

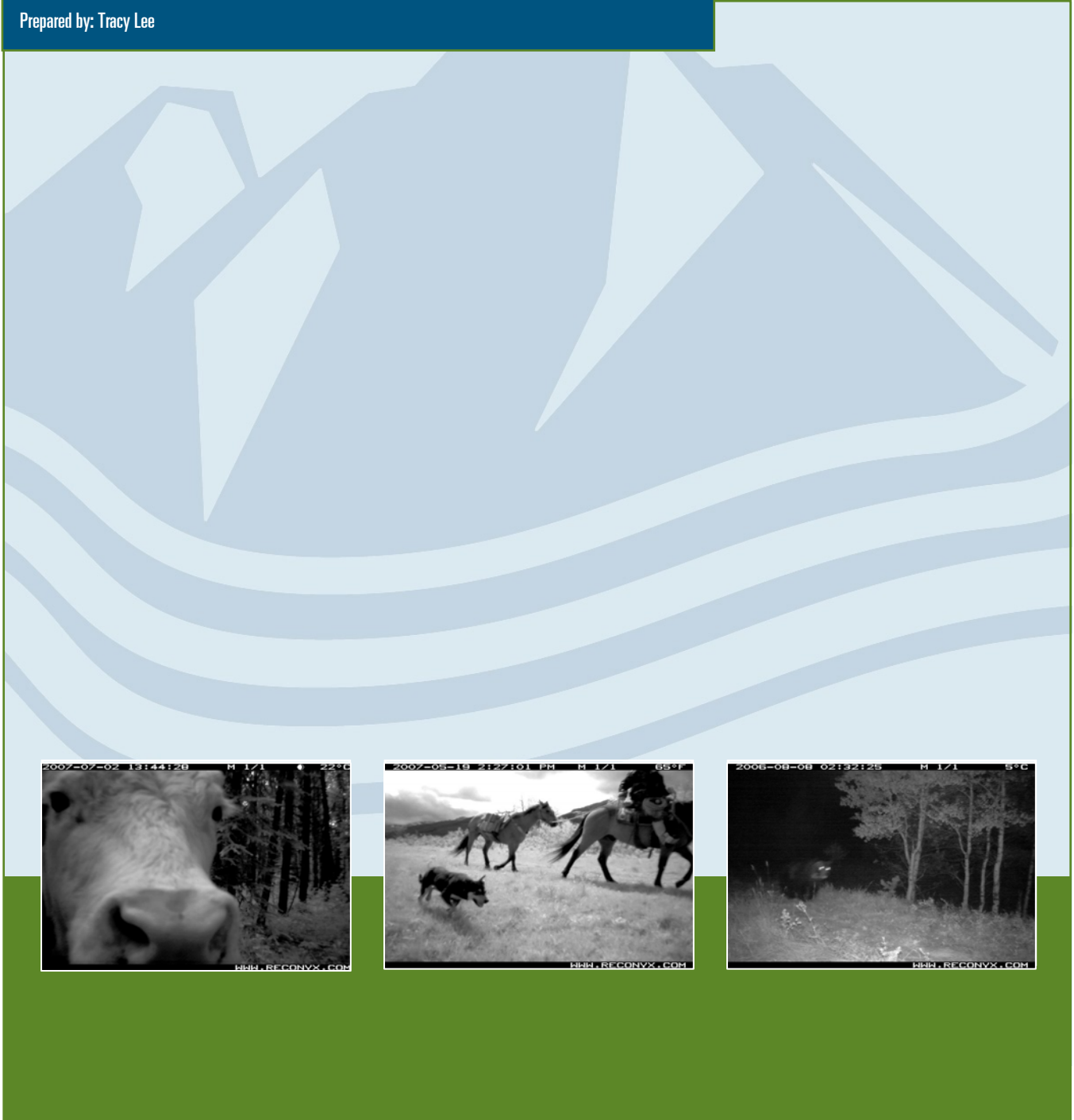
A Review of Compensation Programs for Livestock in Southwestern Alberta

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TABLE OF CONTENTS

Introduction.....	1
Wildlife Predator Compensation Program in Alberta.....	2
Wildlife compensation programs in neighboring provinces.....	3
British Columbia.....	5
Saskatchewan.....	5
Literature Review.....	6
Why Compensation?.....	7
Approaches to Compensation.....	7
Who Pays for Compensation?.....	8
Ex-post Compensation.....	9
Is Ex-post Compensation Effective?.....	9
Payment in Advance.....	11
Technical Challenges.....	13
Case Studies.....	13
Germany - The Otter Bonus.....	13
Botswana- Insurance Compensation Scheme.....	14
Southwestern Alberta Survey Results.....	15
Changes to Compensation Program.....	17
Discussion and Considerations.....	22
Technical Challenges.....	23
Considering other approaches to compensation.....	25
Conclusion.....	27
References.....	30

INTRODUCTION

The relationships between people and carnivores are complex and are influenced by a variety of factors including: life history characteristics of carnivore species, the direct experiences between people and carnivores, and individual attitudes and values. Negative interactions that arise from the interaction between carnivores and private landowners, especially with respect to depredation of livestock by large carnivores, are a topic of international concern. In addition, landscapes shared by people and large carnivores have heightened risks for personal safety. These issues are often particularly significant in the regions surrounding protected areas where permeable boundaries allow for the free movement of animals across public and private domains to meet their life history requirements. Understanding the interactions between human and carnivore components of complex social ecological systems is essential to addressing the long-term sustainability and resilience of such systems.

The Eastern Slopes of southwestern Alberta are home to the full complement of carnivores native to the Canadian Rocky Mountains. The region is also home to vibrant communities with socioeconomic dependence on agriculture, petroleum, tourism and other natural resource-related activities. Many species (e.g., wolf, grizzly bear, black bear, cougar, and coyote) rely on public protected areas, multiple-use public lands and productive private lands along the Eastern Slopes. In fact, collaborative management between public and private land managers is absolutely essential to the long-term persistence of such wide-ranging carnivores. However, livestock depredation by carnivores on private lands (or public lands utilized for agricultural production) results in economic, social and cultural issues for ranchers and other residents in the region. Private producers often feel that they are left to carry a disproportionate burden of the cost associated with protecting a public good (i.e., carnivores). Compensation programs reimburse private landowners for damages and losses caused by wildlife with varying degrees of success.

To understand the issues of living with carnivores in the Waterton Biosphere Reserve region, The Waterton Biosphere Reserve Association and the Chinook Area Land Users Association requested the assistance of the Miistakis Institute in undertaking a survey to document the attitudes and perceptions of landowners toward carnivores in the Waterton Biosphere Reserve region in southwestern Alberta and, more specifically, toward the Wildlife Predator Compensation Program that is currently under operation in Alberta.

This report has five components:

1. Brief description of the Alberta Wildlife Predator Compensation Program;
2. Literature Review: a literature review that takes a global perspective on wildlife predator compensation programs to identify program approaches, to understand the challenges and benefits of wildlife predator compensation programs, and to discern factors required to implement a successful program;
3. Survey Results: the presentation of relevant survey results from the landowners' attitudes and perceptions of carnivores survey undertaken in the Waterton Biosphere Reserve

region by Dr. M. Quinn and Dr. S. Alexander in 2010 with support from the Miistakis Institute;

4. Large Carnivore Communication Committee (LCCC) Workshop: a workshop was organized with the LCCC to present the findings of the survey and initiate a discussion regarding improvement of the existing livestock compensation program in southwestern Alberta. The LCCC is an organized group in southwestern Alberta with representation from Cardston County, Municipal Districts of Pincher Creek, Ranchland and Willow Creek, landowners within each municipal area, and Alberta Sustainable Resource Development Fish and Wildlife staff. The group convenes monthly to discuss/address issues related to carnivores; and
5. Recommendations: based on information generated through the other components, a series of recommendations have been generated for mitigating the wildlife predator compensation program from the landowners' perspective in southwestern Alberta.

This report was not commissioned or requested by Alberta Sustainable Resource Development, Fish and Wildlife Division (ASRD FWD), and it is not a full review of the current Wildlife Predator Compensation Program. Instead it provides the landowners, landowner groups and land managers with a better understanding of landowners' concerns with regard to the Wildlife Predator Compensation Program, and recommendations from a landowner perspective on how to improve the program functionality and to introduce new approaches for compensation into the conversation. Ideally, this report will contribute to meaningful dialogue between landowners and land managers on how to mitigate human carnivore interactions in southwestern Alberta.

WILDLIFE PREDATOR COMPENSATION PROGRAM IN ALBERTA

The Wildlife Predator Compensation Program provides economic compensation to ranchers whose livestock are killed or injured by wildlife predators (ASRD 2011). The program offers compensation for livestock species including cattle, sheep, bison, swine or goats killed or injured by predator species such as grizzly bear, black bear, wolf, cougar or eagle. Compensation is not paid for horses, donkeys or exotic animals nor for livestock kills or injuries by coyote. In addition, incidents of carnivore feeding on livestock that have died of other causes are not covered under compensation. Livestock kills or injuries verified by ASRD Fish and Wildlife Officers as predator kills are compensated at a minimum amount of \$400 per animal. Alternatively, a producer can wait until the end of October and receive compensation based on the Canfax average for the month of October, based on an average weight of 550 pounds (Province of Alberta Wildlife Act 1997).

If a Fish and Wildlife Officer is not able to verify if it was a predator kill, then it is labeled a probable kill. The producer is paid 50% of the loss if a confirmed kill by the same species is found within 10 km either 90 days before or after the incident (Province of Alberta Wildlife Act 1997).

The program is financed through hunting and fishing licenses, and the Alberta Conservation Association (ACA) acts as a fiscal agent for the program. It is administered by a compensation committee made up of representatives from Alberta Sustainable Resource Development, Alberta Beef Producers, Western Stockmen's Association, Department of Agriculture, and Alberta

Veterinary Medical Association. The committee is responsible for reviewing appeals and recommending changes to the program.

