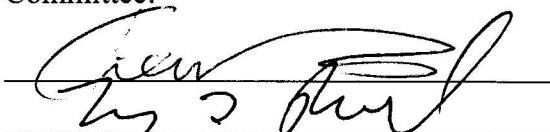
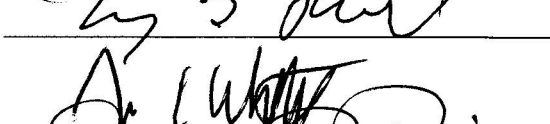
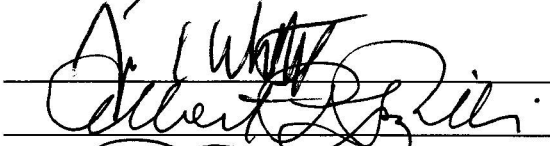
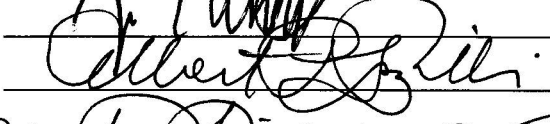
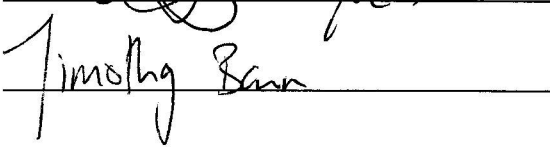
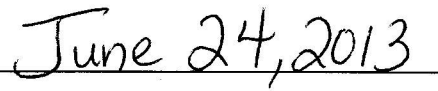


SURVEY OF ATTITUDES TOWARD, CONFLICTS WITH AND MANAGEMENT
OF WOLVES AND BEARS IN RURAL VILLAGES IN ARMENIA

by

Serda Ozbenian
A Thesis
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Master of Science
Environmental Science and Policy

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DEDICATION

This thesis is dedicated to my family, especially my parents, my friends and my cat, Tobi.
Thank you for the encouragement, love and support.

ACKNOWLEDGEMENTS

I would like to thank my family, friends, and supporters who helped make this thesis happen. Drs. Karen Aghababayan and Igor Khorozyan from the American University of Armenia helped with project planning and implementation. Drs. Parsons, Rockwood and Witte provided valuable support and feedback throughout the process. The Animal Welfare Institute and Humane Society International provided the funding that made this project possible. Thanks also to the staff at Green Lane NGO for their help in identifying gatekeepers and to the wonderful gatekeepers, facilitators and translators who provided invaluable support. Special thanks to the Fenwick Library Data Services staff who were always willing to help and provide support. Finally, thanks to the generous, friendly and hospitable villagers who participated in this study.

TABLE OF CONTENTS

	Page
List of Tables	vii
List of Figures	viii
List of Abbreviations	ix
Abstract	x
Introduction.....	1
Gray Wolves and Brown Bears	1
Human-Carnivore Conflicts	3
Hot spots.....	4
Carnivore Management	6
Research Objectives and Questions	9
Study Area	11
Human-Carnivore Conflict in Armenia	12
Livelihoods in Armenia.....	14
Conceptual Background/Methodology	16
Human Dimensions Research	16
Participatory Risk Ranking and Community Mapping	17
Methods	19
Study Site and Sample	19
Selection of Gatekeepers and Sample	21
Selection of Facilitators.....	23
Data Collection and Analysis.....	24
Presence of and Attitudes Towards Wildlife	25
Details of Conflicts.....	26
Conflict Mitigation Strategies	26
Severity and Frequency of Conflicts	27
Participatory Risk Assessment and Ranking	27

Conflict Mapping.....	28
Factors Affecting Levels and Perceptions of Human-Wildlife Conflict	29
Requested Support.....	29
Management and Reporting	30
Results.....	31
Attitudes Towards Wildlife.....	31
Details of Conflicts	33
Types of Conflicts	36
Vulnerable Villagers/Areas	39
Conflict Mapping	39
Mitigation Measures.....	48
Severity and Frequency of Conflicts.....	50
Risk Ranking: Direct Threats and Concerns	51
Factors Affecting Levels and Perceptions of Human-Wildlife Conflict.....	54
Requested Support	59
Management and Reporting	61
Wolf Culling Program	62
Discussion	64
Attitudes Towards and Conflicts with Wildlife	64
Details of Conflicts and Mitigation Strategies	66
Participatory Risk Assessment and Ranking.....	69
Perceptions of Human-Wildlife Conflict and Requested Support	70
Management and Reporting	71
Observations and Anecdotes	72
Conclusion.....	73
Appendix A: Verbal Consent for Individuals	75
Appendix B: Questionnaire for Government Officials.....	77
Appendix C: Verbal Consent Script for Focus Group Participants	80
Appendix D: Focus Group Script	82
References.....	86
Biography.....	94

LIST OF TABLES

Table	Page
Table 1 Individuals surveyed (n=147) listed by region and community.	21
Table 2 Timeline of project.	23
Table 3 Species with which villagers experienced the most conflicts. A red ‘X’ indicates the most serious conflicts.	35
Table 4 Conflicts mentioned by communities.	37
Table 5 Descriptions of conflicts described in Tavush province during the community mapping exercise.	41
Table 6 Descriptions of conflicts described in Ararat province during the community mapping exercise.	43
Table 7 Descriptions of conflicts described in Vayots Dzor province during the community mapping exercise.	45
Table 8 Descriptions of conflicts described in Syunik province during the community mapping exercise.	47
Table 9 Scores of severity and frequency of conflicts with wildlife experienced in each community.	51
Table 10 Direct threats mentioned during risk ranking exercise.	52
Table 11 Worries/concerns mentioned during risk ranking exercise.	53
Table 12 Factors that community members mentioned as possibly contributing to increased conflicts with wolves and bears.	54
Table 13 Support that community members said they would like from the government and non-governmental organizations to help reduce conflicts with wolves and/or bears.	60

LIST OF FIGURES

Figure	Page
Figure 1 Map of Armenia, showing the 23 surveyed communities (in purple) in the four regions of Tavush, Ararat, Vayots Dzor and Syunik.	20
Figure 2 Attitudes of surveyed communities towards wildlife. Each community fit in one, or two, of these categories.	33
Figure 3 Species implicated in conflicts.	34
Figure 4 Percent of surveyed communities reporting conflicts with specific species.	36
Figure 5 Map created in Tavush province. Conflicts occurred between 2009-2012.	40
Figure 6 Map created in Ararat province. Conflicts occurred between 2009-2012.	42
Figure 7 Map created in Vayots Dzor province. Conflicts occurred between 2001-2012.	44
Figure 8 Map created in Syunik province. Conflicts occurred between 2002-2012.	46
Figure 9 Percentage of communities using various mitigation measures.	48
Figure 10 Scatter plot comparing the conflict severity value (<i>0 = no threat, 1 = low, 2 = medium and 3 = high</i>) for each community to the distance to regional center.	57
Figure 11 Scatter plot comparing the conflict severity value (<i>0 = no threat, 1 = low, 2 = medium and 3 = high</i>) for each community to the population density.	58
Figure 12 Scatter plot comparing the conflict severity value (<i>0 = no threat, 1 = low, 2 = medium and 3 = high</i>) for each community to its elevation.	59
Figure 13 Number of reported wolf kills in recent years.	63

LIST OF ABBREVIATIONS

American University of Armenia	AUA
Human-carnivore conflict	HCC
Human-wildlife conflict.....	HWC
Participatory rapid assessment.....	PRA

ABSTRACT

SURVEY OF ATTITUDES TOWARD, CONFLICTS WITH AND MANAGEMENT OF WOLVES AND BEARS IN RURAL VILLAGES IN ARMENIA

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George Mason University, 2013

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Many studies aimed at assessing human attitudes towards and negative interactions (conflicts) with carnivores, such as wolves (*Canis lupus*) and bears (*Ursus arctos*), have been conducted throughout the world. Although villagers in Armenia have reported conflicts with these species and the government recently introduced a wolf-culling program, no such attitude studies had been conducted in Armenia. In an effort to understand more about human attitudes and interactions with these species in Armenia, 23 rural communities were surveyed using focus groups and interviews in July 2012. The types and locations of conflicts that villagers reported experiencing with wolves and bears, the mitigation measures currently being used by villagers, and their attitudes towards wolves, bears and wildlife management policies were documented. Differences were found in the severity and types of conflicts experienced by villagers across the surveyed communities, but no social or geographic variables were identified to explain the variation. Conflicts with wolves centered on wolves attacking livestock, namely cows

and sheep, and domestic animals, namely horse and dogs. Conflicts with bears mainly involved damage to orchards, crops, beehives, fences and livestock. Over half of the surveyed communities described a sense of frustration and defenselessness because of a lack of support from the government and an overall difficulty with managing conflicts. Participation in the wolf-culling program was very low and attitudes towards wildlife management policies were mostly negative. Current wildlife management policies in Armenia are not effective in helping communities deal with human-wildlife conflicts, and conflicts with wildlife seem to be further exacerbated by conflicts with management policies. Therefore, it is recommended that a participatory human-wildlife conflict management plan, with stakeholder involvement, be pursued in Armenia, as well as more outreach and education to affected communities.

INTRODUCTION

The purpose of this research project is to investigate whether communities throughout Armenia are experiencing negative encounters (conflicts) with gray wolves (*Canis lupus*) and/or brown bears (*Ursus arctos*), to elucidate the circumstances surrounding any negative interactions and to assess whether current management measures are appropriate.

This project serves as the first baseline study of conflicts with these large carnivores in Armenia and the information gleaned from this research can set the stage for future research on this topic as well as guide the Armenian government and non-governmental organizations in developing outreach campaigns, educational materials and mitigation strategies for affected communities throughout Armenia. This project attempts to provide a general overview and analysis of the conflicts that various communities in Armenia are facing with wolves and bears, the potential causes of these conflicts, the overall attitude of the people toward these animals, current mitigation practices and management policies.

Gray Wolves and Brown Bears

Bears and wolves are two, often apex, carnivores that are widely distributed throughout the world. As large carnivores, both can have cascading impacts on the ecosystem (Carroll, Phillips, Lopez-Gonzalez, & Schumaker, 2006; Ripple, Larsen,

Renkin, & Smith, 2001; Treves, Wallace, & White, 2009; Wilmers & Getz, 2005). Both species are known for having frequent contact with humans, partly a result of their large habitat requirements. But wolves and bears do have some distinct differences in their needs and behaviors.

Brown bears are mainly plant-dependent and they forage on a variety of plants, fruits, and berries but also occasionally on insects, fish, birds and mammals. The density of brown bears varies greatly and is dependent on the productivity of their habitats (McLellan, Servheen, & Huber, 2012).

Wolves, on the other hand, mainly feed on wild ungulates. They effectively cull prey herds by selecting weak members, which serve to strengthen these ungulate populations by freeing up resources for more reproductively active members of the herd (Wilmers & Getz, 2005). Directly reducing prey populations also leads to important trophic cascades, such as reducing the grazing pressure that ungulates exert on vegetation (Treves et al., 2009). Although wolves prefer to feed on wild ungulates, if there is a shortage of their preferred prey, wolves will consume rodents, livestock or even garbage (Gula, 2008). They are highly adaptable and resilient and are able to survive in fragmented and less than optimal habitats. Wolves are not habitat-specific and are thus not dependent on undisturbed landscapes (Trouwborst, 2010). A negative consequence of the wolf's ability to adapt, however, is that they can live in human dominated landscapes, which can lead to negative interactions with humans.

Human-Carnivore Conflicts

Human conflicts with wolves and bears have been studied in many different communities around the world, including France (Bath & Large Carnivore Initiative for Europe, 2000), Croatia (Bath & Majic, 2001), Latvia (Andersone and Ozolins, 2002), the United States (Treves & Karanth, 2003), Slovenia (Kaczensky, 2003), Georgia (Nacres & Fauna and Flora International, 2010), and Slovakia (Wechselberger, Rigg, & Bet'kova, 2005). There has been a wide range of conflicts identified throughout the world with varying levels of severity (i.e. ranging from mild nuisance to life-threatening). The most severe problems for humans, however, are often similar and include predation on livestock, decrease in human safety and an overall difficulty in addressing conflicts (Distefano, 2005).

Human-carnivore conflicts (HCC) arise for a variety of reasons but are often the result of competition between wildlife and humans for food and space, as well as simple ignorance on the part of humans. It is thought that the frequency and cost of conflicts are increasing in many areas of the world due to the growth and expansion of human populations (Treves & Karanth, 2003).

Losses from wildlife can have a significant impact on rural people's livelihoods. It is important to note that losses can appear small at the community level and can mask devastating problems for individuals if losses are concentrated in one area (Hill, 2004). Similarly, economic losses can appear small but be very large relative to an individual or family's income (Distefano, 2005). These conflicts can often lead to the killing of carnivores, which not only threatens the particular carnivore species but the conservation of many other species as well (Shivik, 2006). Due to their needs for large habitats,

reserves and legal status are often not enough to conserve carnivores. When carnivores move beyond the edges of reserves they are often killed, leading to the decline of the species (Shivik, 2006). Shivik (2006) noted that, “Effective management of predator damage is also a conservation issue, and the edges—that is, the intersections of carnivores, people, and livestock—are where efforts need to be focused” (p. 253).

As demonstrated by Kaczensky et al. (2004) and many others, public opinion and knowledge, or “human dimensions research,” plays a significant role in the future of large carnivores and their survival is not determined by the availability of suitable habitats alone. Therefore, understanding human attitudes toward carnivores is an essential prerequisite to developing adequate management and conservation strategies in order to foster coexistence.

Hot spots

Treves (2011) found that environmental hazards, including wildlife damage, are not distributed randomly. Some studies of carnivore predation on livestock demonstrate the presence of “hot spots,” areas that have recurring attacks on livestock by carnivores (Fascione, Delach, & Smith, 2004). It is unclear how common hot spots are, or what causes them. Some potential factors have been identified including the abundance and availability of wild and domestic prey, individual problem predators, and overall abundance of predators, herding techniques, and habitat characteristics. To determine hot spots one must collect data on the number of livestock killed in a variety of areas and the spatial location of kills, as well as site specific characteristics including proximity to dwellings, husbandry practices and landscape level characteristics (Fascione et al., 2004).

Community engagement is a key to identifying conflict hot spots and assessing risks and vulnerabilities.

Two categories of variables are often used in studies aiming to identify predictive variables for human-wildlife conflict: landscape and anthropogenic variables (Merkle, Krausman, DeCesare, & Jonkel, 2011). Gunson (1983) found that livestock predation was related to the forest-agricultural edge and the number of livestock present, husbandry practices and abundance of natural prey. Kaczensky (1999) concluded that predation levels were neither related to the size of carnivore populations nor to the number of individual livestock, but rather to the local husbandry practices with most attacks occurring at night on forested range. In a study conducted by Mech et al. (2000), GIS was used to compare habitat differences between 41 farms in Minnesota that were experiencing cattle losses to wolves with the same number of farms that were not experiencing losses in order to determine factors that might predispose some farms to wolf predation. They found that greater losses occurred on larger farms with more cattle and where herds were further from human dwellings. They also found that habitat types were the same around farms, regardless of whether they experienced losses or not. Musiani et al. (2005) noted that seasonal livestock predation patterns were related to the grazing and calving seasons. Bradley & Pletscher (2005) found that wolf predation of cattle in Montana and Idaho occurred more on large pastures with more cattle, where elk were present, where there was a higher percentage of vegetation cover and in areas where cattle grazed farther from residences. Edge et al. (2011) found that wolf predation on livestock in Michigan was more frequent in communities with higher proportions of

pasture/hayfields and crops and lower proportions of coniferous forest. Treves (2011) concluded that open habitats far from any forests and close to wolf packs were the riskiest for livestock in Wisconsin.

With regard to bears, Wilson, Madel, Mattson, Graham, & Merrill, (2006) concluded that the likelihood of human-grizzly bear conflicts were associated with the presence of riparian vegetation, proximity to a river or creek, proximity to unmanaged disposal sites for livestock carcasses, and presence of beehives. Merkle et al. (2011) found that the probability of human-black bear interactions in urban areas in Montana were higher for residents residing near forest patches and major rivers and streams.

Carnivore Management

In many countries the strategies for dealing with human-wildlife conflict (HWC) are contentious among the stakeholders involved. Often, affected communities find themselves without the means to reduce conflicts, which has led to feelings of alienation (Hill, 2004). The traditional response to human-wildlife conflicts has been to kill the suspected wildlife in order to prevent losses. However, this strategy is now illegal in some areas due to the rising concern for the status of targeted wildlife or the killing of wildlife is unacceptable. Therefore, the competition between wildlife and people is now accompanied by another conflict between people and governmental institutions (Treves et al., 2006).

