to mention is manipulation with numbers which we see in Georgia over the last years, every year governmental bodies and tourism entrepreneurs are talking about increase of visitor quantity with comparison of past years. But they never take into consideration that we need at list 15% of visitors from Western European countries. This means that only quantity of the tourists is not enough and it is essential to offer tours which will convince higher spender tourists from Western European countries to come to Georgia (The America-Georgia Business Council and SW Associates 2007).

4.1.4. Methodology

This chapter presents an analysis of data acquired during field research in Tusheti in August-September 2014. The analysis shows different stakeholders perceptions and attitudes toward introduction of conservation levy on the accommodation bill which will be used for the Tushetian shepherds on winter pastures. Main stakeholder groups are local guest house owners (one who also owns sheep or has some

connection with sheep farming and one who doesn't has any income from sheep ownership). Also was identified as a major stakeholder local NGO Tusheti Guide and Tusheti national park. In addition was interviewed domestic and international tourists and local association Tushi Meckhvare.

During the research there was interviewed twenty guesthouse owner, ten international and fifteenth domestic tourists, also association Tusheti Guide and association Tushi Meckhvare.

The results in this qualitative research were based on in-depth (semi-structured) interviews with different stakeholder groups.

In-depth interviews, the traditional unstructured interviews sometimes labelled as ethnographic interviews, are utilized to recognize the multifaceted attitude and behaviour of people without imposing any prior classification which might impose boundaries to the field of inquiry. Moreover, an in-depth interview is capable of creating rich and important data.

Basically interviews are about "asking questions and receiving answers" using the media of language, some scholars such as Mason (2002, pp. 63-66) points out that the choice of semi-structured interviews is an indicator to the following beliefs and reasons:

People's understandings, feelings, perceptions and other inner thoughts as well as the interactions with other people are parts of the social reality.

This reality could be revealed by representations and interpretations through language.

What has been revealed is situational knowledge which will be more likely to be reconstructed under it's due context. In appropriate design, the desired context could be brought into the interview conversations.

Qualitative interviews do not aim to standardize but to achieve more in terms of "depth, nuance, complexity, and roundedness" of what is to be understood.

Interviewing is a "process of data generation" and the interviewer plays an "active and reflexive" role in it.

Interviewees should have more controls and freedoms throughout the interview interactions. Association

As I mentioned above to create the trust among the locals one needs to find a right approach, that's why I am choosing the semi-structured interviews, having some fixed questions, but with the space for probing and going more in-depth at times.

4.1.5. Stakeholder groups

Stakeholders based on Freemen (1984) can be defined as "any group or individual who can affect or is affected by the achievement of the organization's objectives".

Tusheti guesthouse and hotel owners

It is tradition in Tusheti to have a sheep or to be a shepherd, very often in Georgia shepherd is associated to Tush directly, although there are many Kakhetians and Azerbaijan ethnics who own sheep in Georgia.

Maybe that's why during the interviews guesthouse owners where positive toward conservation levy or donation which will be spend for support Tushetian shepherds in winter pastures. But, guest house owners do not feel comfortable by adding conservation levy on the accommodation fee. They are not against donation boxes but they clearly stated that do not want to mix their income with conservation levy.

One can distinguish by motivation guesthouse owners who own sheep from the guesthouse owners who do not have any income from sheep business. But still there is not big difference, both types of guesthouse owners are positive toward donation boxes, sheep owners are motivated to talk with tourists and put some effort for getting donation from them. When others don't mind to have donation boxes in guesthouse but one should not expect that they will try to explain significance of this donation for the shepherds.

In addition some guest house owners who do not have any connection to sheep are doubtful that tourists will contribute any money for the shepherds. One of the lady stated that;" most of the tourists which they are hosting are backpackers who always complain about money and they do not even spend money for their own food, how can we expect that they will donate anything for shepherds".

Figure42. Comparative chart of visitors' statistics at Tusheti NP for the period of May-September in 2013 and 2014
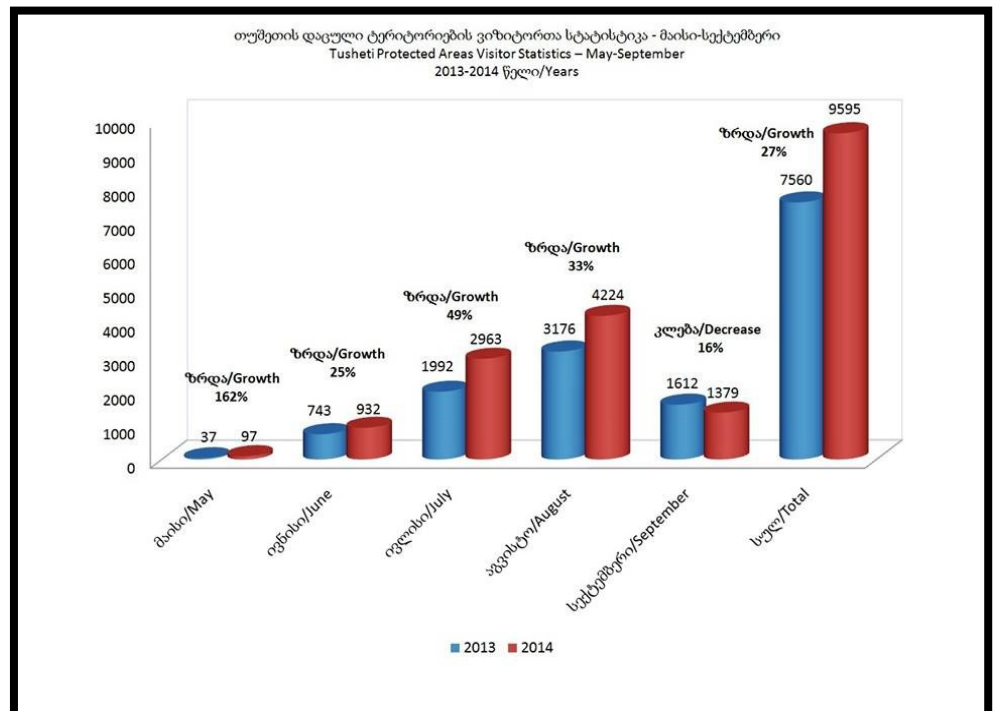
During the interview there was one interesting observation; one of the guest house owner who also owns some sheep was openly telling that he likes idea to make donation boxes and to help to shepherds

but do not expect from me that I won't kill wolf any more. He was also interested about the details and agreements if any during the installing donation box in his guest house. He thought that if he agrees to participate in this project he has to sign a paper which prohibits him to kill the wolf in future.

Agency of Protected Area and Tusheti protected areas administration

I had chance to meet Rati Japaridze director of the Agency of Protected Areas and had mobile interview to Anzor Gogatishvili director of the Tusheti protected Areas. They are positive toward this project and do not see any problems to install donation box in the visitor centre of Tusheti protected areas in Omalo. But Anzor Gogatishvili was doubtful about the revenue generated from donation boxes. He didn't know reason but as he stated this kind of thinks do not work in Tusheti.

As I find out this year they had 9595 visitors which so far is the biggest number. There was quite similar situation in 2011 when the number of visitors reached 9294, but for some reason it dropped down till 6853 in 2012. Usually out of this numbers, around 30 % visits visitor centre for the information or for the maps so it can be useful to have donation box at visitor centre too.

