AN ASSESSMENT OF RANCHER PERSPECTIVES ON THE LIVESTOCK COMPENSATION PROGRAM FOR THE MEXICAN GRAY WOLF IN THE SOUTHWESTERN UNITED STATES

by

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A THESIS

Presented to the Environmental Studies Program
and the Graduate School of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Master of Science

September 2008

"An Assessment of Rancher Perspectives on the Livestock Compensation Program for the Mexican Gray Wolf in the Southwestern United States," a thesis prepared by Stacy Johna Vynne in partial fulfillment of the requirements for the Master of Science degree in the Environmental Studies Program. This thesis has been approved and accepted by:

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An Abstract of the Thesis of

Stacy Johna Vynne for the degree of Master of Science

in the Environmental Studies Program to be taken September 2008

Title: AN ASSESSMENT OF RANCHER PERSPECTIVES ON THE LIVESTOCK COMPENSATION PROGRAM FOR THE MEXICAN GRAY WOLF IN THE SOUTHWESTERN UNITED STATES

Approved: _____
Dr. Ronald Mitchell

Governments and nonprofit organizations use compensation programs to offset the costs of livestock lost to endangered predator species. Both the conservation community and compensation recipients debate the value of such programs and whether they build tolerance for predators. Using surveys of ranchers and interviews with key stakeholders, I assess a program to compensate ranchers in the southwestern United States for livestock lost due to the reintroduced Mexican gray wolves. Results demonstrate that the current compensation program is ineffective because historical, cultural, and social barriers limit the program's ability to offset economic losses and the willingness of ranching communities to tolerate wolves. Improving the compensation program requires increased outreach to communities, greater collaboration among stakeholders and establishment of

additional complementary programs that reduce livestock losses and provide incentives for Mexican wolf conservation.

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ACKNOWLEDGMENTS

Thank you to the following individuals for their stories, support and input: the numerous ranchers and anonymous individuals that participated in interviews and survey, Caren Cowan, Dave DeWalt and his team at the National Agriculture Statistics Service, John Oakleaf, Dave Parsons, Michael Robinson, Laura Schneberger, Craig Miller, Cynthia Wolf, Eva Sargent, Patrick Valentino, John Morgart, John Slown, Robin High, Philip Nyhus, Patty Gwartney, Galen Martin, and the Sun Peaks NYE '07 Crew for being survey "guinea pigs". A very special thank you to my academic advisors for their guidance, critique and support: Ronald Mitchell, PhD (Political Science), Renee Irvin, PhD (Planning, Public Policy and Management), and Kathryn Lynch, PhD (Environmental Studies). This research would not have been possible without the support of the following foundations that sponsored travel and research: T&E, Inc, Donald and Coeta Barker Foundation, and the Mexican Wolf Fund.

To my family and friends for their endless love and support.

"I've always said that the best wolf habitat resides in the human heart. You have to leave a little space for them to live." Ed Bangs

"Wolves are not our brothers; they are not our subordinates, either. They are another nation, caught up just like us in the complex web of time and life." Henry Beston

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CHAPTER I

INTRODUCTION

Wildlife conservation programs provide ecological, economical, and moral benefits to human communities across the globe. However, these programs, particularly endangered carnivore conservation, often result in disproportionately distributed conflicts to human communities that must coexist with wildlife (Cozza 1996; WWF-International 2004). Conflicts between large carnivores (hereafter referred to as predators) and humans are escalating around the world due not only to successful conservation efforts, but also reductions in habitat, growing human populations, and loss of natural prey (Madden 2006; Woodroffe et al. 2007; Saberwal et al. 1994; WWF-International 2004). These human-wildlife conflicts most commonly occur in rural areas and can result in financial loss for local communities, reduced tolerance towards wildlife, human injury or death (Madden 2006; WWF 2004; Mishra et al. 2003). In many cases, these costs to communities are disregarded by environmental conservation advocates in lieu of wildlife protection (Robbins 2004).

One common form of conflict that occurs in agricultural areas is predation on livestock by wild predators (referred to as depredations[i]). Ranchers often seek retaliation for depredations by killing wild predators: for threatened species such as tigers, jaguars, wolves, and lions, the loss of depredating individuals can threaten survival of some species (Bulte and Rondeau 2005; WWF 2004); therefore building tolerance for these animals is critical to their survival. In response to this conflict, governments and nonprofit/non-governmental organizations across the globe developed financial compensation programs for livestock depredations as a management strategy for building local tolerance and offsetting economic losses experienced by communities living

alongside endangered predators. Although governments, nonprofit/non-governmental organizations (NGOs), private foundations, and local communities have made substantial financial investments in these programs, few compensation program have been evaluated to see if they are in fact achieving their conservation objectives and providing appropriate incentives for the community within which they are implemented (Nyhus per comm. June 2008; Nyhus et al. 2003; Vynne per. obs. 2008).

Among the program assessments that have occurred in recent years, few review local community attitudes, factors that may influence tolerance, or potential benefits of alternative programs (Nyhus et al. 2003; Naughton-Treves et al. 2003; Madhusudan 2003; Schwerdtner and Gruber 2007; Wang and McDonald 2006; Montag and Patterson 2001). However, assessments have found that many programs were developed without consulting local communities or with loopholes that create incentives for exploiting the system (Nyhus et al. 2003; Bulte and Rondeau 2005). Although many ranching and rural communities affected financially and socially by predator conservation and reintroduction may never accept these species as neighbors, it is important to understand whether the programs that are in place are succeeding in developing tactics for reducing conflicts and grounds for seeking retaliation for livestock kills. Otherwise, predator recovery and other wildlife conservation programs could further exacerbate human-wildlife conflicts.

This thesis seeks to further investigate programs developed to mitigate the impact of predator conservation on human communities. My research looks at one such program, efforts made to mitigate the costs to local communities, and barriers that prevent success of such efforts. I review the Defenders of Wildlife livestock compensation program that was established in the southwestern United States to compensate for livestock killed by the reintroduced Mexican gray wolf. This program was selected as my case study for multiple reasons: Defenders of Wildlife had not conducted a thorough evaluation of their program's effectiveness; the value of the compensation and wolf recovery programs were currently contested; and I was drawn to evaluating programs in the United States as I found them to be underrepresented compared to research in developing countries.

In 1998, the United States Fish and Wildlife Service (USFWS) reintroduced the Mexican gray wolf, *Canis lupus baileyi,* into Arizona. Since the eradication and capture of the last remaining wild wolves in the late 1970s, the Mexican gray wolf had faced a long battle to return to the Southwest: generations of wolves were confined to captivity, the recovery plan were challenged by livestock associations and politicians in court for over a decade, and the historical range of the wolf was transformed into grazing land. Although only approximately fifty Mexican gray wolves currently exist in the wild today, their reintroduction can still be considered an extraordinary achievement given the near extinction of wolf and the challenges that the program has overcome.

The recovery program and continued survival of the Mexican gray wolf is dependent upon coexistence with communities living within the reintroduction areas of Arizona and New Mexico. The Defenders of Wildlife financial compensation program for livestock depredated by wolves aims to offset economic losses in these communities and, thereby, build tolerance and support for conservation of the wolf. Given the significant amount of conservation dollars and other resources being invested in the program, the purpose of my research was to explore if the program was achieving this objective, and hence assess if the program was an effective and efficient use of conservation dollars. I expected to find mixed feedback from ranchers, with experiences and demographics as the determining factors for assessing satisfaction with the program and its effectiveness.

In 2008, I conducted a survey of ranchers and conducted phone and in-person interviews with ranchers, wolf advocates and government employees in New Mexico and Arizona to collect information for assessing whether the Defenders of Wildlife livestock compensation program is offsetting economic losses within local communities and contributing to wolf conservation. Questions that I assess and address through the literature review, surveys, and interviews include:

- Does the level of rancher[ii] support for the reintroduction of Mexican gray wolves differ from the level of general public support?
- Is the compensation program run efficiently?
- Are ranchers satisfied with the compensation program?
- What factors prevent use of, or satisfaction with, the compensation program?
- Is the compensation program the best use of conservation dollars?

In addressing the above questions, I evaluate efforts to mitigate the costs to ranchers from wolf recovery in the Southwest and provide recommendations for alternatives to financial compensation based on programs that have been effective in other areas of the world. I assess a variety of factors that may inhibit the success of the current compensation program, recognizing that effectiveness of a compensation program cannot be evaluated solely on whether someone receives payment on time. As acknowledged by Bagchi and Mishra, "Assessing the extent of predation alone…is not likely to lead to effective conservation planning, as people's attitudes towards carnivores is seen to be embedded in the socio-economic role that livestock play in traditional economies" (Bagchi and Mishra 2006, 22). To address this point, I look beyond the Defenders of Wildlife and wolf recovery programs to consider potential barriers to success, such as psychological factors, cultural and historical influences, and economics, and how a variety of factors have shaped the attitudes and conflicts in the Southwest.

To build an understanding of how the current controversies surrounding the livestock mitigation program in the Southwest came to exist, and to identify opportunities for improving effectiveness, Chapter II provides an introduction to global conflicts between humans and wildlife, followed by a summary of conflict mitigation efforts. I also address barriers that challenge the success of mitigation efforts and predator conservation around the world, with specific examples from the Southwest. Chapter III reviews the environmental history of the area of study, including the eradication and recovery of the Mexican gray wolf, while also outlining current issues with depredations, wolf management and conflict mitigation programs. Chapter IV describes the process used for the quantitative and qualitative analysis, followed by key findings presented in

Chapter V. I conclude with a discussion of findings and recommendations for consideration in Chapter VI.

Understanding the global context within which the Mexican wolf falls, the history of the region, management strategies, and various mitigation strategies all contribute to a greater understanding of how the depredation mitigation programs in the Southwest can move forward and build a future of coexistence between ranchers and wolves. Throughout my analysis I recognize that much of the Mexican wolf management plan has been developed to deal with livestock depredations, and therefore mitigating these depredations is essential to the survival of the wolf in the wild.

The objective of understanding whether the compensation program is "working" (in terms of meeting rancher financial needs and contributing to wolf conservation), is to provide conservationists, grant-making foundations, ranchers, and policy decision-makers with a comprehensive understanding of challenges and opportunities for livestock compensation and alternative incentive programs in Arizona and New Mexico. By doing so, conservation dollars can be directed towards the programs that most effectively meet rancher needs as well as aid in the recovery of the Mexican gray wolf. In addition, as human populations continue to expand into wildlife habitat, conflicts between humans and wildlife are likely to increase; therefore this assessment may provide lessons for financial compensation and other human-wildlife conflict mitigation programs around the world.

Notes

i Both "predation" and "depredation" are used in the literature to describe livestock killed by wolves. Because the organization I will be discussing, Defenders of Wildlife, typically uses "depredation", I have adopted this term.

ii For the purpose of this thesis, "rancher" implies livestock owner.

CHAPTER II

HUMAN-WILDLIFE CONFLICTS AND MITIGATION

To set the context for the case study of the Mexican gray wolf, this chapter reviews global human-wildlife conflicts (HWCs) and mitigation programs to reduce these conflicts. Following an overview of HWCs, I discuss the conflict that is the focus of this thesis: livestock depredations. To understand the need for mitigating livestock depredations, I provide an overview of the importance of predator conservation. Efforts to mitigate depredations, such as compensation programs, proactive measures and insurance schemes are summarized and strengths and weaknesses of each program are discussed. To conclude the chapter, I review other barriers that may prevent the success of livestock depredation mitigation programs and how these barriers may also impact predator conservation efforts.

Overview of Human-Wildlife Conflicts (HWCs)

The World Wide Fund for Nature (WWF) defines a human-wildlife conflict (HWC) as "any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment" (WWF 2005). According to Francine Madden of the Human-Wildlife Conflict Collaboration (HWCC), human-wildlife conflicts "...typically involve direct and intense competition for resources resulting in real or perceived individualized harm to wildlife, humans or their property" (Madden 2006, 8). These types of conflicts are increasing across the globe as a result of human and livestock populations growing and spreading into previously unoccupied areas, prey depletion from habitat destruction and over-hunting, wildlife populations shifting to adapt to global warming, and even the

success of wildlife conservation programs leading to growing animal populations (WWF-International 2004; Madden 2006; Saberwal et al. 1994; Woodroffe et al. 2007). Siebert (2006) argues that increasing competition for resources may also be causing stress-related reactions in wildlife, further exacerbating violent behaviors and increasing conflicts. Another factor leading to increased HWCs is poor land use planning and misguided development policies (Madden 2006).

Conflicts with wildlife vary considerably and may include crop destruction, damage to property such as fencing, loss of income from sales of produce from cash crops, damage to stored produce, damage to water sources and installations, livestock or pet depredations, and, the most grave result, injury or death to humans and/or wildlife (WWF 2005; Madden 2006; Berger 2006). Although these instances vary in their severity and impact, they all pose a threat to conservation initiatives and property rights (Madden 2006). Communities continuously coming into conflict with wildlife may develop resentment and opposition to conservation actions, and can feel ignored as conservationists are perceived as favoring the biological needs of wildlife over local communities (Madden 2006; Robbins 2004).