The long-term effectiveness of lethally removing carnivores in response to HWC is debatable. Animals, especially in the case of wolves, generally re-colonize vacated territories and problems persist (Treves & Naughton-Treves, 2005). Some argue that

density dependent factors will naturally limit wolf population densities before depleting resources (Sinclair & Pech, 1996). Still others argue that hunting can deter wolves from colonizing certain areas and therefore is an adequate method of control (Shivik, 2006; Woodroffe & Frank, 2005). Shivik (2006) emphasizes the importance of the tolerance of humans for a predator and that the *ability* to lethally remove a predator may be one of the most important tools for ensuring coexistence. Though hunting may offer a greater sense of control for those experiencing conflicts with wolves, the risk of unsustainable hunting is great and the long-term benefits of hunting on conflicts with wolves is doubtful and unproven (Treves et al., 2009). Treves et al. (2009) asserts that if hunting is allowed, large investments in monitoring and precautionary quotas should be utilized.

Today, carnivores are still shot, poisoned and trapped in many countries, both illegally and legally, and unregulated hunting still poses a serious threat to carnivore populations. Some countries do place limits on the number of wolves killed and quotas are used, but often without an understanding of ecology or wolf population dynamics (Salvatori et al., 2002). Although it is the main management tool in some countries, lethal methods alone have not been successful in eliminating wolf predations. Many studies suggest that a common result of the removal of apex predators is an ecosystem imbalance leading to the release of a mesopredator, referred to as “mesopredator release” (Prugh et al., 2009). Brashares et al. (2010) define mesopredator release as “the expansion in density or distribution, or the change in behavior of a middle-rank predator, resulting from a decline in the density or distribution of an apex predator” (Prugh et al., 2009, p. 780). Despite the problems associated with lethally removing apex predators, often,

nonlethal, preventative management tools are expensive; therefore communities resort to legally and illegally killing wolves (Shivik, 2006).

The available non-lethal methods have varying levels of success. Generally, nonlethal wolf management methods are more acceptable to the public than lethal methods, but non-lethal management tools can be cost-prohibitive as they are often borne by the producers (i.e. livestock keepers) (Gehring, VerCauteren, & Landry, 2010). There are two basic non-lethal approaches to repelling carnivores: disruptive-stimulus (frightening wolves) and aversive-stimulus (behavior modification through conditioning) methods (Shivik, 2006).

Some popular mitigation measures include electric and wire fencing, which can be very effective, but can be expensive to construct and maintain (Shivik, 2004). The use of trained guard dogs has been shown to be an effective disruptive-stimulus tool that can deter wolves (Gehring et al., 2010). However, this method can also be cost prohibitive and its success depends on many factors. For example, Otstavel et al. (2009) found that livestock guarding dogs are generally unsuccessful and expensive in Norway, since sheep tend to stay in small family groups and their grazing patterns are widely dispersed. Wolves are also known to kill dogs even to the point of dogs' becoming an important food supply for wolves (Shivik, 2006). Other non-lethal methods include the use of night and seasonal enclosures for livestock, herding vigilance and monitoring livestock, proper sanitation and waste disposal, noise, disruptive visual stimuli, disruptive harassment, biological or chemical repellents, and lights (Shivik, 2004). However, as mentioned, cost can lead to individuals choosing lethal removal rather than nonlethal means of control.

Research Objectives and Questions

The ultimate aim of this study is to provide a basis for determining the nature and extent of conflicts with wolves and bears in Armenia.

The objectives for this research project are to:

- Assess local attitudes towards wolves and bears,
- Better understand the causes and estimate the scale of wolf-human and bear-human conflicts in Armenia,
- Better understand the worries and direct threats resulting from HWC,
- Create maps showing the spatial distribution of conflicts with wolves and bears in surveyed regions of Armenia,
- Better understand the general geographic locations where bears/wolves are living and entering villages in surveyed communities,
- Assess whether current wolf and bear management practices are appropriate.

In order to meet these objectives, several research questions were devised:

- 1) What are the general attitudes towards carnivores?
- 2) Do attitudes towards carnivores differ among communities?
- 3) Do levels and types of HWC differ among communities?
- 4) Do worries/concerns related to carnivores differ from actual threats?
- 5) Are there any shared characteristics of the locations of conflicts?
- 6) What are the attitudes towards wildlife management policies?
- 7) What mitigation measures are currently used?

8) Do communities feel that they have the support and means to manage conflicts with wolves and bears?

STUDY AREA

The focus of this project is on human-wildlife conflict in Armenia. The Republic of Armenia is a small land-locked country in the South Caucasus, the size of the state of Maryland, bordering Georgia in the North, Iran in the South, Azerbaijan in the East and Turkey in the West (Figure 1). A part of the former Soviet Union, Armenia gained its independence in 1991. The official total population is a little over 3 million, with a rural population of around 1 million and an urban population of about 2 million (National Statistical Service of the Republic of Armenia, 2011), although in reality the daily population is less because many Armenian men are citizens of Armenia yet are employed and live and work in Russia.

Armenia consists of 10 regions (or provinces) and the capital city Yerevan, which vary significantly by elevation and topography. Each of Armenia's 10 regions has a regional governor. Regions are further divided into 872 rural and 59 urban communities, which are governed by either a village head or a city mayor, respectively (Babajanian, 2005). The populations of the communities in Armenia range from a couple hundred to a couple thousand residents.

The Caucasus region, including Armenia, is one of the most biologically rich regions on the planet and has been designated as one of the 34 most diverse and endangered hotspots by Conservation International (Mittermeier, Mittermeier, & Cemex,

2004). Armenia has a dramatic variety of land and climate types, including a large number of climatic zones, ranging from the dry subtropics to cold highlands (Avetisyan, 2010).

As a consequence of the political situation of the countries in the Caucasus and massive development, biodiversity conservation, particularly of large carnivores requiring large habitats, faces considerable challenges. Recent land use and socio-economic changes have led to an increase in human-carnivore conflicts in the region (Directorate of Culture and Cultural and Natural Heritage, 2010).

Human-Carnivore Conflict in Armenia

Gray wolves and brown bears are found throughout Armenia but no thorough scientific studies have been conducted to quantify their populations or their habits. Wolves are thought to be common in grasslands (Khorozyan, 2002) and have a much larger range than bears. Wolves do not receive any specific national protection, although they are listed in Appendix II of the Bern Convention on the Conservation of European Wildlife and Natural Habitats, making it a “strictly prohibited species”, however member countries can make exceptions if the removal of animals is not detrimental to the survival of the population (Council of Europe, n.d.). The species is listed as Least Concern globally on the IUCN Red List due to its widespread range and stable population (Mech & Boitani, 2012).

The brown bear is also listed as Least Concern on the IUCN Red List due to its widespread range (McLellan et al., 2012) but is listed as “Vulnerable” in the 2010 Red Data Book of Armenia as well as in Appendix II of the Bern Convention (Aghababyan,

Aghasyan, & K'alashyan, 2010). They are thought to occur in the regions of Ararat, Vayots Dzor, Syunik, Tavush, Lori, Kotayk, and Gegharkunik in broadleaf forests, mountain grasslands and subalpine and alpine meadows that are 400-3000m above sea level. Habitat destruction and illegal hunting have been suggested as the main threats to bear populations in Armenia (Lortkipanidze, 2010).

Conflict hotspots for negative encounters with wolves and bears have not been identified, and attitudes towards and interactions with these species likely vary greatly by region. Syunik, Gegharkunik, Vayots Dzor and Shirak provinces in particular have received attention in the media for reported instances of human conflicts with these species (“Wolves created atmosphere of fear?,” 2012).

Both wolves and bears have been reported as causing serious damage to Armenia’s agriculture and village communities (Barsoumian, 2012). Reports of conflicts with bears are likely from cereal farmers (Nacres & Fauna and Flora International, 2010) and though human encounters with bears are generally peaceful, there have been reports of bears attacking humans (Khorozyan, 2002). Attitudes towards wolves are usually more negative.

Throughout the former Soviet Union a bounty system was in place on all wild carnivores. Therefore, bears and wolves were regularly hunted (Directorate of Culture and Cultural and Natural Heritage, 2010). In the mid-1990s the Armenian government launched a program to cull wolves from helicopters, which proved unsuccessful in Armenia’s mountainous terrain (Khorozyan, 2002). Armenia does not currently have a national policy for dealing with human-wildlife conflicts and there are no formalized

management procedures. Recently, however, the Armenian government endorsed an annual wolf cull, allocating funds to the Ministry of Nature Protection of Armenia to reward hunters for killing hundreds of wolves (Barsoumian, 2012). Records from the Ministry of Nature Protection show that 205 wolves were killed in 2012 (Ministry of Nature Protection of Armenia, 2013), however it is unknown how effective this program is or if this is a representative number of all wolves killed in Armenia. As mentioned previously, the effectiveness of lethally removing carnivores in response to HCC is debatable and current policies in Armenia do not provide a long-term solution for reducing conflicts, and the risk of unsustainable hunting is great. Therefore the culling program in Armenia could potentially be harming wolf populations and their prey in Armenia and in neighboring countries.

It should be noted that gun possession in Armenia is restricted and only licensed gun owners are permitted to acquire or possess a firearm or ammunition (United Nations, 2010). During the time Armenia gained its independence, a Presidential decree was issued requiring all citizens to surrender their firearms and ammunition (United Nations, 2010). In order to participate in the wolf-culling program, an individual is required to register to possess a firearm and obtain a permit to kill wolves.

Livelihoods in Armenia

Agriculture and animal husbandry have been an important part of Armenia's history and culture and have been practiced in Armenia for thousands of years (Avetisyan, 2010). It has been suggested that the Armenian Highlands served as one of

the cradles of domestication of wild cattle and sheep because of Armenia's alpine meadows, mountainous pastures and spacious grasslands (Avetisyan, 2010).

Agriculture is a vitally important component of the country's economy, and it reflects local culture and livelihoods. In 2009, the structure of agriculture in Armenia was: 62.3% crop production and 37.7% livestock management (Avetisyan, 2010). Most of the rural populations in Armenia engage in some sort of agricultural activity.

Following the collapse of the Soviet Union, the Armenian government passed legislation, which privatized many resources, including land. The drastic social and economic changes in Post-Soviet Armenia led to a decrease in non-farm employment and an increase in agricultural activities. Thus formerly collective farms were transformed into individual peasant farms (Thalmann, Urutyan, Porsche, & Grigoryan, 2007) and many villagers found it extremely difficult to look after their livestock. Some villagers today do not have the resources to take their livestock to adequate pastures and therefore take their animals to nutritionally-void and overgrazed pastures for which they still may have to travel great distances (up to 12 km) (Kharatyan, 2003). Nevertheless, agriculture has become the key safety net for many rural communities, serving as a food and income source. Though many sectors in Armenia have decreased in productivity, the agricultural sector has become the most important sector of Armenia's economy and has played a key role in helping rural villagers during Armenia's transition and economic hardships.

CONCEPTUAL BACKGROUND/METHODOLOGY

Human Dimensions Research

Decker et al. (2001) defined human dimensions of wildlife as “how people value wildlife, how they want wildlife to be managed, and how they affect or are affected by wildlife and wildlife management decisions” (Majic, 2007, p. 11). As previously mentioned, human dimensions research has been identified as being incredibly vital to understanding and mitigating human-wildlife conflicts and fostering coexistence (Kaczensky et al., 2004). The economic, political, social, legal and institutional dimensions can all be examined over spatial and temporal scales (Bath, 1998).

As defined by Adams (1988), human dimensions research “focuses on the publics’ knowledge levels, expectations, attitudes and activities concerning fish and wildlife resources and associated habitats” (Bath, 1998, p. 350). The information gathered from this type of research is central to developing educational materials aimed at modifying human behaviors. Obtaining information through engaging communities is a powerful way to encourage more active public involvement.

A well-known and widely used approach is Participatory Rapid Assessments (PRA), which have been shown to be very useful in environmental conservation (Treves et al., 2006). Rapid assessment is when researchers prepare a list of questions and conduct fieldwork in a short period of time when there isn’t sufficient time to develop rapport with survey participants (Bernard, 2006). When conducting PRAs researchers

will often convene stakeholders to discuss human activities and needs and will use the opportunity to collect qualitative, quantitative and/or spatial information. This allows the researcher to conduct a broad-level assessment of a particular community or communities to understand how they use and manage resources and can serve to provide a basis for developing more sustainable management systems. It can also be valuable to the communities by enabling them to engage in discussion and evaluate their own resource management practices (Asia Forest Network, 2002).

A variety of tools such as observation, focus groups, interviews, and case study research may be used (Bernard, 2006). This process not only provides access to a wealth of traditional knowledge but it also fosters communication with stakeholders and fosters trust which can prove very useful for future planning and monitoring (Treves et al., 2006). PRA has been found to be particularly valuable among vulnerable populations such as low-income pastoralists (Smith, Barrett, & Box, 2000)

Participatory Risk Ranking and Community Mapping

Smith et al. (2000) defined “risk” as “exposure to potentially unfavorable circumstances or the possibility of incurring nontrivial loss” (p. 1946). It is often difficult for outsiders to assess the risks and problems that communities face. Participatory risk ranking is a method designed to make the process of ranking risks simpler, less expensive and less anecdotal (Smith et al., 2000). The application of participatory appraisal methods for risk management can help to highlight the main risks a particular community is facing while engaging stakeholders in the process.

It is important to note that an individual or group's perception of risk can differ greatly from the actual threats they are facing since their perceptions are socially and/or culturally influenced by prior experience (Hill, 2004). As Sjoberg (2000) has shown, perceived risk is not just merely a function of the probability of harm but of many other factors as well, such as attitudes, thoughts, and beliefs. People often recall the most extreme events and these events can strongly influence perceptions of risk, even more than those events that happen more frequently but are less extreme. Additionally, individuals who feel helpless in dealing with conflicts tend to exaggerate the level of risk (Hill, 2004).

Many researchers have used convenience sampling of participants for measuring risk perception in a particular community (Sjoberg, 2000). Open-ended questions are often used so as not to influence the cited risks or the order of importance. The risk ranking technique begins with the respondents identifying risks and then ranking the identified risks in order of importance (Smith et al., 2000). Studying the incidence and severity of risk perceptions provides researchers with a greater understanding of the variation of risks faced within a population. Smith et al. (2000) found this method to be an inexpensive, convenient and informative tool for assessing risk exposure and severity within a population.

METHODS

Prior to beginning this study, all survey materials and procedures were submitted to George Mason University's Human Subjects Review Board for approval. Identical materials were used in each village.

Study Site and Sample

In July 2012, surveys, specifically PRA's, were carried out in 23 rural communities throughout Armenia, across four regions. The four regions included Syunik in southern Armenia, Ararat and Vayots Dzor in central Armenia and Tavush in northern Armenia (Figure 1).

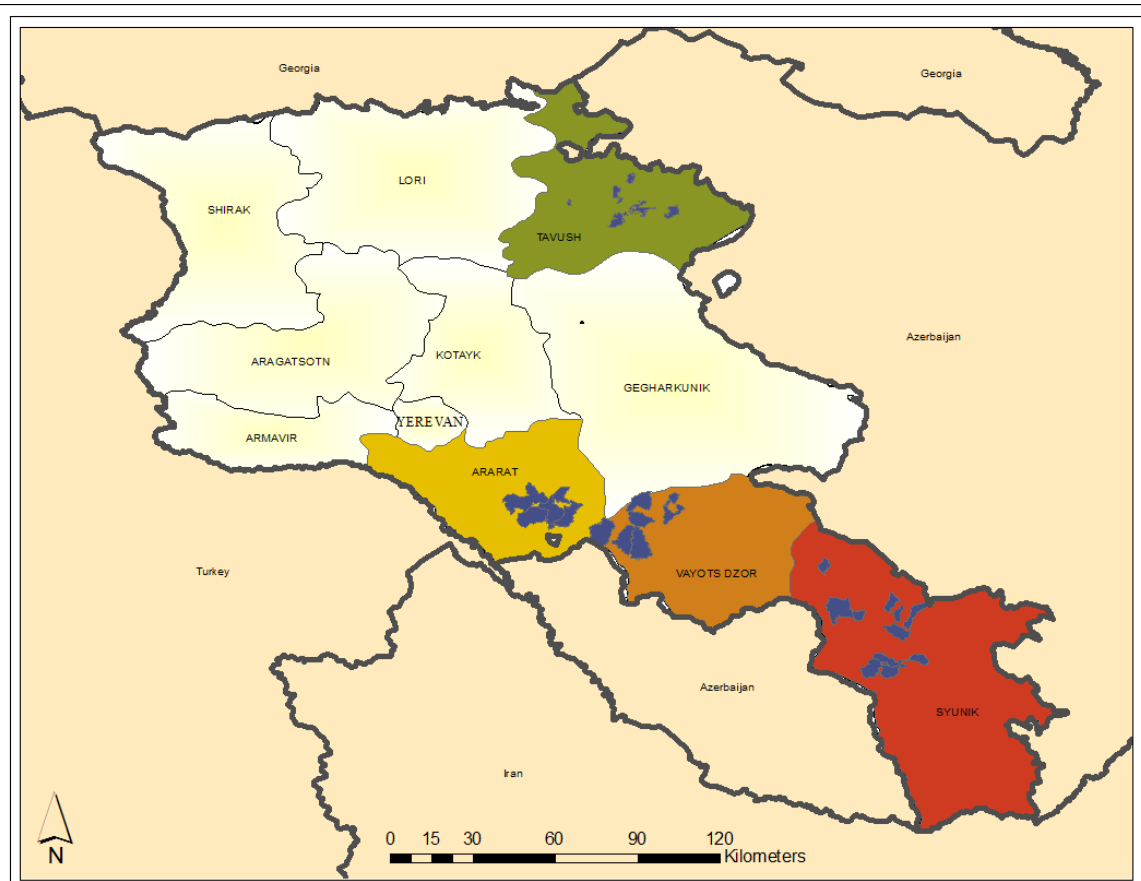


Figure 1 Map of Armenia, showing the 23 surveyed communities (in purple) in the four regions of Tavush, Ararat, Vayots Dzor and Syunik.