Based on my interviews can be concluded that APA is positive toward this project but it would rather have passive role, which means that one can install donation box in visitor centre but shouldn't expect more help.

Local NGO Tusheti Guide

Non-profit, non-governmental organization "Tusheti Guide" was founded on May 6, 2010. Its members are the owners of Tusheti Protected Areas guest houses and other people involved in the tourism activities.

Figure43. Donation box placed at one of the guest houses by Tusheti Guide

One of the main goals of Tusheti Tourism Association establishment was to introduce this region's natural, cultural and architectural heritages for interested people and promote eco-tourism in region.

In July 2014 they have installed donation boxes (Figure43) at their member local guest houses with mission to get some funds which will be spend for tourism development and for organization needs. During the interview with representative from Tusheti Guide Giorgi Bakuridze it became clear that donation boxes didn't work and basically they got around 70 Lari in total. One of the reasons can be the lack of the information on the donation box, since they didn't clear out who they are or what they are going to do with this

donation money. Another reason can be the time, since they only managed to install these boxes in July in the middle of the season.

In general their position was positive toward the conservation levy or donation boxes, although they also suggested the adding conservation levy on accommodation fee was not suitable for local guesthouse owners.

Since they had already installed donation boxes it creates obstacle for the new project regarding introduction of conservation levy. As Giorgi Bakuridze stated at the moment they do not see how to combine two different projects, one can't put the two different donation boxes at guesthouses and at the same time they are looking for revenue generated too for their project. One solution can be to install donation boxes for conservation levy and offer to Tushetian Guide some percent of income for taking care of donation boxes. Furthermore Giorgi stated that he doesn't see how he can distribute this money to shepherds; he was suggesting involving in this situation association Tushi Meckhvare who are more familiar with Tushetian shepherds and their problems.

Association Tushi Meckhvare

Association Tushi Meckhvare was founded in 2013th, with main goal to promote Tushetian sheep, to keep this tradition and work on issues which Tushetian sheep owners are facing everyday bases. Director of association is Zurab Murtazashvili who used to be head of local municipality some years ago and he was actively involved in creation of Tusheti national park.

During the interview he seemed positive toward this project and as he stated his association can be involved in donation distribution to Tushetian Shepherds. He also stated that this project can built the trust among Tushetian shepherds toward conservation NGO's and toward Tusheti national park and maybe in future shepherds will be more tolerant toward the carnivores.

Tour-operators

Tour operators play big role I tourism promotion and tourism development in Tusheti, big companies are usually attending tourism fairs in different countries and spreading information over the European and North American markets. There are quite a few individuals and small companies who are offering trips to Tusheti who are more concentrating on domestic tourists or on tourists from post-Soviet countries.

During the feasibility study was interviewed representatives from Wild Georgia and Explore Georgia, this companies are one of the big once who are offering different activities in Tusheti. Mainly they had complains about the service in Tusheti guesthouses, regarding the food and clean rooms. Another challenge for them was infrastructure such as; roads, bridges, lack and accuracy of signposts. It seems that some of the road and bridges belong to Akhmeta Municipality and some to Tusheti Nationals Park, there is no cooperation between them and very often they blame each other. Main road to Tusheti is also very broken and needs to be cleaned after winter and then after every heavy rain, although tour companies do not have much complains on the road itself. Actually the road to Tusheti is part of the tourism experience and it was even included in BBC's moves as a Worlds most dangerous road and become great promotion for Tusheti as a tourist destination.

The biggest concern for tour companies was garbage; in Tusheti most of the local people throw all their garbage to the rivers, also many tourists leave their waste on the hiking paths. One can find plastic bags and bottles on the hiking paths, or alongside the rivers, mostly at almost touristic spot.

Regarding the introducing conservation levy; in general they seemed supportive toward this idea although they mentioned that trust is important and they would like to know if this money will be spend by purpose. Furthermore they were doubtful that one can collect enough money from donations which can have effect on the Tush shepherds. Representatives from both companies stated that conservation levy should be introduced by APA and it should be include in the entrance fee.

Domestic and foreigner tourist

In total were interviewed twenty-six tourist, fifteenth Georgian and eleven international tourists (from Poland, Israel, Check republic).

There is no difference between international and domestic tourist toward the project, most of the tourists like Tusheti and are willing to donate some money for nature conservation. But they want some information about the project, it seems that one needs to build trust toward the project, one should provide some information why and how is going to be spend this money.

There was one hiker from Poland who was doubtful about this project, it appears that he was working on the similar project in Poland and as he stated only subsidy for the shepherds is not enough to stop them killing the carnivore. Based on his experience it is rather complex issue and needs some other tools as well, such as; awareness rising among the shepherds.

The domestic Georgian tourists also would like to donate some money for the nature conservation, although want to be sure that it will be in good hands and will be spent on purposefully.

Legal aspects of collecting as well as distributing the conservation levy (by guesthouses, protected area administration, local NGOs and etc.)

Based on Georgian regulation, NGO's and associations can collect money for donation, it can be through donation boxes or money transfer or just selling some brochures, art crafts and etc. But it has to be included in their organizations goals during the NGO's registration, to be clear their future goals. Furthermore they need to have all the documentation about the amount of donation, when and how was it collecting and how it was distributed.

APA is governmental organization but they do have very similar rules and they can also collect donation money as NGO's and donation money is free of tax. Most problematic and I would say impossible is to collect donation money by LTD such as guesthouse owners, since as soon as they show amount of donation have to pay income tax 20% to the budget.

Presenting conservation levy to visitors

One of the clear messages which I got from tourists was about the trust toward the project. Consequently while installing donation boxes to guest houses it is important to print booklets for tourists where they will find comprehensive information regarding the project, and where goes money

which they are about to donate. I mentioned that association Tusheti Guide had donation boxes in local guesthouses but it didn't work, one reason can be the lack of the information on the box.

Especially Georgian tourists where doubtful about the money allocation, so one needs to build trust and provide needed information by booklets, create the web page where people who donate money can registered as a members and if interested follow project step by step.

Regarding the guesthouse owner training for presenting conservation levy to tourists; guesthouse owners who do not have sheep and do not have any income from sheep business seem passive, so most likely they do not want to talk about the project. Other guesthouses owners who do have an income from sheep business are more active and they might say something to tourists regarding the importance of the project, just another problem is language. Most of the guesthouse owners speak no or poor English so one should take into consideration this issue too.

4.1.6. Discussion

In Georgia there is not implemented a comprehensive system of tourism based income generation mechanisms, to put it differently there is no entrance fee, the costs that visitation creates for protected areas and which could contribute to much needed investments that will result in:

- Improved protected area management capacity
- Reduce threat to biodiversity
- Improve visitor experience quality
- Iinvestment in sustainable development opportunities for local communities
- Higher national and international profile of protected areas.

Tourism has potential to be a significant contributor to parks financial sustainability howeever many parks around the world either charge low or no fees for visitation. Consequantly, income generated by tourism are insufficent to cover conservation management costs. Good example of this situation are poor countires such as Bolivia and Indonesia, both countries are subsidizing tourists from wealthy uropean and North American countires who visit their parks.