In Alberta the highest rates of livestock predation occur in southwestern Alberta, representing 37% of total claims. Figure 1 is a graphical depiction of the annual amount paid for compensation over a ten year period from 2000-2010 (Morehouse & Boyce 2011). Total compensation paid to producers in Alberta over 10 years with confirmed depredation events was \$944,006. The annual totals in figure 1 indicate a recent increase in the total annual amount paid out for livestock compensation.

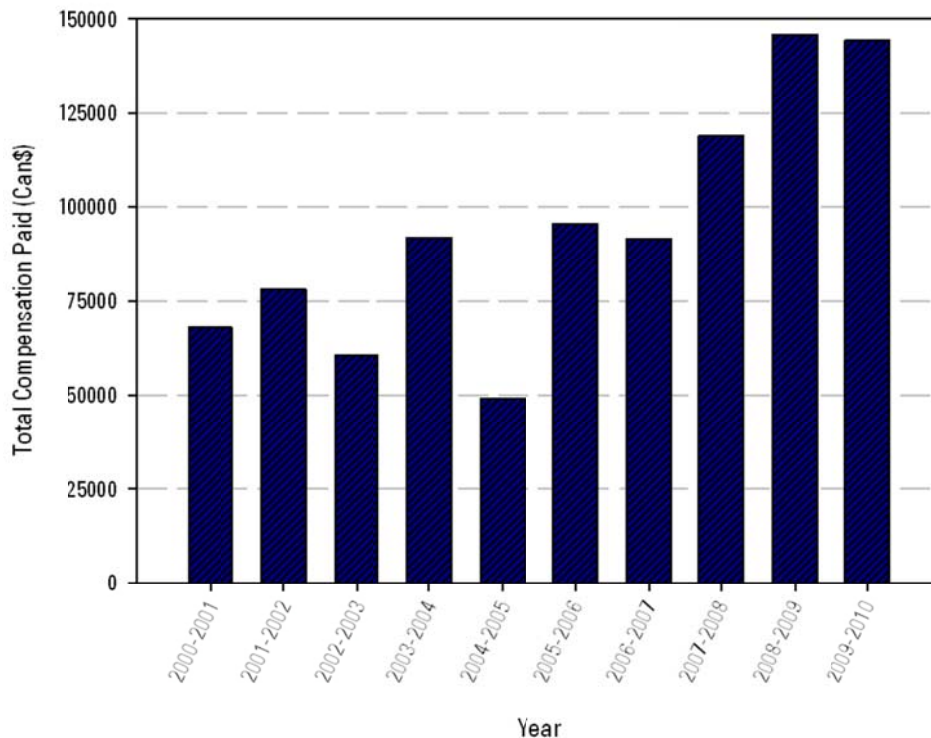


Figure 1: Compensation payments to livestock producers in Alberta through Wildlife Predator Compensation Program

Wildlife compensation programs in neighboring provinces

To provide a better understanding on how Alberta approaches compare to neighboring jurisdictions we reviewed wildlife predator compensation in neighboring regions, including British Columbia and Saskatchewan. Table 1 provides general information on each program. Information on the B.C. program was acquired from Drew Carmichael (project coordinator) and the BC Agricultural Research and Development Corporation (ARDCorp) and B.C. Cattlemen’s Association websites. Information on the Saskatchewan Livestock Depredation program was acquired from the Saskatchewan Crop Insurance Corporation (SCIC) program website.

Table 1: Predator Compensation Programs in Western Canada

Region	Administration	Eligible species	Predators	Compensation for kill	Compensation for Injury	Compensation for Probable
British Columbia Wildlife Predation Loss Prevention and Mitigation Pilot Project	Administered by the B.C. Agricultural Research and Development Corporation (ARDCorp) and BC Cattlemans Association as a pilot program, but ends in Dec 2011. Program currently in transition with Conservation Officers from BC Ministry of Environment are now playing the role of verification, unless they are unable to attend then qualified contracted wildlife specialists involved in the pilot program.	Beef cattle	Coyote, wolves, bears, cougar	Calves under 4 months receive \$300, calves older than 4 months receive 75% average market value. For bulls and dairy cattle up to a maximum of \$2000	none	none
Alberta - Wildlife Predator Compensation Program	Administered by a compensation committee made up of representatives from Alberta Sustainable Resource Development (ASRD), Alberta Beef Producers, Western Stockmen's Association, Department of Agriculture, and Alberta Veterinary Medical Association Conservation Association and members of various associations. Verifications are done by ASRD Fish and Wildlife Officers.	Cattle, bison, sheep, swine and goats	Wolves, bears, cougars and eagles	Compensation is based on the average commercial value for the type and class of animal on the day it was killed, or the CanFax 3-day average with a minimum of \$400.	The costs of veterinary care and medication up to the value of the animal based on the average for the type and class of livestock	If predation is suspected but cannot be confirmed, 50 per cent compensation will be provided.
Saskatchewan-Livestock Predation Program	Administered by the Saskatchewan Crop Insurance Corporation (SCIC). Policies developed by Saskatchewan Livestock Predation Program Committee, consists of representatives from Ministry of Agriculture, Ministry of Environment and members of various associations for sheep, cattle, equine and others. Verifications done by SCIC adjustors trained in predator verification.	Cattle, sheep, goats, bison, horses, hogs (excluding wild boar), elk, fallow deer, llamas and donkeys, ostriches, emus, ducks, geese, chickens and turkeys, other less common species	coyotes, bears, cougars, lynx, foxes, wolves, eagles or any other wild animal that causes injury or death to eligible livestock	Compensation with a minimum of \$400 for beef calves, \$150 for foals, \$60 for sheep and \$60 for goat kids. Compensation for other species will be determined using market sales data. Prices will be set using months when sales volumes are high. Rates will be determined on an as-needed basis for uncommon species.	In the event livestock are injured, producers can receive up to 80 per cent of the animal's value to cover veterinary costs	If predation is suspected but cannot be confirmed, 50 per cent compensation will be provided.

BRITISH COLUMBIA

British Columbia's Wildlife Predation Loss and Prevention and Mitigation Project, is delivered by ARDCorp with a goal of reducing the economic impact of wildlife predators on cattle and sheep in B.C. The project is run by a coordinator, who reports to a committee made up of a Chief Operating Officer (C.O.O.) of ARDCorp, 2 representatives from the B.C. Sheep Producers, 2 representatives from the B.C. Cattlemen's Association (BCCA), representatives from the Ministry of Environment and from the Ministry of Agriculture and Lands. The project has established an agreement with qualified wildlife specialists to respond to predator issues occurring in B.C.

The priorities of the project have been identified as: the development of prevention measures; the investigation and verification of predator harassment, injuries, or killing of livestock; and the implementation of targeted predator control strategies (mitigation). There is some effort to place a level of responsibility on the producer, as the wildlife specialists may refuse payment for a verified kill if they feel there are poor husbandry practices occurring. This decision is up to the discretion of the wildlife specialist and in many cases the specialist may work with the landowner to improve husbandry practices. There are currently no subsidies programs to help landowners improve practices.

Last year the project paid out approximately \$50,000 in compensation to landowners for verified depredation events and \$57,000 to contracted wildlife specialists. The pilot project will run until Dec 2011 and will then be reevaluated.

As of December 2010, the BC Conservation Officers Service took the lead on responding to landowners issues with predators including control and verifying depredation events. If the conservation officer is unable to attend, then the landowner can call one of the Wildlife Specialists under agreement with the Wildlife Predation Loss and Mitigation Project to respond.

SASKATCHEWAN

In Saskatchewan, the Livestock Predation Program, is administered through the Saskatchewan Crop Insurance Corporation (SCIC), who hires adjustors and predator control specialists to verify claims of predation and to help identify prevention measures to reduce the risk of predation on farm animals. The program is guided by the Saskatchewan Livestock Predation Committee which includes representatives from Ministry of Agriculture, Ministry of Environment, and members associations representing different livestock industries. The program's main focus is on prevention to reduce the risks associated with predation on livestock; however predator control specialists will remove problem wildlife and recommend compensation for verified losses of livestock due to depredation.

The project states, "producers are expected to implement the predator control measures recommended by the specialist and, in general, follow good livestock husbandry practices to minimize the potential for predator problems. Failure to fulfill these responsibilities will result in a producer being denied further predator control services or compensation." Therefore compensation is tied to an incentive for producers to address poor husbandry practices. In addition, SCIS has established programming to help subsidize the costs associated with some of the prevention recommendations, such as a \$100 subsidy toward the purchase of a livestock

guardian dog. In addition, SCIC will pay up a subsidy of up to \$4000 to a producer for fencing off feed stacks.

There are slight differences in payment amounts and types of livestock and predator's compensation is paid for between the jurisdictions, this may be due to the context of the region and the key issues facing producers regionally. A key difference between the Alberta program and the Saskatchewan and British Columbia compensation programs is the latter two have identified producer responsibilities that enable the administrative body to refuse payment if there are poor husbandry practices. Saskatchewan has also implemented a few subsidies programs to help producers implement suggested improvements by predator control specialists to reduce the risk of depredations occurring in the future.

LITERATURE REVIEW

Wolves in the United States, tigers in Russia, jaguars in Mexico, lions in Kenya and large carnivores in southwestern Alberta all share a similar story: all are involved in interactions deemed negative by people (Madhusudan 2003; Nelson 2009; Zabel & Holm-Muller 2008). Negative carnivore and human interactions occur in a variety of forms, such as livestock depredation, killing of pets, damage to property and, in exceptional cases, human injury or death (Large Carnivore Initiatives for Europe 2007). These interactions often result in economic impacts that tend to fall disproportionately on local populations living within the carnivores' range (Large Carnivore Initiatives for Europe 2007; Nelson 2009; Zabel & Holm-Muller 2008). Historically, and to an extent today, the impact on local people has resulted in persecution of carnivores by local populations, leading in some cases to the eradication of a carnivore species (MacLennan et al. 2009; Woodroffe 2001). However at a national and international scale carnivores tend to have a high existence value, indicating a high societal value for maintaining healthy populations of carnivores on the landscape (Nelson 2009; Treves et al. 2009).