The identified communities were surveyed using individual interviews and focus groups. A total of 147 people, including 13 village heads, were surveyed as part of this project (Table 1). 131 villagers, including 82 men and 48 women, participated in 18 focus groups. An additional three individuals were identified through purposive sampling as individuals with knowledge about HWC in their community and were interviewed individually.

Table 1 Individuals surveyed (n=147) listed by region and community.

Location		Number of individuals surveyed			
Region	Community	Focus Group	Village Head Interview	Individual Interviews	Total
Ararat	Urtsadsor	9	1	--	10
	Shaghap	12	1	--	13
	Lusashogh	--	--	1	1
	Lanjanist	--	--	1	1
Syunik	Lor	12	1	--	13
	Noravan	8	--	--	8
	Uyts	7	1	--	8
	Torunik	6	--	--	6
	Dastakert	9	1	--	10
	Soflu	--	1	--	1
	Shaghat	3	--	--	3
	Ishkhanasar	5	--	--	5
	Balak	9	--	--	9
Vayots Dzor	Yeghegis	6	1	--	7
	Rind	6	1	--	7
	Yelpin	9	--	--	9
	Hors	8	--	--	8
	Aghavnadzor	--	1	1	2
	Aghnjadzor	4	--	--	4
Tavush	Navur	--	1	--	1
	Lusadzor	7	1	--	8
	Gandzakar	7	1	--	8
	Ditavan	4	1	--	5
Total		131	13	3	147

Selection of Gatekeepers and Sample

It was planned to send letters to each of the ten regional governors in Armenia to collect information about instances of human-wildlife conflict in their region and use this information to guide the selection of target communities and gatekeepers. However, due to time constraints, assistance was requested from Green Lane NGO, a non-profit organization with many years of experience working with agricultural cooperatives and farmer groups throughout Armenia. Green Lane identified and recruited gatekeepers to

assist in identifying the target communities. “Gatekeepers”, as defined by Campbell et al. (2006), are “those who provide - directly or indirectly - access to key resources needed to do research, be those resources logistical, human, institutional, or information” (p. 98). Selected gatekeepers were asked to contact their respective regional governors to find out which villages in their region had high numbers of reported instances with HWC. After compiling a list of the most affected communities, the gatekeepers contacted the village heads of these communities and notified them of the study. The village heads were asked for an in-person interview and to recruit 5-10 individuals who had reported experiences with HWC for community focus group (Table 2).

The surveyed regions and communities were selected based on the 1) recommendation from Green Lane NGO, 2) presence of dependable gatekeepers, 3) availability and interest of the village head, 4) reported instances of conflicts with wolves and/or bears.

The resulting sample was not random and the conclusions are therefore not statistically unbiased estimates of the whole population in Armenia but this study does provide valuable information about HWC in Armenia. It should be noted that participatory research and participatory techniques can work best with nonrandom participants who are eager to talk and share their experiences (Smith et al., 2000).

Table 2 Timeline of project..

Date	Location	Activity
July 2-4:	AUA office, Yerevan	Identified and briefed gatekeepers/facilitators
July 4-8:	Various regions	Gatekeepers contacted governors and selected target villages
July 9-12	Region 1: Ararat (Urtsadsor, Shaghap, Lusashogh and Lanjanist communities)	Interviewed village heads, conducted focus groups and interviewed other individuals
July 13-16	Region 2: Syunik (Lor, Noravan, Uyts, Torunik, Dastakert, Soflu, Shaghat, Ishkhanasar, and Balak communities)	Interviewed village heads, conducted focus groups and interviewed other individuals
July 17-19	Region 3: Vayots Dzor (Yeghegis, Rind, Yelpin, Hors, Aghavnadzor and Aghnjadzor communities)	Interviewed village heads, conducted focus groups and interviewed other individuals
July 20-23	Region 4: Tavush (Navur, Lusadzor, Gandzakar and Ditavan communities)	Interviewed village heads, conducted focus groups and interviewed other individuals

Selection of Facilitators

Although the study was originally scheduled for June 2012, it was pushed to July due to a lack of sufficient funding. When the funding was secured, the main facilitator from American University of Armenia (AUA) was no longer available for the full term of the project. This facilitator was only available for the survey of the communities in the region of Ararat, therefore three local facilitators were hired in the regions of Syunik, Vayots Dzor and Tavush to help coordinate and facilitate interviews and focus groups and translate when necessary. Each facilitator was provided with a copy of all of the materials (consent forms, interview questionnaire, and focus group script) and was briefed on the purpose of the project and the survey procedures. As defined by O’leary and Bingham (2003), the role of the facilitator is to serve as a neutral party and “assist a group of stakeholders in constructively discussing the issues in controversy” and to “assist parties in effectively communicating, and to help participants keep on track in

working together toward their goals” (p. 11). It is worth noting, however, that each facilitator had very different facilitation styles and it is unknown what affect this had on the outcome of each focus group.

Data Collection and Analysis

Prior to beginning any interview or focus group, the consent of participants was verified using the verbal consent scripts (Appendix A and C).

Interviews with the village heads were semi-structured and open-ended, as this has been shown to be the most appropriate interview style for interviewing elite members of a community (Bernard, 2006). The village head questionnaire (Appendix B) consisted of four questions with four-point Likert scales and 15 open-ended questions. The interviews with the village heads were conducted on the same day as the focus groups, either before or after.

The focus group scripts (Appendix D) contained 4 sections: I. Introduction and Consent, II. Risk Ranking, III. Community Mapping and IV. Wrap Up and Discussion. Open-ended questions have been shown to be very important for learning about the behavior and attitudes of respondents (White, Jennings, Renwick, & Barker, 2005). The facilitator asked a series of open-ended questions to encourage conversation during the focus group. Semi-structured, open-ended interviews (Bernard 2006) were also conducted with other important members of the community identified during the focus groups.

All of the interviews and focus groups were recorded, transcribed and translated into English for analysis by native Armenian speakers with an understanding of the

purpose and goals of the research. Although every effort was made to ensure that the translations were accurate, it is important to note that there could have been some meaning lost in translation.

The qualitative data from the focus group and interview transcripts were analyzed using grounded theory, which is widely used for text analysis and involves the identification of themes and concepts that arise from the data, comparison of the data from the different themes, and the generation of theories (Bernard 2006). Grounded theory is an iterative and inductive process so the researcher recognizes themes as he/she becomes grounded in the data, rather than approaching a project with a hypothesis.

Transcripts were coded by hand in a system developed in a Word document. Codes were generated based on themes that emerged from the interviews and focus groups. A profile analysis was then conducted using a data matrix to compare the responses in order to identify relationships between the themes (Bernard, 2006). A data matrix, or, simply, a table of cases and their associated variables, was created of the communities, the generated themes and other additional variables to try to identify similarities and differences between communities as well as any indicators of conflicts (Bernard, 2006).

Presence of and Attitudes Towards Wildlife

Since human-wildlife conflict had not been studied in Armenia before, each focus group and interview began with this question to assess the wildlife species present in each village: “What wildlife species are found in your community?” All of the surveyed communities were also asked if sightings of wolves and bears had increased recently in

their community. In order to get a measure of each community's attitudes towards wildlife, each interviewed village head was asked this open-ended question: "What would you say is your community's general attitude towards wildlife?" Respondents were also asked if they felt there was a need to control wolf and bear populations in their community and if they felt it was important to protect wolves and bears. The answers to these questions and the information collected from the focus groups were analyzed to develop attitudinal categories to describe the general attitudes of the surveyed communities.

Details of Conflicts

Respondents were asked to free-list the conflicts that their communities were experiencing with wildlife and a variety of conflicts were discussed. This open-ended question was used so as not to influence the order or number of conflicts mentioned (Smith et al., 2000). Focus group participants were encouraged to discuss all human-wildlife conflicts encountered in their community and were asked specifically if they experienced conflicts with wolves and/or bears. In order to identify any potential hotspots or particularly vulnerable individuals or groups of individuals, respondents were also asked if there are any vulnerable areas or individuals in their community.

Conflict Mitigation Strategies

Community members and village heads were asked to discuss the types of mitigation measures used by their community for conflicts with wolves and/or bears by the government and by individuals. The question was once again open-ended to

encourage a variety of answers. The information was compiled into tables and graphs to visually present the conflict mitigation measures used in the surveyed communities.

Severity and Frequency of Conflicts

Each community was asked to rate the frequency of conflicts in their community using a four-point Likert scale (0 = never, 1 = rarely, 2 = sometimes and 3 = often) and similarly, they were asked to rate the threats from wildlife to their community (0 = no threat, 1 = low, 2 = medium and 3 = high). The values for the level of risk and the frequency were aggregated to create a 'Frequency and Severity' score and then averaged by region for comparison. Using the SPSS (SPSS 9) analysis tools, the severity values were compared to a set of independent variables that were hypothesized to influence the distribution of conflicts based on previous studies, such as distance to regional city (Michalski, Boulhosa, Faria, & Peres, 2006; Nellemann et al., 2007), altitude (Gazzola et al., 2005) and population density (Cayuela, 2004) to look for patterns among the communities and the regions. Discriminate function analysis was also conducted to predict a dependent variable and determine the necessity of further statistical tests.

Participatory Risk Assessment and Ranking

Risk ranking exercises were carried out in 12 of the 18 focus groups. The exercise was not carried out in six of the focus groups because of minimal conflicts in the community and/or a lack of participant time/interest. The risk ranking activity was designed to identify and rank direct conflicts with wolves and bears and other wildlife species and worries associated with wildlife.

Participants were each provided with a notecard and a pen and asked to list on one side, any direct conflicts with wildlife that they personally experienced and on the other side, their worries associated with wildlife. After 15 minutes, the participants were asked to rank the most serious conflicts/worries, with 1 being the least serious and 5 being the most serious. The group then discussed their individual rankings and the facilitator kept a list of the conflicts and worries on large poster paper. The participants then collectively ranked the three to five most serious conflicts and worries. The ranked responses were then analyzed and compared to identify categories of direct threats and worries/concerns mentioned.

Conflict Mapping

Focus group participants were asked to contribute to a community mapping exercise using Google Earth (7.0.3.8542). Google Earth has been shown to be an inexpensive yet effective mapping tool that allows researchers and community members to better understand their social environment (Lefer et al., 2008). The researcher “pre-loaded” the Google Earth cache by visiting each village in Google Earth prior to the field surveys. By doing this, Internet access was not necessary to view and modify the maps in the field. Before beginning the mapping exercise, the researcher showed the Google Earth map of the community to all of the focus group participants to make sure everyone was able to interpret the image. The focus group participants were asked to identify specific conflict sites, areas where wolves and bears are most often seen, and any other relevant spatial information on a Google Earth image of their community. Only the researcher input this information into Google Earth to avoid any user error.

The information from Google Earth was later uploaded to ArcGIS 10 along with vector boundary maps of Armenia from AUA's Acopian Center for the Environment to create maps for each surveyed region. Conflicts were categorized by species and type of conflict and sightings were categorized by species. The maps were also analyzed to determine whether there were any common spatial characteristics of the reported conflicts. The locations of conflicts were viewed with a variety of vector maps showing other variables that were hypothesized to influence conflicts based on previous studies, such as proximity to roads (Potvin et al., 2005), proximity to forest (Merkle et al., 2011; Treves, 2011), proximity to rivers (Merkle et al., 2011), and vegetation type (Wilson et al., 2006).

Factors Affecting Levels and Perceptions of Human-Wildlife Conflict

Each surveyed community was asked to discuss any other factors that weren't already discussed that they thought might increase conflicts with wolves or bears in the community. The information from this part of the focus group was categorized to reflect the range of responses received.

Requested Support

Each community was also asked if they could think of some possible measures that are not being employed that should be to reduce HWC and if they would like support from the government or non-governmental organizations. The facilitator encouraged participants to discuss the community strategies and government support for dealing with conflicts and what could be done to reduce conflicts.

Management and Reporting

In order to assess attitudes towards the current management of carnivores and human-carnivore conflicts and the level of reporting of conflicts, each community was asked to talk about options that are available to community members experiencing conflicts with wildlife, if they report conflicts to anyone and if anyone responds to them. Respondents were also asked whether their community has participated in the wolf-culling program introduced by the Armenian government and to discuss their attitudes towards the program.

RESULTS

Attitudes Towards Wildlife

The wildlife species mentioned by community members included: bear, wolf, stone marten, fox, jackal, badger, mouflon, hare, wild boar, partridge, goat, lynx, weasel, hawk, snake, turtle, deer, hyena, chamois, wild goat, and duck. Although not a wild animal, it should be noted that many villagers also said they have problems with large numbers of stray dogs in their community. Also notable is that there was some confusion distinguishing weasels from martens and the researcher recommends taking pictures of wildlife species to future focus groups and interviews on this topic to assist with identification.

All of the surveyed communities stated that wolves were present in their community. Of the surveyed communities, 61% said that bears enter their village, 22% said they see bears around the village (mainly in the mountains) but that bears don't enter the village and 17% said that they never see bears in or around their village. Thirty-five percent of the surveyed communities reported seeing jackals in their community (all in Tavush and Syunik provinces) and 78% reported seeing foxes.

All of the surveyed communities fit into one, sometimes in two, of these following categories: Respectful/Concerned, Defenseless/Frustrated, and Careful/Defensive (Figure 2). The most prevalent attitudes towards wildlife were defenselessness/frustration. Fifty-two percent of the surveyed communities expressed a

sense of defenselessness and frustration and an inability to protect themselves from wildlife. Forty-eight percent of communities expressed a respect for carnivores and their role in the ecosystem and/or concern for wildlife populations. Wolves were referred to as “cleaners” of the environment, disposing of the sick and dead. Respondents were found to be more forgiving of conflicts with bears than of conflicts with wolves or jackals, which they often described as being unpredictable. Four communities expressed concern about wildlife populations related to human impacts on wildlife populations such as over-hunting of hare and ungulates (in Hors, Yelpin, Rind, Uyts) and destruction of wildlife habitats (in Rind). Thirty percent of the communities described being defensive towards wildlife and being careful to avoid negative interactions with them. Many of the village heads and community members described their need to protect themselves and their property from carnivores and the modification of their own behaviors in order to avoid negative interactions.

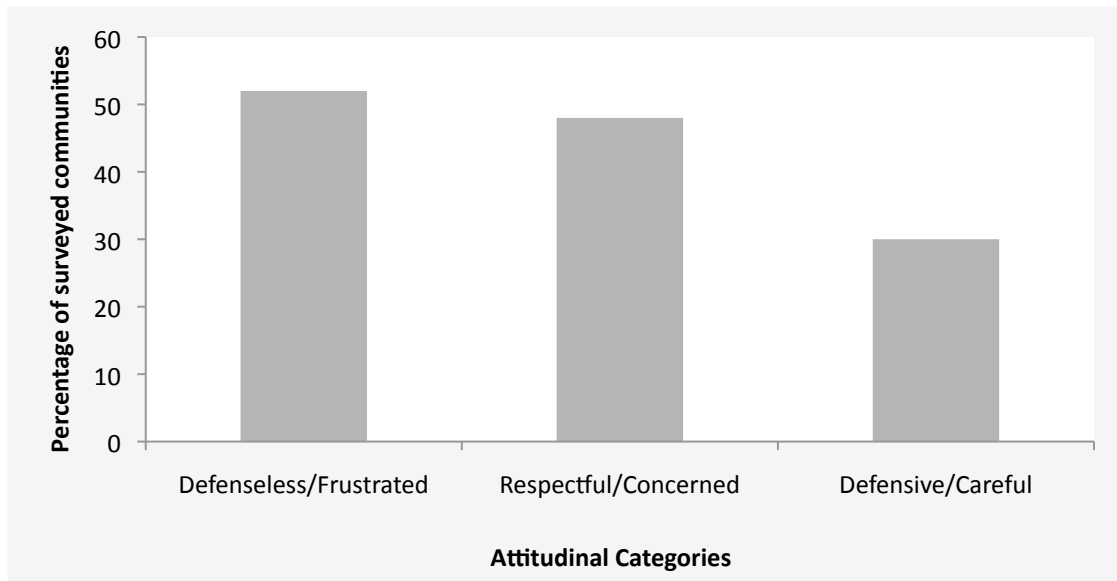


Figure 2 Attitudes of surveyed communities towards wildlife. Each community fit in one, or two, of these categories.