The best and easiest way to introduce conservation levy would be to implement a comprehensive system of tourism based income generation mechanism. Introducing entrance fee for Tusheti national park could contribute for national park management and for Tushetian shepherds as well. For example visitor statistics provided by APA it is clear that in last few years more and more visitors go to Tusheti national park and it reached around 10 000 visitors in 2014. Out of this number (60%) of tourists are international tourists. If they will introduce entrance fee around 20$ at list for international tourists Tusheti national park can easily generate money to sustain and even provide funds for conservation levy. If we take into consideration that most of the people who visit Tusheti stay at list five days and $20 entrance fee is not big amount, especially if you know that all this money goes for nature conservation projects.

Another alternative way to introduce conservation levy would be to install donation boxes to local guesthouses and into the visitor centre of Tusheti national park. Based on report by (Stewart, T. 2012) it

is clear that only 50% of visitors stay at guest houses at list for three nights which means that chances of getting donation reduces to the 50% too.

Also it is interesting that only 30% of visitors go to visitor center of Tusheti national park for the maps or for other reasons. Very often tourists are coming for hiking and they stay in their tents or they are hiking from Tusheti to another Georgian mountain region Khevsureti. It is hard to say are the same tourist who stay at guest houses who also visit visitor center or they are different tourists. Even if we assume that 60% of visitors will give donation around $1 it will be $6000 equal to 10 000 lari. If we take into consideration that price of sheep varies from 80 Lari (old sheep) to 250 lari (ewe), it will make overage 150 lari which means that donated money 10 000 will be enough for approximately 66 sheep.

According to (Stewart, T. 2012), shepherds with the highest losses (above 1%) were the most negative towards wolves, when 87% of farmers reported losses of sheep to predation in Vashlovani with mean annual losses of 1.3%, in numerical losses were 11.1 sheep on average and the maximum was 70. Since on territory of Vashlovani national park are located 40 Tushetian sheep farms from the revenue generated one can only cover price of 1.5 sheep per farm. Arguably compensation on its own, for the full amount would provide disincentives for shepherds to protect their livestock (Stewart, T. 2012) although it is clear that compensation which is less than 10% can't have vast influence on shepherd's behaviour toward the wolf.

4.1.7. Recommendations for introducing the conservation levy in Tusheti

After the data analysing it is clear that one can't introduce conservation levy on guesthouse accommodation fee, also at this moment APA is not planning to introduce entrance fee for Tusheti National park, therefore other alternative ways will be;

Donation boxes; it should be made by plastic transparent material to be visible through it. One should have some information on the box or publish leaflets with comprehensive information regarding the project. Information should include why this donation boxes were implemented, problem analyses and future goals. It will be also useful if there will be created web page where one can register as a member and get monthly letter regarding the project development.

Booklets; one should publish booklet or short stories about the shepherd's life in English, which will be sold at guesthouses and in small shops. There are many stories about the shepherds, which might be interesting for tourists plus they will know that buying this book is already donation for the valuable project. On other hand it might be step stone to build trust between the Tushetian shepherds and conservation NGO's or toward National parks as well since Tushetian shepherds are always complaining that there are too much obstacles and regulation on their way, and no one cares for them. Publishing booklets about the shepherd life or small stories from shepherd's personal experience will be perceived by shepherds as a promotion of their traditional lifestyle.

Festival; One more way to introduce conservation levy in Tusheti will be to make a festival (shepherds day), it can be in one place such as Omalo, or in other villages too. Idea is to gather shepherds and tourists together, where shepherds will be able to sell their cheese and shepherds families can sell some handicrafts. Also shepherds can demonstrate shearing sheep where tourists can participate as well. In addition on the fair can be installed donation box.

Documentary movie; Finally one can also make short documentary movie about sheep migration and shepherds life, later on DWD's can be sold to tourists at local guest houses.

Lastly, one needs to negotiate with NGO Tusheti Guide to find out their final decision toward cooperating during the project (Addressing Human-Carnivore Conflict in Vashlovani& Tusheti Protected Areas Southeast Georgia). Since they have already installed donation boxes in ten different guest houses it will be reasonable to cooperate and work together rather having two different donation boxes. As Giorgi Bakuridze (from Tusheti Guide) stated, they are positive toward this project and toward cooperation, although he didn't clear out the ways of cooperation. He told me that he will have final meeting with association Tusheti Shepherd and with local guest house owners in November and he will let me know final decision and terms of cooperation.

APPENDICIES

APPENDIX #1. STRATEGIC WORKSHOP HANDOUTS, PARTICIPANTS LIST AND SCHEDULE

General overview

Preliminary findings of the Project "Addressing Human-Carnivore Conflict in Vashlovani and Tusheti Protected Areas Southeast Georgia" indicate that strategy in place since 2009 is making progress. However, while positive impacts are evident, measuring outcomes at this stage has proved challenging. To ensure that our project strategy remains sound and will achieve the desired impacts and outcomes, we will organize participatory strategic workshop. The workshop process will also enable us to identify further indicators and measures of impacts and outcomes that will allow us to scientifically monitor project impacts on local behavior and, ultimately, the number and distribution of the species in conflict. Newly develop strategy will include monitoring program and protocols to clearly measure impacts, outputs and outcomes of project activities. This program would cover both species (i.e., wolf telemetry, scat and diet analysis) and socio-economic monitoring.

Vashlovani HCC stakeholder workshop programme

Objective: To solicit feedback from project stakeholders and beneficiaries, on the work done by the HCC-RT to date, any gaps and issues with our approach and possible future directions and/or focus of the work

The general question we will be asking: how do we make it easier for livestock owners to tolerate/co-exist with large carnivores?

Topics for discussion (prioritised):

1. Cooperation between livestock owners/shepherds and the HCC-RT
2. Improving protection of livestock (with a possible focus on LGDs)
3. Compensation mechanisms; what might work?
4. Research; what should we know in order to better manage large carnivores?
5. Animal health; how can we support improving animal husbandry and veterinary care?
6. What are the mid-term plans of the livestock owners in terms of the number of sheep?

Participants

1. Merab Pirosmanashvili (Vashlovani protected area);
2. Vaja Pavliashvili (Vashlovani protected area);
3. Representative of Service of Biodiversity Protection representative;
4. Representative of Association "Tushi Metskhvare";
5. Beqa Gonashvili (Representative of Georgian Shepherd Association);
6. Representative of Dedoplistskaro government representative;
7. Amiran Kodiashvili(Friends of Vashlovani);
8. Irakli Macharashvili, facilitator of the workshop (Green Alternative);
9. Gareth Goldthorpe (Flora and Fauna International);
10. Teimuraz Popiashvili (NACRES);
11. Bejan Lortkipanidze(NACRES).