To address HWC, a participatory approach is often recommended, involving various stakeholders including conservationists, developers, politicians, planners and the affected communities. These collaborative working groups aim to understand and reduce instances of negative human-wildlife interactions and provide reparation for those negatively affected by wildlife (Madden 2006; WWF-International 2004). According to the WWF, solutions for conflict are best managed if the affected community eventually takes over the control of the program and transitions into an internally regulated and self-sustaining model (WWF-International 2004). In the Masai Mara National Reserve of Kenya, for example, pastoralists from communities dependent on livestock for their economic livelihood have been invited into the process to meet with conservationists and identify problems and solutions, develop methods for collecting data and negotiating conflicts, and establish conservation priorities that balance socio-economic needs (Ngari 1997). Workshops and seminars are used as a means for engaging participants in the

decision-making processes such as developing incentive-based and compensation programs that offset economic losses resulting from conservation initiatives.

Generally, no single solution exists for mitigating conflicts and often multiple options that match the financial and technical capability of communities and individuals responsible for management are combined (WWF 2005). Although the most severe impacts are typically localized, it is commonly recommended that the entire cost of wildlife conservation, and the losses that come with it, should be spread across society at large.

Livestock Depredations

Conflicts between wild predators and livestock occur across most continents, and can challenge conservation when these predators are perceived as a threat to livelihoods (Berger 2006; Mishra et al. 2003; Schiess-Meier et al. 2007; Montag and Patterson 2001; Breck 2004; Clark et al.1996; Woodroffe et al. 2007; Bagchi and Mishra 2006; Conforti and de Azevedo 2003). Competition between wildlife and humans has existed throughout history, and in areas of high density grazing, predation on livestock and conflicts with wildlife is inevitable (Musiani et al. 2003; Ngari 1997). Livestock depredations tend to be higher in areas where livestock graze far from human presence, husbandry practices are relaxed, predator densities are high, and poor habitat conditions exist (Wang and McDonald 2006). Researchers in some parts of the world have also questioned the compatibility of livestock production in areas designated for conservation of large mammals, while others suggest that there may be little to no impact on either wildlife or cattle if they coexist (Young et al. 2005).

In addition to predation, livestock die for a variety of reasons for which ranchers are not compensated, including starvation, mismothering, lightning, consumption of noxious weeds, falling off cliffs, disease, and exposure (Greentree et al. 2000; CIAZ3, RINM2 per comm. 2008). Across the various predator species, livestock typically comprise less than 6% of a predator's diet (Patterson et al. 2004; Reed et al. 2006). Studies have found that actual livestock depredations are typically less than the losses perceived by ranchers (Marker et al. 2003; Bradley and Pletscher 2005). However,

human perceptions regarding depredations can influence opinions on conflicts and predator species and therefore are important to consider.

Benefits and Challenges of Depredation Mitigation Strategies

Large predators play a crucial role in shaping ecosystems by influencing the demography of prey species, such as behavior and community structure (Berger 2006; Woodroffe and Ginsberg 2005; Peterson et al. 2003). The recognition of these ecological benefits of predator conservation was one leading factor in the development of the Endangered Species Act (ESA) in 1973. However, when drafting the legislation, Congress recognized the potential impact the ESA could have on landowners (Matsumoto et al. 2003). With the listing and protection of the gray wolf, one major impact recognized by the government was livestock depredations. As stated by John Morgart, a wildlife biologist with United States Fish and Wildlife Southwest Headquarters:

> The ESA says that we will do everything we can to try and bring back endangered species to the land and it says we will do that in the context of having the least impact on the people on the ground. Even though we are attuned to the ranchers needs and we work as closely as we can and are allowed to work, [wolf reintroduction] isn't just a rancher initiative, it's a national initiative (Morgart per comm. March 2008).

While the Endangered Species Act outlines the obligation for species recovery, politics continue to emerge as a barrier to wolf recovery. Congress has ultimate discretion of how funds are distributed and typically answers to the requests of each state's congressional delegation (Schlickeisen 2001). The opponents of wolf reintroduction tend to voice their opinion louder than advocates, gaining heavy media attention not only in their counties and states, but across the United States (NPR 2008; Dougherty 2007). Congressional delegations can set up roadblocks and pressure state and federal agencies to put moratoriums on reintroductions or funding for these program (Schlickeisen 2001). In the face of these political roadblocks, depredation mitigation

programs have emerged as an important conservation tool for wolves to help meet obligations to the ESA while also addressing concerns of local communities.

Extensive literature exists on non-lethal deterrent, "proactive" and compensation schemes for managing predator-livestock interactions. In this section I provide an overview of some of the most promising options as they may be applicable in the Southwest.

Compensation

Compensation for livestock depredations is often selected as an immediate solution and is typically implemented for one of six reasons, as described by Yoder: 1) cover losses that might impact agricultural-based livelihoods; 2) address common problems that impact a large number of citizens; 3) offset restrictions on abatement tools (such as consultation, proactive measures); 4) address wildlife problems made severe by management actions taken by government agencies; 5) address recently emerging or increasingly more severe wildlife caused damage; and 6) address problems caused by highly valued species (Yoder 2000). Compensation typically takes one of two forms: *ex-post compensation*, where payment is provided after damage has occurred; or *compensation in advance*, where an estimation of expected loss is made and payment provided prior to any damage (Schwerdtner and Gruber 2007). When it is possible to conduct a historical assessment to predict future impacts of depredations (e.g. by looking at livestock losses in the years prior to and following wolf recovery), compensation in advance may be a more cost-effective scheme. If damages cannot be predicted because of the variation in time and/or space of depredations, ex-post compensation is recommended as a more appropriate means (Ibid). However, ex-post compensation has significantly higher costs due to the need of case-by-case verification of damages and high transaction costs (Ibid) as well as the requirement for a constant supply of funding. Beyond Schwerdtner and Gruber's 2007 study, little research on the cost-effectiveness of either of the above mentioned compensation schemes exist.

There are typically two categories of damage for which costs are reimbursed, both of which have levels of uncertainty: *direct* damage costs which can be supported by evidence such a livestock carcass or destruction of infrastructure; and *indirect* damage

costs which are more difficult to quantify, such as stress to humans or animals, loss of future income, or loss of a highly trained guard dog (Ibid). In addition, there are search and information as well as decision-making costs that are acquired in determining the direct and indirect damage costs and the amount that will be compensated (Ibid).

Most compensation schemes focus on ex-post compensation for direct damage costs. Although management and implementation of these programs vary, they typically include the following process: a) discover carcass; b) verify depredation; c) if verified, file claim for compensation; and d) provide compensation payment. The amount compensated is typically fixed based on the market value of the animal killed. Recommendations for effective compensation programs include focusing on:

1. Valuable species;
2. Individuals who maintain significant control over species or habitat;
3. Property that is quantifiable (if damaged); and
4. Products for which substantial markets exist (Yoder 2000).[i]

In addition, Yoder recommends that compensation be given on contingency that abatement techniques are also used, a method for offsetting the disincentive of preventing depredations that can accompany compensation.

Compensation programs continue to develop in North and Latin America, Asia, Africa and Europe, as they are assumed to be a valuable tool for reducing human-wildlife conflicts and ensuring survival of endangered and threatened species; however, they are also coming under wide criticism (Nyhus et al. 2003). For example, Schwerdtner and Gruber (2007) describe their concern that none of the above mentioned forms of compensation provide incentives for ranchers to prevent future depredations and may in fact encourage a "reduction of preventative action" as a means for receiving additional compensation for losses, resulting in greater financial costs to the program (359). For the few compensation programs that have been evaluated, there is little evidence that these programs have the ability to improve tolerance and support for predators, meet the economic needs of the ranchers, or improve the conservation status of threatened or endangered predator species.

Whether managed by governments, nongovernmental organizations, or local community groups, compensation programs have faced significant challenges.

Government managed programs typically involve bureaucratic hurdles, inefficient processing of claims, lack of funding, or compensation rates far below market value (WWF-International 2004; Madhusudan 2003). Weaknesses in a government-run compensation program in Italy include coverage of losses caused by protected as well as non-protected species (including dogs), and payments of 100% market value of dead livestock with no requirements for proof of adequate safeguarding of livestock (Cozza et al. 1996). Researchers also found a lack of professional support for compensation claims, challenges in verifying causes of death, and vulnerability of livestock to wild and domesticated animals (Ibid). As it was set up, the program invited farmers to lose livestock to predators and claim extra compensation. Without tighter restrictions and encouragement of personal responsibility for preventing depredations, funding for the program was declared unsustainable (Ibid).

Compensation programs managed by nonprofit/non-governmental organization (NGO) or communities have developed in many areas of the world due to a lack of capacity, willingness, or trust for a government managed program. Traits of successful NGO or community managed programs include implementation of programs that complement compensation (such as cattle replacement), rewards for locating and removing carcasses, and community established regulations (such as punishing individuals who leave herds unattended) (WWF-International 2004). Other organizations develop programs in conjunction with compensation, including programs on anti-poaching, education, land-use planning, forest fire-fighting, and habitat monitoring (Bereznuck and Hotte 2002). Alone, these compensation programs would likely not be effective, but they have proven successful mainly in that they use a multiple objective approach that includes other incentives or effort to mitigate depredations in addition to financial compensation. In Spain, however, a community-run compensation program failed because the psychological barriers to wolf reintroduction were not addressed (Bergman and Sierra 1997), while in Brazil and Bhutan, the lack of attention to preventing depredations and changing grazing patterns is likely to run the compensation programs dry as depredations will continue to occur and funding can not be continue indefinitely (Conforti and de Azevedo 2003; Wang and McDonald 2006).

Bulte and Rondeau argue that compensation may in fact have a negative impact on wildlife, by decreasing efforts by the rancher to prevent further damage and potentially exacerbating future conflicts with wildlife (Bulte and Rondeau 2005, 14). The potential for this negative impact of compensation has also been recognized by many designers of compensation programs, including Defenders of Wildlife and others stakeholders of the program (Bulte and Rondeau 2005; Sargent per comm. September 2007; Morgart, Miller per comm. March 2008). Bulte and Rondeau (2005) also found that, at least in developing countries, compensation could trigger agricultural expansion (i.e. habitat conversion) and intensify agricultural practices. When compensation programs are developed to reduce the killing of wildlife out of defense or retaliation, it is assumed that local support and participation in conservation efforts will also be built; however, there is little evidence to support success of any of these intentions of the compensation programs being implemented globally (Bulte and Rondeau 2005).

Compensation programs that attempt to expand beyond offsetting the economic loss due to depredations have also show to be ineffective. For instance, Naughton-Treves et al. (2003) recognized that organizations and governments have occasionally used compensation as a tool for building rural community tolerance of predators; however, research in the United States and other regions of the world, found compensation to be inadequate for building tolerance or changing human attitudes towards predators (Ibid).

To summarize, potential damaging implications of compensation programs include[ii]:

- Dependency on continuous funding primarily from individuals living outside of the area affected;
- Lack of incentives to protect livestock (e.g. changing husbandry practices, investing in fencing or guard animals), potentially leading to increased conflicts;
- Opportunity for ranchers to increase their number of livestock to reap benefits of compensation, leading to further habitat degradation;
- Taxpayer- or private donor- subsidized compensation or predator control may perpetuate the public perception that predators kill large numbers of livestock;
- Reliance on taxpayers and individual donors to pay for livestock management and predator control programs;

- Rancher dependency on subsidies from compensation program; and
- Opportunities for corruption or politically-driven (as opposed to conservation-driven) decisions.

The challenges to compensation programs are vast, but as Bulte and Rondeau state:

> ...[the] point is not to argue against compensation programs as a tool to promote conservation. They could certainly achieve their objective. The point is that as an indirect incentive mechanism for conservation, compensation distorts other incentives that negatively impact the wildlife population, and that the net effect could realistically make compensation be detrimental to the conservation of any given wildlife population (2005, 18).

In some situations, compensation programs have proven to be a useful tool for conservation when used to offset economic losses and applied in conjunction with other programs, but they are not a stand-alone solution to livestock depredations. Alternative or complementary programs to compensation that could be considered, and which are relevant to the area of this study, are presented below. A thorough evaluation of these programs is beyond the scope of this thesis; however, a brief overview of each is important for understanding how they may strengthen, or replace, the existing livestock mitigation programs in the Southwest.