Three of the communities in the Tavush region (Gandzakar, Ditavan and Lusadzor) reported an increase in sightings of jackals. Two of the communities (Gandzakar and Navur) reported an increase in wolves. In the Ararat region, Lusashogh and Shaghap reported an increase in wolves in the village. In Vayots Dzor, two communities (Aghnjadzor and Yelpin) reported an increase in bear sightings and three communities (Rind, Hors, Yeghegis) reported an increase in both bears and wolves. In Syunik, seven of the communities reported an increase in wolves (Balak, Dastakert, Soflu, Lor, Torunik, Uyts, and Shaghat).

Details of Conflicts

When asked with which species villagers experienced the most conflicts, respondents mentioned wolf, bear, fox, jackal, snake, stone marten, weasel, raptors and boar (Figure 3; Table 3).

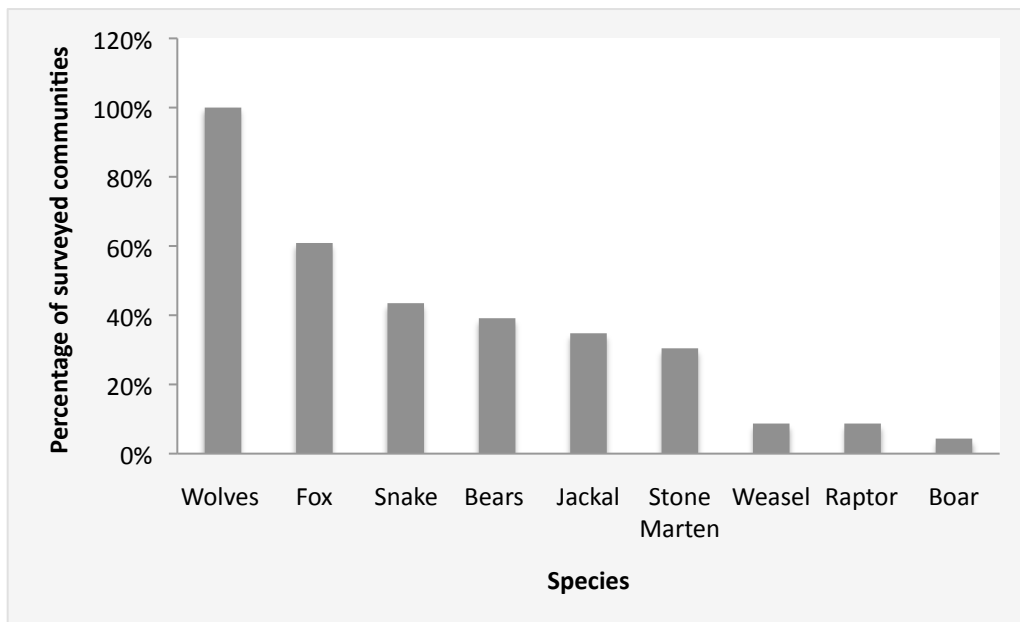


Figure 3 Species implicated in conflicts.

Table 3 Species with which villagers experienced the most conflicts. A red 'X' indicates the most serious conflicts.

	Wolf	Bear	Fox	Jackal	Snake	Stone Marten	Weasel	Boar	Raptor
TAVUSH									
Gandzakar	X			X			X		
Ditavan	X			X					
Lusadzor	X		X	X	X	X			X
Navur	X								
ARARAT									
Urtsadsor	X	X			X		X		
Shaghap	X	X				X			
Lusashogh	X	X	X						
Lanjanist	X		X			X			
VAYOTS DZOR									
Aghavnadzor	X	X			X				
Aghnjadzor	X	X	X		X	X			
Rind	X				X				
Yelpin		X							
Hors	X	X	X		X	X			
Yeghegis	X	X			X	X		X	
SYUNIK									
Balak	X		X	X					
Dastakert	X		X		X				
Soflu	X		X						
Lor	X			X		X			
Noravan	X		X	X					
Torunik	X		X		X				
Ishkhanasar	X		X						
Uyts	X		X	X					
Shaghat	X		X	X					

As Figure 4 shows, 100% of the surveyed communities said they experienced conflicts with wolves but only 65% of the communities stated that the most serious human-wildlife conflicts occurred with wolves. Thirty-nine percent of the surveyed communities said they experienced conflicts with bears but only 13% stated that the most serious human-wildlife conflicts occurred with bears (three communities in the region of Vayots Dzor). Thirty-five percent of the surveyed communities said they experienced

conflicts with jackals but only 9% stated that the most serious human-wildlife conflicts occurred with jackals (two communities in the region of Tavush). Forty-three percent of the surveyed communities said they experienced conflicts with snakes but only 9% stated that the most serious human-wildlife conflicts occurred with snakes (two communities in the region of Vayots Dzor).

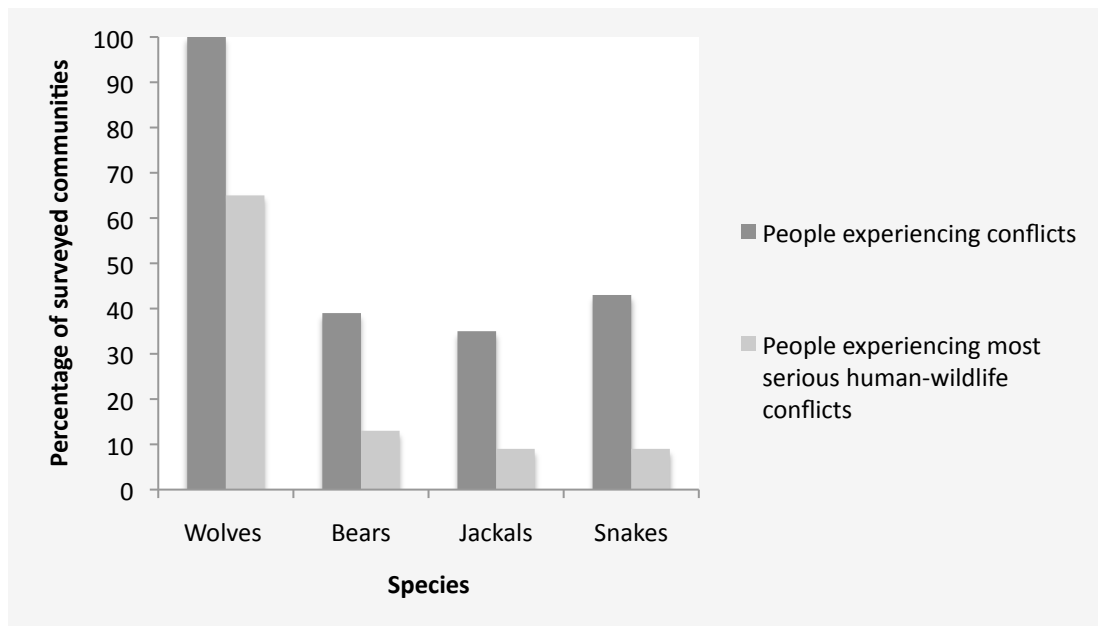


Figure 4 Percent of surveyed communities reporting conflicts with specific species.

Types of Conflicts

A variety of different conflicts involving bears, wolves, jackals, snakes and small carnivores were discussed (Table 4).

Table 4 Conflicts mentioned by communities.

<i>Species</i>	<i>Conflict</i>
Bear	Damage to beehives Damage to crops Damage to orchards Attacking livestock Damage to fences Attacking people
Wolf	Attacking livestock/domestic animals Spreading rabies Attacking people
Jackal	Harming hare populations Attacking poultry
Fox/marten/weasel	Attacking poultry
Snake	Biting people Biting livestock

As shown in other studies (Bradley & Pletscher, 2005; Distefano, 2005; Gula, 2008; Gunson, 1983; Nacres & Fauna and Flora International, 2010), conflicts with wolves were most often related to livestock predation, namely of sheep, cows and, to a lesser extent, goats. These predation events occurred in both the villages and in the pastures (see maps - Figures 5-8 for more information about specific attacks). Many villagers expressed anger and frustration with wolves killing large numbers of sheep at one time without eating them. Attacks on cows were also seen as very serious since cows are often the most expensive livestock animals. Wolves were also implicated in killing domestic animals such as dogs, donkeys and horses. Often, these animals were tied up outside.

The locations, and times of year, of conflicts with wolves varied greatly by community. Some communities said conflicts occur all year round in the village, mainly at night. Many communities said that conflicts used to occur often in the mountains but

that they have recently been experiencing more conflicts with wolves in the village. As a result, many villagers expressed a fear of going outside after dark and ‘rushed home’ in order to avoid conflicts with wolves. Although there was great variation, 11 communities mentioned that conflicts with wolves occurred more in the fall and spring. Most communities said they take their livestock elsewhere for the summer and therefore conflicts occur more in the mountain pastures in the summer, and in the village in the spring and fall, when the animals are back in the village. This finding is interesting since in Georgia, they found that most conflicts occurred in the winter, specifically in February (Nacres & Fauna and Flora International, 2010), whereas only two of the surveyed communities in Armenia mentioned more conflicts occurring in the winter.

There were very few stories of wolves attacking humans but many communities were fearful that this could become a problem in the future. Similarly, there were very few instances of bears attacking people but, unlike with wolves, there wasn’t the same level of fear of attacks, except for in Yelpin where a bear had recently entered a village and the community members were visibly emotional. The focus group participants in this community were very fearful of bear attacks and the effects on human well-being. Most of the complaints about bears were due to bears damaging orchards, crops, beehives or fences, or killing livestock. Fruit trees can be very expensive so damage to fruit trees was often cited as a serious financial burden.

Conflicts with jackals, foxes, martens, weasels, and snakes were also discussed but these often involved poultry, which are significantly less expensive than livestock and

therefore not such a serious concern for communities, even though some villagers said they incur daily losses.

Vulnerable Villagers/Areas

Of the communities that said there were vulnerable individuals or locations in the community, they cited houses located at the edge of the village, herders with large herds who take their animals a long distance to pasture and don't have guns, villagers with beehives and orchards on the edge of the village, and villagers with orchards or gardens outside of the village.

Conflict Mapping

Four maps were created, one of each region, using the spatial data collected from each community during the community mapping exercises showing the conflicts with and sightings of wolves and bears. It is important to note that although all surveyed individuals were asked to identify locations of conflicts on the map, some communities were more aware of and able to point out locations of conflicts than others. But this should not be taken to mean that conflicts were less in these communities. Similarly, some focus groups had fewer participants and therefore identified conflicts might be fewer, as is the case with villages where focus groups weren't held and only individual interviews were conducted. The maps serve as visual representations of the types and locations of conflicts but should not be interpreted as representations of the quantity or severity of conflicts. Specific details of each sighting and conflict can be made available by the author upon request.

Figure 5 Map created in Tavush province. Conflicts occurred between 2009-2012.

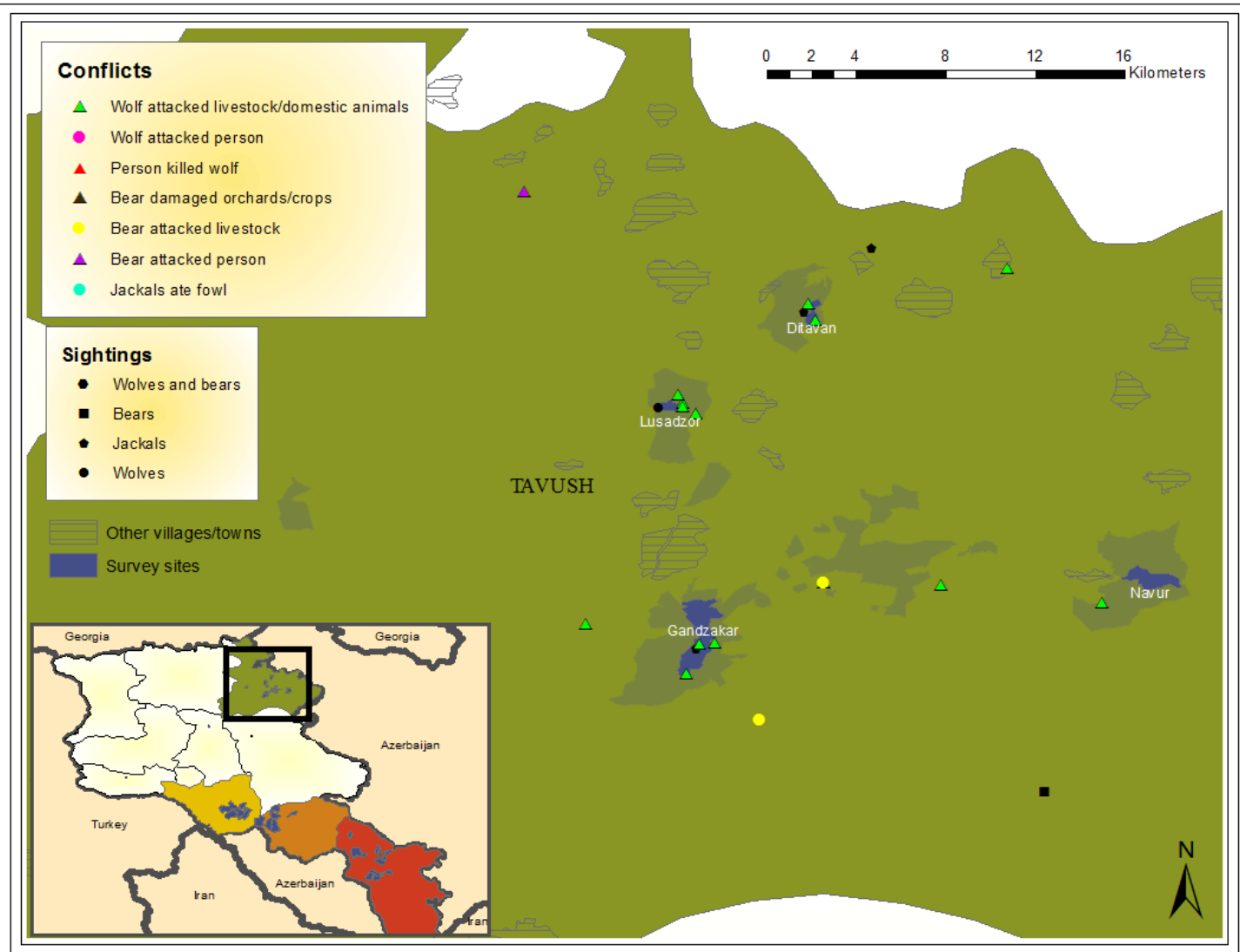


Table 5 Descriptions of conflicts described in Tavush province during the community mapping exercise.

<i>Community</i>	<i>Description of conflicts</i>
Navur	Wolves enter the village in the winter and attack livestock.
Lusadzor	A bear attacked a person outside of the village in the forest collecting mushrooms in 2011. Total losses – 2 horses, 1 donkey and 4 goats
Gandzakar	Bears attack cattle every summer in the mountains and attacked 6 goats in 2012. Wolves have attacked cows and horses in the village. Wolves eat cows in the mountains outside the village 5-6 years in a row. Total loss – 8 cows, 2 horses (tied outside), and 6 goats attacked.
Ditavan	Wolf predations in 2010 and 2011 but recently jackal numbers have been increasing around the perimeter of the village and wolves have been decreasing. Total losses – 18 sheep, 1 dog and 2 cows attacked

Figure 6
Map
created in
Ararat
province.
Conflicts
occurred
between
2009-2012.