Globally, there is a reported decline in large carnivore populations. For example, jaguars are experiencing extirpation in 37% of their historic range, tigers have lost 41 % of their range in the last decade, and lions have become scarce in western and central Africa (Bauer & Van Der Merwe 2004; Sanderson et al. 2002). Grizzly bears have also experienced a decline in their historic range across North America, and in Alberta they were recently (June 2010) listed as threatened under the *Alberta Wildlife Act* (Government of Alberta 2010). Although reasons for the declines in carnivore populations are complex, key variables include habitat loss and human-caused mortality (Alberta Sustainable Resource Development & Alberta Conservation Association 2010; Nelson 2009; Zabel & Holm-Muller 2008). Therefore, reducing human-caused mortality is an important strategy for maintaining carnivores on the landscape. One solution for reducing human-caused mortality is to address the disproportionate societal costs to local populations living with carnivores. A mechanism used extensively around the world to address the economic burden associated with livestock loss is to offer an economic payment to individuals and/or groups experiencing losses to carnivore depredation (Bulte & Rondeau 2007; Kaczensky 1999; Large Carnivore Initiatives for Europe 2007; MacLennan et al. 2009; Mishra 1997; Ogra & Badola 2008; Treves et al. 2009; Treves et al. 2006; Vynne 2009).

A review of international compensation programs highlighted some of the successes and challenges of compensation. Compensation programs may have different program goals and approaches depending on who is implementing the program. For instance, a conservation group may have different goals than a livestock producer or government agency. The review also highlighted characteristics of successful compensation programs, and the importance and challenge of measuring effectiveness of compensation programs.

Why Compensation?

It is important that the motives for compensation are clearly defined (Agarwala et al. 2010). Beeland (2008) identified compensation program goals stated in the literature:

- Address the economic loss to local populations;
- Share the costs of conserving large carnivores equitably;
- Reduce killings of carnivores by local populations;
- Increase tolerance toward carnivores; and
- Reduce attractants and promote good husbandry practices.

If the goals are not clearly articulated it is difficult to measure the effectiveness of compensation programs (Agarwala et al. 2010). Unfortunately, although compensation programs exist the world over, few have been rigorously tested and, for many, their effectiveness is unknown (Nyhus et al. 2003). Defining program goals and approaches to compensation will help managers and stakeholders decide on the most effective strategy. It may require a combination of approaches to ensure the risk to local human populations is reduced and carnivore populations are maintained.

Approaches to Compensation

There are two approaches to compensation: ex-post compensation and compensation in advance. However, many compensation programs make use of elements of both approaches (Large Carnivore Initiatives for Europe 2007). Traditionally, the most common approach has been ex-post compensation, where a cash payment is made to cover the costs of a livestock animal loss (killed or injured) due to a depredation event by a large carnivore *after* the damage has occurred. This is the current approach in Alberta's Wildlife Predator Compensation Program. The effectiveness of this approach has been widely criticized in the literature with the main critique being that compensation has not been tied to incentives to reduce attractants and realize improved husbandry practices (Bulte & Rondeau 2005). This criticism of conventional ex-post compensation has partly led to the development of the payment in advance approach to compensation to alleviate human carnivore conflicts.

Compensation in advance includes supporting assistance schemes and/or performance payments. These programs aim to increase the sense of landowner responsibility and are based on the premise that prevention is better than reactionary measures. Assistance schemes usually involve partial financial support (grants or loans) for materials and technical support to cover initial costs of incorporating husbandry practices that are more carnivore-compatible. This type of compensation is increasing in popularity (Large Carnivore Initiatives for Europe 2007). Examples of improvements may include electric fencing, livestock guard dogs, and improved enclosures.

Performance payments are tied to the concept of payment for “ecosystem services” defined by the Millennium Ecosystem Assessment as benefits people obtain from an ecosystem (2005). This strategy addresses the disparity between geographic scales and economic burden occurring between local communities and the national/international community. The local community faces conflict with carnivores that may affect their livelihood and safety compared to national/international levels where people place a high value on carnivores but do not experience the burden of living with them (Nelson 2009; Zabel & Holm-Muller 2008; Zabel et al. 2010). In Sweden the public’s willingness to pay (the minimum amount an individual is willing to pay for a good) for maintaining carnivores on the landscape was calculated at approximately 297 million US dollars annually (Broberg & Brännlund 2008). The issue of placing an economic value on carnivores is the difficulty in translating existence values (and their economic valuation) into tangible local incentives for carnivore conservation. The payment for ecosystem services concept is best highlighted by Sweden’s approach to carnivore conservation whereby the government offers a performance payment to reindeer herder communities based on births of specified carnivore species on the landscape that they manage (Bostedt & Grahn 2008; Zabel & Holm-Muller 2008; Zabel et al. 2010).

Who Pays for Compensation?

Compensation programs can have different financial models but typically are supported by government agencies (federal and/or provincial/state), conservation organizations, and/or by individual livestock producers. In Canada, compensation programs are primarily supported by the provincial governments. In Alberta compensation payments are made by the Alberta Conservation Association (ACA), a conservation organization that operates at “arm’s length” from government and is funded through hunting and fishing licenses. In addition, ASRD FWD has supported financial assistance schemes to help livestock producers reduce risks associated with carnivore human conflicts. In the US, compensation for wolf depredation events were historically paid by Defenders of Wildlife, but federal legislation was recently passed to enable state wildlife agencies to implement compensation programs (USFWS 2010). The US federal government will contribute one million dollars annually to be disbursed among ten states where wolf re-introductions have been successful. State governments are required to match their allocated funds to support compensation.

Conservation organizations have funded or contributed to compensation schemes in many areas throughout the world, although not on a national scale like the Defenders of Wildlife program in the US. For example, compensation for lion depredation in Kenya is funded by the Mbirikani Predator Compensation Trust (MacLennan et al. 2009) and compensation for tigers in Russia is funded by the Tigris Fund (Hotte & Bereznuik 2001). However, a concern expressed in the literature with these programs is they tend to be small in scale and have difficulty ensuring long-term sustainable funding.

There are also compensation programs funded through the development of an insurance program. An interesting example of an insurance approach is in Botswana where livestock loss to big cats (i.e., lions, cheetahs, leopards) is common. The Botswana Conservation Predator Trust and the local community designed an insurance program supported through investments by participants (livestock producers) and conservation organizations to compensate landowners for depredation events. This example is discussed further in the case studies section.

Ex-post Compensation

Ex-post compensation programs involve payments made after verification of livestock mortality caused by a large carnivore. This is the most common approach used in North America. The process typically includes detection of a depredation event by a landowner, verification of the depredation event by a sanctioned body, application to a payment agency, and payment to the landowner.

IS EX-POST COMPENSATION EFFECTIVE?

There are numerous challenges to ex-post compensation programs. Some criticisms focus on the overall ex-post compensation approach while others focus on aspects of program functionality or technical challenges.

Approach Challenges

The primary criticism of the ex-post compensation approach is that it does not create incentives for local human populations to reduce the risks of human carnivore conflicts. Further, it does not appear to be an effective mechanism for increasing a local population's tolerance toward carnivores (Agarwala et al. 2010; Madhusudan 2003; Nyhus et al. 2003; Ogra & Badola 2008; Treves et al. 2009; Václavíková et al. 2011).

Numerous programs with a goal of large carnivore conservation are moving away from ex-post compensation as the primary mechanism for compensation because it does not address the causes of the conflict. Examples include tiger conservation in India, large carnivore initiatives in Europe, and the African Elephant Specialist Group (Large Carnivore Initiatives for Europe 2007; Zabel et al. 2010). In these cases, governments and/or organizations are working to develop a more comprehensive system whereby landowners are offered incentives for maintaining carnivores on the landscape. In Europe, the large carnivore specialist group only supports the use of an ex-post compensation approach when the large carnivore species is rare and/or endangered and dependent on domestic livestock for survival, and/or individual carnivores cause damage outside their normal range. Otherwise they recommend a performance payment compensation approach (Large Carnivore Initiatives for Europe 2007) where monetary or in-kind payments are made by a regulatory body to individuals or groups conditional on specific conservation outcomes (Zabel et al. 2010). Other programs, such as in Germany, use ex-post compensation only in cases of extreme hardship, usually defined by a specified measurement of loss (Freitas et al. 2007).

A few ex-post compensation programs have coupled the compensation payment to an agreed upon set of husbandry practices. Payment for a confirmed depredation event is only provided if the livestock producer has implemented good husbandry practices, or in some cases penalties for poor husbandry are applied resulting in a reduced payout (Madhusudan 2003). It is often an assumption that ex-post compensation programs increase a local population's tolerance toward large carnivores but a majority of studies dispute this claim (Agarwala et al. 2010; Beeland 2008; Bulte & Rondeau 2005; Naughton-Treves et al. 2003). Agarwala et al. (2010) compared landowners' attitudes between groups receiving compensation for wolf depredation on livestock in Solapur, India and Wisconsin, USA. In both cases ex-post compensation failed to alter landowners'

perceptions of wolves. The authors note that if one of the goals of the compensation program was to reduce killings of wolves, then ex-post compensation programs, in this case, are not effective.

However, they also found landowners supported the notion of receiving economic compensation as a management strategy for reducing the overall economic burden of having carnivores on the landscape. Similar results were found in other studies, including studies in New Mexico and Arizona where Beeland (2008) undertook an extensive survey of livestock producers who received compensation for gray wolf depredation events from Defenders of Wildlife. The author concluded that livestock producers' tolerance to wolves did not change, and that livestock producers supported compensation but felt the current system was not functional. The author suggested shifting away from compensation on a per animal basis to a new approach whereby landowners are compensated for wolf presence on the landscape as this may cast wolves in a better light. If the payment is tied to wolf presence and not to a livestock loss, landowners may be more likely to implement strategies to reduce the risk of livestock depredation, as they would be receiving a payment for an ecosystem service instead of livestock loss. Vynne (2009) also reported similar results for a Mexican gray wolf livestock compensation program supported by Defenders of Wildlife. Additionally, the author noted a high number of producers felt the compensation program was a publicity stunt by an environmental group and many felt ex-post compensation was not the most effective approach. However, over 50% of the respondents supported investments in proactive measures (assistance schemes), such as fencing projects or tax incentive programs to reduce the risk of human carnivore conflicts.