Alternative and Complementary Depredation Mitigation Techniques

Insurance. Livestock insurance schemes are similar to compensation as they provide financial reimbursement for livestock losses, but differ in that they require personal investment by the individuals affected by depredations. For instance, a program managed by Project Snow Leopard in Pakistan requires farmers to pay insurance premiums to a community managed fund for each head of livestock (WWF-International 2004). Insurance programs can encourage local communities to take some initiative in protecting their livestock, help reduce the likelihood of people cheating the system, and ensure that people receive full market value for their livestock (Madhusudan 2003). Livestock insurance programs have not been tested in many areas and prior to

implementation their effectiveness should undergo a trial in a small area prior to wider implementation.

Incentives. Incentive programs take on various forms as they are developed to meet the needs of a specific community. In India, landowners are offered a financial incentive to sell their grazing rights to conservation organizations, and individuals are hired to patrol these areas to reduce the illegal presence of livestock (Mishra et al. 2003). Additional incentives for safe herding, wildlife protection, sustainable grazing, and marketing of local handicrafts have also been developed for some communities (Ibid). Other incentive programs have been successful in building eco-tourism in rural areas, which generates employment and income for the local community (WWF-International 2004). In northern Mexico, Defenders of Wildlife has set up a community trust fund for rewarding ranchers that use remote cameras to photograph predators on their property. The program is valuable as it, "…doesn't require dead livestock, third party [verification], second guessing, lack of trust, [or] dead wildlife" (Miller per comm. March 2008). Defenders of Wildlife pays ranchers $500 for a photograph of a jaguar and $150 for a photo of an ocelot. This incentive program encourages ranchers to develop wildlife habitat on their property, thus promoting sustainable conservation of the species. The ranchers sign an agreement not to use lethal predator control on their property for two years, and receive training on research and conservation techniques.

Proactive Measures (also referred to as "preventative"). Madden, speaking on behalf of the HWCC, states that, "shift[ing] the emphasis from reactive mitigation of HWC to greater reliance on proactive prevention strategies [is essential]" (Madden 2006, 8). Measures that are being tested, with mixed results, include: fencing; fladry and turbo fladry (Musiani et al. 2003); guard or early warning animals (Stahl et al. 2001; Espuno et al. 2004); horse patrol or range riders (Timberlake, Miller per comm. March-April 2008); changes to husbandry (Johnson et al. 2006; Landa et al. 1999; Georgiadis et al. 2007; Woodroffe et al. 2007); deterrents such as flashing lights and sirens (Fritts et al. 1992), taste aversion (Gustavson 1982), electric howling devices (Schultz et al. 1999), artificial scent markings (Schultz et al. 1999), or shock collars (Schultz et al. 2005); and predator

behavior research (Oakleaf per comm. April 2008; WCS 2005). Advantages and disadvantages of each technique are provided in Table 1.

Table 1. Types of Proactive Measures.

Type	Description	Advantages	Disadvantages
Strand wire fencing	Made of steel wire strung between metal poles, with occasional lower sections of netting	Can be used by individual farmers	Effectiveness depends on design, construction and maintenance
Fladry	Rope or fencing strung with red or orange flags at fixed intervals	Relatively inexpensive	Requires some maintenance (hanging, untangling); ineffective over large areas, long term or periods of extreme drought; wildlife may become habituated
Turbo fladry	Combination of electrified fencing and flags	Relatively inexpensive if attached to existing fence	Requires some maintenance; has not been thoroughly tested; wildlife may become habituated.
Electric fencing	Similar to design to strand wire fencing, but with an electrically charged wire.	Effective as a deterrent	Some animals become habituated and are able to find gaps in the fence to get through
Guard or early warning animals	Dogs accompany and protect grazing livestock from wolves and provide an early warning (i.e. bark) when wolves approach; llamas known to deter predators from approaching	Useful when accompanied with changes in husbandry; inexpensive; non-technical; other advantages such as preventing theft, locating carcasses or warning if livestock are sick	Requires training of dogs; some claims that dogs attract wolves to the livestock; llamas not thoroughly tested; may increase intolerance if animals attacked by predators
Horse patrol or range riders	Individuals or pairs of riders patrol wolf habitats and/or accompany livestock	May keep wolves from approaching livestock; trained riders track health of livestock and remove carcasses; useful for open grazing; riders can also monitor wildlife	Requires salary for range rider for long periods of time; effectiveness debated

Table 1. Continued

Type	Description	Advantages	Disadvantages
Changes in husbandry	Adjusting the way that livestock are cared for and bred.	Long term solution and has proven effective in other parts of the world; inexpensive	Resistance to changing rancher behavior and may require long-term paradigm shift from current livestock management practices
Deterrents	Used to frighten or discourage wolves from approaching livestock; examples include fire crackers, paint balls, flashing lights, sirens, and artificial scent markings	May work as short term deterrent or during particular times of year when livestock are most vulnerable	Requires extensive monitoring of individual animals; not effective on whole pack; no indication of long term avoidance; more research needed
Predator behavior research	Improving the understanding of where, when and under what conditions wolves depredate on livestock	Provides information to improve effectiveness of proactive measures and husbandry needs	Lost term and costly initiative; does not provide immediate relief from depredations; minimal research taking place

Although reducing depredations offsets the need for compensation and is beneficial for both ranchers and predators, some researchers argue that proactive measures are only effective if all landowners cooperate (Adamson et al. 2008). For example, an investment may be made for fencing and deterrents on one ranch resulting in a successfully aversion of depredations, but wolves may then move to a neighboring ranch that is not using proactive measures. Despite the drawback of landowner cooperation, many proactive methods are being employed across the globe to complement other mitigation programs such incentives and compensation as a means of reducing the number of depredations (Bradley and Pletscher 2005).

Summary of Depredation Mitigation Strategies

As human populations continue to expand into areas previously unoccupied, conflicts between humans and wildlife will continue to occur. Research on HWCs around the globe demonstrates the vast array of options available for mitigating livestock depredations. Lessons learned from existing mitigation programs that can be applied across species and countries include:

- Promote coexistence of livestock and wildlife through incentives as opposed to disincentives;
- Recognize that conservation efforts may results in real and perceived threats to local economies;
- Define and teach sustainable grazing practices;
- Identify programs that meet local needs;
- Involve a range of stakeholders; and
- Draw on multiple approaches, as few mitigation programs are effective if used in isolation.

Barriers to Depredation Mitigation and Wolf Conservation

In many cases, the lack of acceptance for large predators, particularly wolves, is based on more than direct impacts from conservation efforts. This section provides a brief discussion of cultural, social, historical, and philosophical factors that may drive an individual or community to reject the presence of wolves near their home. These factors will later be addressed in the findings, discussion and recommendations sections. Acknowledging and understanding these factors and how they act as barriers to predator tolerance at the global level as well as in the Southwest is essential for implementing effective depredation mitigation and wolf recovery programs.

"Evil Wild" Nature

Globally, wolves have been considered a symbol of power, wisdom, as well as representative of "evil wild nature" (Midgley 2001, 181; Kellert et al. 1996). For early Euro-Americans, eradicating the wolf was seen as a means for taming nature. Wolves, like much of 'wild nature', were depicted as negative, conniving symbols throughout fables and folk tales such as "Little Red Riding Hood" (Schlickeisen 2001, 61; Nash 2001; Midgley 2001, 185; Rood 1971). In early Euro-American history, wolves were seen as a threat to civilized life (Midgley 2001, 182). Wolves are respected by some communities for their courage and intelligence, but were more commonly seen as "creepy" for their "slinking appearance" by Euro-Americans, likely as a result of the way they hunted by smell (Midgley 2001, 185). These deep-seated Euro-American views of wolves as despicable creatures and their presence on the landscape as conflicting with

"civilized" society can lead to apprehension of wolf recovery programs as well as associated compensation programs. Historic relationships between wolves and Native American tribes varied considerably depending on tribal culture. A thorough analysis of Native perspectives on wolves is beyond the scope of this thesis, but research on this topic is being conducted in the Southwest by the University of Arizona (Rinkevich 2008).

(Mis)Perceptions

As the ecological, moral, and economic benefits of wolf recovery have been recognized, acceptance for wolf reintroduction in the United States has been growing since the 1990s. In contrast, at the local level where humans are dealing with wolves on a daily basis, perceptions of wolves have changed little over the past century (Schlickeisen 2001). Perceptions of wolves are often shaped by exaggerations or rumors, which can invoke fear and hatred for their perceived threat to human safety, impact on prey populations and the economy, and role recovery efforts appear to play in ending the ranching way of life. These misguided perceptions can lead to resistance by communities to participate in wolf-related programs.

(Mis)Perception #1. Wolves pose a threat to human safety. Nicknamed the "Red Riding Hood" syndrome (Schlickeisen 2001), many people express fear for themselves and families when living in the presence of wolves. Despite no incidences of healthy wild wolves killing a human in North America for at least the last fifty years,[iii] fear continues to be a major argument against reintroduction (Paquet 2008; USFWS 1996). Midgley links fear of wolves to their powerful and mysterious symbol, as mystery can invoke a feeling of danger (2001). In the southwestern United States, communities have constructed "wolf proof" school bus shelters to protect children, yet have not taken similar measures in defense against other dangerous wildlife that have killed humans, such as cougars and rattlesnakes (Slown per comm. March 2008). Some individuals in the Southwest have expressed concern for the reintroduction of wolves from captive breeding facilities, believing that these wolves are accustomed to humans and more likely to post a threat (Beeland 2008, Parsons per comm. March 2008). Contrary to this believe, however, captive bred wolves are only reintroduced if they have been kept

primarily in isolation from humans and shown fear in the presence of humans (Beeland 2008; MWF 2008).

(Mis)Perception #2. Game populations, such as elk, will be dramatically reduced and hunting affected. Hunters and commercial guides often express concern for depletion of ungulate game populations by wolves (Schlickeisen 2001). However, some estimates have found that there is a prey capacity to support 200-400 wolves in the Southwest (Parsons 2008), and flyovers in the Southwest in October 2007 found healthy ungulate populations of between 14,000-18,000 elk in the Gila region (Dougherty 2007). Kroeger et al. found that predation on deer and elk by wolves could actually be beneficial for the livestock industry, as it increases the amount of forage available for cattle (2006).

(Mis)Perception #3. Wolves are a means for government and environmental groups to encroach on private property and personal freedom. Encroachment on private property rights (land and livestock) and personal freedom is a major concern among many ranching communities. Kay argues that wolf-killed livestock is "another example of the government taking private property under the Endangered Species Act..." (Kay 1996, 24) and that wolf presence will restrict areas for livestock grazing on Forest Service lands to the point where no amount of money will compensate livelihood lost. The debate over private rights and property and public lands is long and conflicting, particularly in the Southwest, and has driven much of the opposition to wolf reintroduction by the ranching community (Fitzgerald 2006; Stuebner 1998). In terms of encroachment on land rights, however, 94-96% of the wolf recovery area of the Southwest is federally owned, with the remaining 4-6% of land under private and state ownership (USFWS 1996, 3-8)

(Mis)Perception #4. Wolf reintroduction will destroy the cattle industry. Ranchers often argue that the impact of livestock depredations from wolves is severe enough to run ranchers out of business. Research in North America has found that large predator conservation is not about "jobs versus the environment" but instead "jobs and the environment" (Rasker and Hackman 1996, 993) and in most areas there are not enough wolves to decimate livestock populations. Rasker and Hackman (1996) found that, in general, areas of large resource extraction (including mining and agriculture)

lagged behind counties with wilderness areas or near protected areas in terms of economic development, "...in many instances economic growth [jobs] is stimulated by environmental amenities such as wildlife, including large predators" (997). Kroeger et al. (2006) looked at people's willingness-to-pay (WTP) for wolf recovery as an indicator of the Mexican wolf's economic value by assessing a study done in 2001 on whether residents of Albuquerque, New Mexico, would pay higher prices for beef labeled as "wolf friendly" (i.e. grown in areas where wolves exist). They found a strong WTP for wolf conservation in the Southwest that is comparable to WTP levels around Yellowstone National Park.

Emotional Investment in Livestock

Wolves do kill livestock and there are genuine economic and emotional costs associated with wolf reintroduction (Schlickeisen 2001). As de Bruin (2008) notes, ranchers are emotionally as well as economically invested in their animals, and to see them killed by predators can be devastating. Emotional investments in livestock are difficult to compensate, and if a rancher can not be wholly compensated, often they do not want to participate in any program. A congressmen who raises beef in New Mexico stated that, "Wolves kill cows and sheep, and it's distressing to see that happen. It's emotional as well as economic. When you see them ripped apart by wild animals it makes you mad" (de Bruin 2008, 1). The emotional connection between ranchers and livestock is further described by Midgley:

> When you depend on the produce of your domesticated animals, you can no longer afford to identify with other animals that might threaten your flocks, whether by attacking them or by competing for their fodder. And if you have sown crops, you want above all to stop those crops from being eaten by other animal (Midgley 2001, 180).

Ranchers care for their animals, and when depredations occur, the emotional investment made in these animals often does not have a price tag. When there are costs that can not be compensated, ranchers may avoid participating in any component of the program.