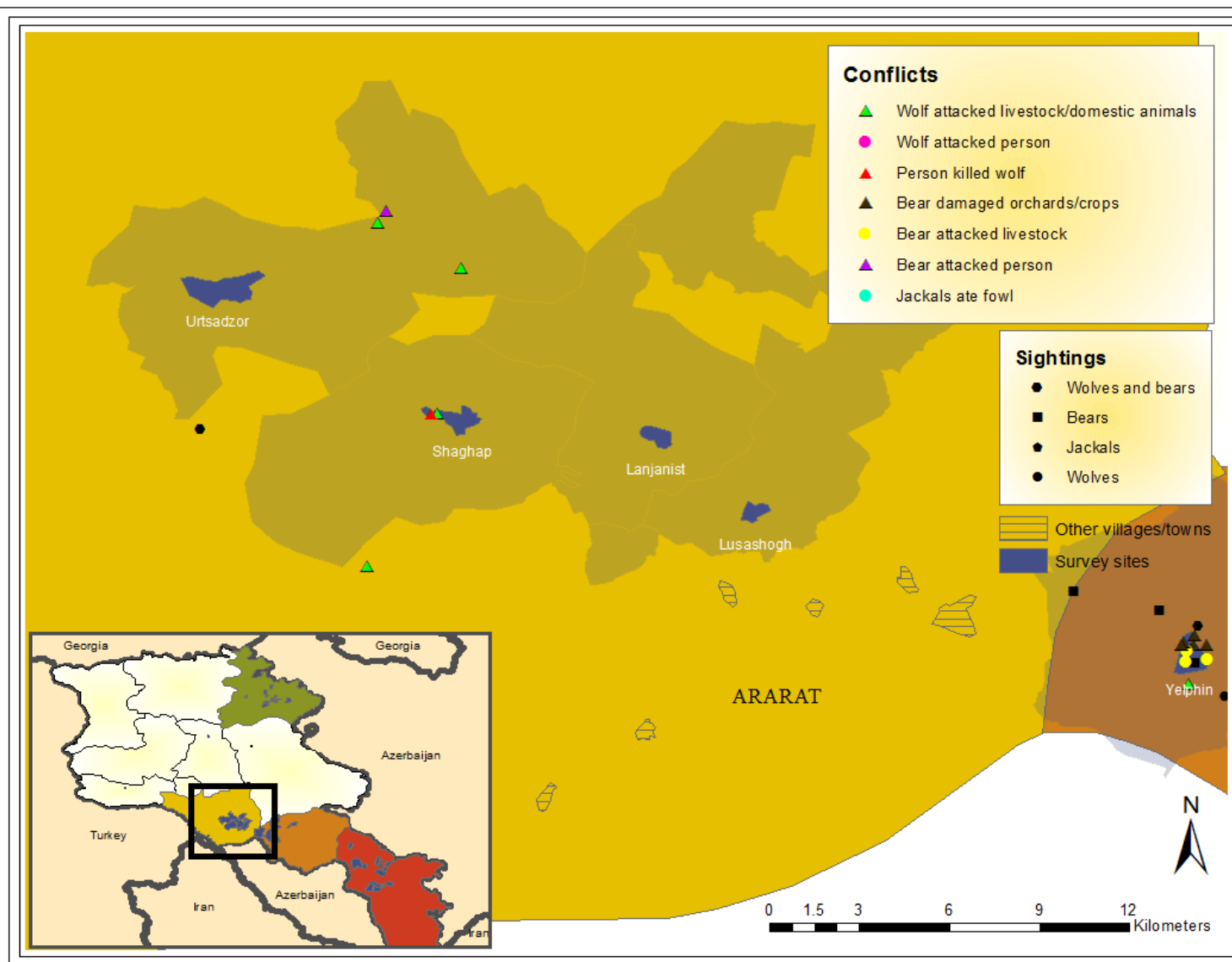


Table 6 Descriptions of conflicts described in Ararat province during the community mapping exercise.

<i>Community</i>	<i>Description of conflicts</i>
Urtsadsor	Annual livestock kills by wolves in mid-February and mid-March. Total losses - 2 sheep and 1 calf
Lanjanist	3 wolves killed in 2009
Shaghap	Total losses – 5 horses and 2 donkeys (inside a fenced area) and a person killed a wolf a month later.

Figure 7 Map created in Vayots Dzor province. Conflicts occurred between 2001-2012.

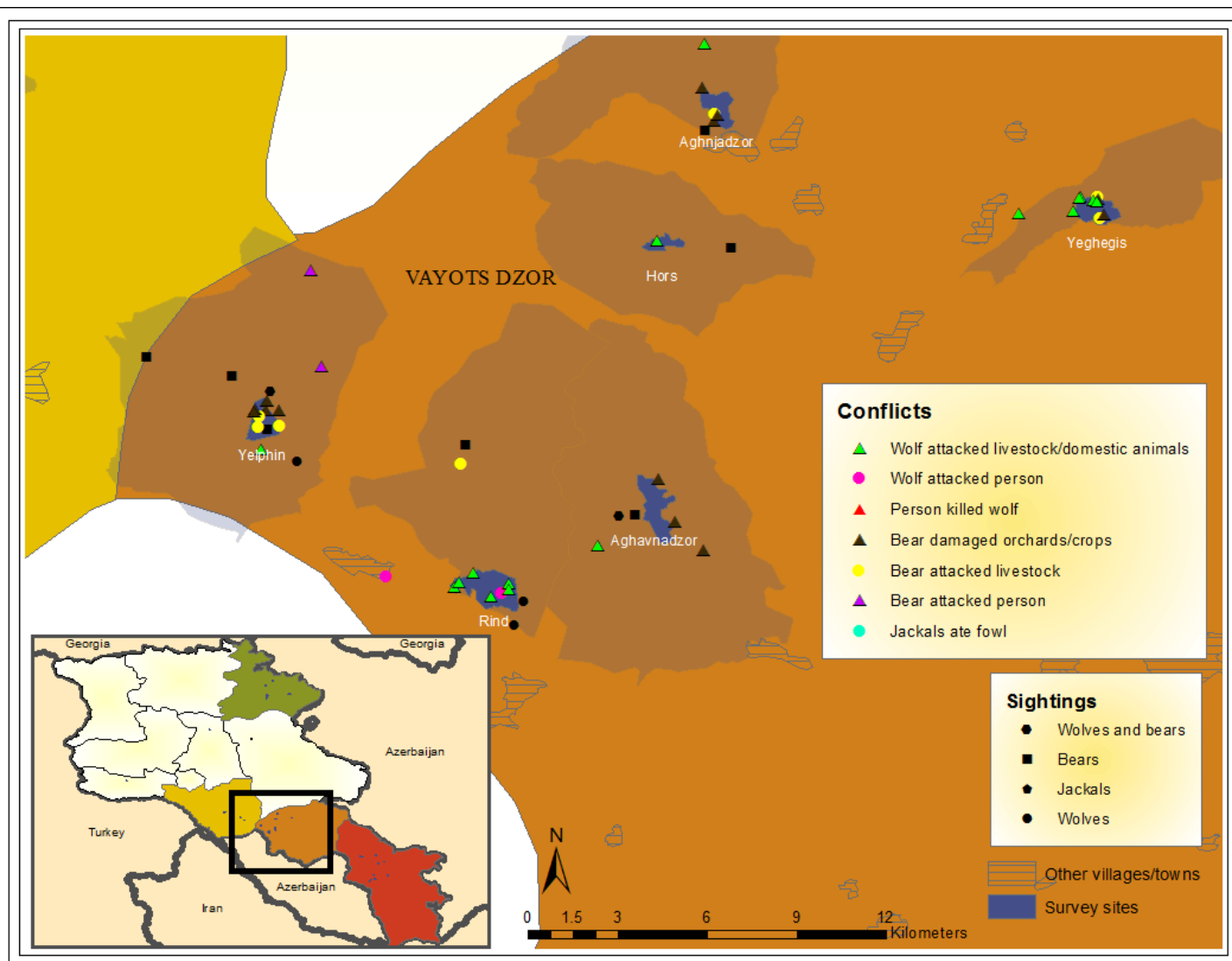


Table 7 Descriptions of conflicts described in Vayots Dzor province during the community mapping exercise.

<i>Community</i>	<i>Description of conflicts</i>
Yeghegis	Bear damage to orchards and attacked livestock near the river and in a fenced in area. Wolves attacked mainly sheep but also a cow near the river. Total losses – fruit trees, 5 sheep, 2 cows, 3 cows attacked, 13 sheep attacked
Rind	Wolf attacked a man in 2012. Wolves attack sheep in the village and also in the pasture lands outside of the village. Bears attacked a large herd of 26 sheep outside of the village in May 2011. Total loss – 1 donkey (2 attacked), 37 sheep, and 1 goat attacked
Yelpin	Bear attacked a man in 2001 who later died. Another bear attacked a man in 2005 who also later died. Bears are seen daily at the waste dump eating animals. Total loss – Fences and fruit trees, beehives, chickens, 6 sheep, 2 cows, and 1 goat attacked.
Hors	Bears are frequent visitors to the vineyard. In 2012, a wolf attacked 8 sheep in a fenced area.
Aghavnadzor	Bears damaged vineyards and apricot trees near a lake.
Aghnjadzor	Over the past few years, bears have destroyed over 30 trees in an orchard along the river. Bears have also killed goats and damaged beehives and fences. Wolves killed sheep in the mountain in 2011. Total loss – sheep, 3 goats, and over 30 trees

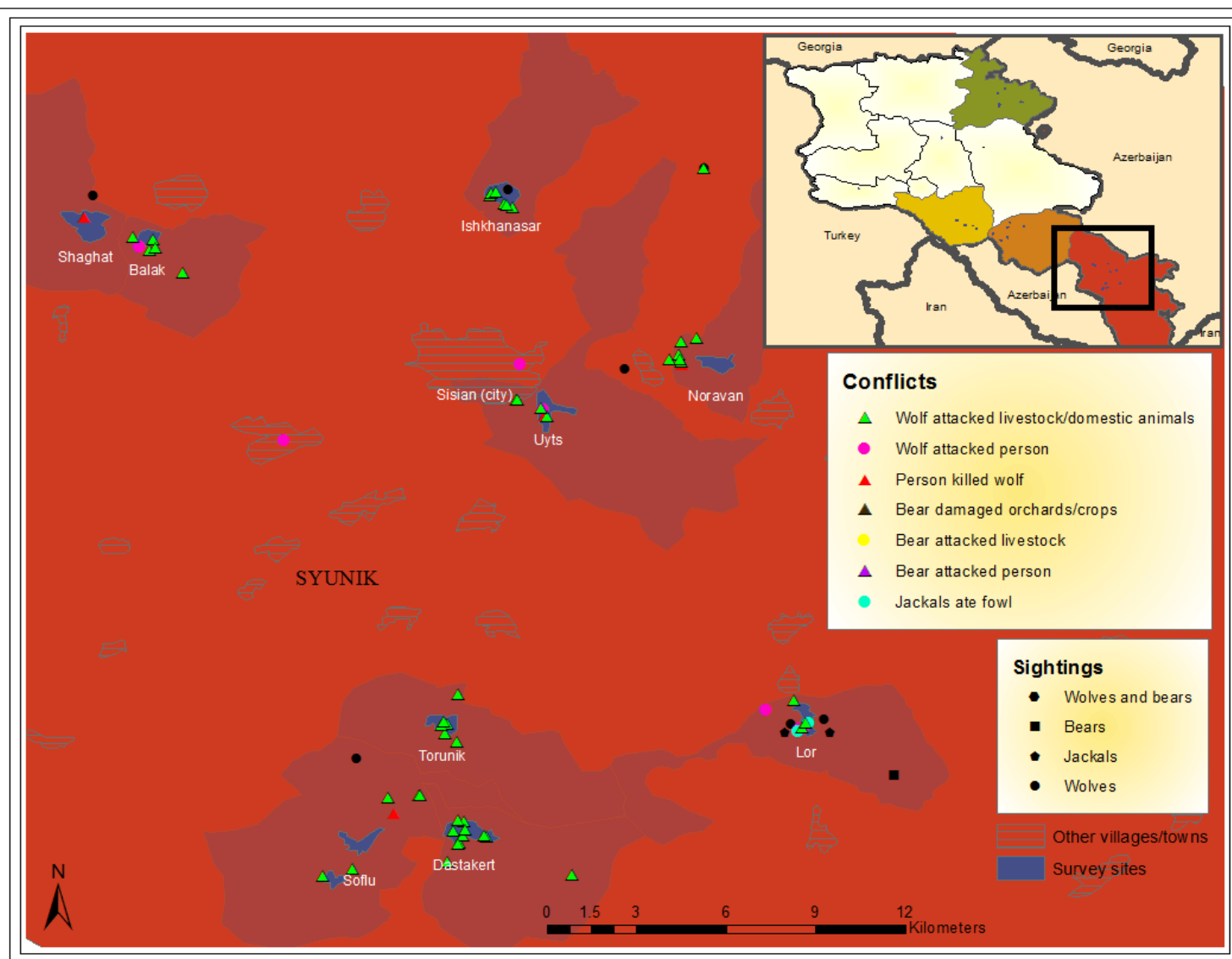


Figure 8 Map created in Syunik province. Conflicts occurred between 2002-2012.

Table 8 Descriptions of conflicts described in Syunik province during the community mapping exercise.

<i>Community</i>	<i>Description of conflicts</i>
Lor	2 stories of a person getting attacked by a wolf (1 in 2006). 1 story of a rabid wolf killing a horse and attacking 2 people and a dog in 2007. The villagers had to travel to Yerevan to get a rabies shot. Jackals kill chickens daily. 1 wolf killed in 2012 following sheep depredation. Total losses – 5 sheep, 1 horse, chickens
Noravan	Livestock depredation of fenced animals in the evening. Attacks also occur when herders come down the mountain with their sheep. 1 wolf killed in 2010. Total losses – 24 sheep, 2 donkeys, 1 cow
Uyts	Nightly conflicts occur with wolves. 2 cases of a wolf attacking people. In 2010, a wolf attacked a woman and then ran into a house and attacked others. The wolf was killed. In 2012, 3 wolves, 10 jackals and 30 foxes were killed using traps. Total losses – 1 dog, 1 horse, 10 sheep
Torunik	Night and daytime depredations of fenced sheep. Dogs killed annually. 1 cow killed when coming down the mountain. Foxes kill many fowl. Total losses – 32 sheep, chickens, ducks, dogs, 1 cow and 1 horse
Soflu	6 wolves killed in the winter. Total losses – 6 cows, 3 chained dogs, 4 sheep
Dastakert	Wolves attacking various animals. Total losses – 14 cows, 27 sheep, 1 horse
Shaghat	Leghold traps set to catch wolves and jackals. 11 wolves, 15 foxes and 10 jackals caught in 2011/2012.
Ishkhanasar	Total losses – 13 sheep killed, 10 sheep attacked and 1 chained dog killed.
Balak	Wolves attacked sheep in the village and in the pasture. The village head fought with a wolf in 2002. Total losses – 1 calf, 12 sheep, 1 donkey (tied outside)

The locations of the mapped conflicts in each region were analyzed in terms of their proximity to roads (Potvin et al., 2005), proximity to forest (Merkle et al., 2011; Treves, 2011), proximity to rivers (Merkle et al., 2011), and vegetation type (Wilson et al., 2006). However, no significant relationships were identified.

Mitigation Measures

When asked about mitigation measures used in the communities, a variety of measures were named including dogs, barns, fencing, guns, traps, poisons, noises, lights, scarecrows, and stay awake/keep guard (Figure 9).

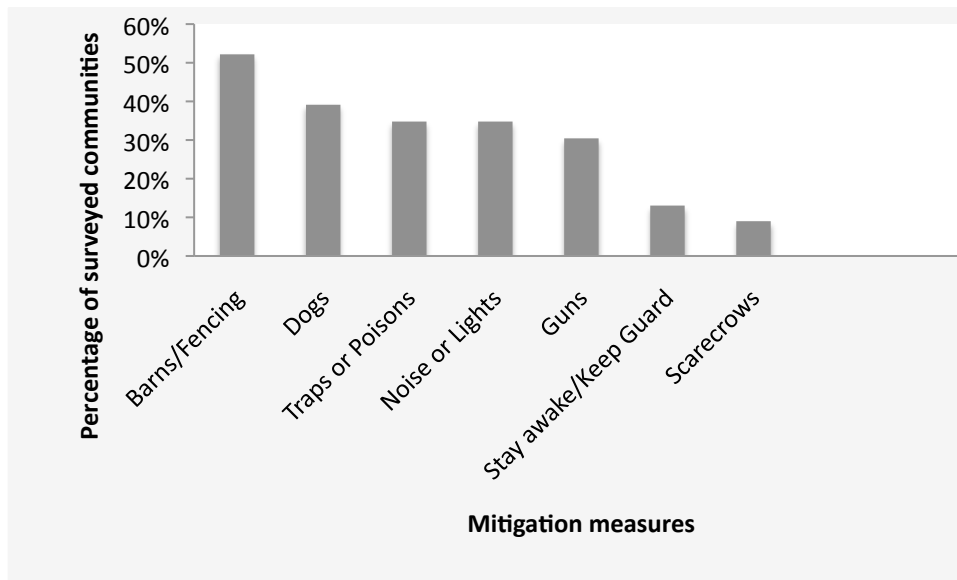


Figure 9 Percentage of communities using various mitigation measures.