Technical Challenges

Many reviews of ex-post compensation approaches report that recipients of compensation agree with the concept of offsetting the economic burden, but had concerns about program functionality (Breck et al. 2011; Madhusudan 2003; Vynne 2009). Technical challenges reported in the literature (Agarwala et al. 2010; Breck et al. 2011; Hotte & Berezuk 2001; MacLennan et al. 2009; Treves et al. 2009; Vynne 2009; Zabel et al. 2010) with regard to ex-post compensation programs include:

- inequality in detection rate of depredation events between producers due to difference in landscape variables (e.g., hilly terrain, vegetation density, etc.);
- low reporting by producers;
- program inefficiency (time lags for verification and payment);
- high transaction costs for governing body;
- sustaining funding; and,
- issues regarding trust and transparency between landowner and governing bodies.

The detection rate is defined as number of livestock killed by predators, found by producer, verified by governing body and classified correctly as predator as the cause of death. It is generally accepted that a producer's detection rate is generally lower than what is actually occurring on the landscape (Breck et al. 2011; Oakleaf et al. 2003; Sommers et al. 2010). Indeed studies in southwestern Alberta and Wyoming suggest that missing livestock associated with carnivore depredation events generally go undetected (Nyhus et al. 2003; Morehouse and Boyce 2011). If one of the goals of a compensation program is to provide fair and equitable financial mitigation to landowners, then a lack of confirmed depredations is problematic. Detection rate is affected by a number of factors such as terrain, weather, vegetation type, grazing practices,

livestock monitoring regimes and the type and density of large carnivores in the region (Breck et al. 2011).

In addition to concerns about the low detectability rate, some studies reported a low rate of landowners reporting depredation events (Madhusudan 2003; Ogra & Badola 2008). Reasons for low reporting rates include confusion with regard to the process and loss of confidence that the process will result in an economic return due to burden of proof or corruption (Václavíková et al. 2011).

Many programs report large time lags between observation and verification, reducing the ability of land managers to verify if the mortality was caused by a large carnivore. In addition, there can be a long time lag between verification and payment (Madhusudan 2003; Ogra & Badola 2008). Successful compensation programs depend on quick, accurate verification of damage and prompt and fair payment (Nyhus et al. 2003). Ex-post compensation programs require a verification process whereby a governing body directly assesses the claim, often resulting in high transaction costs (costs associated with verifying the claim) (Schwerdtner & Gruber 2007). Very few programs have reviewed the costs and benefits of an ex-post compensation approach where there is an assessment of transaction costs compared to payout to producer. This makes comparisons between different compensation approaches difficult.

Beeland (2008) reported that livestock producers had a general distrust of federal and state government agencies responsible for verifying depredation events. Trust issues generally arise due to issues with the verification process. In some cases, the lack of trust may undermine the government agency's ability to work with the local population to develop and implement management strategies to reduce risks of human carnivore conflicts (Jackson & Wangchuk 2004; Nyhus et al. 2003; Ogra & Badola 2008; Treves et al. 2009; Treves et al. 2006; Vynne 2009). Some compensation programs have taken a community-based approach whereby the community is actively engaged in program design and delivery, including helping to verify depredation events (Aust et al. 2009; Jackson & Wangchuk 2004; Treves et al. 2009).

Overall, ex-post compensation programs may play an important role in reducing the economic burden to livestock producers, but there seems to be considerable problems with many of the programs in achieving a high level of effectiveness. This has given rise to new or additional approaches for addressing compensation, such as landowner assistance schemes or performance payments.

Payment in Advance

Assistance schemes and performance payments are compensation methods that aim to reduce the risks of negative human-carnivore interaction. They differ from ex-post compensation because the payment is made in advance of a depredation event. These programs tend to focus on implementing strategies to reduce the risk and/or to create incentives to maintain carnivores on the landscape.

Assistance schemes provide the affected landowners with a grant or subsidized loan for technical support and materials (e.g., electric fencing, grain bins and livestock carcass bins) to improve husbandry practices and reduce losses to carnivores. The Large Carnivore Initiative in Europe (2007) suggests recipients make some contribution to the improvements, in labor and/or money, to

ensure a sense of ownership of, and responsibility for, the improvements. Many compensation programs include assistance schemes as part of their compensation programs, as they directly address the causes of the conflicts and help distribute the costs associated with the upgrade between the landowner and the government body or other organization.

Performance payments are monetary or in-kind payments made by a governing body to individuals or groups and are conditional on specific conservation outcomes (Zabel et al. 2010). In the case of maintaining large carnivores on the landscape, the specified outcome may be tied directly to population goals of the specified species, or a surrogate such as good husbandry practices and presence of large carnivores on the landscape. A key difference between this approach and ex-post compensation is that the provision of performance payments is tied to a conservation outcome and creates an incentive for local populations to maintain carnivores on the landscape (Nelson 2009; Zabel et al. 2010). This approach parallels the 'payment for ecosystem services' concept in North America.

The best implemented example of this approach occurs in Sweden where Sami communities (reindeer herders) are paid for births of wolverine, lynx or wolf occurring within their defined Sami territories. Payments are tied to a defined conservation outcome- in this example producers are paid for births of specific carnivore species. The livestock producer receives compensation in advance (prior to a depredation event) reducing the burden of transaction costs associated with ex-post compensation, such as finding a carcass, verifying cause of death and applying for funds. The payment upon a carnivore's birth has been set to account for the monetary damage the carnivore is expected to cause over its lifetime. In this case, a birth of a wolverine or lynx is worth approximately \$29,000 US. Additionally, lower payments (\$5000 US) are made to Sami Villages for proof of lynx and wolverine on Sami community lands. Although the program has reduced transaction costs associated with depredation events, the increase in costs for monitoring and verifying numbers of carnivores may be substantial (Zabel & Holm-Muller 2008).

Once the Sami village/community receives annual funds from the state (including birth payments and species presence payments), they are responsible for deciding: 1) how the money is used, and 2) on a process for allocating the funds internally. Groups have chosen to allocate the money differently: some distribute to individuals who have experienced a depredation event, some invest in community projects that benefit the whole group, and others use a combination of these approaches. Zabel and Holm Muller (2008) have attempted to measure the success of this program through an evaluation of the effects of performance payments on carnivore offspring numbers. Although there was an increase in carnivore births after the program's inception (and a slight decrease in illegal poaching), it is difficult to establish a causal effect attributable to the performance payment. The authors conclude it is not possible to positively affirm the success of the program in helping Sweden meet its conservation target, although desired project goals of increasing populations of targeted carnivore species and reducing illegal poaching rates have been met.

The Northern Jaguar Project is another example of a program where payment is made in advance of carnivore-caused mortality. This is a program to conserve jaguars in Sonora, Mexico, where landowners allow individuals working for the Northern Jaguar Project on their lands to set up remote cameras. For each picture of a jaguar (proving carnivore presence) landowners are paid a fee (Nistler 2007). Other programs have added a performance payment approach to their overall

compensation program, such as a program in Russia to address tiger and leopard depredation run by the Tigris Fund and a German program to address otter impact on fish farms (Hotte & Bereznuk 2001; Schwerdtner & Gruber 2007). More details on these examples are provided below in the case studies.

TECHNICAL CHALLENGES

There are a number of technical challenges with the payment in advance, performance payment approach such as:

- determining the right variable to monitor;
- deciding the appropriate payment level;
- decisions on how to allocate payments (needs to be to those responsible for outcomes);
- defining the boundaries for the conservation outcomes (e.g., communities, watersheds, ranches); and
- the ability of incentives to reach the entire affected community.

The greatest challenge for successful implementation of a performance payment approach is defining the conservation outcome and agreeing on a transparent variable (or set of performance criteria) to monitor. In some cases, governing bodies may not have the necessary information to monitor a carnivore population. In these cases, a surrogate may be used. In northern India, a payment scheme to protect snow leopard was developed using prey species of the snow leopard as a surrogate for the monitoring variable (Mishra et al. 2003). The prey species was more common and easy to monitor. Once the variable has been selected, an agreement is needed on the appropriate payment level. This may be a complicated process because the program could be jeopardized if the payments are too low (no longer an incentive) or too high (threatens the long-term sustainability of the program).

Decisions on how to allocate payments are complicated by large carnivores often exhibiting large home ranges that occupy numerous private land holdings. It is a challenge to agree on who is producing the outcome and how to define a community to make payments to.

Case Studies

Here we highlight two case studies where a combination of compensation approaches have been implemented, including Germany's otter bonus and Botswana's community insurance scheme (Schwerdtner & Gruber 2007; Václavíková et al. 2011).

GERMANY - THE OTTER BONUS

The Eurasian otter was almost driven to extinction due to hunting pressure and habitat loss (Freitas et al. 2007). The otter is currently a protected species under European and national law in Germany and efforts to conserve the species have resulted in population increases across Europe. Recent increases in otter populations have resulted in an increase in negative

interactions between fish farmers and otters across Europe. In Germany, the State of Saxony uses compensation schemes to pay fish farmers for their economic losses with goals to raise the acceptance of otters and prevent illegal killings of otters (Schwerdtner & Gruber 2007; Václavíková et al. 2011).

They use two approaches for compensation: ex-post compensation (referred to as compensation for hardship cases) and performance payment (referred to as feeding habitat for endangered species). The ex-post compensation scheme is used if damage exceeds a certain level of fish loss defined by the state. The process of applying for compensation can occur twice a year after the fish ponds are drained and fisheries owners are required to supply a marginal returns calculation as well as two independent expert case studies describing the loss and evidence of otters. The other approach, payment in advance (known locally as the Otter Bonus), provides fish farmers with a payment based on hectares of pond the fish farmer operates per year (103 euros/ha/pond/year). Here the fish farmers are paid in advance based on a prediction of the damage the otters are expected to cause. The scheme is based on five year contracts between a fish farmer and state conservation authority. Some fish farmers have implemented mitigation measures to reduce loss of fish to otters, thereby turning the Otter Bonus into extra income as they suffer less fish loss due to the preventative measures.