Workshop schedule

Time	Topic	Presenter	Organization
10:00 – 10:10	Opening workshop	Gareth Goldthorpe	FFI
10:10 – 10:20	Workshop goals and objectives	Irakli Macharashvili	Green Alternative
10:20 - 10:40	Human – carnivore conflict project overview and implemented activities	Teimuraz Popiashvili	NACRES
10:40 – 10:50	Questions and answers		
10:50 - 11:10	Some findings of wolf ecology research in Vashlovani national park	Bejan Lortkipanidze	NACRES
11:10 – 11:20	Questions and answers		
11:20 - 12:40 Coffee brake			
11:40 - 12:00	Human – Carnivore Conflict Monitoring Results, achievements and problems	Teimuraz Popiashvili	NACRES
12:00 – 12:10	Questions and answers		
12:10 – 13:30	Brainstorming and discussion	Irakli Macharashvili	Green Alternative
13:30 – 14:30 Lunch			
14:30 – 16:30	Continuing brainstorming and discussion	Irakli Macharashvili	Green Alternative
16:30-17:00	Summary of the workshop	Irakli Macharashvili	Green Alternative

APPENDIX #2. MAPS

Map 1: Main toponyms in Vashlovani PA and 2 km buffer zone

Main Toponyms in Vashlovani PA and 2 km buffer zone

Western   Central   Eastern

Nazarlebi

Patara Shiraki

Dilicha

Black Mountain

Chaibulaki

Chighdeli Khevi

Vashlovani

Pantishara

Miashe Tskali

Alphadara

Alazani River

Ghoris Tskali

Kumuro

Bugha Moedani

LEGEND
▲ Farms
⋯⋯ Region boundary
— 2km buffer
— River
◼ Village
▨ Vashlovani Nature Reserve
▨ Vashlovani National Park

0 1 2 3 4 5   10 Kilometers

Date Saved: 19/06/2013 14:26:06
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610000   620000   630000   640000

4570000
4560000
4550000

GCCP
Prepared by T. Popiashvili

Map 1: Surveyed farms in 2013 and their migration

Farm migration within the project area in 2012/13 winter season

Eastern

Central

Western

Kasristskali

83

48

Sabatlo

25

42

84

45

08

09

10

41

65

67

68

4570000

4560000

4550000

LEGEND
- ● Surveyed farm
- ▲ Not surveyed farm
- ✖ Inactive farm
- ▬ Village
- — River
- Road
- Region boundary
- 2km buffer
- Vashlovani Nature Reserve
- Vashlovani National Park

0   1   2   3   4   5   10 Kilometers

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GCCP
Prepared by T. Popiashvili

Map 2: Farms surveyed during five years of surveys (2010-2014)
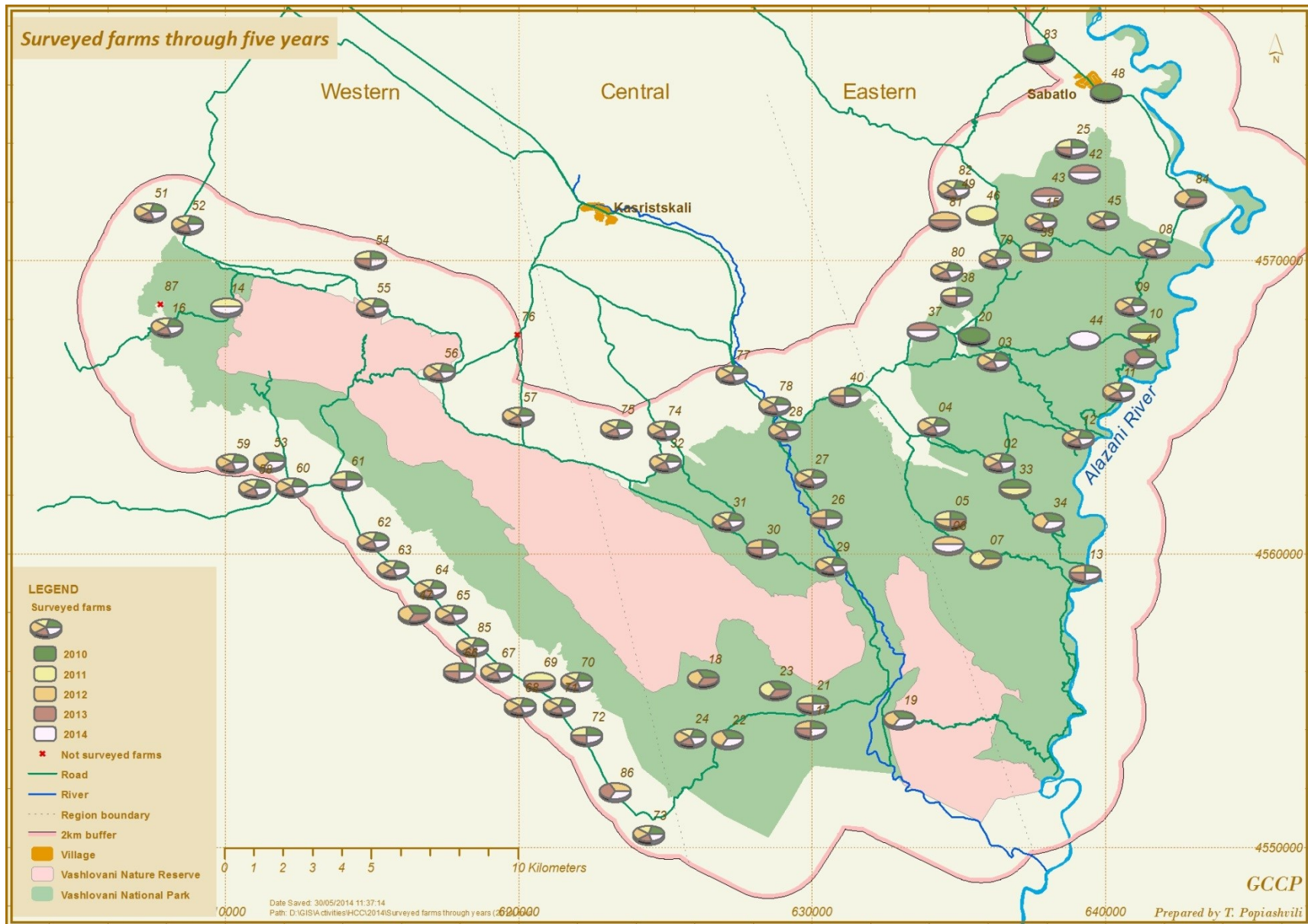
Map 3: Livestock distribution at farms in the study area
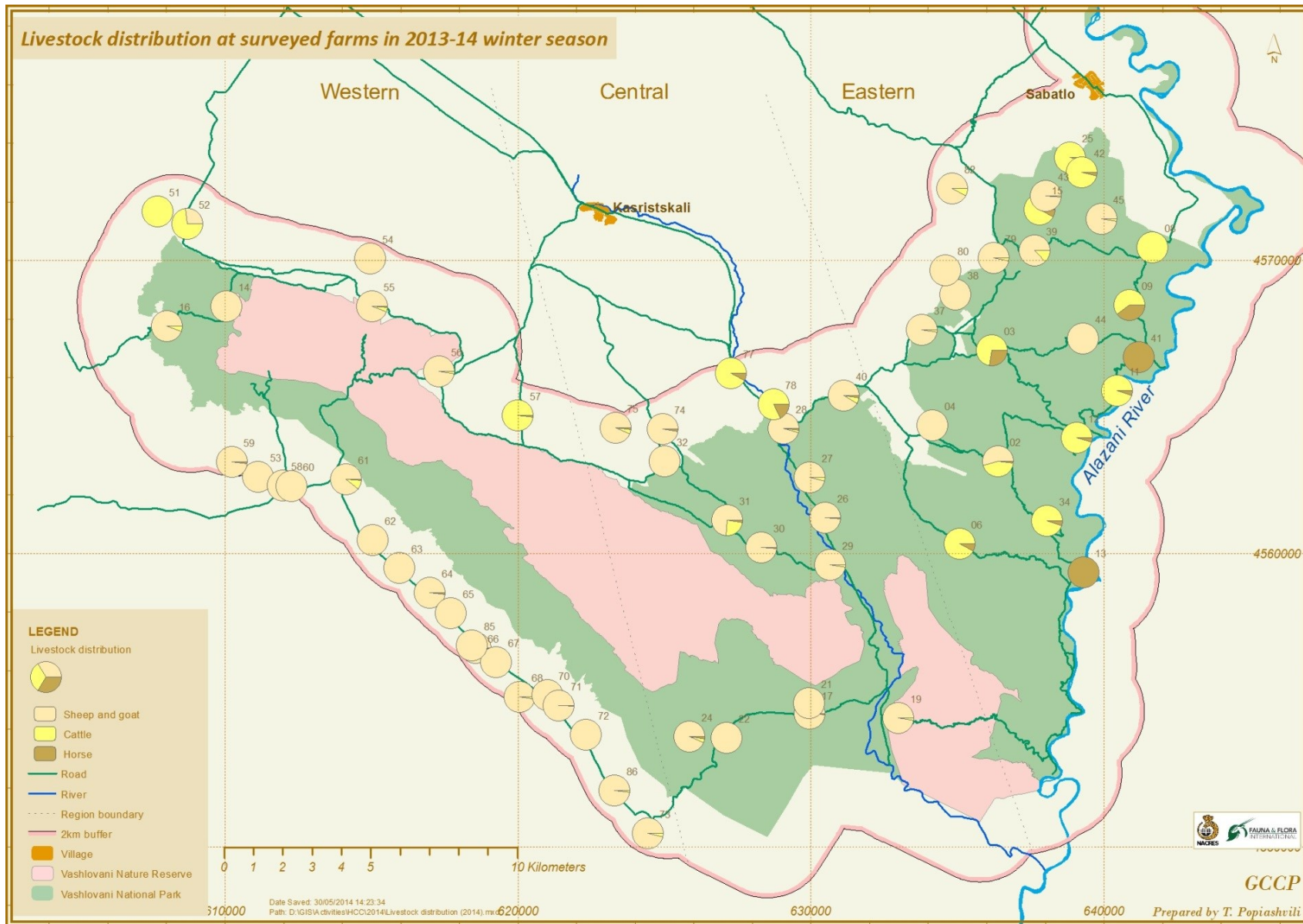
Livestock distribution at surveyed farms in 2013-14 winter season