Fifty-two percent of communities mentioned the use of barns and fencing. However, many villagers stated that this method does not help to protect livestock from

wolf predation. Thirty-nine percent of communities mentioned the use of dogs, but once again, it was felt that dogs were no match for a pack of wolves or a bear. Some communities simply tie their dogs outside to serve as an alarm if there is an approaching carnivore. Many villagers mentioned that wolves regularly “steal” their dogs. No villagers mentioned having trained shepherd dogs, so most, if not all, of the dogs in the surveyed communities are likely domestic dogs.

A surprising number of communities - 35% - mentioned that they use, or have used, poisons and/or traps to catch wolves, jackals, foxes and small mammals. Villagers seemed to be aware that these methods are indiscriminant and anecdotes of raptors eating and succumbing to poisons were shared. This method is particularly worrisome as the numbers of animals killed are likely not reported to any authorities therefore it is unknown how many and what species of wildlife are being killed.

Thirty-five percent of the surveyed communities mentioned the use of noises and/or lights with some success as a means of deterring carnivores from entering the village. The main complaint of this method was that it can be expensive (in the case of leaving lights or radios on all night) and animals become habituated. In one community, it was mentioned that streetlights were installed and it was actually followed by an increase in conflicts in the village.

In 30% of communities it was mentioned that guns are used to either scare away or kill wolves. This method is, however, not useful where bears are concerned since they are a protected species. The use of guns to kill wolves was also described as being difficult due to the type of guns being used and that one must stay up all night and set

lures in order to kill a wolf. The attitudes towards guns will be discussed in more detail in the 'Discussion' section.

In 13% of communities, villagers stated that they often stay awake in the evenings to guard their livestock and scare off approaching predators. In 9% of communities, villagers mentioned the use of scarecrows to deter bears from harming crops and beehives.

Severity and Frequency of Conflicts

Forty-eight percent of the surveyed communities said that conflicts with wildlife occur 'often' in their community. Thirty percent said that conflicts occur 'sometimes'. And 22% said that conflicts occur 'rarely'. Fifty-six percent of surveyed communities rated the threats from wildlife to their community as 'high', 22% gave a rating of 'medium' and 22% gave a rating of 'low'. There was a surprising amount of within and among region variation.

The values for the level of risk and the frequency were aggregated to create a 'Frequency and Severity' score (Table 9). The region of Syunik received the highest score and the region of Ararat received the lowest score.

Table 9 Scores of severity and frequency of conflicts with wildlife experienced in each community.

REGION Community	FREQ	AVG FREQ	SEV	AVG SEV	FREQ & SEV	AVG FREQ & SEV
TAVUSH		2.25		2.25		4.5
Gandzakar	2		2		4	
Ditavan	2		2		4	
Lusadzor	2		2		4	
Navur	3		3		6	
ARARAT		2		2		4
Urtsadsor	1		1		2	
Shaghap	3		3		6	
Lusashogh	3		3		6	
Lanjanist	1		1		2	
VAYOTS DZOR		2.2		2.3		4.5
Aghavnadzor	1		1		2	
Aghnjadzor	2		3		5	
Rind	3		3		6	
Yelpin	3		3		6	
Hors	1		1		2	
Yeghegis	3		3		6	
SYUNIK		2.4		2.6		5
Balak	2		2		4	
Dastakert	3		3		6	
Soflu	3		3		6	
Lor	3		3		6	
Noravan	1		1		2	
Torunik	2		3		5	
Ishkhanasar	2		2		4	
Uyts	3		3		6	
Shaghat	3		3		6	

Risk Ranking: Direct Threats and Concerns

The 12 communities that participated in the risk ranking exercise identified a total of 10 distinct direct conflicts and 14 distinct concerns/worries (Table 10 and 11).

Three categories emerged from the direct threats mentioned including ‘property damage’, ‘human health and safety’ and ‘other’ (Table 10). The most often cited threat that communities mentioned were direct conflicts involving ‘wolves harming livestock

and domestic animals'. Of these, eight communities ranked this threat as the most important, especially when cows or large numbers of sheep are damaged due to the economic value. Other threats that were ranked as the most important were bears damaging crops, livestock or beehives, jackals harming crops or poultry and bites from venomous snakes.

Table 10 Direct threats mentioned during risk ranking exercise.

Table 10: Direct threats mentioned during risk ranking exercise.					
Direct Threats	Sum of communities ranking direct threats from most (1) to least (4) serious				
	1	2	3	4	Total
Property Damage					
Wolves harming livestock and domestic animals	8	2	1		11
Small carnivores or raptors harming fowl		2	4	3	9
Bears damaging crops (fruit trees)	2	1	1	1	5
Bears harming livestock	2			1	3
Jackals harming poultry or crops	1	1	1		3
Bears damaging beehives	1	1		1	3
Total	14				34
Human Health and Safety					
Wolves threatening human safety		2	1		3
Venomous snake bites	2	2	1	1	6
Total	2				9
Other					
Lack of protection measures		1			1
Total	0				1

Four categories emerged from the worries/concerns mentioned including ‘human health and safety’, ‘property damage’, ‘restrictions’ and ‘overall’ (Table 11). The most often cited worry that communities mentioned were ‘wolves harming people’ even though this is not a major direct threat. Overall, the main worries villagers had were related to physical harm due to encounters with wildlife.

Table 11 Worries/concerns mentioned during risk ranking exercise.

Worries/Concerns	Sum of communities ranking worries from most (1) to least (4) serious				Total
	1	2	3	4	
Human Health and Safety					
Wolves harming people	4	1		1	6
Bears harming people	1	1		1	3
Stress or diseases			1		1
Access to medical services				1	1
Venomous snake bites	1	2	1		4
Total	6				15
Property Damage					
Wolves harming livestock		2	2		4
Financial losses from wildlife		2			2
Small carnivores harming fowl		1			1
Bears harming livestock and crops				1	1
Total	0				8
Restrictions					
Inability to go to barns/mountains			1		1
Inability to defend oneself			1	1	2
Inability to go out at night		1		1	2
Total	0				5
Overall					
More animals entering the village	4				4
Wildlife decreasing	1	1			2
Total	5				6

It should be noted that the fear of venomous snake bites were mentioned as being a threat to both human safety and livestock. Because human safety was seen as a more serious threat, this item was listed under the ‘Human Health and Safety’ heading for both direct threats and worries (Table 10 and 11).

Factors Affecting Levels and Perceptions of Human-Wildlife Conflict

There were a large variety of answers to the question about additional factors that might increase conflicts with wolves and/or bears (Table 12) that generated some good discussion among community members.

Table 12 Factors that community members mentioned as possibly contributing to increased conflicts with wolves and bears.

Factors that may increase conflicts with wolves or bears	Communities
Decrease in wild prey	9
Lack of hunters, guns or ammunition	7
Increase in wolves or bears	5
Lack of right to kill bears	4
Fewer livestock animals taken to the mountain	3
Less industrial noise in the community	2
War in neighboring territory	1
Habitat destruction	1
Nearby waste dump attracting animals	1

The most cited reason (mentioned by nine communities) was a ‘decrease in wild prey’, leading to more wolves entering villages in search of food. A decrease in hare and wild boar were mentioned in a number of communities. The potential reasons named for the decrease in hare were disease and over-hunting. A letter from the Ministry of Nature

Protection of Armenia dated May 22, 2013, in response to an inquiry about the state of hare populations, stated that there was a decrease in hare numbers from 2004-2008 but a 2012 survey indicated an increase in their populations (Ministry of Nature Protection of Armenia, 2013). Further research on this topic to explore the health and state of hare populations around the surveyed communities is recommended. As for boars, some communities mentioned that the African swine fever virus was the cause of the decrease in boar populations. One community (Torunik) attributed the decrease in wild prey to humans burning forests around the village.

Seven communities mentioned a lack of guns (in terms of numbers and types of guns), hunters (in terms of active or registered hunters) and/or ammunition as a problem. Many villagers mentioned that ammunition and guns are expensive and they don't have the means to purchase guns or ammunition to shoot or scare away animals. It was mentioned that the lack of guns to scare away animals has resulted in a lack of fear in these animals and they no longer fear approaching villages. Similarly, five communities said the overall increase in wolves and bears has resulted in new generations of animals that are taught by their parents to approach villages. These communities stated that wolves and bears have increased to the point where they need to be controlled and this is the reason that conflicts are occurring.

Four communities (Aghnjadzor, Yelpin, Yeghegis and Rind) expressed extreme anger and frustration at the inability to kill or scare bears with guns. This topic generated some heated discussion and these villagers expressed a strong sense of being defenseless

against conflicts with bears. As one villager said, “If bear damages us nobody will put him in jail but when we shoot the bear we will be sent to jail for 10 years. It is not fair.”

Three communities (Navur, Rind and Lor) said that a decrease in the number of livestock animals being taken to the mountains was contributing to an increase in conflicts in the village. These villagers thought that since there were fewer livestock in the mountains, wolves were approaching villages more often in search of prey. Participants in Hors and Dastakert both stated that factories in their villages served as a deterrent for wildlife but since the factories are no longer operational, wildlife are approaching the villages more often.

Individuals in Rind mentioned that people have been cutting trees and this may be a reason why bears are approaching the village more. In Lor they mentioned that the noise from the Kharabakh war (an ongoing war with Azerbaijan) caused many animals to flee the forests of Kharabakh towards Lor. Participants in Ditavan mentioned that a waste dump near to the village attracts many jackals.

Scatter plots comparing the conflict severity values of each community to the distance to regional center (Figure 10), population density (Figure 11), and elevation (Figure 12) of each community show that no significant relationships exist among the communities or regions.

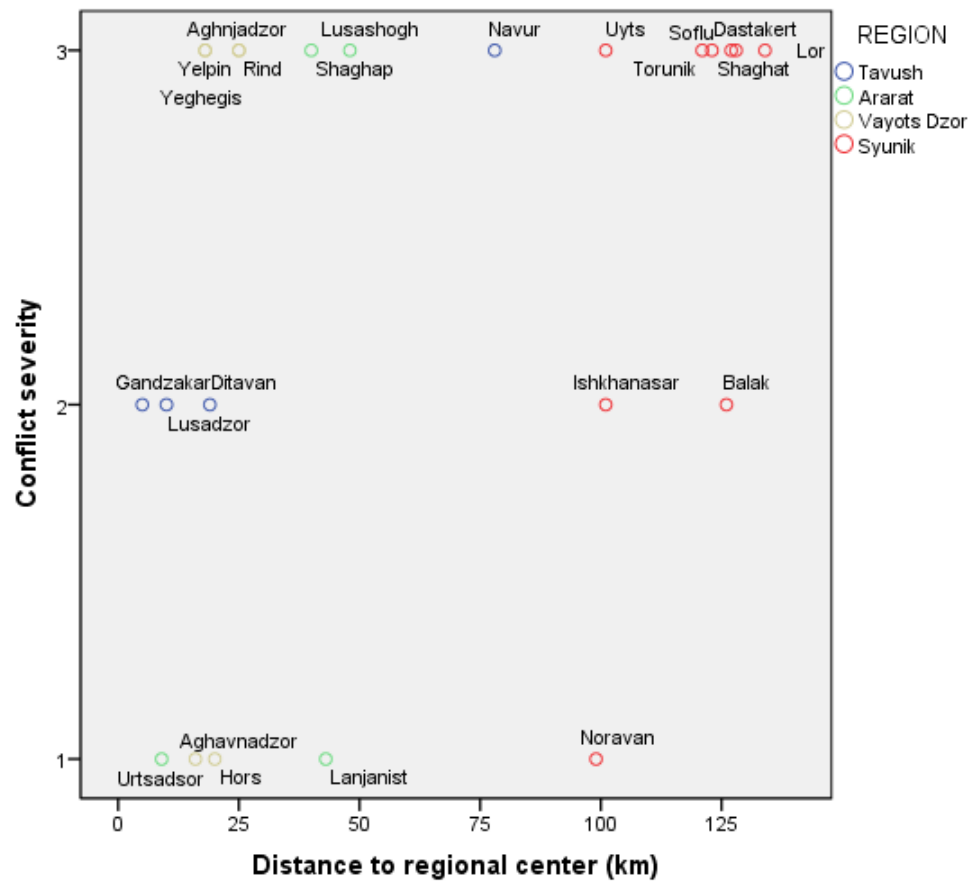


Figure 10 Scatter plot comparing the conflict severity value ($0 = no\ threat$, $1 = low$, $2 = medium$ and $3 = high$) for each community to the distance to regional center.

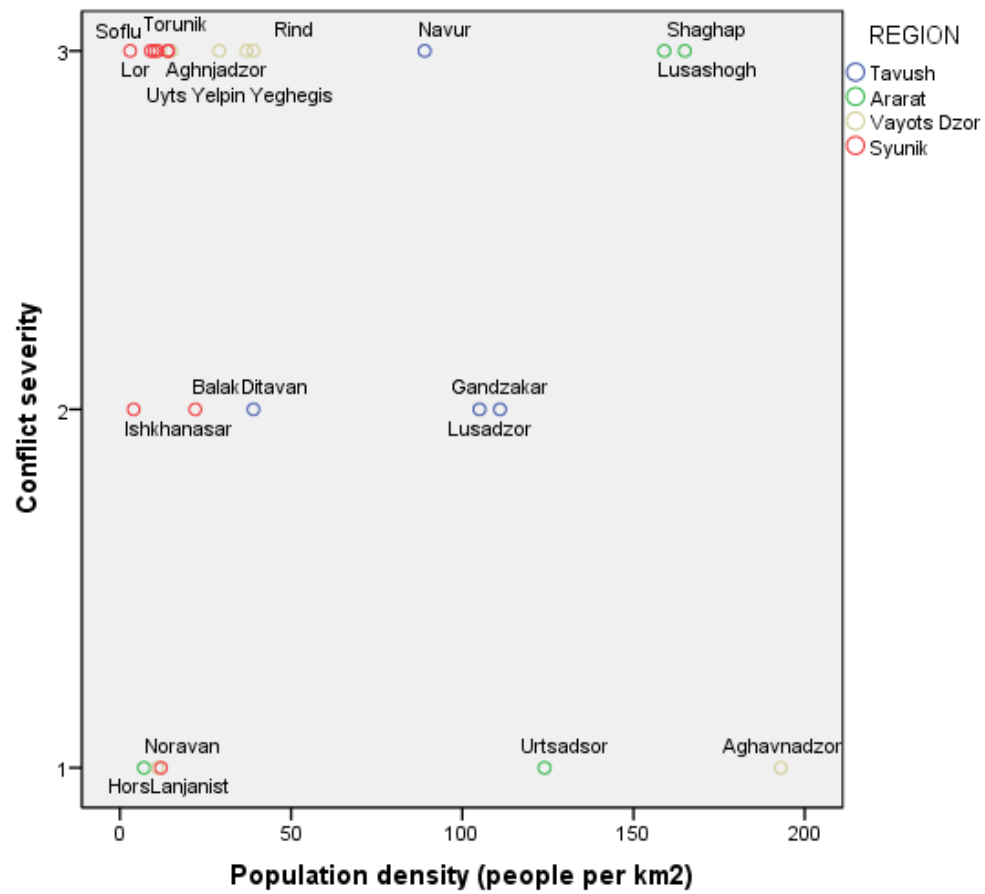


Figure 11 Scatter plot comparing the conflict severity value (*0 = no threat, 1 = low, 2 = medium and 3 = high*) for each community to the population density.