Schwerdtner and Gruber (2007) compared the cost effectiveness of these two approaches by developing a conceptual framework for assessing costs of compensation schemes. The transaction costs, defined in their article as search and information and decision making costs, differ between the two approaches. Search and information and decision making costs include the process of determining the damage (i.e., the verification process) and costs associated with monitoring the species. For the otter, the performance payment was recommended as the ex-post compensation approach brought about higher costs through the case by case verification process. However, the spatial and temporal distribution of species causing damages may influence the transaction costs, as species that vary in space and time between years will be more difficult to predict when designing payments in advance (performance payments). Therefore it is important to consider the costs associated with different compensation approaches, as a variety of factors and context can influence costs. The Schwerdtner and Gruber framework (2007) can help assess the costs associated with different compensation approaches.

BOTSWANA- INSURANCE COMPENSATION SCHEME

In Northern Botswana, the Botswana Ministry of Environment, Wildlife and Tourism and the Botswana Predator Trust (BPT) received a grant from National Geographic to develop a program to address losses to carnivores (lions, leopards, cheetahs, spotted hyena and wild dog) by livestock producers. The government was offering an ex-post compensation program which was not deemed ineffective. The new program has been designed as a risk reduction education program (non-lethal means of reducing the risks such as increasing use of guard animals, corral construction and herding techniques) and an insurance program to reduce conflicts and the economic burden to livestock producers. The program has been developed through extensive outreach to the local population. Educational workshops are included as part of the insurance scheme. Only those livestock producers who adopt risk reduction measures are successful in receiving claims.

The insurance program is funded through a payment by the livestock producer which is subsidized by an independent funding source (National Geographic's Big Cats program). The funds are held by BTP and are used to pay out claims. If a claim comes in, a researcher from the BPT team and a community outreach assistant investigate the incident for verification (BTP 2011).

SOUTHWESTERN ALBERTA SURVEY RESULTS

In 2009, Dr. Michael Quinn and Dr. Shelley Alexander, with support from the Miistakis Institute, developed a survey to explore the perceptions and attitudes of landowners toward carnivores in the Waterton Biosphere Reserve region. The survey was implemented in 2009 and 2010 and received 115 responses from landowners living within a 20km buffer zone around Waterton Lakes National Park (WLNP) (Figure 2). Of the respondents, 73% reported they were livestock producers. Many of the questions in the survey were directly related to landowners' perceptions and attitudes towards the predator compensation program in the region. The following summary of the survey reports on landowners' perceptions and attitudes towards the wildlife predator compensation program. Please see Quinn and Alexander (2011) for a full review of survey findings. The survey did not evaluate a participant's knowledge of the current Wildlife Predator Compensation Program.

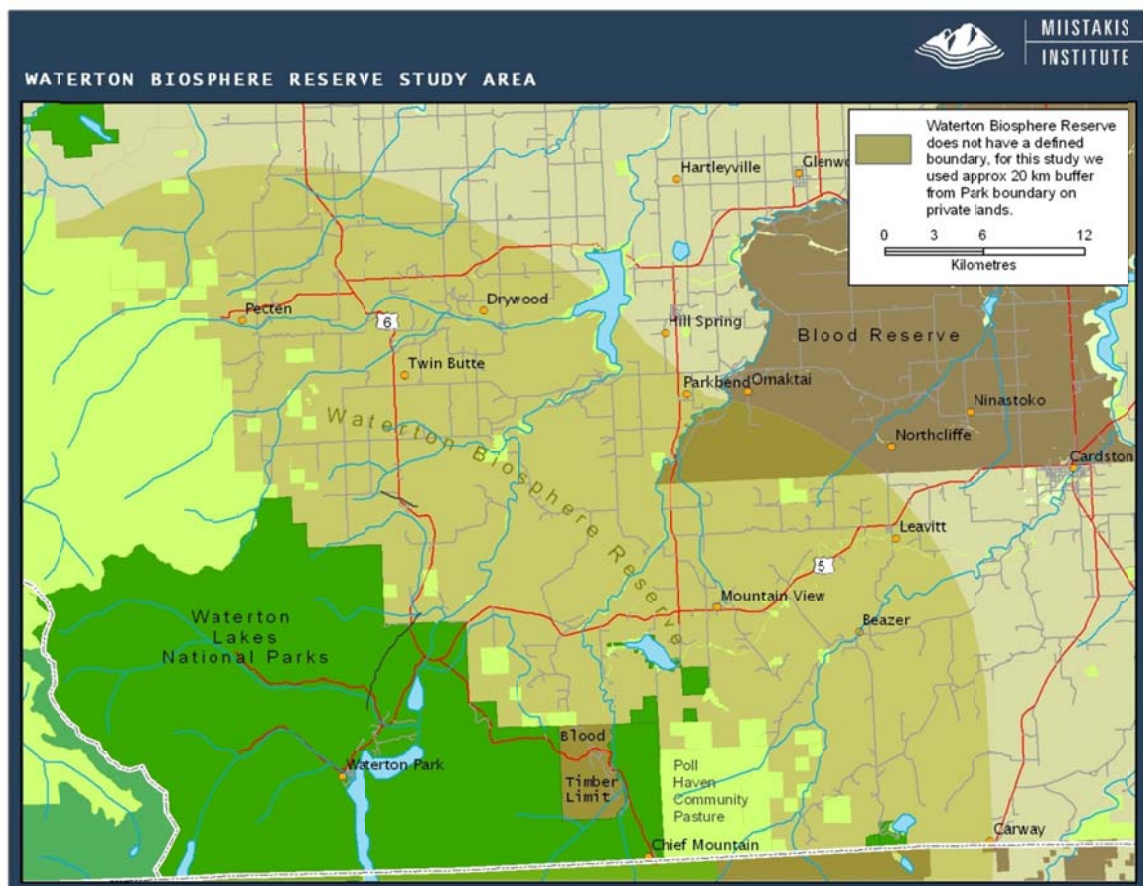


Figure 2: Representation of the survey study area

An analysis of the survey results found a high level of agreement in landowners' attitudes towards the current approach to compensation with over 76% of survey respondents reporting they were not satisfied with the current compensation program (Figure 3). In addition, 77% of survey respondents reported they do not think the current program is fair while 88% supported the notion that landowners should be fully compensated for livestock losses due to livestock depredation by carnivores.

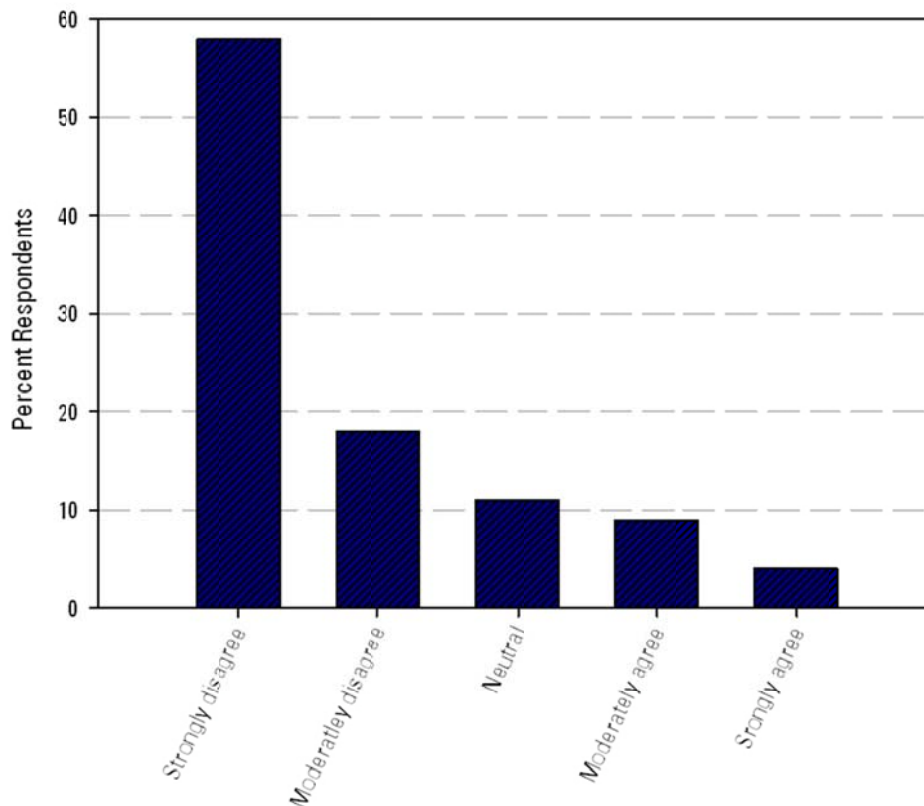


Figure 3: Results from survey statement: "I am satisfied with the existing livestock compensation program for large carnivore depredation losses (strongly disagree and moderately agree represents 76% of survey participants)"

There wasn't agreement among survey respondents with regard to government involvement in dealing with problem carnivores. Fifty-nine percent of respondents indicated the government should not interfere with how a landowner deals with problem carnivores and 38% indicated the government should be involved. Sixty percent of respondents felt their concerns were not taken into consideration by ASRD FW. Most participants (80%) wanted to provide information to ASRD FW. Further, 77% percent of respondents did not trust ASRD FW to make good decisions without their input.

There was a diversity of opinion among participants with regard to overall tolerance toward living with carnivores; however the results indicate a certain level of tolerance for carnivores. For example, 51% of respondents disagreed with the statement "they would be happier if there were no large carnivores on the landscape." In addition, 71% of respondents felt they could share the

landscape successfully if carnivores were properly managed. Within the survey, properly managed was not defined and was up to the interpretation of the survey participants. There was polarity in respondents' tolerance to losing livestock to carnivores with 45% agreeing that losing livestock to depredation is part of ranching in the region, while 48% disagreed with that statement. Sixty-six percent of survey respondents feel the current rate of livestock depredation events occurring on the landscape is unacceptable.

Changes to Compensation Program

To better understand the issues respondents have with the current Wildlife Predation Compensation Program, participants were asked through an open-ended survey question how they would change the current program. Ninety-five survey respondents (83%) answered the question. Of these respondents: 90% made recommendations for improvement; 4% thought there should be no change; 3% reported they were not familiar with the process; and 2% thought there should be no compensation program.