Map 4: Farms that reported no predator cause livestock lose to according to all survey years

Not attacked farms across all surveys in Vashlovani PA and 2 km buffer zone
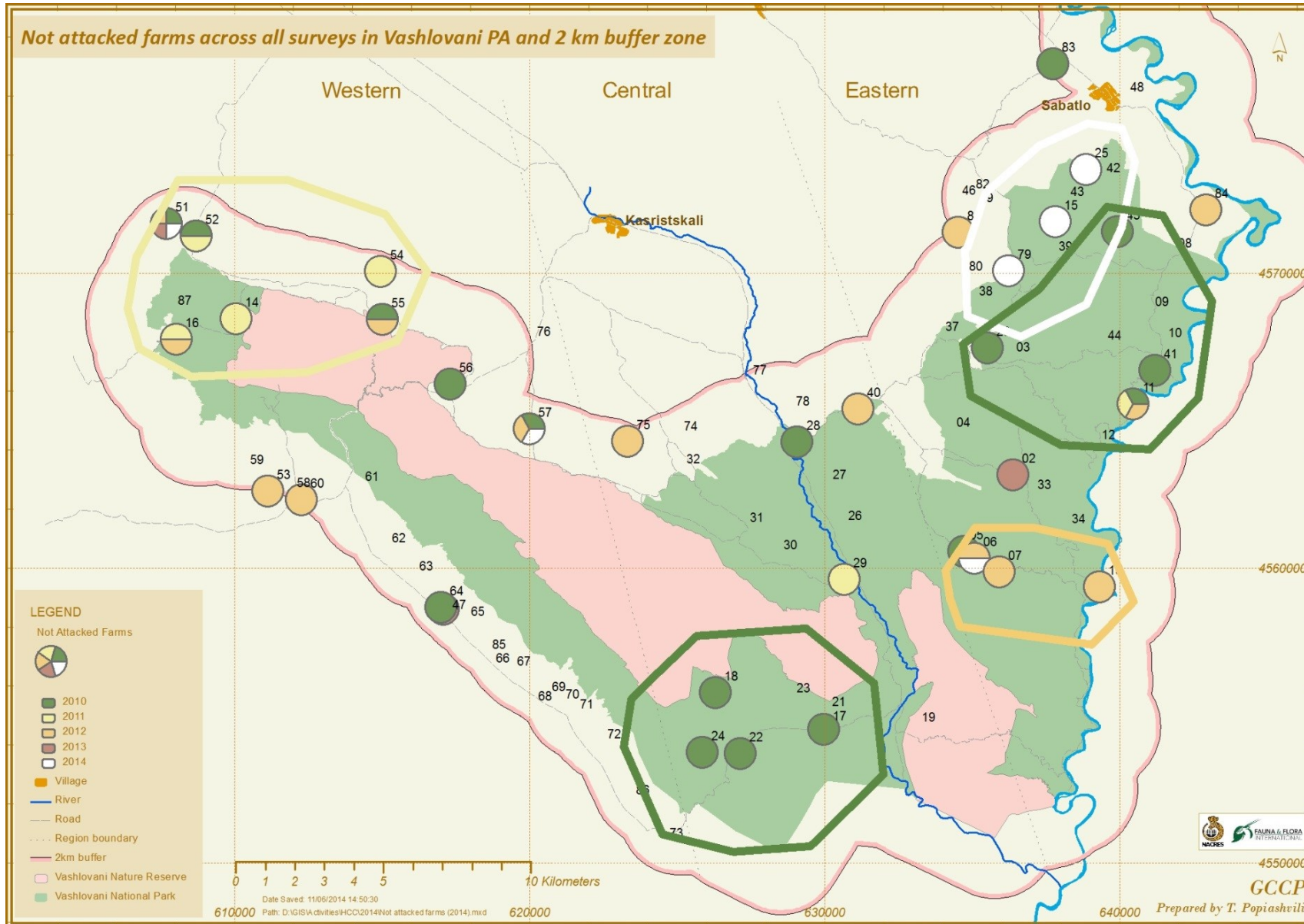
Map 5: Financial damage level at farms in 2013/14 winter season

Damage level at farms in 2013/14 winter season

Western   Central   Eastern

Sabatlo

Kasristskali

4570000

4560000

LEGEND

Damage Level

0.10% - 1.00%
1.01% - 2.00%
2.01% - 4.00%
4.01% - 8.00%
8.01% - 17.00%

Village
River
Road
Region boundary
2km buffer
Vashlovani Nature Reserve
Vashlovani National Park