Mistrust of Environmental Organizations

Beyond the perception that environmental organizations are attempting to end the ranching lifestyle, even at the national level, polling has demonstrated that environmental organizations have failed to gain trust from the majority of the public (Bowerman per comm. May 2008). Even in states viewed as environmentally progressive, such as Oregon, almost 40% of the public sees environmental groups as "extremists", with a greater percentage of rural communities having this view (Ibid). Even if a predator reintroduction program has support from the general public, the involvement of an environmental group may deter support or interest in collaboration because of the organization's image or perceived radical behaviors. Despite the organizations intentions, negative perceptions can greatly influence the success of the program supported by environmental groups. For instance, research in the Northern Rockies (Wyoming, Montana and Idaho) found that ranchers saw compensation as a publicity stunt for environmental groups and not for the benefit of the ranchers (Montag et al. 2003). Even if a program is well-run, a lack of trust for those distributing funding will result a low participation rate and therefore little impact in offsetting costs to ranchers.

Attitudes Toward Predators and Depredation Mitigation

In addition to perceptions, investments in livestock, and issues of trust, understanding attitudes and experiences that shaped perceptions and behaviors is essential to developing an effective depredation mitigation program. Historically, wildlife conservationists have often failed to look at the attitudes of human communities affected by reintroduction and recovery efforts (Conforti and de Azevedo 2003), and therefore these communities have disassociated themselves from predator related programs. However, research over the last decade has begun to assess perceptions and attitudes towards predators and compensation programs. Building this knowledge can help in the development of more effective communication tools and programs that prevent conflicts and aid in predator conservation.

Perceptions towards wildlife are often based on values, the physical and behavioral characteristics of species, knowledge and understanding of the animal, and past or present interactions with particular species (Kellert et al. 1996). Research in the

1980s found livestock producers, elderly persons, rural dwellers, and those with less education to express more negative attitudes towards predators, particularly wolves, than their counterparts (Ibid). Kellert et al. (1996) found personal experience and knowledge of wolves not to impact opinion of the animal.

Research in India found positive attitudes towards predators to be based on the availability of a livestock insurance program, religious beliefs, and alternative income generating opportunities (Bagchi and Mishra 2006). In Brazil, attitudes were shaped by financial support for mitigation programs, experiences interacting with predators, and knowledge of wildlife (Conforti and de Azevedo 2003). Neither assessment found rate of depredation or size of property to influence attitudes towards predators or mitigation programs.

Naughton-Treves et al. (2003) conducted a survey of landowners who filed complaints regarding depredations, randomly sampled landowners, bear hunters who had filed complaints, and members of the Wisconsin Bear Hunter's Association. Again, there was little correlation between negative experiences and negative attitudes: instead attitudes were influenced more by social affiliation.

These limited studies on predators and depredation mitigation programs reflect that attitudes are most often shaped by a variety of factors, which may differ from region to region. Depending on the community, knowledge, cultural or religious ties, financial support, demographics, experience with depredations, and social affiliation may or may not be influential factors for developing attitudes towards wolf recovery or mitigation programs. Because these factors are likely site-specific, areas where predators have been recovered and depredation mitigation programs are being implemented should be studied on a case-by-case basis. Only through a site-specific analysis can the most influential factors be determined and appropriate means be decided for generating predator support and implementing mitigation programs.

Notes

i Of the state and provincial run compensation programs in the United States and Canada, approximately 70% tie compensation with abatement requirements (Yoder 2000).

ii Adapted from (Bulte and Rondeau 2005) and (Berger 2006) and based on personal observation

iii In 2006, a student in Northern Saskatchewan was found dead, with the likely cause from a large predator. Physical evidence did not conclude whether the killer was a wolf or black bear (the only two large predators in the area), but substantial evidence implicated a black bear. A second investigation using circumstantial evidence disagreed with the official findings and declared that a wolf was the cause of death. While the results are inconclusive as to the cause of death (and presumed by the world's leading wolf biologist to "remain unknown and that the judicial inquiry [that linked the cause of death to a wolf] erred in its determination"), this is the first case in many decades for a wolf to be linked to a human death and is cited by many communities as reason for their fear of wolves (Paquet 2008).

CHAPTER III

DESCRIPTION OF CASE STUDY SITE

This chapter describes the environmental history and culture of the Southwest to set the context for the study. The description of the Mexican wolf and its ecological importance validates the argument for the wolf's recovery and the need to reduce depredations to ensure the long-term survival of the wolf. A summary of eradication and recovery of the wolf is provided to demonstrate the long and complex relationship between wolves and livestock associations and continued opposition to wolf-related programs by ranchers. The chapter concludes by presenting the current livestock depredation situation in the Southwest and efforts to mitigate depredations.

The Mexican Gray Wolf

The gray wolf, *Canis lupus*, has experienced one of the fastest recoveries of all endangered species, but continues to be one of the most controversial and politically dividing wildlife issues in the United States (Robbins 2005). Only fifty years ago, after decades of hunting, trapping and poisoning, wolves were on the verge of extinction in the Western United States. Today, one subspecies of the gray wolf, the Northern Rockies gray wolf, has reached a population exceeding 1,500 individuals in the wild resulting in a delisting from the Endangered Species Act. Another story of successful wolf recovery is the Mexican gray wolf, with a captive and wild population that has grown in the last thirty years from a few individuals to over 400 today.

The Mexican gray wolf, *Canis lupus baileyi*, is a subspecies of the gray wolf. Gray wolves belong to the canid, or Canidae family and Carnivora Order. The genus *Canis* includes coyotes, jackals, domestic dogs, and the dingo. The number of subspecies of *Canis lupus* existing in North America has been reduced from descriptions in the early 20th century from 24 to 5 subspecies due to extinctions and changes in taxonomy, and includes *C.l. arctos* (arctic wolf), *C.l. lycaon* (Eastern Timber wolf), *C.l. nubilus* (Buffalo wolf or Great Plains wolf), *C.l. occidentalis* or *iremotus* (Rocky Mountain or MacKenzie Valley wolf) and *C.l. baileyi* (Mexican wolf).

Mexican gray wolves, also referred to as Mexican wolves or *los lobos*, are the smallest and most endangered of the five subspecies in North America. Weighing between 50-80 pounds, they are a mixture of gray, buff, rust and black in color. The Mexican wolf's scientific name is ironically named after Vernon Bailey, an employee at the Bureau of Biological Survey in the mid-1900s who promoted wolf eradication to reduce wolf impact on wild ungulate and cattle populations (Murie 2008).

Wolves are wide ranging; each pack moves across a home range of 650 to over 1,300km^2 (Robbins 2005). To fulfill their average need of 4 kg of daily meat, wolves must kill often, more than any other large predator. Wolves feed on most ungulate species, and in the Southwest their primary wild diet includes elk and white-tailed and mule deer. They are social animals, participating in group-hunts and rearing of pups. Packs typically are comprised of 5-6 animals and include an alpha pair, which breeds for life, and their offspring of several generations. Wolves demonstrate characteristics of advanced vertebrate societies, rearing their young for 25-30% of their lifespan, demonstrating sophisticated learning abilities, and cooperative caring for the young of the breeding pairs (Harber 1996). They divide labor, demonstrate cooperation, maintain contact with individuals of the pack over many miles (Harber 1996), and are often admired for their loyalty to the pack and family (Rood 1971). When packs are well-defined and have an established territory, they can express extreme hostility (including killing) of members of other packs that come into their home range.

Limited research was conducted on the Mexican wolf prior to the eradication efforts and removal from the wild, and therefore, the impact of the Mexican gray wolf on

the southwestern ecosystem is relatively unknown. However, researchers have acknowledged the ecological and economic benefits that wolves provide, including: *direct use values*, such as increased tourism and educational activities; *indirect use value* such as provision of ecosystem services; and *non use value* including moral implications and value for existence (Kroeger et al. 2006). Paquet et al. (2001), Rood (1971), and Woodroffe and Ginsberg (2005) also acknowledge the direct and indirect ecological, psychological, and economic benefits that wolves provide to society as a whole.

Environmental History of Wolf Eradication in the Southwest

The controversies surrounding the wolf reintroduction today can in many ways be traced to the history of ranching and predator eradication in the Southwest. The development of the fur trading industry, specifically beaver pelts, allowed for the introduction of cattle into the West during the 1800s (Robinson 2005). With near extinction of the bison herds, wolf populations in the West looked for a new food source and ultimately began preying on the easiest targets that were not accustomed to predation: livestock. From the late 1800s through the middle of the 20th century, livestock carcasses were often poisoned to kill wolves that returned to feed, while hunting of wolves was widespread throughout the west with privately financed bounties often paid for by livestock growers associations (LGAs).[i] In addition to privately financed bounties, states and counties also provided bounties: New Mexico and Arizona passed a law in 1893 allowing counties to pay bounties for large predators such as wolves, bears, mountain lions, bobcats and coyotes (Robinson 2005; Fitzgerald 2006). The wolf was hated by ranchers, not only for its predation of livestock, but for its mere presence on the landscape and the threat that the animal was perceived to pose to human life.

Ranchers realized early on the need to implement proactive measures to protect their livestock from wolves. For instance, in the San Luis Valley of New Mexico, sheep ranchers used herders and guard dogs for protection as early as the 1830s (Robinson 2005). However, the reduction of livestock depredations through proactive measures did little to reduce hatred and fear for the wild, and particularly for wolves that were driven

to the bottom of the "moral hierarchy" and epitomized as the "antithesis of civilization" (Robinson 2005, 40).

Even the President of the United States, Theodore Roosevelt, who is often recognized for his fondness of nature, described wolves in 1905 as the "beast of waste and desolation" (Robinson 2005, 43). Under the guidance of Roosevelt-appointed Gifford Pinchot, the federal government began predator eradication to reduce the impact of depredations on ranchers in the early 1900s. As head of the United States Forest Service (USFS), Pinchot set grazing fees for ranchers and invested resources in tracking and trapping wolves on ranchland (Robinson 2005). Based on reports of negative impacts on rancher livelihoods from wolf depredations, the USFS expanded efforts to kill wolves throughout the early 1900s. Given that ranchers were paying for grazing permits, and some individuals claimed wolves took up to 20% of their cattle, the USFS felt obliged to provide predator protection (Fitzgerald 2006; Robinson 2005). The USFS began killing wolves in the early 1900s, which led to mass killings of wolves in the West. For example, in 1908, 232 wolves were killed in New Mexico and 127 wolves killed in Arizona. States also contributed to the effort by increasing incentives for killing wolves: a 1909 New Mexico legislature act paid $15 for scalp or the entire hide of the Mexican wolf, which the New Mexico Cattle Growers Association (NMCGA) later supplemented to increase payment to $25 per wolf (Fitzgerald 2006).

In 1916, the Biological Survey (later to be named the United States Fish and Wildlife Service or USFWS) declared an estimated 300 wolves to be left in New Mexico, and predicted an average depredation of 3 cows per month per wolf, or a total of 10,800 depredations per year (Fitzgerald 2006). Based on contemporary research, these estimates were likely highly exaggerated, but they led to further expansion of eradication efforts in the name of livestock protection.

As the federal government and ranchers worked to reduce the number of predators in the West, conservationists began to speak out against wildlife eradication. However, even the early wildlife supporters saw little value in predators because of their impact on livestock, but instead spoke out on behalf of birds and bison (Robinson 2005). For instance, Aldo Leopold was greatly influenced by the writings of early conservationists,

and he set out with his brother-in-law to conserve only species that he deemed worthy of existence. During his early days as a conservationist, Leopold continued to convince Congress to allocate increased funding for predator killing and was involved in the establishment of a strychnine plant in Albuquerque, New Mexico to supply poison for wolves and other fur-bearing predators (Robinson 2005). Claims in the early 1900s by the New Mexico livestock producers showed that predators were costing them $2.71 million annually, which further encouraged expansion of wolf eradication programs in New Mexico and Arizona (Robinson 2005).

As support for predator protection emerged in the late 1920s and early 1930s, the government was heavily criticized. Stanley Young, with the Bureau of Biological Survey, continued to defend the wolf eradication programs, stating in the late 1920s that, "…the grey wolf has no place in modern civilization…[it is] one hundred percent criminal, killing for sheer blood lust…more often killing to satisfy his lust than to satisfy a natural and reasonable hunger…"(Robinson 2005, 223). As predator control continued into the 1930s, the Forest Service regulated grazing through issuing permits for a fee. Despite increased management of grazing, livestock industries continued to have influence over the permitting system, such as ensuring that the fees were kept low (Fitzgerald 2006; GAO 2005).