Of the respondents who felt improvements were needed, five categories of change were identified: types of compensation; compensation process; payment; relationships; and approaches to compensation.

1. Types of compensation

Of the respondents suggesting changes to the compensation program, 31% of the comments focused on changes to the types of damages for which they are currently compensated. There was a diversity of opinions on the additional changes landowners suggested be made to the compensation program (Figure 4).

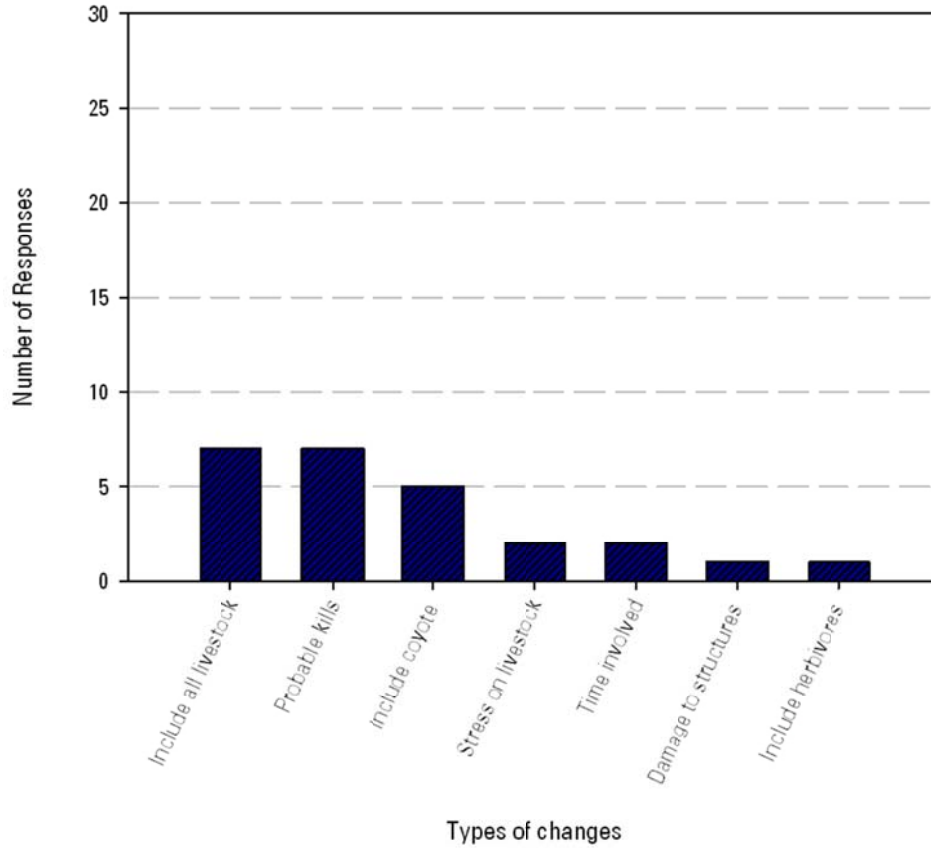


Figure 4: Suggested changes to the compensation program

2. Compensation process

Of respondents suggesting changes to the compensation program, 49% of the comments focused on changes to the compensation process. The most frequently cited suggestion was reducing the burden of proof, as shown in figure 5. FWO refers to Fish and Wildlife Officer.

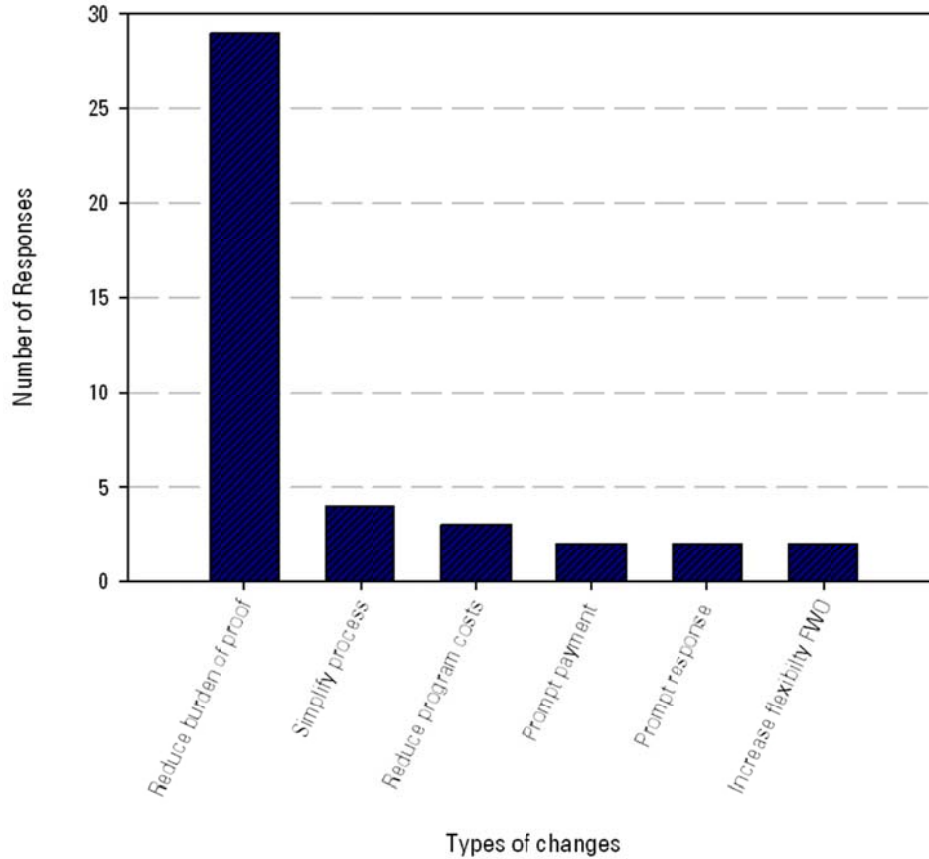


Figure 5: Suggested changes to the compensation process

3. Payment

Of the respondents suggesting changes to the compensation program, 51% of the comments focused on changes to the payment resulting from compensation. As displayed in figure 6, many participants felt the compensation amount needed to increase, with some respondents specifying the program pay fair market value. In addition, two participants had concerns about the high costs for ASRD FW to verify depredation events on a case by case basis.

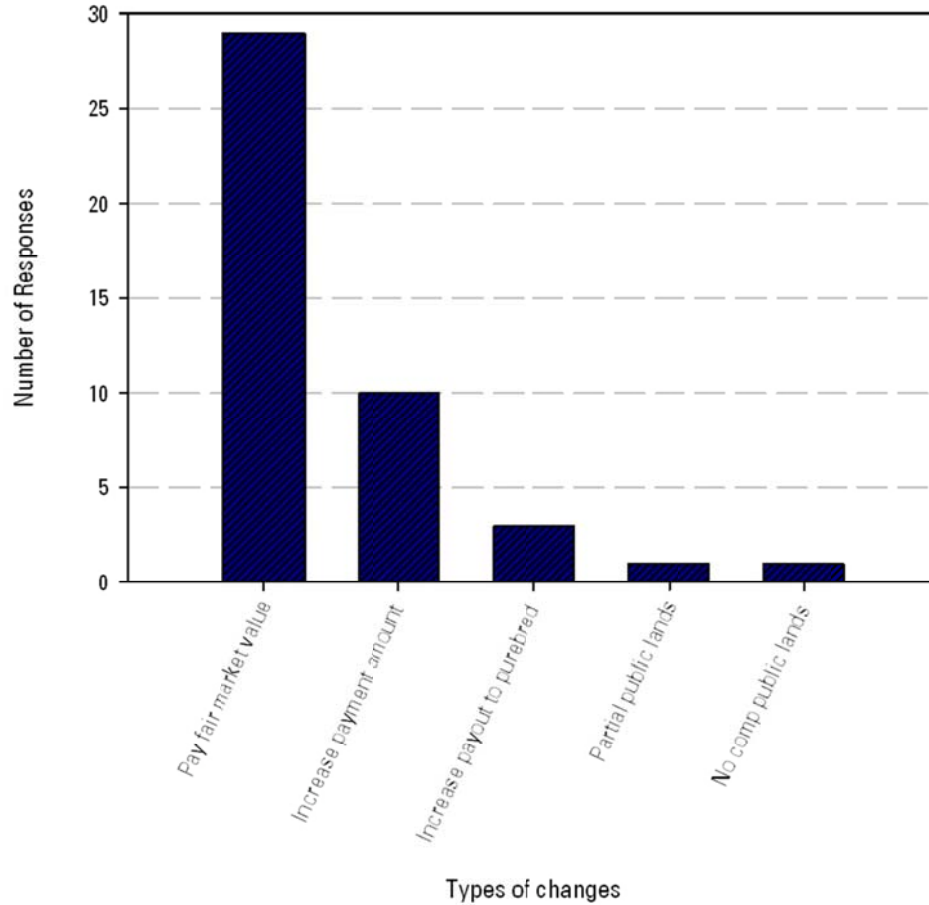


Figure 6: Changes to the payment of compensation programs

4. Relationships

Of the respondents suggesting changes to the compensation program, 26% of the comments focused on relationships between landowners and Fish and Wildlife officers. As highlighted earlier, there seems to be polarity in landowners' perceptions of working with Fish and Wildlife officers. In the open-ended questions, two key issues were identified: some survey respondents have a lack of faith in officers' abilities to identify a depredation event while some felt there was a lack of trust from the officers with regard to the ability of a landowner to identify a depredation event.