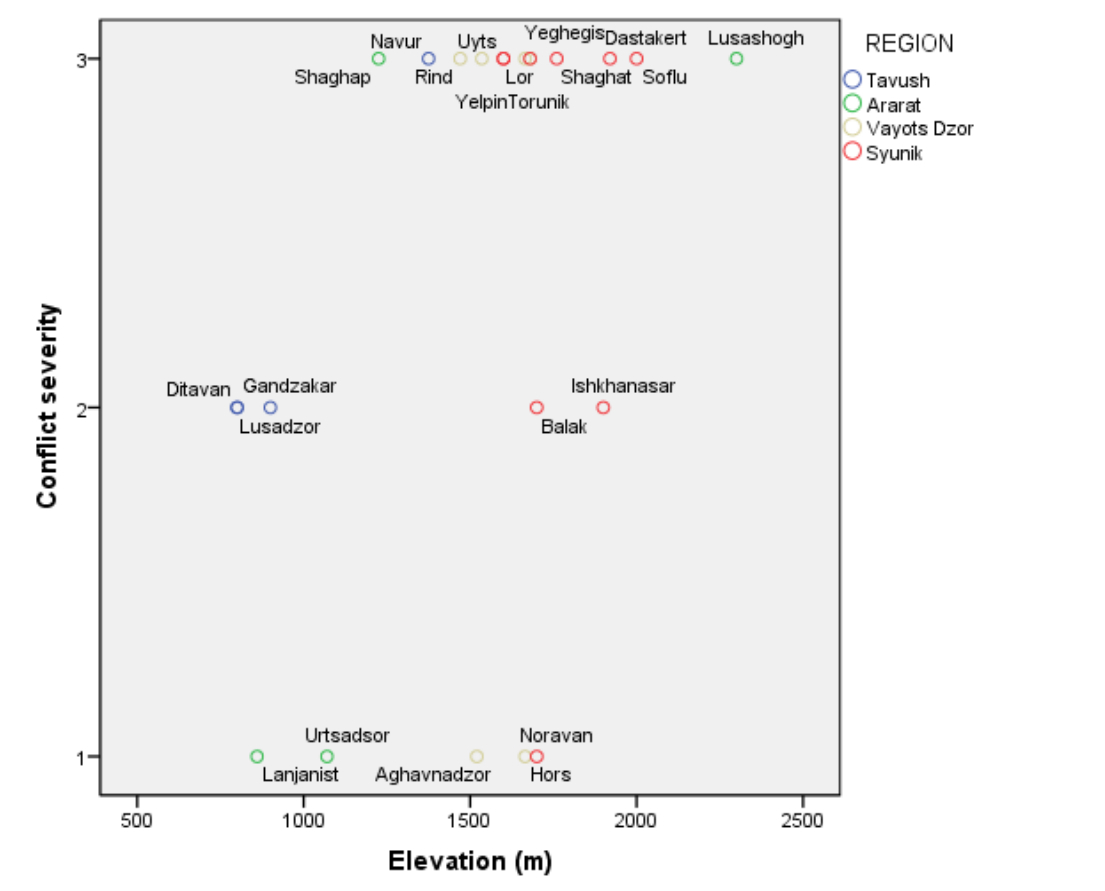


Figure 12 Scatter plot comparing the conflict severity value (0 = no threat, 1 = low, 2 = medium and 3 = high) for each community to its elevation.

Requested Support

Each surveyed community said that they would welcome more support from the government or non-governmental organizations and there were a range of ideas related to possible measures that should be employed to reduce conflicts (Table 13).

Table 13 Support that community members said they would like from the government and non-governmental organizations to help reduce conflicts with wolves and/or bears.

Requested support	Communities
Guns or hunters in the community	9
Insurance/compensation program	6
Government implemented culls	6
More education about conflict mitigation	3
Government oversight and organization	3
Better fences/barns or trained dogs	3
Government should feed wolves and bears	3
Increase prey numbers	2

Villagers in nine communities mentioned that they would like more guns and/or registered hunters in the community. It is important to note that not all of these communities were seeking guns for the purpose of killing animals but also to protect themselves and use guns to scare off animals. Six communities requested an insurance or compensation program to help cover any losses incurred from wildlife. It was mentioned that there was an insurance system during the Soviet period. Similarly, it was mentioned that the government controlled wildlife numbers during the Soviet period and 6 communities said they would prefer that the government manage conflicts by culling wildlife. Three communities said they would like more education about conflict mitigation and how to handle conflicts with wildlife. Three communities also mentioned that they would like more government oversight and organization, such as stimulating and organizing efforts to deter wildlife and to ensure that animals are not being over-hunted. Five communities said that the government should feed wolves away from

villages, introduce more prey animals and plant fruit trees for bears so the animals don't approach villages in search of food. Three communities mentioned a need for better fences/barns and trained shepherd dogs.

Management and Reporting

There was a clear lack of an organized structure for reporting and responding to human-wildlife conflicts. Many villagers and village heads expressed frustration with not having received any compensation for losses. Statements such as “we’ve reported it before but we haven’t received anything” and “we don’t report it because we know that nobody will cover the damage” were common among the focus groups and village head interviews.

Nine village heads stated that if community members do report their losses, they report it to them and four of these village heads stated that they then sometimes report the losses to the regional governor with the hopes of receiving financial compensation. Only one village head mentioned ever receiving any help from the regional governor to help a very poor farmer purchase a new cow to replace a cow killed by a bear, but it was not enough to cover the cost so he had to provide additional help to the farmer. One village head said he has personally compensated villagers whose crops have been damaged by bears by allowing them to harvest from his garden. Similarly, another village head stated that he tries to provide advice and sometimes a little money to help villagers with their losses.

Wolf Culling Program

Respondents were asked whether their community has participated in the wolf-culling program introduced by the Armenian government and to discuss their attitudes about the program. Respondents in five communities (Gandzakar, Shaghap, Yeghegis, Balak and Soflu) mentioned that they had participated in the government program to cull wolves but in only one was there mention of any payment. Of those communities that said they do not participate in the program, three main reasons were cited: 1) lack of trust that payment will be received from the government, including many stories about not receiving payment in the past for culled wolves; 2) fear of the government, such as penalties and other problems; 3) paperwork and time requirements, including the application for a permit and physically taking the wolf to the capital city, Yerevan. As one respondent said, “Mainly it is a headache for them and they avoid it. Government promised things, but they never keep it. So people are not interested”.

Twelve communities stated that they had killed wolves in recent years (mostly in 2011 and 2012, but some dates were unknown) (Figure 13). Eighteen wolves were killed with incidental traps (leghold and neck snare) and 35 with guns. Unless being submitted for payment to the government, it is unknown how many of these killed wolves are being reported or counted by community officials or officials in Yerevan. Although the government states that 205 wolves were killed in 2012, there were likely many more killed through shooting and especially trapping since the government doesn’t provide payment for wolves killed with traps.

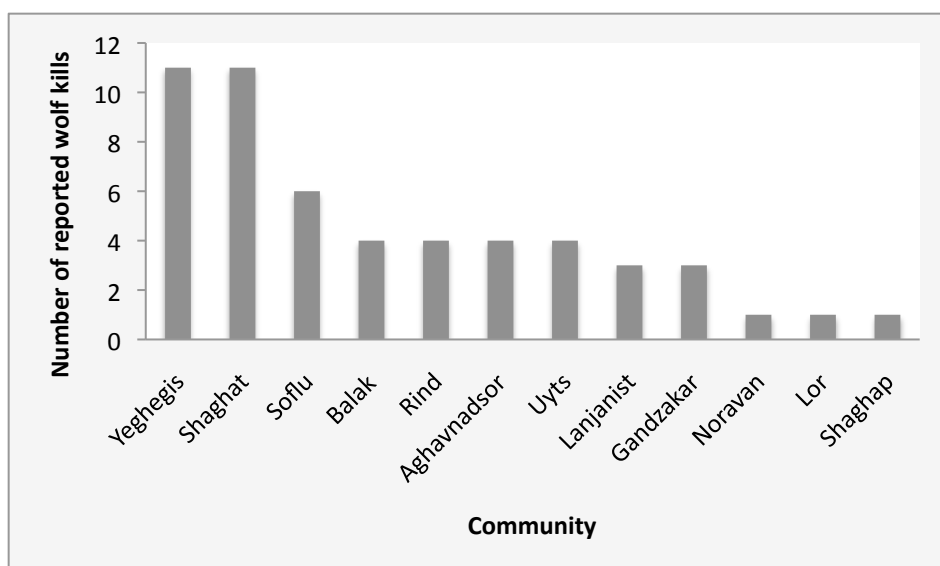


Figure 13 Number of reported wolf kills in recent years.

DISCUSSION

The purpose of this project was to explore eight questions related to human-wildlife conflict in Armenia. As a result of this project, each of the following questions were addressed:

- 1) What are the general attitudes towards carnivores?
- 2) Do attitudes towards carnivores differ among communities?
- 3) Do levels and types of HWC differ among communities?
- 4) Do worries/concerns related to carnivores differ from actual threats?
- 5) Are there any shared characteristics of the locations of conflicts?
- 6) What are the attitudes towards wildlife management policies?
- 7) What mitigation measures are currently used?
- 8) Do communities feel that they have the support and means to manage conflicts with wolves and bears?

Attitudes Towards and Conflicts with Wildlife

This project documented valuable information related to the distribution and presence of wildlife throughout Armenia and the nature of human-wildlife conflicts in the surveyed communities. It was found that attitudes towards wildlife, and particularly carnivores, do differ between communities. Three main attitudes emerged from the interviews and focus groups to describe the surveyed communities:

Respectful/Concerned, Defenseless/Frustrated and Careful/Defensive. Over half (52%) of the surveyed communities expressed a sense of defenselessness and frustration. These communities were Navur, Shaghap, Lusashogh, Aghnjadzor, Rind, Yelpin, Yeghegis, Balak, Soflu, Lor, Torunik and Uyts. All of these communities (plus Dastakert and Shaghat) also reported severe conflicts with wildlife. The attitudes in Yelpin were particularly negative since there was a recent incident with a bear in the community and they were hoping for compensation for their losses. These communities can be seen as high priority for future engagement and this information will be of use for wildlife managers and other groups interested in reducing human-wildlife conflicts in Armenia. It should be noted however that the communities that expressed less extreme attitudes (Respectful/Concerned or Defensive/Careful attitudes) and reported a moderate level of conflicts may be easier to engage (Meadow et al. 2005). These communities were Gandzakar, Ditavan, Lusadzor, and Ishkhanasar.

As Majic and Bath (2010) concluded, attitudinal studies are important to understand the nature of human-wildlife conflicts however the resulting information should be used to work towards resolving underlying conflicts rather than changing attitudes. Such underlying conflicts were uncovered and explored as part of this project. Majic and Bath (2010) also advocated for neutral attitudes towards wildlife rather than extremely positive ones. Similarly, Shivik (2006) asserts that the goal should not be to convince people to love wolves but rather to instill trust in people for biologists and managers so they abstain from killing wolves. Luckily very few particularly extreme

views on either end of the spectrum were encountered during this project, however trust in managers is clearly lacking.

Details of Conflicts and Mitigation Strategies

Many similar stories were shared about conflicts with wildlife though it was found that the levels and types of conflicts do differ between communities. There was a surprising amount of variation among regions and within regions for which no one obvious explanation was identified. It is likely due to a number of variables, some of which were explored in this study and some for which there was no available data to test. The two species that were implicated in the most serious conflicts were wolves and bears, with wolves being mentioned by significantly more (65%) communities than communities that mentioned bears (13%).

Conflicts with wolves centered on wolves attacking livestock, namely cows and sheep, and domestic animals, namely horse and dogs. Wolves attacking people and spreading rabies was also mentioned by a number of communities and this generated a lot of fear. Many stories were told about how children are afraid to go to the outhouse for fear of encountering wolves. Stray dogs were mentioned in a number of communities as also being aggressive and causing problems. Each community was asked if they had heard of wolf-dog hybrids occurring in their community. None of the communities seemed to think this was a serious concern in their village though some community members did say that they had heard about hybrids occurring. Some villagers also mentioned that wolves now have two breeding cycles per year, which could be a sign of hybridization. The potential existence of wolf-dog hybrids should be explored as this can

lead to more aggressive animals and more conflicts with humans (Linnell, Salvatori, & Boitani, 2008).

Conflicts with bears mainly involved damage to orchards, crops, beehives, fences and livestock. Stories of bears attacking people were rare and usually occurred outside of the village, but as with wolves, villagers were very scared of the possibility of bear attacks. Many stories were told of villagers experiencing paralyzing fear due to encounters with bears and suffering from long-term effects because of it, some people even dying after fearful encounters. Although these stories seemed exaggerated, they appeared to be a very serious concern for villagers, especially when the encounters involved children.

Some villagers mentioned having serious conflicts but were unable to recall any specific details of conflicts in recent times. Many people told stories from years ago as if they were very much still fresh in their minds and the villagers were fearful of these instances. Many villagers recalled stories of wolves or bears attacking people, even if they occurred in other communities. This was interesting since even if the attacks occurred many years ago, the villagers would speak of them as if they occurred more recently. This finding is in line with Hill's (2004) finding that people's perceptions of risk are strongly influenced by extreme events. It was said many times "everyone knows of the conflicts because news travels very fast", even from one village to another. It was mentioned that conflicts have been in the media a lot recently, which could be impacting the perception of wolf/bear-related risk as demonstrated by Gore, Siemer, Shanahan, Scheufele, and Decker (2005).

Conflicts with jackals, foxes, martens, weasels and snakes were also reported as occurring frequently in some villages, however there seemed to be more acceptance of these conflicts because the economic loss associated with poultry predation was relatively low and because they felt more able to prevent conflicts with these species (i.e. modifications can be made to barns to keep these animals from entering).

The distribution of conflicts with particular species across regions was particularly interesting. No predictors or explanation for the distribution of conflicts were identified, however the distribution of particular species involved in conflicts follows a clear pattern. Although bears were seen in or around each surveyed community, they were only implicated in conflicts in the central regions of Ararat and Vayots Dzor. Conversely, jackals were only implicated in conflicts in the northern and southern regions of Tavush and Syunik. These communities reported still experiencing conflicts with wolves so it is not clear whether the increase in conflicts with jackals indicates any mesopredator release mechanism (Prugh et al., 2009), however the reports of an increase in jackals and a subsequent decrease in hare warrants further investigation. Conflicts with wolves were mentioned in every village.

A variety of mitigation measures were mentioned across the communities, but there did not seem to be any organized or standardized methods. Villagers mentioned trying different things to protect themselves but there was an overall dissatisfaction with the effectiveness of the methods used. All communities were open to learning about new methods but cost was mentioned as being a prohibitive factor. Although most communities were aware that the use of poisons were illegal in Armenia and that traps

are indiscriminant, 35% of the surveyed communities mentioned using traps and/or poisons and more education is needed on the harm these methods can cause to unintended wildlife species.

Participatory Risk Assessment and Ranking

As mentioned above, 14 communities (56%) reported a high level of threats from wildlife to their community. These communities were Navur, Shaghap, Lusashogh, Aghnjadzor, Rind, Yelpin, Yeghegis, Balak, Soflu, Lor, Torunik, Uyts, Dastakert and Shaghat. These communities were spread across all of the surveyed regions and no obvious common social or environmental variables or indicators were identified to explain the level of severity experienced in these communities in relation to the other surveyed communities. Similarly, the region of Syunik received the highest average 'Frequency and Severity' score and there are no clear explanations for this.

No significant relationships were indicated between conflict severity and the three other variables tested, distance to regional center, elevation and population density. This could be because these variables alone do not impact the severity of conflicts or because the sample size of 23 communities was too small. Similarly, no patterns or predictor variables were identified as a result of analyzing the community maps of sightings of and conflicts with wolves and bears. Further analysis of the severity scores and community maps were constrained by a lack of community-specific and spatially-explicit information related to human land use, livestock numbers, husbandry methods and economic situations. Although all of the surveyed communities are rural, slight differences in any

one of these variables could influence the severity, or perceptions of severity, in a community.

It was found that the actual threats experienced by the surveyed communities did differ from the worries/concerns. The risk ranking exercise further supported the claim made above that although instances of wolves/bears attacking people are infrequent; they generate a lot of fear and concern. Property damage, namely wolves harming livestock and domestic animals were the most serious direct threats ranked by the 12 communities that participated in the exercise. Wolves harming people and more animals entering the village were the most serious worries/concerns. There seemed to be an understanding and acceptance of living close to wolves, bears and jackals but a growing concern that more and more animals were going to enter the villages and cause conflicts.

Perceptions of Human-Wildlife Conflict and Requested Support

Most of the surveyed communities expressed that they do not have the support and means to manage conflicts with wolves and bears. There is a strong perception among many of the surveyed communities that there is not enough natural food for wolves and bears to eat and as a result they are approaching villages more often.

There was a great deal of discussion in many of the communities about guns and lethal management. It was felt by many that guns were necessary to reduce conflicts, either by scaring animals or through lethal removal. Many villagers were upset and frustrated about the lack of support from the government in lethally removing wolves and/or bears and the complicated and, what was described as, the expensive and time consuming process required to become a registered hunter and hunt wolves. Whereas

many communities wanted to have more guns in the community, some mentioned the Soviet period and a desire for the government to step in to protect communities and lethally remove animals when necessary. Although many villagers mentioned lethal removal and guns, they seemed to be open to nonlethal measures as well but did not feel as though the measures currently being used were effective. If conflicts could be reduced without lethal removal, many communities would likely be open to this though some villagers seemed to think that the wolf/bear numbers were out of balance and they needed to be killed in order to reduce their numbers, so education and stakeholder involvement in managing human-wildlife conflicts would be beneficial.