By mid-century, the ecological role of predators was widely recognized and predator eradication programs were being contested. In Leopold's famous essay of the 1940s, "Thinking Like a Mountain", he describes the emotional and physical feelings invoked by the excitement of being in the Southwest's "wolf country" (Leopold 1949, 129). After killing a female wolf, Leopold recognizes the interconnectedness of the ecological system and the impact that wolf eradication would have for hunting and grazing:

> ...I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deers...for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades...So also with cows. The cowman who cleans his range of wolves does not realize that he is taking over the wolf's job of trimming the herd to fit the range. He has not learned to think like a mountain. Hence we have dustbowls, and rivers washing the future into the sea (130-132).

Despite support for predator conservation emerging mid-century among the general public, the government continued to develop poisons and methods for predator control through the 1950s and 60s. Poisons were even shipped to Mexico by the government to kill Mexican wolves. While the last remaining Mexican gray wolves continued to be hunted into the 1970s, opposition to extermination continued to grow among the general public. Eventually, the passing of the Endangered Species Act (ESA) in 1973 led to the capture of the last remaining Mexican wolves to be placed in a captive breeding program before they reached a functionally extinct level. The Endangered Species Act, however, did nothing to calm protests by livestock associations and their supporters against the relaxation of the predator control programs. Hatred for the wolves came to represent distaste for federal control over land (Murie 2008; Dougherty 2007). Kay quotes University of Wyoming geography professor James Thompson stating in 1993 that, "Wolf recovery is a 'stalking horse' for the larger issue of land use change...on the deepest level the issue of...wolf recovery is not about wolves, it is about control of the west" (Kay 1996, 31). Livestock associations took to the courts and media to defend their way of life, which they felt was threatened by the recovery of wolf populations.

The "Recovery" of the Mexican Gray Wolf

Protection and Persecution

After the placing of the Mexican gray wolf on the Endangered Species Act in 1976, it was mandated that a formal recovery plan be developed based on the best available science (ASM 2007; USFWS 1982). The wolf also gained state protection

under Arizona law in 1973 and in 1977 in New Mexico and Texas (Fitzgerald 2006). Following listing, and with only a few remaining wolves left in the Southwest, USFWS trapped the last known four males and a pregnant female between 1977 and 1980 to establish a captive-breeding program. Little was known about the biology of the Mexican wolf prior to the capture of the remaining individuals (Reed et al. 2004). Because of the small remaining population, genetic viability and inbreeding depression were a major concern for the recovery teams. The captive breeding program, set up at various zoos and wolf centers around the country, ultimately saved the wolf from inbreeding depression and extinction. Genetic testing of the lineages was conducted to ensure they were genetically pure Mexican wolves and that fitness would be maintained and inbreeding reduced (Garcia-Moreno et al. 1996).

Researchers found that the captive Mexican gray wolves were more closely related than any combination of the other canids (including dogs, gray wolves and coyotes), and in addition, found that the Mexican gray wolf was the most genetically distinct wolf population in North America (Ibid). The authors concluded that individuals to be released should come from the Mexican wolf captive breeding programs (Ibid) as opposed to gray wolf populations from the northern part of the continent.

The 1982 recovery plan for the Mexican wolf called for captive breeding with eventual reintroduction of two "non-essential experimental" [ii] viable populations totaling at least 100 wolves in the Blue Range Wolf Recovery Area (BRWRA), a 6,800-square-mile area (USFWS 1982; ASM 2007).[iii] The historical range of the wolf was believed to have expanded throughout New Mexico, Arizona, Texas and South-Central Mexico, however, the recovery area called for wolves to be reintroduced to only a fraction of this range (DOW/NRDC 2008; Robinson per comm. March 2008; Parsons per comm. March 2008; Young and Goldman 1944). Despite the successful captive breeding programs and the mandate for recovery under the ESA, implementation of the recovery plan almost ended in 1987 due to opposition from state officials and livestock associations. Captive breeding was suspended until a lawsuit in 1990, which reinstated the recovery plan and brought interagency and state collaboration (Robinson 1998; Parsons per comm. March 2008).

On January 26, 1998, Secretary of the Interior and former Arizona Governor, Bruce Babbitt, along with Director of USFWS, Jamie Rappaport Clark, carried kennels containing Mexican wolves into a holding pen in the Arizona portion of the BRWRA. Eleven wolves were acclimatized for several weeks in a holding pen before being released into the recovery zone (Robinson 1998). These first individuals to be released were radio collared and heavily monitored. Between the initial spring release and the winter of 1998, thirteen wolves were "successfully" reintroduced into the recovery area and were avoiding cattle, gaining weight and reproducing (Aleshire 1998; USFWS 2007b). However, during the first year of recovery, five wolves were shot and killed[iv], two disappeared, and three were recaptured for leaving the recovery area or deteriorating health (Aleshire 1998; Fitzgerald 2006). Only three males remained in the wild at the end of 1998.

In addition to the attempt to eliminate funding for wolf recovery prior to the release of the wolves, the livestock industry took USFWS to court twice more to stop further reintroduction efforts and allow for legal trapping and shooting of all wolves (Fitzgerald 2006). In 1998, the New Mexico Cattle Growers Association (NMCGA) et al. filed a lawsuit against the USFWS claiming violations against NEPA, EPA and the Administrative Procedures Act (Dougherty 2007; Fitzgerald 2006). The lawsuit was denied due to estimates that depredations would claim less than 1% of the cattle (Fitzgerald 2006).

In 2000 and 2001 wolves were, for the first time, translocated into New Mexico (where no initial releases are allowed) and the completion of the 3-year review found that the program should continue with some management modifications. In 2002, USFWS was taken to court again by the Coalition of Arizona and New Mexico Counties, et al., for allowing hybridization of Mexican wolves and domestic dogs, which were immediately destroyed by USFWS (Dougherty 2007; Fitzgerald 2006). The lawsuit was dismissed in 2005, at which point an appeal was filed.

The recovery plan and the 1996 Environmental Impact Statement projected the population of wolves to grow to 102 individuals between 1998 and 2006 and include 18 breeding pairs (USFWS 1996). However, as of 2008, the current population hovers

around an estimated 50 wolves, with only four breeding pairs (Defenders of Wildlife [DOW] 2008; Parsons per comm. March 2008). To compare with ten years of recovery in another area, the wolf population in the Northern Rockies went from 101 individuals to 1,300 (DOW 2008). Figure 1 compares the predicted and actual minimal population counts and breeding pairs for the Mexican wolves.

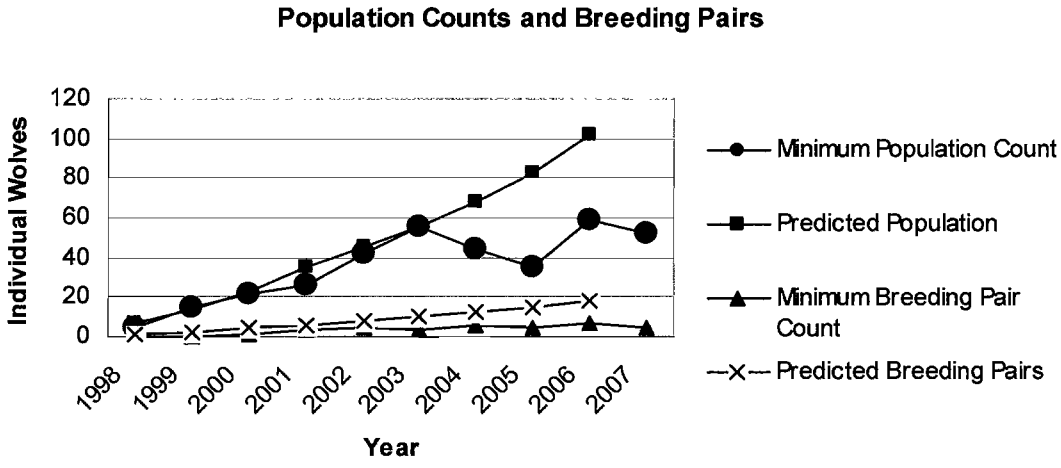

Figure 1. Minimum population counts and breeding pairs, compared with predictions, for first 10 years of wolf recovery. Predictions made through 2006. (Based on data from USFWS 2007b)

Over 100 individual wolves have been reintroduced since 1998, with more than 20 being permanently removed or destroyed mainly for killing cattle. Other causes for mortalities are presented below in Figure 2. Lethal control includes individual wolves and multiple members of packs that developed a habit for killing cattle (Dougherty 2007).

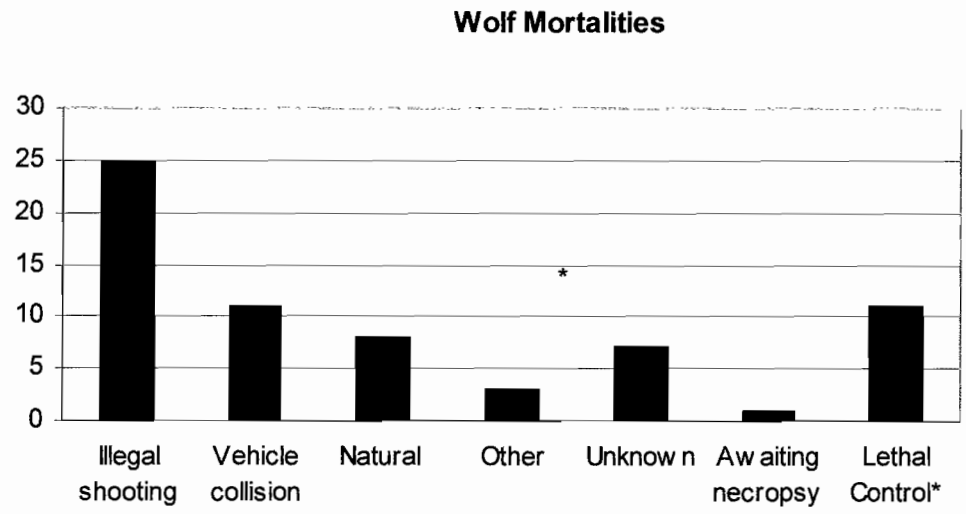

Figure 2. Causes of Wolf Mortalities in the BRWRA. (Based on data from USFWS 2007b)

The wolf recovery program has been criticized for its cost to taxpayers (Vynne per obs. 2008). Public perceptions suggest upwards of $1 million is spent per wolf (or over $100 million in total for the program), however, government records during the first seven years since the initial release in 1998 show "best possible" estimates of combined spending by all the agencies involved to be just over $12 million total or $120,000 per wolf (including staff salaries), with annual expenditures ranging from $579,000 to $2.5 million (AMOC 2005).

Captive Breeding

The Mexican Wolf Species Survival Plan (SSP) is the captive management program that is responsible for overseeing the continued existence of the species through a captive breeding program. SSP maintains a goal of a minimum of 240 wolves in captivity, and currently there are approximately 300 individual wolves in 49 breeding facilities throughout the United States and Mexico (USFWS 2008c).

The Blue Range Wolf Recovery Area (BRWRA)

The recovery plan has tight restrictions for where wolves can be reintroduced and where they can roam. A brief overview of the recovery area is essential to understanding

where and why depredations occur, the challenges faced by implementation of compensation and other depredation mitigation programs, and the tension between ranchers and associations, wolf-advocates and government agencies.

The Blue Range Wolf Recovery Area (BRWRA) was designated as the area restricted to wolf recovery and was drawn somewhat arbitrarily, based somewhat on historical reports of wolf ranges but primarily on political negotiations (Robinson, Parsons per comm. March 2008). Figure 3 outlines the wolf recovery area. The BRWRA stretches across east-central Arizona and west-central New Mexico, accounting for more than 6800 square miles of territory across the Apache National Forest (1.87 million acres) and Gila National Forest (2.96 million acres), including over 790,000 acres of wilderness areas (GAO 2005).