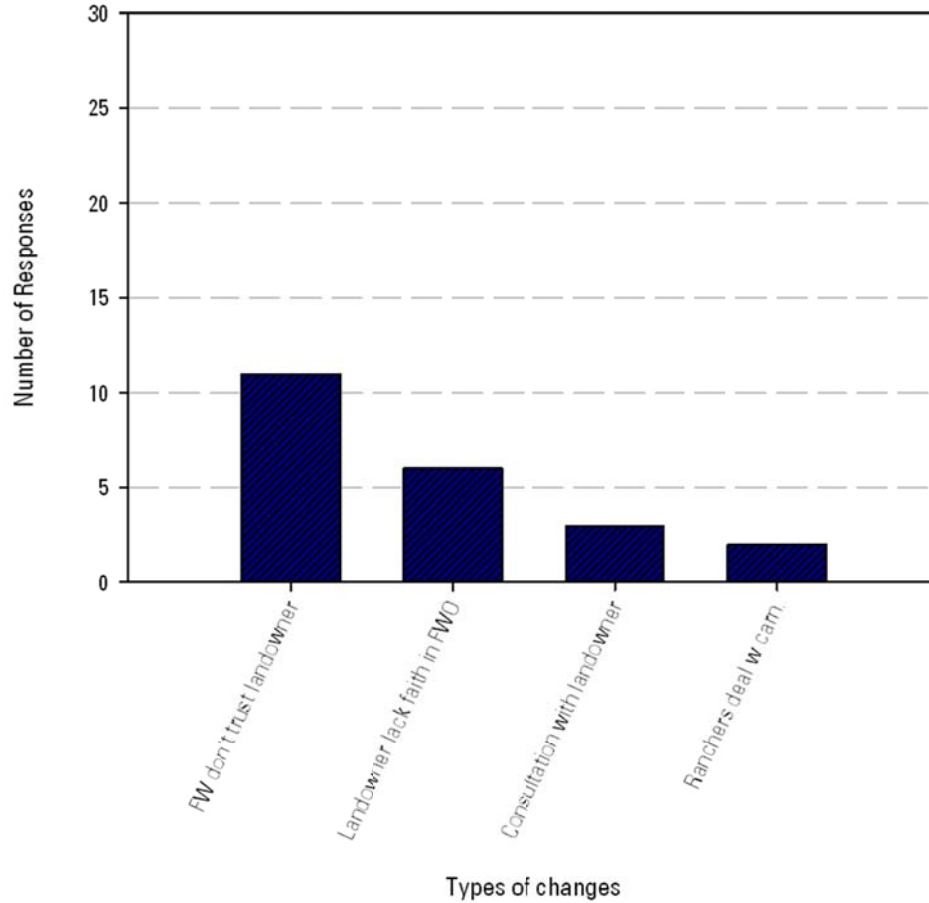


Figure 7: Relationship improvement areas for compensation program

5. Approaches to compensation

The current approach to compensation is ex post-compensation where payment is made based on proof that the livestock was killed by a predator. There are other approaches to compensation, such as economic incentives or assistance schemes whereby funds are provide to reduce risks or to implement preventative measures. A few survey participants mentioned exploring alternative approaches to compensation, such as:

- Design a program to reward producers who increase good husbandry and stewardship practices (introduce a system with incentives to reduce conflict) (total respondents who made suggestion=4);
- introduce a hunting season to deal with problem carnivores (2);
- create an insurance program (1); and
- create a system where abusers (those with attractants) are fined (1).

Discussion and Considerations

To enhance the discussion on how to improve Alberta's existing wildlife predator compensation program, results from the survey were considered in association with feedback obtained from the LCCC workshop and a literature review on global approaches to compensation. In addition, ASRD FWD hired a consultant in 2007 to undertake a review of their provincial compensation schemes. This review is also discussed below.

In 2007, based on concerns expressed by the livestock industry, ASRD FWD requested a private consultant undertake a review of the wildlife predator compensation program (Lyster 2008). The review consisted of an assessment of the existing program and the development of a series of recommendations which were reviewed through workshops, meetings or interviews with ASRD FWD, Alberta Beef Producers (ABP), Alberta Agriculture and Rural Development (ARD), Alberta Conservation Association (ACA) and the wildlife sub-committee of the Alberta Government Affairs Committee.

The review concluded that the program appears to be meeting its fundamental purpose and should be maintained in present form with a few changes. The review found:

- the list of animals eligible for compensation is appropriate (cattle, bison, sheep, swine and goats);
- no change was required to the current procedure of inspecting all claims and determining death of animal as a confirmed or probable kill;
- payment level should be increased to account for livestock producer's time to undertake the compensation process;
- raise the minimum amount per animal from \$300 to \$400;
- ASRD FWD consult with ARD and ABP each spring to determine compensation value of working bulls;
- special consideration for purebreds is not required (as they can be insured); and
- coyotes should not be included as carnivores in the compensation program.

The 2007 review of the livestock compensation program does not seem in accordance with the perceptions and attitudes landowners expressed toward the program in the 2010 survey carried out by Quinn and Alexander (2011). The results of the 2010 landowner survey indicate discontent with the livestock compensation program, with strong agreement from survey participants on three key issues:

- burden of proof required for the program is too high;
- payment for compensation is too low; and
- trust issues exist between ASRD FWD and landowners.

The challenges to the existing compensation program outlined in the 2010 survey did not come as a surprise to the LCCC workshop participants, who included landowners, municipal staff and ASRD FWD staff who live and work along southwestern Alberta's Eastern Slopes.

TECHNICAL CHALLENGES

Like most ex-post compensation programs, the Wildlife Predator Compensation Program in Alberta requires a case by case assessment of each incident to verify if the injured or dead livestock was caused by a carnivore. The 2007 ASRD review of the program recommended keeping the current validation process as it provides ASRD with an audit trail to ensure funding to the program by the Alberta Conservation Association (ACA) continues. In addition, it was noted that this enables FW officers to educate landowners on preventative measures to reduce conflicts (Lyster 2008).

The 2010 survey indicated the burden of proof required to confirm a kill during the verification process was a major concern among survey participants; this issue was discussed further with members of the LCCC as a major point of contention with the current program. Landowners within the LCCC expressed frustration that livestock are often heavily consumed by carnivores by the time FW officers visit the site, making it difficult to confirm if the animal was actually killed by the carnivore (carnivores are attracted to dead livestock and will scavenge) and too often probable kills do not end up being compensated. One of the landowners in the LCCC suggested that ASRD take into consideration paying full compensation for probable kills. This would show good will by the government and possibly off-set some of the non-consumptive costs to the livestock producer.

The economic costs associated with the non-consumptive effects on livestock of living in carnivore habitat (e.g., weight loss, shrinkage and reduced reproduction) were expressed as a concern in the 2010 survey and were also brought up by the LCCC. A study by Laporte et al. (2010) found livestock living within wolf range suffered weight loss and reduced reproduction. The authors suggest that although it is difficult to measure the actual cost of wolf presence on the landscape to livestock, compensation programs could offer a payment based on predation risk as well as actual livestock losses. Payment in higher risk areas could be higher to adjust for the non-consumptive effects.

The 2010 survey also highlighted concerns over the payment level received for compensation; primarily landowners feel the payment is low and does not account for the true economic costs associated with livestock loss. The 2007 ASRD review also recommended an increase in the minimum amount compensated per animal; this recommendation was adopted by the committee responsible for the Wildlife Predator Compensation Program. Despite this recent change, many of the survey participants recommended paying fair market value. As the 2010 survey is an assessment of landowners' perceptions and attitudes it did not address the landowners' knowledge of the current program. It is important to note that some of the issues identified in the survey may be a result of knowledge gaps.

The perception of the compensation amount being too low is a common problem of ex-post compensation programs around the world (Vaclavikova et al. 2011, Nyhus 2005, Ogra and Badola 2008, Madhusudan 2003). It may be a limitation of program budgets (lack of a sustainable source of funding) or possibly due to the emotional tie between livestock producers and their livestock,

complicating our understanding of the true economic value of the loss. A participant at the workshop suggested the payment would need to be well over market value before it would be considered acceptable, due to the producer's emotional ties with livestock. Naughton-Trevers et al. (2003) found in a survey of livestock producers in Wisconsin that the current payment was inadequate given the emotional bond and years invested in some livestock.

Regardless, the current compensation program does not address non-consumptive losses, including land owner's time, weight loss and reproductive loss to livestock, nor is it comprehensive in addressing all types of livestock loss, nor does it address all wildlife responsible for depredation (e.g., coyotes). It also does not take into account problems associated with the detection rate; for each depredation event confirmed there are likely many not discovered or reported (Sommers et al 2010, Breck et al 2011, Morehouse & Boyce 2011). From the perspective of the survey participants, the program does not currently effectively address reducing the true economic burden of living with carnivores.

The challenges identified by survey participants with the current Wildlife Predator Compensation Program may contribute to undermining ASRD's ability to work effectively with the community on reducing the risk of human wildlife conflicts. Relationship issues between ASRD and landowners were identified in three ways: some survey participants expressed concern that Fish and Wildlife staff lack trust in landowners' ability to identify a depredation event; other survey participants did not have faith in Fish and Wildlife's ability to accurately identify a depredation event; and some survey participants felt they needed to be given more flexibility when evaluating depredation events. The role of Fish and Wildlife Officers as verifiers of depredation events may limit their ability to act as educators to reduce conflicts due to a lack of trust, although this was not explored fully in the 2010 landowner survey. The notion of the verification process leading to trust issues between verifier and landowner is listed as a concern of the ex-post compensation model in the literature (Beeland 2008). At the LCCC workshop, participants noted relationships were also affected by individual personalities. However, landowners noted a positive shift in working with ASRD to develop and address mitigation strategies to reduce risk of human carnivore conflicts. When asked how to continue improving the level of trust between ASRD and the local community, it was suggested ASRD continue to build on successful collaborations, such as support for assistance schemes designed to reduce the risks associated with carnivores and livestock. In addition, the commitment of ASRD, municipalities in southwestern Alberta and landowners to the LCCC is a sign of a more positive working relationship and the desire to work together to address human carnivore conflicts.

The 2010 survey highlights the desire by survey participants to be involved in designing and implementing strategies to help mitigate human carnivore conflicts. A high percentage of respondents (75%) were interested in guiding ASRD on issues associated with carnivores, however most (56%) indicated they do not currently feel they are being heard. Many of the reviews of compensation programs in the literature highlighted the importance of engaging local community in the design of the program to ensure success (Hotte & Bereznuik 2001; Jackson & Wangchuk 2004; Treves et al. 2009; Vynne 2009).