Management and Reporting

Attitudes towards wildlife management policies, specifically in relation to dealing with HWC, were generally negative across all of the surveyed communities. Almost all of the surveyed communities expressed their gratitude that such a project was being conducted and made statements about how they often feel as though they are “forgotten” and “nobody is concerned about them”.

Although there was much talk about guns and lethal removal, it seemed as though this was more of a concern for villagers because it limited their control over the situation and made them feel helpless, especially with regards to conflicts with bears since they are a protected species. As Hill (2004) noted, “people who believe they have little control over conflict situations are likely to further inflate perceptions of risk” (p. 281). This helpless feeling coupled with the lack of trust in and fear of the government is likely aggravating the situation and making conflicts even more frustrating for affected

villagers. Although very few villagers mentioned ever receiving financial compensation from the government for losses, it seemed as though many promises of compensation had been made by the government but not kept, further exacerbating the problem.

In general it seemed as though most of the village heads were very sympathetic to the plight of villagers dealing with human-wildlife conflicts and they tried to help villagers whenever possible. In some of the villages the village heads were also hunters and engaged in killing wolves in response to conflicts.

The wolf-culling program was undeniably unpopular in the surveyed villages. Many villagers told stories about killing wolves and not receiving any payment from the government. Due to the unpopularity of the program, the obvious lack of community input, and a lack of information related to wolf population numbers, it is recommended that this program be abandoned and a participatory management plan developed with stakeholder involvement.

Observations and Anecdotes

It should be noted that with the exception of Lanjanist, which was surveyed as a result of convenience sampling, all of the surveyed communities were surveyed upon the recommendation of the regional governor who identified these communities as having high conflicts with wolves and/or bears. It raises questions about the assessment of the communities that reported having low levels of conflicts with wildlife (Urtsadsor, Lanjanist, Aghavnadzor, Hors, and Noravan). In Aghavnadzor, for example, the village head said that conflicts with wildlife were not a problem for his village but then later admitted that he did not want to make it seem as though conflicts were big because he did

not want hunters to come to his community to kill animals. Similarly, some additional communities in the Tavush region (in Noyemberian) were reported to have serious conflicts with wildlife but they refused to participate in the project because they did not want to reveal that they had problems with wolves and bears. The reasons for this are unknown but outreach to these communities is recommended.

The gatekeeper in Gandzakar had knowledge of wolves having been killed in the village but this information was not revealed during the survey in that community. The reasons for this are unknown but could be related to the fear of the government and such information may have been kept quiet during surveys in other communities as well. During the focus group in Yelpin, it was mentioned that there was an individual who recently caught a bear in a trap and that he had a picture of it, however when the individual was asked about it, he denied it. This is worrisome and outreach to this community before conflicts get any worse is recommended.

In both Yelpin and Urtsadsor, it appeared as though the summer was not the optimal time for a survey about human-wildlife conflicts. In Urtsadsor, it was mentioned that many of the shepherds were in the mountains with their livestock. In Yelpin, many of the focus group participants had limited time since there was a fruit buyer in the community. This should be considered when conducting similar studies and perhaps late fall or winter may yield more participation in surveys.

Conclusion

The specific conflicts that rural communities in Armenia are facing with wildlife are not very different than what rural communities are facing in other parts of the world:

fear of personal safety, property damage and various economic losses. The situation in Armenia, however, seems to be further exacerbated by conflicts with managers (i.e. the government) and management policies. The perceived risk may also be influenced by the increase in media attention to conflicts with wolves and bears in Armenia.

Each community has its own set of circumstances that contribute to the type and severity of conflicts with wildlife and each has its own strategies for dealing with these threats. In the short-term, increasing the capacity of communities in Armenia through education and other means of support would not only help villagers feel empowered and limit their losses but could also limit the numbers of wildlife being killed as a result of conflicts. Given the current lack of support that these communities are receiving to help them reduce or prevent conflicts, any support, no matter how small would likely be welcomed. Additionally, the wolf-culling program should be abandoned due to the clear lack of public support and lack of reliable wolf population estimates.

In the long-term, a human-wildlife conflict management plan should be developed with community involvement. Management decisions may be more acceptable when stakeholders believe they have been involved and heard, therefore stakeholder engagement and involvement is key to the success of management decisions (Chase, Siemer, & Decker, 2002). In Croatia, for example, a human-dimensions facilitated workshop approach was used to develop their wolf management plan (Bath, 2009) which could be one potential avenue that could be pursued in Armenia to develop a human-wildlife conflict management plan.

APPENDIX A: VERBAL CONSENT FOR INDIVIDUALS

INFORMED CONSENT FORM – Individual Interviews VERBAL CONSENT SCRIPT

Date: _____ Community: _____

Interview #: _____ Time Start: _____ Time End: _____

I am a graduate student from the United States and my name is Serda Ozbenian. I attend George Mason University and am studying human-wildlife conflicts. Human-wildlife conflicts are any negative interactions between people and wildlife. I am interested in learning more about instances of human conflicts with wolves and bears in Armenia. This research helps me complete requirements for my education, but may also help improve management of conflicts between Armenian citizens and these species.

You are being asked to participate in this research and I am required to make sure that you understand that your participation in this research is voluntary, to explain the risks and benefits of participating and answer any questions you have at any time.

I am very interested in hearing about your experiences with this topic. There are no wrong answers to the questions that will be asked but I do ask for your honest opinion as this will help researchers, regional and local government officials better understand the threats to your community and wildlife from conflicts with wolves and bears. I will not record your name in association with your answers so your responses will be completely confidential. I will only give your interview a number. The entire interview should take about 1 hour.

This interview is voluntary, which means that you may choose not to participate in the interview at any time. You may also choose not answer a particular question of the interview. If you do not understand the questions please ask me and I will be happy explain in greater detail. You must be at least 18 years of age to participate in this interview. By saying “Yes I understand,” you are telling me that you at least 18 years of age and want to participate.

I will be using an audio recorder during the research. The voice recordings will only be reviewed by myself and one other person, who will transcribe and translate the information into English for analysis.

My contact information is listed below, should you need to contact me later. You must be at least 18 years of age to participate in this project. By remaining here you are telling me that you at least 18 years of age and want to participate.

Do you have any questions before we get started?

Serda Ozbenian
George Mason University
Email: sozbenia@gmu.edu
Cell: 098 96 9181
Dr. Chris Parsons
George Mason University
Email: ecm-parsons@earthlink.net
Tel: (001) 703-993-1033

If you have questions about your rights as a participant, you can contact the George Mason University Office of Research Integrity & Assurance at 001-703-993-4121.

APPENDIX B: QUESTIONNAIRE FOR GOVERNMENT OFFICIALS

GOVERNMENT OFFICIAL QUESTIONNAIRE

Community:

Date:

Start Time:

What wildlife species are found in your community?

What would you say is your community's general attitude towards wildlife?

How often do conflicts with wildlife occur in your community?

0	1	2	3
Never	Rarely	Sometimes	Often

Are threats from wildlife to your community:

0	1	2	3
No threats	Low	Medium	High

What options are available to community members experiencing conflicts with wildlife (who do they report these incidents to and who responds to them)?

Describe the greatest (most reported) risk from wolves and/or bears to your community (i.e. monetary, physical harm, property damage)?

What mitigation measures are currently employed in your community for conflicts with wolves and/or bears, by the government and by individuals?

Can you think of some possible measures that are not being employed that perhaps, could and should be?

Do you have registered hunters in your community?

Does your community participate in the government program to cull wolves?

***Do you think there has been an increase in wolf or bear sightings in your community?
Please explain.***

***Have you received more reports of conflicts with wolves and/or bears in your
community in recent years? Please explain.***

If yes, what do you think are some possible reasons?

***Do you think that human activities in your community threaten local wolf or bear
populations?***

If yes, how?

***How much do you think that natural factors (i.e., drought, or floods) increase conflicts
with wolves/bears in your area? Explain your answer.***

0	1	2	3
No increase	Low increase	Medium increase	High increase

***How much do you think that your community's development (i.e., where people build
housing or plant crops) increases conflicts with wolves/bears in your community?***

0	1	2	3
No increase	Low increase	Medium increase	High increase

***Do you think there is a need to control wildlife populations in your community,
specifically, wolves and/or bears? Please explain.***

***Do you think it is important to conserve and protect wildlife populations, specifically
wolves and bears? Please explain.***

***Do you think particular individuals in your community are more vulnerable to conflicts
with wolves and/or bears (i.e. farmers, herders, individuals living close to water
sources, etc.)?***

***Talk about any other factors that you think might increase conflicts with wolves/bears
in your community.***

***Do you feel that you have the necessary tools to deal with conflicts with wolves and
bears in your community? Please explain.***

Would you like more support from the government or non-profit organizations?

If yes, what kind of support would be helpful?

Please identify one individual, a gatekeeper, in your community that can help us plan a public hearing in your community as well as any other outreach to the community we may need to do.

Please identify any specific individuals in your community that have direct experience with conflicts with wolves and/or bears that I should also speak with.

Do you have any other comments you would like to share with me related to conflicts with wolves and bears in your community?

That concludes the interview. Thank you for your time. Please feel free to contact me later if you think of anything else you would like to add. If you are interested in learning about the results of this research the researcher will be happy to share them with you when she is finished.

End time of interview:

APPENDIX C: VERBAL CONSENT SCRIPT FOR FOCUS GROUP PARTICIPANTS

INFORMED CONSENT FORM – Focus Groups VERBAL CONSENT SCRIPT

Date: _____ Community: _____
Focus Group #: _____ Time Start: _____ Time End: _____

I am a graduate student from the United States and my name is Serda Ozbenian. I attend George Mason University and am studying human-wildlife conflicts. Human-wildlife conflicts are any negative interactions between people and wildlife. I am interested in learning more about instances of human conflicts with wolves and bears in Armenia. This research helps me complete requirements for my education, but may also help improve management of conflicts between Armenian citizens and these species.

You are being asked to participate in this research and I am required to make sure that you understand that your participation in this research is voluntary, to explain the risks and benefits of participating and answer any questions you have at any time.

I am very interested in hearing about your experiences with this topic. There are no wrong answers to the questions that will be asked but I do ask for your honest opinion as this will help researchers, regional and local government officials better understand the threats to your community and wildlife from conflicts with wolves and bears. I will not record your name in association with your answers so your responses will be completely confidential. I will only give your focus group a number. The entire focus group activity should take about 2-3 hours.

This interview is voluntary, which means that you may choose not to participate in the interview at any time. You may also choose not answer a particular question of the interview. If you do not understand the questions please ask me and I will be happy explain in greater detail. You must be at least 18 years of age to participate in this interview. By saying “Yes I understand,” you are telling me that you at least 18 years of age and want to participate.

I will be using an audio recorder and digital camera during the research. The voice recordings will only be reviewed by myself and one other person, who will transcribe and translate the information into English for analysis. I will take digital photographs of any

maps created and I may also take photographs of participants or the group. If you are uncomfortable with being photographed, I will not photograph you.

My contact information is listed below, should you need to contact me later. You must be at least 18 years of age to participate in this project. By remaining here you are telling me that you at least 18 years of age and want to participate.

Do you have any questions before we get started?

Serda Ozbenian
George Mason University
Email:
Cell: 098 96 9181

Dr. Chris Parsons
George Mason University
Email: ecm-parsons@earthlink.net
Tel: (001) 703-993-1033

If you have questions about your rights as a participant, you can contact the George Mason University Office of Research Integrity & Assurance at 001-703-993-4121.

APPENDIX D: FOCUS GROUP SCRIPT

Focus Group Script

Community:

Date:

Start Time:

- I. Introduction & Consent**
- II. Risk Ranking**
- III. Community Mapping**
- IV. Discussion**

I. INTRODUCTION & CONSENT

FACILITATOR DISTRIBUTES COPIES OF THE CONSENT FORM TO PARTICIPANTS AND READS THE CONSENT FORM ALOUD. PARTICIPANTS ARE INSTRUCTED TO SIGN AND THE FORM AND THE FACILITATOR COLLECTS THE FORMS.

Human-wildlife conflicts (HWC) are negative interactions between people and wildlife. HWCs can involve any number of wildlife species from birds to bears and can threaten the health and safety of people and wildlife. Our focus today will be specifically on conflicts with wolves and bears but feel free to discuss conflicts with other species as well, when appropriate.

- Can you think of some examples of human-wildlife conflict that humans around the world face?

IF PARTICIPANTS ARE NOT WILLING OR ABLE TO RESPOND, FACILITATOR NAMES A FEW EXAMPLES (ELEPHANTS IN AFRICA, DEER IN NORTH AMERICA, BEES PLACING HIVES NEAR HOMES, SQUIRRELS IN ATTICS, ETC.)

There are a variety of threats to people as a result of human wildlife conflicts. Threats can be both direct and indirect. Threats can vary from very serious to very small hassles. The severity and types of threats can vary by individuals within a community based on

many factors that we will be exploring today. Examples of some threats include injuries, damage to crops, and damage to livestock. Sometimes we may not directly be affected by any of these threats but we may still have concerns that they could occur. These concerns, or fears, are important as well as they can influence our actions.

- What are some species of wildlife you have seen in your community?
- Can you think of some specific threats associated with human-wildlife conflict in your community?
- Are human-wildlife conflicts generally a concern for your community?
- Are conflicts with wolves and/or bears generally a concern for your community?
- Can you think of any benefits from having wolves and bears in your community?
- Do you have registered hunters in your community?
- Does your community participate in the government program to cull wolves?

II. RISK RANKING:

We are going to do an activity to identify and rank threats and worries associated with conflicts with wolves and bears in the community and how important these threats are for the community.

FACILITATOR GIVES EACH PARTICIPANT TWO SHEETS OF PAPER AND A PEN AND GIVES THE FOLLOWING INSTRUCTIONS

- On one sheet of paper I want you to list *direct conflicts* with wolves and/or bears that you have *personally experienced*.
- On the other sheet of paper I want you to list *worries* associated with wolves and/or bears that you are *personally affected by*.
- Please take 15 minutes to list as many conflicts and worries as you can think of.
- After you complete your lists, rank the five most serious conflicts/worries, with 1 being the least serious and 5 being the most serious.

AFTER 20 MINUTES THE FACILITATOR SAYS:

- Now each of you will read aloud your top 5 threats.

FACILITATOR KEEPS A LIST OF EACH UNIQUE CONFLICT ON LARGE POSTER PAPER. SAME PROCESS IS REPEATED FOR THE TOP 5 WORRIES.

III. COMMUNITY MAPPING:

FACILITATOR PRESENTS A BASE MAP OF THE COMMUNITY (physical map or Google Earth image).

- Let's gather around and look at this map. Has anyone ever used Google Earth before?

- Let's locate some important features on the map that are found in the community (i.e. rivers, lakes, ponds, community water sources, schools, clinics, roads, businesses, guest areas, houses, village boundaries, fences, gardens, livestock areas).
- Are there any important community areas that are not on the map? If so, let's add the important areas to the map.

Now we will use this map to help us visualize where in the community conflicts with wolves and bears are taking place. Community maps can be useful to show where most of the conflicts are happening and what characteristics those areas share. You will mark your specific encounters with wolves and/or bears on a transparent sheet secured to the community map. I have assigned each of the conflicts we identified a specific color. You will use the marker to place a dot at the location of your encounter with a wolf or bear. Once you have completed this activity, we will have a better idea of where in the community conflicts with these species occur (if using Google Earth, the researcher will input the information mentioned by the community to Google Earth to avoid any user error).

AT THE END OF THE EXERCISE, THE FACILITATOR COLLECTS ALL THE PAPERS.

IV. DISCUSSION

FACILITATOR INITIATES AND MODERATES A DISCUSSION ABOUT THE LOCATION OF THE CONFLICTS ON THE MAP. FACILITATOR TAKES NOTES.

- Are there areas within the community that have conflicts with wolves and/or bears more often than others?
- Are the conflicts primarily located in one specific area?
- Are they primarily located near any specific land features?
- Are there specific individuals in the community that you think are more vulnerable to conflicts with wolves and bears based on the distribution of conflicts on the map?
- Are there other factors that you think might increase conflicts with wolves/bears in your community that may not be reflected in the map we've created.
- Can you think of some possible mitigation measures for reducing conflicts with wolves and bears in this community?

FACILITATOR POSES THE FOLLOWING CLOSING QUESTIONS:

- Do you have any additional information to share related to conflicts with wolves and bears that we did not discuss?
- Are there any other individuals within the community that are not present in this group that you think would have additional information to share?

That concludes the focus group. Thank you each for your time. Please feel free to contact me later if you think of any additional information you would like to add. If you are interested in learning about the results of this research, please provide your contact information and I will share the results with you when the research is complete.

End time of focus group:

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