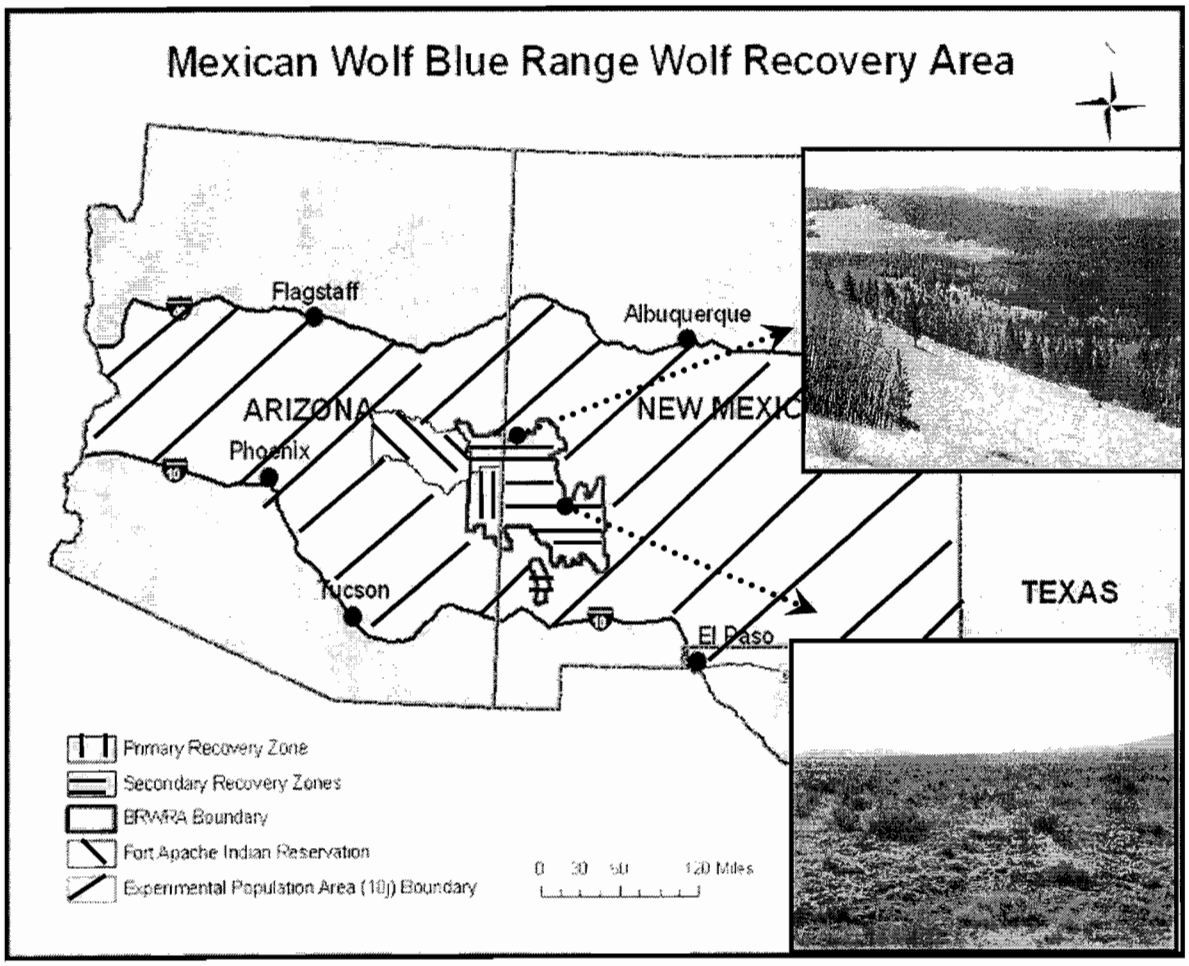

Figure 3. Blue Range Wolf Recovery Area. Primary recovery zone is where wolves are released. (Map Courtesy of USFWS 2008b.) Photographs near Alpine, AZ/Reserve, NM (top) and Beaverhead, NM (bottom).

Much of the recovery area includes alpine habitat and high elevation, the habitat preferred by the Mexican wolf. It is "a world of rocky red bluffs, precipitous canyons, juniper scented mesas and upland forests of ponderosa pine and Douglas fir" (Robinson 1998, 1; Reed et al. 2004). The BRWRA is a mixed use area, with about 95% of the area open to cattle grazing, mining, recreation and forestry (MacAllister 2008; USFWS 1996; ASM 2007). Despite the remoteness and ruggedness of the BRWRA, an estimated 3.2 million visitors come to the region each year to hike, hunt, or horseback ride (Kroeger et al. 2006)[v].

The BRWRA includes land owned by the Forest Service, private land, and, as of 2003, White Mountain Apache Tribe land. The inclusion of 1.6 million acres (2400 square miles) of the tribal lands has proven valuable to the recovery program (Robinson, USFWS, Miller per comm. March 2008; Rinkevich 2008). Although the White Mountain Apache Tribe has agreed to be a participating partner, the San Carlos Apache Tribe, which is a cattle-centric tribe and depends on a trophy elk hunting program for their livelihood, opted out of the program in 2003 (Dougherty 2007) and wolves that enter the San Carlos Apache Reservation are removed (Rinkevich 2008).

There is virtually no place free of livestock in the reintroduction area (NPR 2008). An example of how grazing allotments are dividing in the Gila Forest (the majority of the New Mexico BRWRA boundary) is provided in Figure 4. Livestock producers are granted permits for grazing on public lands, and there are approximately 79 range allotments in the recovery area of Arizona, and 134 in New Mexico (Beeland 2008). Estimates of the number of cattle grazing in the BRWRA vary significantly from 34,800 to 82,000 head present on an annual basis (Fitzgerald 2006; Beeland 2008).

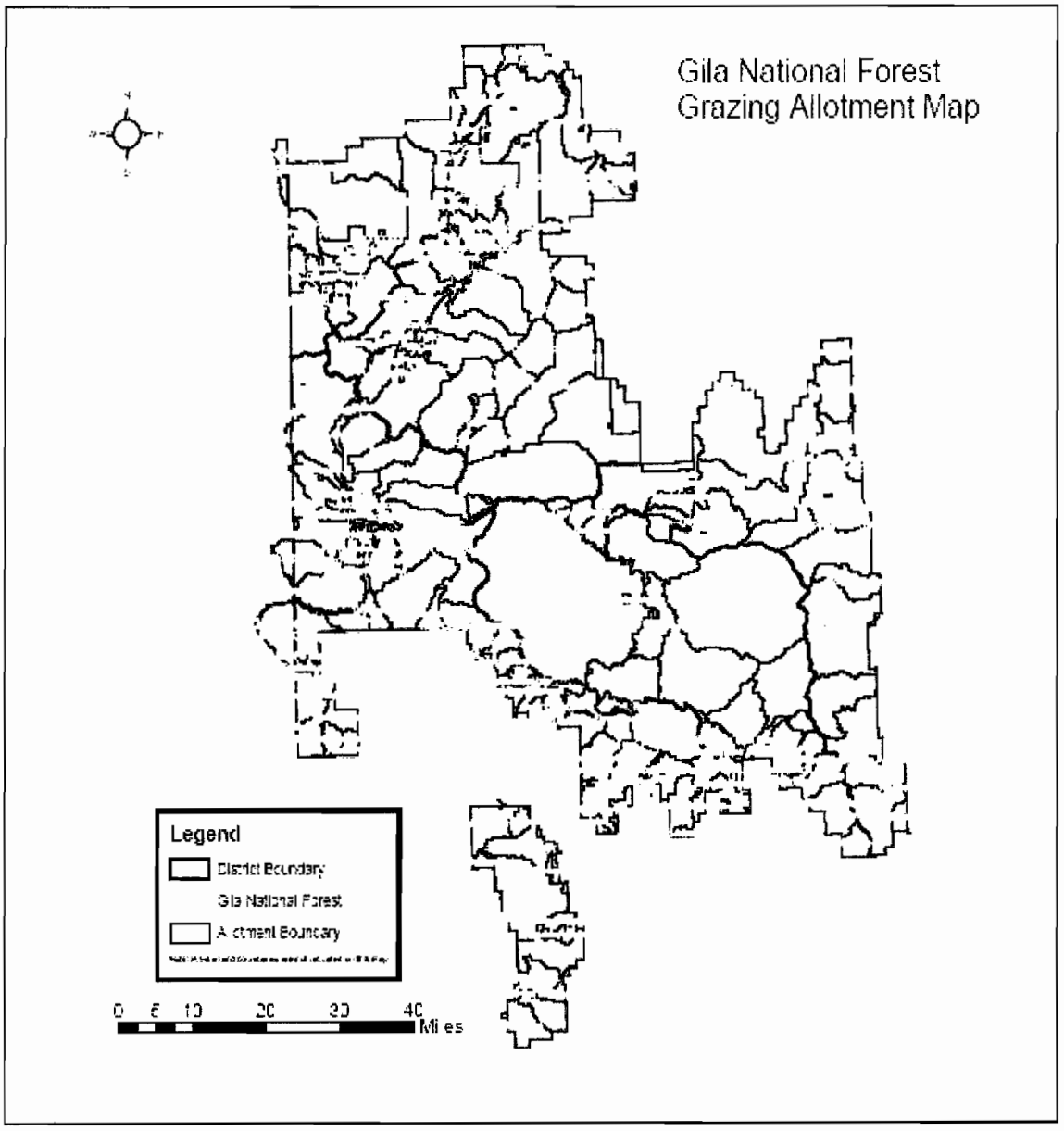

Figure 4. Grazing allotments for Gila Forest, NM. (Courtesy of USFS 2008a)

Allotment size and private property size within the recovery area varies from less than 10 acres to tens of thousands of acres, with average ranch size from 50-200 acres (Vynne per. obs. 2008). The forests and wilderness areas are heavily hunted, mostly for elk, and hunting is promoted to reduce the competition for grazing land with cattle (Robinson per comm. March 2008). Occasionally, allotments are closed off to cattle to allow for the recovery of foraging areas. Cattle are supposed to be removed from closed

areas, but there is little management of 'trespass' cattle and they are often seen grazing in the closed areas (Parsons, Robinson per comm. March 2008). As one interviewee stated, "[The ranchers] spread their cattle over thousands of acres…when I first set eyes on western ranch land and was told they graze cattle here I was blown away- what do they eat? [In the Southwest ranchland accommodates] maybe 6-10 cattle per square mile…[so ranchers] spread them out to make them find food all year round" (CINM1).

Captive wolves can be released into the "primary recovery zone" located in the Apache National Forest in Arizona. Wolves can then move into the "secondary zone" that runs into New Mexico. Wolves can only be released into New Mexico if they are being translocated from another part of the recovery zone. In other words, as the recovery plan currently reads, no captive wolves can be released into New Mexico, a decision made based on objections from state officials (Parsons per comm. March 2008). Wolves establishing territories outside of the BRWRA are captured and relocated within the BRWRA or returned to captivity. Wolf advocates have argued this management as one of the most problematic rules of the recovery plan, leading to numerous wolf injuries and deaths (Robinson per comm. March 2008).

Depredations in the BRWRA

The Adaptive Management Oversight Committee (AMOC) estimates that, historically, livestock producers lost about 4% of their animals to predation, lightning, sickness, and landscape factors (AMOC 2005). During 2002, the highest recorded year of depredations by wolves, losses of livestock for all factors were still at about 4%, with wolves accounting for an estimated 2.5% of losses (USFWS 2007a; AMOC 2005). Some ranchers perceive their losses to wolves to be much greater (up to 30%), but government field agents estimate impacts to between less than 1% to 3% (GINM1, GINM2, GIAZ3, RINM3, RINM2, RSNM7.2 per comm. 2008). The total annual estimated cost of these depredations is expected to be between $38,650 and $206,290 (USFWS 2007a).

In comparison to the government figures, Kroeger et al. (2006) estimate the total cost of livestock depredations in the Southwest from 1998-2004 to fall between $27,887

to $119,995, with injuries to livestock costing an estimated $4,250 and additional costs to ranchers (e.g. time spent applying for compensation) at $6,240. The total amount of uncompensated livestock losses for 1998-2004 is estimated between $5,017 and $97,125 and the total amount of regional economic output lost (including lost livestock production and other costs to local communities) combined with uncompensated livestock losses to be between $4,375 and $126,011 (Kroeger et al. 2006). Figures 5 and 6 show two depredation cases in Arizona.

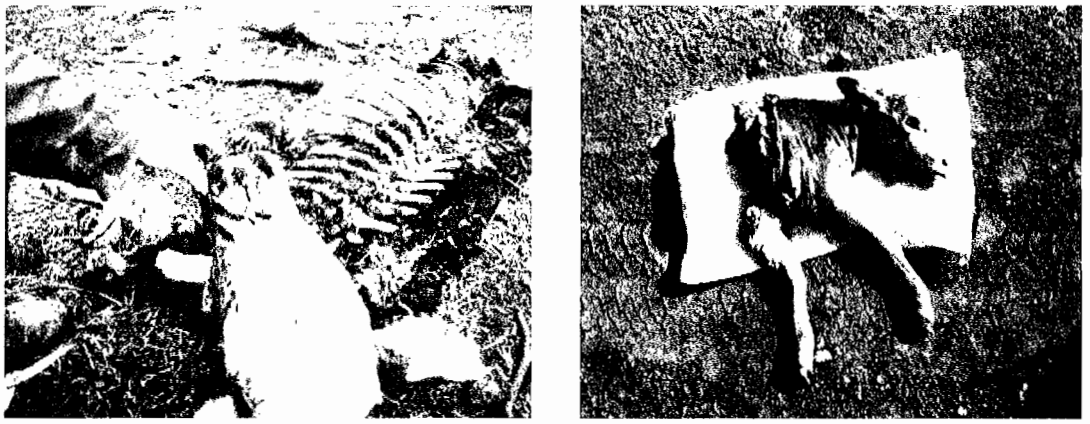

Figure 5-6. Two cases of depredated cattle.
(Photos courtesy of Laura Schneberger)

Estimates of the actual number of depredations occurring compared to those that are verified range from 2:1 (two wolf depredations for every one found) to 8:1 (Kroeger et al. 2006; Dougherty 2007). Research in other areas of the United States have found that coyotes and dogs typically have a much larger impact on livestock, and "wolves may in some circumstances account for only 20-50 percent of the depredations for which they are held liable" (Kroeger et al. 2006, 24). An argument has also been made that mountain lions may cause more depredations than wolves in BRWRA (Thompson 2007). Researchers from the University of Arizona in conjunction with USFWS conducted a Mexican wolf scat analysis and found only 4% of the wolf's diet could be linked to livestock (Reed et al. 2006).