0 1 2 3 4 5   10 Kilometers

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4550000

GCCP
Prepared by T. Popiashvili

Map 6: Distribution of farms with high level of damage through all surveys

Clusters of farms with high level of damage through all surveys

Western   Central   Eastern

Sabatlo

Kasristskali

4570000

4560000

LEGEND

Damage Level

•   0.000000% – 4.104341%

⬤   4.104342% – 25.396825%

▢   Village

—   River

⋯   Road

⋯   Region boundary

—   2km buffer

▦   Vashlovani Nature Reserve

▦   Vashlovani National Park

0   1   2   3   4   5   10 Kilometers

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4550000

GCCP

Prepared by T. Popiashvili

Map 7: Attack sites in project area

Attack sites in Vashlovani PA and 2 km buffer zone

Western   Central   Eastern

Sabatlo

Kasristskali

4570000

4560000

4550000

LEGEND

Attack site
○ 2009/10
■ 2010/11
▲ 2011/12
◆ 2012/13
● 2013/14
■ Village
— River
— Road
⋯ Region boundary
— 2km buffer
▨ Vashlovani Nature Reserve
▨ Vashlovani National Park

0 1 2 3 4 5   10 Kilometers

Date Saved: 12/06/2014 14:40:56
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610000   620000   630000   640000

GCCP
Prepared by T. Popiashvili

Map 9. Sampled farms for 2015 survey at Vashlovani Protected Areas and 2 km buffer zone
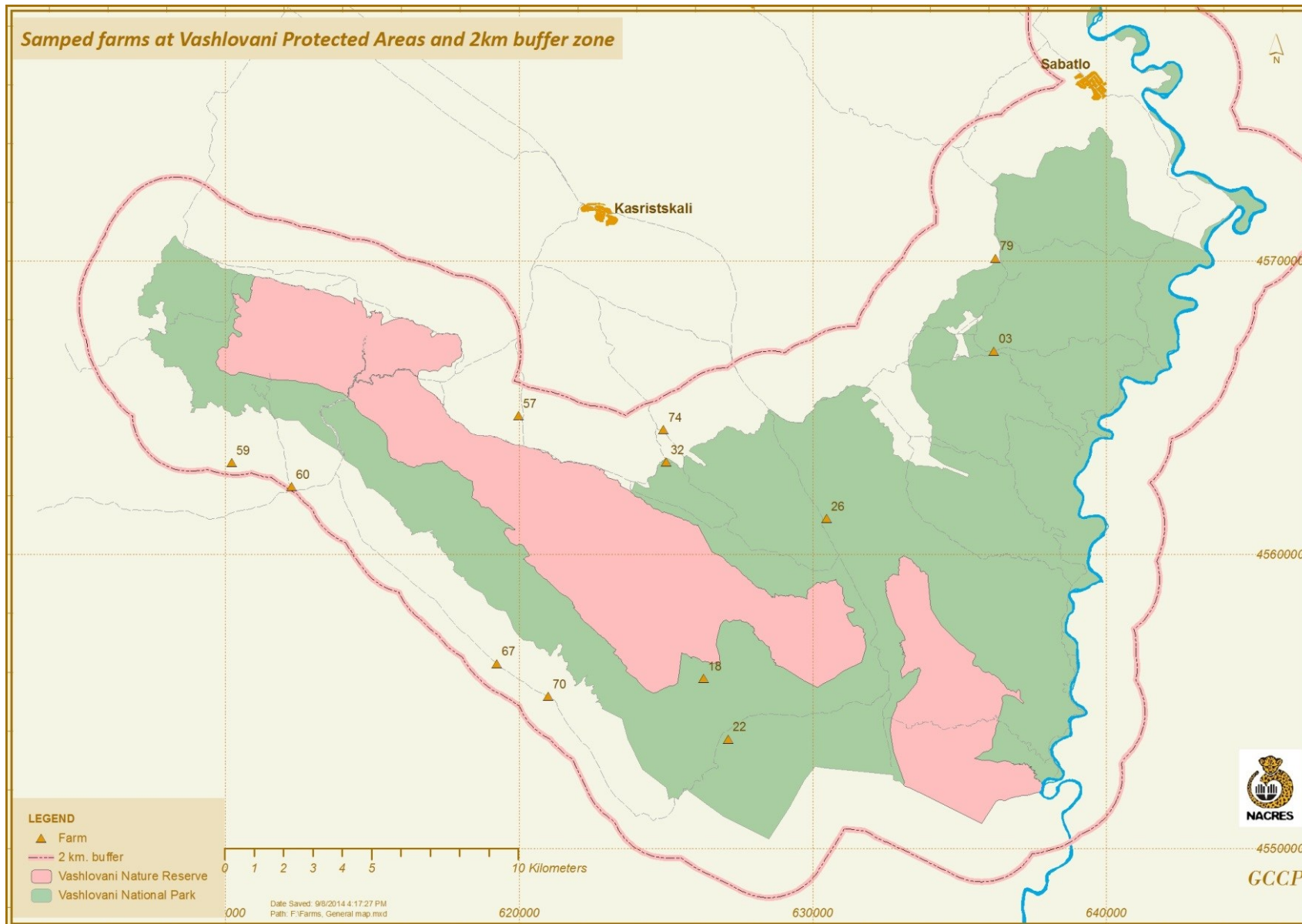
Map 10. Surveyed farms in Tusheti PA

Surveyed farms in Tusheti, 2015
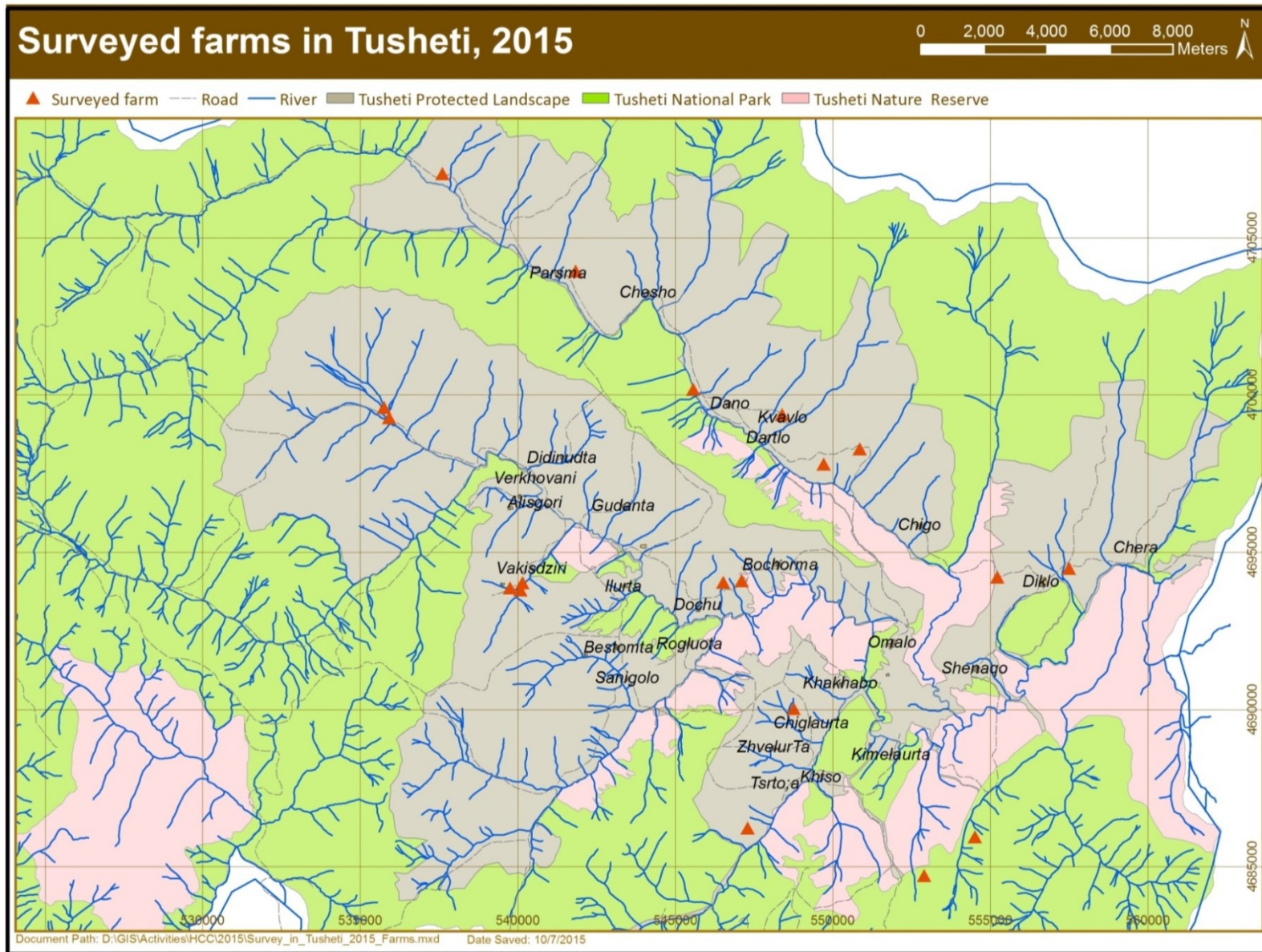
APPENDIX #3. DATASHEETS