Although the 2007 review found the current compensation program appears to fundamentally meet its objectives, it should be noted that the objectives of the livestock compensation program are not clearly articulated by ASRD and measurements of success for the program have not been

clearly defined. In addition to the ex-post compensation program, ASRD has offered assistance programs to landowners to reduce the risks of carnivore depredation, but how these programs work together with the wildlife predator compensation program is not clearly articulated. Setting the compensation program within the broader context of human-carnivore co-existence management will help landowners understand the purpose and value of the program. Overall, the technical challenges identified by survey participants indicate the perception of the current Wildlife Predator Compensation Program is that it fails to address the true economic loss of livestock in southwestern Alberta and it appears to be contributing to relationship issues between ASRD and landowners. In addition, livestock producer surveys in the literature of similar ex-post compensation programs suggest they are not an effective conservation strategy as they do not create incentives for reducing the risk and fail to increase tolerance toward carnivores (Naughton-Treves et al. 2003; Ogra & Badola 2008; Treves et al. 2009). On the other hand, survey participants liked the idea of being economically compensated for their direct losses and feel they should be economically compensated. These are challenging but important issues to overcome for the Wildlife Predator Compensation Program to evolve into an effective program.

CONSIDERING OTHER APPROACHES TO COMPENSATION

Within the 2010 survey, a few survey participants noted the current system lacked incentives to reduce the risk of carnivore depredation and suggested exploring alternative approaches to compensation, such as rewarding livestock producers who have invested in risk reduction strategies and/or show good husbandry practices. In addition, a few survey participants suggested mechanisms for generating funds to support compensation programs, such as reinstating a grizzly bear hunt to address problem carnivores and/or instating an insurance program. These ideas have been explored in the literature and indeed many compensation programs are currently using aspects of these approaches. Each of these suggestions is explored below.

Incentives to Reduce Risk

As identified in the literature review, a critique of the current ex-post compensation program, such as Alberta's provincial compensation program, is the failure to reward landowners investing in equipment and/or labor to reduce the risk of a livestock depredation event or other human carnivore conflict. There are a number of ways to address this challenge: link the payment for compensation to an acceptable level of husbandry; continue to support assistance programs that help producers reduce the risk; and/or change the current approach to a performance payment. The current Wildlife Predator Compensation Program is not linked to good husbandry practices; compensation is paid regardless of any proactive investment by a landowner to reduce risks or the failure of a landowner to reduce risks. However, ASRD has provided financial assistance to landowners in southwestern Alberta to off-set costs associated with mitigation strategies to reduce the risk of damage from wildlife. For example, they have supported carcass bins to encourage producers to remove dead livestock from the landscape and helped finance the replacement of grain bins and the installation of electric fences to reduce damage to grain and silage by grizzly bears. Currently the Wildlife Predator Compensation Program and assistance programs (described above) in Alberta are not directly linked to each other.

There are a number of examples in the literature where ex-post compensation programs are linked to good husbandry practices. In many programs livestock producers are only paid if they meet certain standards of husbandry (Hotte & Bereznuik 2001; MacLennan et al. 2009). Both

Saskatchewan and British Columbia program have policies around producers expectations that enable the administration to deny payment if husbandry practices are poor. Defining appropriate husbandry practices is an important aspect of linking compensation to improved husbandry. This approach will be more socially acceptable if producers are involved in the discussions of helping to define appropriate husbandry practices and ASRD continues to offer financial assistance to help promote good husbandry practices.

Another approach for addressing lack of incentives for reducing risk is to introduce a performance payment approach. Although examples of performance payments are limited, Sweden and Germany have developed programs that successfully reduce illegal poaching of wolverine and otter, and have thereby contributed to the increase in the species' population. In these cases governments have extensive monitoring programs and goals for species recovery that are linked to performance payments, providing a means of measuring conservation success. Other examples have used a surrogate for conservation outcomes, such as:

- indicator species- in India the Bharal (prey species of snow leopard) is used as an indicator for good snow leopard habitat and maintenance/increase in Bharal on a ranch results in performance payment;
- change in land-use practices/ husbandry practices; and
- proof of presence payments, such as paying for jaguar captured on remote cameras in Mexico (Nistler 2007).

For the performance payment approach to be considered in southwestern Alberta, a more extensive analysis is required to identify:

- appropriate variables to measure for conservation outcomes and for the basis of payment;
- who enters into the agreement (community vs. individual);
- an acceptable payment amount; and
- a payment distribution system that is fair and equitable within the community.

Discussions between ASRD and livestock producers on the acceptability of this approach are also necessary, as it requires development of an entirely new way of addressing human carnivore interactions. In addition, engaging livestock producers from the inception of compensation program development will help strengthen the approach, program design and possible implementation if it is deemed desirable.

Insurance Programs

Implementing an insurance program was suggested in the 2010 survey and at the LCCC workshop as a mechanism for generating funds to adequately address economic burden of livestock loss from carnivores. Development of an insurance program to address loss of livestock from carnivores has been explored in India for tigers and Botswana for big cats (Madhusudan 2003). In both these cases the premiums are shared by livestock producers interested in protecting their

livestock, government agencies responsible for wildlife management and a non-governmental organization interested in protecting the wildlife and/or community. The advantage to this approach is the recognition of responsibility and the economic burden for conflicts are shared. The acceptability of this approach within the local community and the true costs associated with developing an insurance program that could pay out an acceptable amount requires further investigation. The costs and benefits of developing such a program for southwestern Alberta would need further exploration to determine feasibility.

Hunting

A suggestion in the 2010 landowner survey and at the LCCC workshop is tied to generating income for compensation through introducing an auction for a hunting license for problem grizzly bears. Landowners from the LCCC workshop felt re-instating a targeted grizzly bear hunt would generate good will between the community and ASRD, and enable a mechanism to deal with problem grizzly bears while also generating dollars that could be used to reduce risks or compensate landowners for livestock loss. The current compensation program is funded by hunting and fishing licenses, so the mechanism of payment and obtaining a license is in place. ASRD expressed some concern of the social acceptance of this solution.

In addition, this suggestion requires re-instating a grizzly bear hunt in Alberta, which is dependent on provincial grizzly bear management that is tied to status (grizzly bears are currently threatened) and recovery planning. The recovery plan states, "It is recognized that, for healthy wildlife populations, hunting can be a useful management tool and can provide recreational and economic activity. However, because hunting is the largest source of grizzly bear mortality, an immediate, temporary suspension of the hunt is necessary to significantly reduce mortality while recovery actions are implemented. When recovery has been achieved, hunting resumption can be considered on a bear management area (BMA) basis. A hunting suspension on its own will likely not recover grizzly bear populations, but should be implemented immediately" (Alberta Grizzly Bear Recovery Plan 2008-1013 2008).

Given these decisions are occurring at the provincial scale, it may be more appropriate to consider alternative solutions for compensation. In addition, this suggestion is tied to generating income for conservation and not on the challenges currently facing the existing Wildlife Compensation Program in Alberta. It does not address issues with the process and payment, nor does it provide incentives for reducing the risks associated with living with carnivores.

CONCLUSION

The findings in this report provide an important contribution to discussions on the evolution of wildlife predator compensation in Alberta. Understanding livestock producers' attitudes and perceptions toward compensation is important for successful implementation and application of programs designed to address the economic burden placed on producers and to reduce human carnivore conflicts on the ground. Healthy carnivore populations in southwestern Alberta are dependent on successful collaborations between private and public land managers. The current ex-post Wildlife Predator Compensation Program in Alberta has many identified challenges, both in functionality and approach to compensation:

- There was a strong level of agreement among survey participants that producers should be compensated for livestock loss due to predation by carnivores but there was also an equally strong agreement of discontent with the implementation of the current program;
- Challenges focus on the limited types of compensation offered (i.e., non-consumptive losses not covered), process of verifying the depredation event, low payment received for confirmed depredation events and trust issues between ASRD Fish and Wildlife Officers and producers; and
- The current program is not tied to incentives to reduce the risk associated with living with carnivores; and compensation for a confirmed depredation event is received regardless of husbandry practices by the producer.

It is difficult to determine if the current Wildlife Predator Compensation Program is meeting intended goals from a provincial perspective, as goals and objectives and measurements of success have not been clearly articulated. Although the landowner survey indicated a level of discontent toward the current program, producers strongly support the idea of receiving economic compensation for livestock loss and are in support of the compensation concept. There may be some opportunity to improve the existing program through more extensive discussions between producers and ASRD to determine if there are potential solutions to the identified challenges. Venues for discussion have already been established, such as at LCCC meetings and/or through communication between ASRD and other active landowner groups working in the region.

The Wildlife Predator Compensation Program is one component in a series of strategies aimed at reducing the risk of human carnivore conflicts in Alberta. For example, ASRD has also provided financial support to producers for implementation of strategies to reduce attractants on the landscape, such as electric fencing or carcass bins. Ideally, setting the Wildlife Predator Compensation Program in the broader context of carnivore management and linking economic compensation to other carnivore management strategies may help to strengthen the effectiveness of carnivore management on private lands. Ideally, reducing attractants and implementing good husbandry practices need to occur across the landscape to effectively reduce carnivore conflicts, requiring buy-in and action by numerous private landowners. Developing a compensation program that meets the needs of the community will require extensive community discussion and input.

There is some question as to the validity of the ex-post compensation model as an effective conservation strategy given the complexity of finding solutions to the above identified challenges. It may be appropriate for landowners and ASRD to consider exploring alternative approaches to compensation on a small scale. There was interest expressed at the LCCC workshop to explore the development of pilot compensation programs to test alternative approaches to compensation, such as an insurance program, performance payments or perhaps a combination of approaches such as the otter hardship and feeding bonus used in Germany. These programs should:

- Clearly define goals, objectives and measurements of success;

- Build on established relationships and venues for discussion (such as LCCC and/or other landowner groups);
- Ensure the program is flexible and adaptable and is regularly reviewed;
- Ensure the program is fair and equitable among the local community; and
- Includes a framework to determine costs associated with different compensation approaches.

There is tremendous opportunity to use the Waterton Biosphere Reserve as a pilot area for exploring alternative mechanisms for compensation and the co-existence of people and large carnivores on the landscape. This is one of the purposes of Biosphere Reserves and may help to attract additional resources for a program that could serve as a model for surrounding areas.

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