As seen in Figure 7, at the national level, wolves play a small part in livestock deaths.

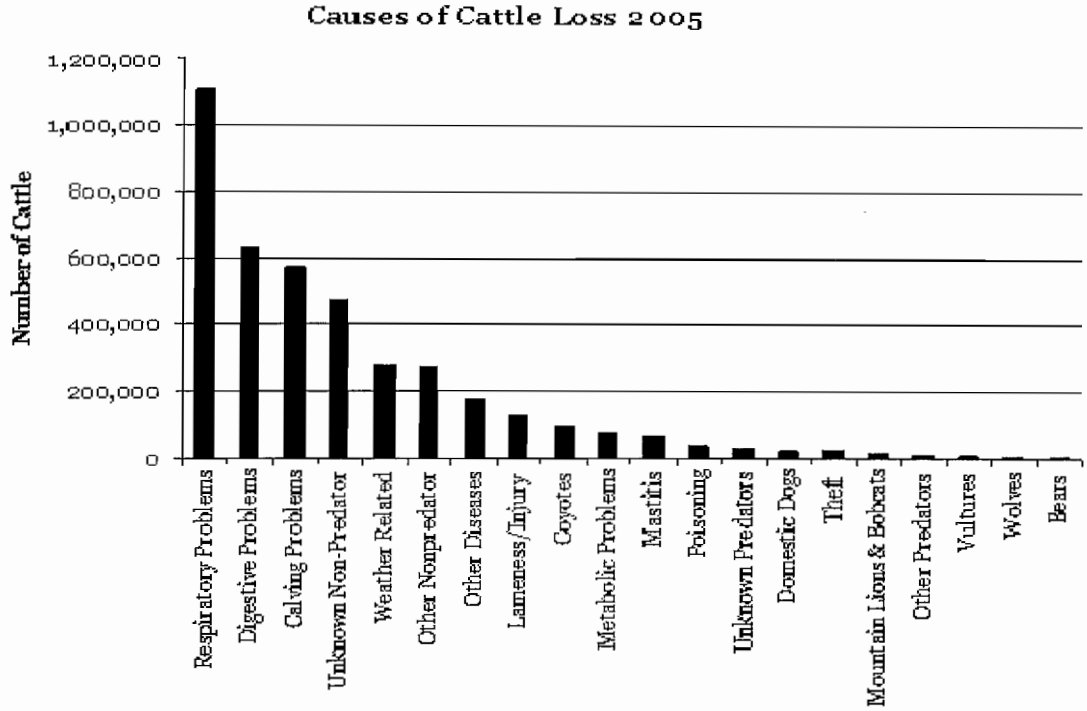

Figure 7. National Causes of Cattle Loss for 2005. (From Defenders of Wildlife, courtesy of USDA-NASS 2006a.)

According to agricultural data, for the United States as a whole, predators account for approximately 5% of cattle losses, with wolves responsible for only 0.11% of losses (USDA-NASS 2006a). Domestic dogs, coyotes, vultures and theft are stronger contributors than wolves. The National Agricultural Statistics Service (NASS) has not tracked the exact number of cattle losses from wolf predation for most states, but they have tracked cattle losses by groups of "other predators" with includes wolves, bears, vultures and other predators. For Arizona, cattle losses due to predation by "other predators" were found to be 0.21%, and 0.68% for New Mexico (USDA-NASS 2006a). For sheep, "other predators" were found to be responsible for 2.56% of sheep losses in Arizona, and 0.78% of sheep losses in New Mexico (USDA-NASS 2006b).

However, it is important to again emphasize that while the actual losses may be minimal, consideration must be given for the economic impact on individual ranchers, as well as how perceptions of loss can influence attitudes. Depredations in the BRWRA tend to be concentrated in specific areas that overlap wolf home range, and have been most heavily experienced in the New Mexico portion of the BRWRA, especially in

Catron County likely because it is more forested than other areas (GINM5, GIAZ3, RIAZ6 per comm. 2008). The accusations of wolf baiting Catron County, discussed below, is an example of how real and perceived losses can influence attitudes and drive behavior to rid the area of wolves in the Southwest.

Catron County

Many of the communities within the BRWRA have spoken out against the wolf recovery: Catron County has been the most vocal and adamant opponent of wolf recovery since the 1980s (Robinson 1998; Dougherty 2007). The residents of Catron County have filed the most claims for compensation, with almost 200 filed in a span of two years (Dougherty 2007). The largest portion of compensation has also been paid out to Catron County residents, accounting for over 20% of payouts (Miller per comm. March 2008) indicating that it may be a 'hotspot' for concentrated depredations. In 2007, the County illegally passed an ordinance allowing for the "take" of wolves perceived as a threat and planned to trap wolves seen on the Adobe-Slash Ranch (Dougherty 2007). Catron County has argued that wolves are driving down the local economy, but only an estimated 1% of personal income from Catron County comes from ranching (CINM1 per comm. 2008; Dougherty 2007).

In December 2007, a cowboy on one of the largest ranches in Catron County that falls within the BRWRA, confessed to "wolf-baiting" (Dougherty 2007). The cowboy managed several thousands of cows on the Adobe-Slash Ranch, and had witnessed a female wolf visiting the ranch numerous times. He admitted to branding cattle near the den of the wolf in order to attract her to kill and receive her third strike and later claimed he had left vulnerable calves in the vicinity of the wolves (Dougherty 2008). Defenders of Wildlife is withholding $7,400 in compensation for nine verified livestock kills and suspending further compensation until an investigation on the wolf-baiting statements are completed (Dougherty 2008). This is not the only incident of wolf-baiting or even bounties being set for wolves (CIAZ3, RIAZ7 per comm. 2008), a demonstration of the length that individuals may go to build a case against the wolves, even when provided compensation for livestock losses.

Management of Mexican Wolves and Depredations

When wolves depredate livestock, there are specific management strategies in place for dealing with these "problem" animals. In fact, much of the management structure for Mexican wolves has in many ways been shaped by influence from livestock associations, as well as developed as a means for controlling livestock depredations. Beginning with the initial discussions of recovery, the USFWS determined that collaboration among various stakeholders was essential for management of the Mexican wolf. In the 1980s, a taskforce was formed with representatives from a variety of communities: ranchers, landowners, outfitters, state agencies, and two conservation groups. While this group helped to shape the recovery program during the 1980s and 1990s, it wasn't until 2003 when a formal collaboration was formed among the state, federal and tribal agencies. In 2003, USFWS entered a memorandum of understanding (MOU) with state, tribal and federal agencies to establish an Adaptive Management Oversight Committee (AMOC). This collaboration is identified as one of the great strengths of the recovery project (Morgart per comm. March 2008). AMOC was developed to incorporate various stakeholders into the overarching management of the reintroduction program, with on-the-ground management to be carried out by an Interagency Field Team (IFT). AMOC, further described in Table 2, consists of representatives from the various agencies: Arizona Game and Fish Department, New Mexico Department of Game and Fish, U.S. Fish and Wildlife Service, White Mountain Apache Tribe, United States Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services[vi] (USDA-APHIS-Wildlife Services), and the USDA Forest Service. The IFT works under the administration and direction of AMOC, carrying out the reintroduction efforts on the ground. In addition, an Adaptive Management Working Group (AMWG) was also developed to expand participation beyond the AMOC representatives to other state and county participants. AMWG holds public sessions on a quarterly basis. A breakdown of the memberships and roles of each group are further explained in Table 2.

Table 2. Key Interagency Mexican Wolf Recovery Program Collaborators. (Based on information from AZGFD 2008.)

Group	Members	Description	Role in Depredation Mitigation
AMOC (Adaptive Management Oversight Committee)	Arizona Game and Fish Department, New Mexico Department of Game and Fish, White Mountain Apache Tribe, USDA Animal and Plant Health Inspection Service, Wildlife Services, USDA Forest Service and U.S. Fish and Wildlife Service (Currently chaired by the Arizona Game and Fish Department)	Responsible for management of the recovery program	Defines management rules for depredating wolves
AMWG (Adaptive Management Working Group)	AMOC agencies and other state and county government agencies and meetings are open to the public	Provide additional input from counties, agencies and the public to AMOC	Provides input to AMOC on management of depredating wolves
IFT (Interagency Field Team)	Field team leaders (one per state and tribal lead agency), wildlife biologists and specialists, depredation specialists, conservation education and outreach specialists, field assistants and other staff as the lead agencies and cooperators deem appropriate and necessary	Carries out the day-to-day, on-the-ground activities for the wolf reintroduction on behalf of AMOC	Verifies depredations and conducts research on depredations

Standard Operation Procedures (SOPs) provide commonality and consistency among the implementing agencies. AMOC recognizes the "conflict between rural and urban values, perceptions and points of view that stresses the Mexican gray wolf program and local residents in many ways" (AMOC 2005). Therefore, the SOPs were not only to provide guidance to the administrators of the program, but to ease concern among landowners and ranchers affected by the wolf recovery. Topics covered by SOPs include translocation, responses to depredations (defined by AMOC as the confirmed killing or wounding of lawfully[vii] present domestic livestock by one or more wolves), monitoring, darting, howling surveys, and capturing wolves.

SOP-11 covers management of livestock and domestic animal depredations by wolves (AMOC 2005). IFT is required to respond immediately to reports of depredations by contacting the affected person and developing a timeline for investigation (there are slight adjustments for procedures on tribal lands). Guidelines for determination of death are outlined as well as classification for confirmed, probably, possible, or not a wolf kill. The IFT investigator completes a depredation report, providing the person who suffered depredation two copies of the report as well as information on the Defenders of Wildlife compensation program (See Appendix B for Depredation Report Form). Wolves (individuals or packs) identified as depredating livestock or found scavenging on carcasses are recorded and assigned a "strike" (described below). These individuals are carefully tracked and decisions are made as to their fate, such as removal or translocation, if they continue to depredate on livestock.

Standard Operation Procedure 13 (SOP-13) "Control of Mexican Wolves" is a greatly contested aspect of the reintroduction program. SOP-13 contains protocols for: 1) Listing criteria for determining the status of "nuisance" (non-depredating) and "problem" (depredating) wolves; and 2) developing guidelines for wolf control actions (AMOC 2005). Under SOP-13, the "three strikes" rule calls for permanent removal of wolves that have three depredations within a 365 day period. The rule was developed in that control of "problem" wolves was felt to be essential for successful recovery of the population as a whole. SOP-13 also authorizes the "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) or removal of wolves that: (1) prey on livestock; (2) attack pets or domestic animals other than livestock on private or tribal land; (3) impact game populations in ways which may inhibit further wolf recovery; (4) prey on members of the desert bighorn sheep herd found on the White Sands Missile Range and San Andres National Wildlife Refuge so long as the State of New Mexico lists it as a species to be protected; (5) are considered problem wolves; (6) are a nuisance; (7) endanger themselves by their presence in a military impact area; (8) need aid or veterinary care; (9) are necessary for authorized scientific, research, or management purposes; (10) threaten human life; or (11) establish territories wholly outside of BRWRA (AMOC 2005).

Lethal take is allowed when immediate removal of "problem" wolves from the wild is necessary or non-lethal attempts have proven ineffective. SOP-13 defined problem wolves as those that 1) have depredated lawfully present domestic livestock, (2) are members of a group or pack (including adults, yearlings, and young-of-the-year) that were directly involved in livestock depredations, (3) were fed by or are dependent upon adults involved with livestock depredations (because young animals will likely acquire the pack's livestock depredation habits), (4) have depredated domestic animals other than livestock on private or tribal lands, two times in an area within one year, or (5) are habituated to humans, human residences, or other facilities (AMOC 2005). SOP-13 outlines specific criteria for investigating and assigning strikes against wolves that depredate. The number of wolves removed from BRWRA and the purpose for their removal is presented in Figure 8. SOP-11 and SOP-13 are both being considered for revisions or clarification, discussed below.