Datasheet for livestock owner interviews (beginning of season, extended version, 2013-2014 winter seasons)

Interview #: *5____*   Date: _____   Interviewer: _____

Name of interviewee: _____   Ethnicity: _____ Home district: _____Contact details: _____   Year of birth: _____

Farm details

Farm number: _____   Photo: *Yes /No*Livestock Owner(s): _____

Buildings and facilities at farm (brief description of the general condition and maintenance of each)*:*

　　House　　　　　　*Large barn*　　　　　　*Smaller barn(s) for lambs*

　　Corral (details) _____ *Other* _____

How many livestock owners: _____ and herders: _____ are at the farm?

When did you arrive? _____   Did you have losses to predators during migration? Yes / No

How many head of livestock and what type have you lost during migration? _____

　　Sheep: killed____   injured_____

　　Cattle: killed____   injured_____

　　Other _____: killed____   injured_____

Livestock numbers

Sheep*:* _____   Goats*:* _____   Cattle*:* _____   Horses: _____   Donkeys: _____

Preventive measures

What measures do you use to protect your livestock from predators?

　　Dogs　　　*Sleep with flock Scare devices*　　　　　*Shooting*

　　Patrols　　　*Avoid risky places*　　　*Remove carcass*

　　Other _____

Number of LGDs: _____ of which adults (>1 yr): _____ juveniles (<1 yr): _____

Do you think you have good dogs?   *Yes / No / Partly*

explanation: _____

Remarks

Datasheet for livestock owner interviews (end of season, extended version, 2013-14 winter seasons)

Interview #: *5*_____   Date: _____   Interviewer: _____

Name of interviewee: _____   Ethnicity: _____ Home district: _____Contact details: _____   Year of birth: _____

Details of attacks

Have you had any problems with predators this winter?   *Yes / No*

How many head of livestock and what type have you lost since arriving at Vashlovani? _____

      Sheep: killed____   injured_____

      Cattle: killed____   injured_____

      Other _____: killed____   injured_____

Compared to the past 5 years, is this: *Less than usual / About average / More than usual*

For your income is this loss: *Big / Medium / Small / Insignificant*

Losses to predators

In general are predators a big problem for you?   *Yes / No / Partly*

Are the problems worse in winter pastures, in summer pastures or during the migration?

      Circle applicable: Winter   Summer   Migration

Do you lose more money because of predation or other causes? *Rank by importance (0 = not important):*

      Disease ___   Predation ___   Other ___ (specify _____)

Which is the most troublesome predator? *Rank in order of importance (0 = not important):*

      Bear _____   Jackal _____   Lynx _____   Wolf ____

      Other ___ (specify _____)

In which month(s) do you tend to lose most stock to predators? _____

Why is this month(s) more problematic? _____

When did you expect to leave winter pasture? _____

Remarks

Datasheet for livestock owner interviews (beginning of season, shortened version, 2013-2014 winter seasons)

Interview #: *5*____   Date: _____ _____   Interviewer: _____

Name of interviewee: _____   Ethnicity: _____ Home district: _____ Contact details: _____   Year of birth: _____

Farm details

Farm number: _____   Photo: *Yes /No*Livestock Owner(s): _____ _____

How many livestock owners: _____ and herders: _____ are at the farm?

When did you arrive? _____   Did you have losses to predators during migration? *Yes / No*

How many head of livestock and what type have you lost during migration? _____

    Sheep: killed____   injured_____

    Cattle: killed____   injured_____

    Other _____: killed____   injured_____

Livestock numbers

Sheep*:* _____   Goats*:* _____   Cattle*:* _____   Horses: _____   Donkeys: _____

Preventive measures

Number of LGDs: _____ of which adults (>1 yr): _____ juveniles (<1 yr): _____

Do you think you have good dogs?   *Yes / No / Partly*

explanation: _____

Remarks

Datasheet for livestock owner interviews (end of season, shortened version, 2013-14 winter seasons)

Interview #: *5*____ Date: _____ Interviewer: _____

Name of interviewee: _____ Ethnicity: _____ Home district: _____Contact details: _____ Year of birth: _____

Details of attacks

Have you had any problems with predators this winter? *Yes / No*

How many head of livestock and what type have you lost since arriving at Vashlovani? _____

Sheep: killed____ injured_____

Cattle: killed____ injured_____

Other _____: killed____ injured_____

Compared to the past 5 years, is this: *Less than usual / About average / More than usual*

For your income is this loss: *Big / Medium / Small / Insignificant*

Losses to predators

In general are predators a big problem for you? *Yes / No / Partly*

Do you lose more money because of predation or other causes? *Rank by importance (0 = not important):*

Disease ____ Predation ____ Other ____ (specify _____)

In which month(s) do you tend to lose most stock to predators? _____

Why is this month(s) more problematic? _____

When did you expect to leave winter pasture? _____

Remarks

Datasheet for livestock owner interviews (beginning of season, 2014-15 winter seasons)

Interview #: _6_____   Date: _____   Interviewer:
_____

Interviewee: _____   Ethnicity: _____

Home district: _____   Contact details: _____   Year of birth: _____

Farm details

Farm number: _____   # of Photo: _____   Farm Owner: _____

How many livestock owners: _____ and herders: _____ are at the farm?

Names of livestock owner(s) and herders: _____

_____

_____

_____

Corral details: _____ When did you arrive? _____

Livestock numbers

Sheep*: juveniles* _____   *ewes* _____   *Other* _____   Goats*: _____*

Cattle*: juveniles* _____   *cows/oxen* _____

Horses: _____   Donkeys: _____

Preventive measures

Number of LGDs: _____ of which adults (>1 yr): _____ juveniles (<1 yr): _____

Do you think you have good dogs?   *Yes / No / Partly*

explanation: _____

Remarks

Datasheet for livestock owner interviews (end of season, 2014-15 winter season)

Interview #: _6____   Date: _____   Interviewer:

_____

Interviewee: _____   Ethnicity:

_____ Home District: _____ Contact

details: _____   Year of birth: _____

Details of attacks

Have you had any problems with predators this winter?   *Yes / No*

How many head and what type of livestock have you lost since arriving at Vashlovani? _____

       Sheep: killed____   injured_____

       Lamb: killed____   injured_____

       Cattle: killed____   injured_____

       Calves: killed____   injured_____

       Other _____: killed____   injured_____

Compared to the past years, is this: *Less than usual / About average / More than usual*

How many and what kind of animals did you lost due to diseases?

       Sheep: killed____   Disabled_____

       Lamb: killed____   Disabled_____

       Cattle: killed____   Disabled _____

       Calves: killed____   Disabled _____

       Other _____: killed____   Disabled _____

What are main diseases that cause livestock death? _____

_____

How much do you spend to prevent diseases? _____

When did you expect to leave winter pasture? _____

Remarks

Datasheet for livestock predation event (2014-15 winter season)

(ID_____)

Farm #: _____ Eyewitness: _____ Interviewee (if not same): _____

Interviewer: _____ Contact details: _____

Owner(s) of damaged livestock: _____

Details of attack

Date of attack: _____ *(appr.☐)*   GPS attack site: _____ _____ *(appr.☐)*

Time of attack: _____   *dawn / am / pm / dusk / night-time*

Activity of flock immediately before the attack: ☐*Sleeping at farm (Corral/Barn)*

  ☐*Walking to/from pasture*   ☐*Grazing on pasture*   ☐*Resting on pasture*

  ☐*Walking to/from water*   ☐ *at water source*   ☐*Kept near farm*

  Other: _____

Weather at time of attack*:*   *Clear / Cloudy / Mist/fog / Raining / Snowing / Other: _____*

Snow cover on ground? *No / Yes (Light / Deep)*

Number of: *Sheep*   *killed ____*   *injured ____ in flock _____*

Lambs   *killed ____*   *injured ____ in flock _____*

Cattle   *killed ____*   *injured ____ in herd _____*

Calves   *killed ____*   *injured ____ in herd _____*

Other _____: *killed ____*   *injured ____ total _____*

Type of attacked sheep flock: *Lambs*   *Juveniles*   *Sick/lame*   *Other: _____*

Details of attacked animals (Approx. price, health, age):

Predator species and number if seen: *Bear ___   Jackal ___   Lynx ___   Wolf ___   Other _____*

Were dogs with the flock?   *No (Why_____) /   Yes (if so, how many_____)*

Dog behaviour toward predator*:   No reaction / Bark/Chase / Contact / Run away*

Other _____

Was there a herder/owner with the flock?   *No (Why_____) /   Yes (if so, how many_____*
)

Herder/owner's behaviour toward predator*:   No reaction / Shout / Chase / Shoot*

Other _____

What happened to attacked animal? *Only injured / Killed / Eaten by wolf (Percentage if known_____)*

What will you do with the killed/injured animals from this attack?   ☐*Leave at site* ☐*Feed to dogs*

disposed of (details) _____   Other (details) _____

Distance of attack site to nearest: *Tree cover: _____ m.   Ravine: _____ m*

Farm: _____ m.   Water source: _____ m.

Degree to which attack site is overgrown with bushes/trees*: 0% / 1–10% / 11–25% / 26–50% / >50%*

Information trustworthiness (more to less): *1 / 2 / 3*

Photos: _____

Datasheet for livestock owner interviews (HCC survey in Tusheti, 2015)

Interview #: _____   Date: _____   Interviewer: _____

Camp Location: _____   Name of the place: _____

Number/location of winter farms: _____

Photos of camp infrastructure: _____

Farm and livestock demographics

Name of interviewee: _____   Age: _____   Contact details: _____

How many livestock owners _____   and herders _____   are at the farm?

What are the main duties of these persons at farms? _____

Describe farm organization (what is the status of the pasture/camp, whom are you using with etc.)

_____

When did you arrive here? _____   When do you expect to leave? _____

Sheep/Goats: _____   Cattle: _____   Horses: _____   Donkeys: _____

What kind and how many flocks do you have and how are they managed? _____

Losses to predators

In general are predators a big problem for you?   *Yes   No   partly*
Have you had any problems with predators this summer?   *Yes   No*

How many head of livestock and what type have you lost since arriving in Tusheti?

	killed	*injured*
sheep		
Cattle		
other (specify) _____		

Is this: *less than usual   about average   more than usual?*

In which month(s) do you tend to lose most stock to predators at summer pastures? _____

What preventive measures do you use against predation? _____

How do you feed your dogs? _____

In which season do you lose more livestock due to predation?: _____

Losses to diseases

How many head of livestock and what type have you lost due to diseases since arriving in Tusheti?

	killed	*injured*
Sheep		
Cattle		
other (specify) _____		

Is this: *less than usual*   *about average*   *more than usual?*

What are the most problematic diseases in mountains? _____

Remarks:

Datasheet for livestock predation event (HCC survey in Tusheti, 2015)

Farm #: _____   Eyewitness: _____   Interviewee (if not same): _____

Interviewer:_____Contact details: _____

Owner(s) of damaged livestock: _____

Details of attack

Date of attack:_____ *(appr.☐)*   GPS attack site:_____   _____ *(appr.☐*
)

Altitude: _____   Time of attack: _____   *dawn / am / pm / dusk / night-time*

Activity of flock immediately before the attack: *☐Sleeping at farm (Corral/Barn)*

   ☐Walking to/from pasture   *☐Grazing on pasture*   *☐Resting on pasture*

   ☐Walking to/from water   *☐ at water source*   *☐Kept near farm*

   Other: _____

Weather at time of attack*:   Clear / Cloudy / Mist/fog / Raining / Snowing / Other: _____*

   Number of: *Sheep*   killed _____   injured _____ in flock _____

    Lambs   killed _____   injured _____ in flock _____

    Cattle   killed _____   injured _____ in herd _____

    Calves   killed _____   injured _____ in herd _____

    Other _____: killed _____   injured _____ total _____

Type of attacked sheep flock: *Lambs   Milking   Sick/lame   Other: _____*

Details of attacked animals (Approx. price, health, age): _____

_____

Predator species and number if seen: *Bear __ Jackal __ Lynx __ Wolf __ Other _____*

Were dogs with the flock?   *No (Why_____) / Yes (if so, how many_____)*

Dog behaviour toward predator*:   No reaction / Bark/Chase / Contact / Run away*

Other _____

Was there a herder/owner with the flock?   *No (Why_____) / Yes (if so, how many____)*

Herder/owner's behaviour toward predator*:   No reaction / Shout / Chase / Shoot*

Other _____

What happened to attacked animal? *Only injured / Killed / Eaten by wolf (Percentage if known_____)*

What will you do with the killed/injured animals from this attack?   *☐Leave at site ☐Feed to dogs*

disposed of (details) _____   Other (details) _____

Distance of attack site to nearest: *Tree cover: _____ m.*   *Ravine: _____ m*

   Farm: _____ m.   *Water source: _____ m.*

Degree to which attack site is overgrown with bushes/trees*: 0% / 1–10% / 11–25% / 26–50% / >50%*

Information trustworthiness (more to less): *1 / 2 / 3*

Photos: _____

Remarks