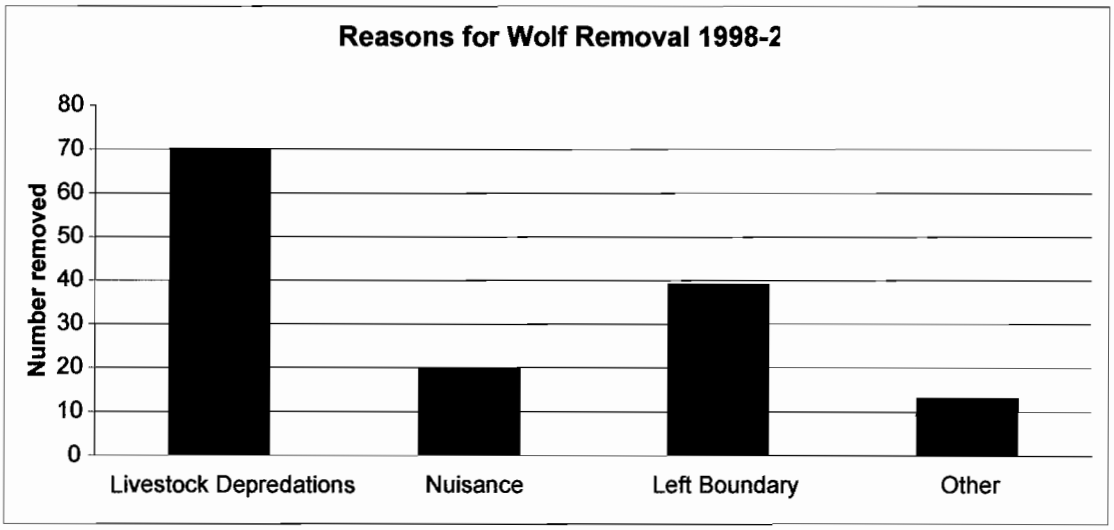

Figure 8. Reasons for wolf removal during first 10 years of reintroduction program. Lethal control has been used for 11 wolves, permanent removal (i.e. placed into zoos or breeding centers) for 23 wolves, and 108 wolves have been temporarily removed. "Other" includes dependent pups or repairings. (Based on data from USFWS 2007b.)

Lethal take is only permitted when administered by AMOC: members of the general public are punished for killing wolves. Rewards from government agencies and nonprofit organizations for information leading to the conviction of an individual

responsible for killing a wolf total about $45,000 (Aleshire 1998; Morgart per comm. March 2008). Non-injurious harassment of wolves, however, can be done by the general public when wolves come within 500 yards of humans, animals or buildings, but a report must be filed with the USFWS's Mexican Wolf Recovery Coordinator. In addition, IFT and USFWS employees can haze wolves in a non-injurious manner to prevent nuisance or problem behavior.

Five-Year Review Recommendations for Improved Management of Depredations

The management of the recovery, and specifically SOP-13 and section 10(j) under the ESA, has come under great criticism from a number of conservation organizations. Criticism focuses on the haphazard use of the term "adaptive management", lack of obligation for ranchers to modify husbandry practices or remove carcasses, restriction of the recovery zone (and that the boundaries are based on politics and not ecology), failure to implement recommendations of the 3 year review, and the continued classification of the wolf population as "non-essential experimental" (Parsons 2008; Robinson 2005; Hailey 2008; Parsons, Robinson per comm. March 2008). In 2005, AMOC and IFT completed a five-year review of the reintroduction project (AMOC 2005), of which many of the recommendations addressed concerns presented by conservation organizations. Highlights from the 5-year review recommendations, as they are applicable to livestock depredations, are presented below.

Recognition of Issues with Grazing Allotments. Ranchers pay a fee to graze livestock on federal lands. The fee is based on a calculation of Animal Unit Months, or AUMs, which is the amount of forage a cow and her calf eat in one month, along with other factors such as the ability of the rancher to pay and the price of beef (GAO 2005; Cowan per comm. March 2008). The price is admittedly low, at about $1.40/cow/month, or as some noted, less than it costs to "feed a hamster" (CINM2, CINM1 per comm. 2008). A study by the Governmental Accountability Office (GAO) found fees charged for grazing come no where close to offsetting the grazing-related expenses of the government (GAO 2005). The Gila National Forest is approved for almost 270,000 AUMs (used and vacant) of which over 146,000 AUMs have been billed. The Apache – Sitgreaves National Forest is approved for almost 210,000 AUMs, of which over 95,000

have been billed (GAO 2005). Low grazing fees have led to expansion of livestock throughout much of the historical Mexican wolf range, leading to competition between natural prey and livestock. Livestock depredations are inevitable when grazing is allowed throughout the BRWRA.

Opening of New Recovery Areas. AMOC recognizes that the "areas for release and establishment of wolves have not always been selected on the basis of biological suitability, cost efficiency, logistical feasibility, wolf management feasibility, and minimized potential for impacts on existing land uses" (AMOC 2005, AC-6), but instead many decisions are politically motivated. The recovery plan requires recapturing or removal of wolves that move beyond the arbitrary boundaries of the BRWRA. Defenders of Wildlife and other conservation organizations such as The Rewilding Institute (TRI) and Center for Biological Diversity (CBD) argue that new suitable habitat areas need to be designated to support additional populations and further recovery of the wolf (Miller, Parsons, Robinson per comm. March 2008). Opening of new areas may also reduce instances of concentrated depredations. Recommended areas being studied for recovery feasibility include the Grand Canyon, Sky Islands borderlands (US-Mexico border), Apache Highlands (partially under the San Carlos Apache Reservation which currently rejects reintroduction on their lands), northern Mexico (Sierra San Luis and Sierra del Carmen), Chiricahua Mountains in southern Arizona and Big Bend National Park and Big Bend Ranch State Park in Texas (WWF-International 2004).

Lack of Resources and Capacity. The reintroduction program faces a lack of government resources for management, monitoring and research. The lack of funding for staffing as well as for dealing with livestock depredations is acknowledged as "a huge impediment to local acceptance of wild Mexican wolves… [funding for depredations] would not eliminate opposition, but it would separate those who are adamantly opposed regardless from those who are opposed at least in part because they bear brunt of the real [economic losses]" (AMOC 2005, AC-4)).

Need for Incentives. The review recommends developing a program that offers relief from depredations including prevention, quicker responses, carcass discovery,

monitoring, removal, burial, destruction; adjustments to the grazing fee; and compensation for documented and undocumented losses of livestock.

Lack of Outreach. Creation of a new position to work among the collaborators and stakeholders on proactive measures is recommended by AMOC and IFT. The 5-year review recognizes the misperceptions held about the program and the need to ensure correct information is reaching the appropriate communities. Although the review acknowledges the need for outreach, the outreach position within IFT was recently eliminated (Beeland 2008; Oakleaf per comm. April 2008).

Limitations on Government Mandates. A major challenge faced by AMOC is the restriction of management on private property. It is expected that wolves are scavenging on carcasses (cattle that have died from causes other than wolf depredations) and that this may lead to increased livestock depredations as wolves become accustomed to cattle as part of their diet. However, neither state nor federal authorities can mandate the removal of carcasses neither from private property nor from a permitee on public land where livestock grazing is authorized (AMOC 2005). Livestock associations from both states have publicly acknowledged their opposition to mandatory removal of carcasses from public land (AMOC 2005). AMOC and IFT recognize the need to improve the incentive program to encourage immediate carcass removal and reduce potential wolf attractants.

Revise SOPs. SOP-11 and SOP-13 are both being considered for revision (Johnson et al. 2008). Public comments were accepted through June 25, 2008 with the final clarification or redrafting to be completed on July 31, 2008.[viii] Some of the recommendations proposed in this thesis may be addressed in the clarification memo that will be released in the summer of 2008. The clarifications being proposed address implementation of SOP-11 (e.g. investigation of wolf depredations and filing of reports), particularly in how the adaptive management process is carried out. Investigators will be required to record not only what happened, but hypothesize why it happened. For example, why did a wolf or wolves depredate on this particular animal at this particular time in this particular place? In addition, they must identify what steps might have been

taken to prevent or mitigate the depredation. AMOC and IFT acknowledge in their clarifications that more research on the biological aspect of predation is essential to be able to initiate proactive measures. The clarification memo will also provide clearer guidance for the management of depredating wolves- e.g. who should be contacted and who makes the ultimate decisions regarding assigning depredating incidents to individual wolves and removal techniques. The agencies also intend to clarify when assigning a "strike" is not appropriate, for instance if a wolf is intentionally lured towards cattle through wolf-baiting.

Wolf-Livestock Conflict Mitigation Programs in the Southwest

Although subsequent reviews have recognized the gap, the 1982 USFWS Mexican wolf recovery plan did not include a program for compensating ranchers who lose livestock to wolves. Recognizing this gap, the nonprofit organization, Defenders of Wildlife, began talking with ranchers in the 1980s to develop a plan for financial compensation. Since the reintroduction of wolves in 1998, additional programs for mitigating livestock depredations have been developed by state and federal governments and other organizations. The Defenders of Wildlife "Wolf Compensation Trust" program is the focus of this thesis because it is the only program that has been widely implemented, however, an overview of additional existing and planned programs that may act as complementary to the Defenders of Wildlife program is also provided.

Nonprofit Depredation Mitigation Programs

Defenders of Wildlife's "Bailey Wildlife Foundation Wolf Compensation Trust". In 1987, Defenders of Wildlife established a livestock compensation program in Northwest Montana[ix] to offset the first loss of livestock to wolves in over fifty years (Miller per comm. March 2008; DOW 2007a). The compensation program expanded as wolves were reintroduced to other parts of the West. In the Southwest, modifications were made to the program to meet rancher needs as identified through an advisory taskforce, which included representatives from the ranching community. With funding from foundations and individuals, mostly living outside of the recovery area, the

compensation program was in place when wolves first hit the ground in Arizona in 1998. The purpose of the compensation program in the Southwest is to "assume primary responsibility for economic impacts of wolf recovery" (Miller per comm. March 2008). Whether or not compensation should, or could, build tolerance is questioned by those involved in the program; as it currently stands staff acknowledge that the program has been limited in building tolerance and not as effective at doing so as was originally expected (Miller per comm. March2008). Wildlife Services, a division of the United States Department of Agriculture, was selected to verify depredations given their specialization in livestock deaths and stronger relationship with the ranching community (Miller per comm. March 2008).

If a rancher suspects death or injury to livestock by a wolf, they contact the IFT, which dispatches an investigator to the scene. The time for the investigator to arrive varies depending on workload and distance to travel to the ranch. After conducting the investigation, a report is field and mailed to the rancher. If a wolf is confirmed ("reasonable physical evidence to prove a wolf made the attack on a living [and otherwise healthy] livestock or livestock working dog) or determined probable ("based on same strong evidence [as confirmed], but lacks exclusive proof") to be a wolf, information on the Defenders of Wildlife compensation program is also sent to the rancher (DOW 2007b).

Within six months of the incident, the rancher must mail a copy of the IFT report (demonstrating sufficient evidence), full contact information, and a federal tax ID or Social Security Number. Documents are sent to the Defenders of Wildlife Tucson office, where the claim is processed and checks are distributed approximately six weeks after claims are received (DOW 2007b). The compensation program pays 100% fall market value[ix] (so if a calf is killed in the spring, the compensation covers what the calf would have been worth if it had gone to market the following fall) up to $3000, and 50% of value for probable losses.

There is one staff member at the Defenders office managing the compensation program. Compensation is not paid for livestock covered by insurance, illegally present livestock on federal lands, or if carcasses were present in the area acting as an attractant.

Ranchers are not currently required to show they are taking proactive measures to reduce depredations, as they are in the Northern Rockies, but this could be considered in the future (Miller per comm. March 2008).

Up until a few years ago, Defenders of Wildlife was alerted of each depredation and was able to contact the rancher within days of the incident to discuss options for compensation and proactive measures. However, a lawsuit in Texas by ranchers banned Wildlife Services from distributing personal information to organizations or the public (AP 2002). The process has remained fairly simple with little paperwork, but it is still dependent on the willingness of ranchers to send information to Defenders of Wildlife. There is concern that individuals may be discouraged by neighbors, friends or some livestock associations from filing for compensation (Miller per comm. March 2008) or due to their mistrust of environmental groups.

The Defenders of Wildlife compensation program, like other compensation programs discussed above, has been criticized by both sides: conservationists often see it as "another subsidy to ranchers" (Kay 1996, 24), while others claim it is a step in the direction of using the ESA and wolf recovery to run ranchers off the land as well as "a way for animal-rights and anti-hunting groups to ban all hunting and use of wildlife" (Kay 1996, 31). In other areas of the US where the program has been implemented, ranchers feel it is a public relations ploy for Defenders of Wildlife and not developed in the best interest of the ranchers (Kay 1996; Naughton-Treves et al. 2003). A concern for some ranchers is that Defenders of Wildlife has committed to paying for verified losses as long as species remain on the ESA, but there is no legal obligation for indefinite commitment and the program could be terminated at any time (Kay 1996; Miller, per comm. March 2008; RINM2).

Defenders of Wildlife understands the limitations of the program and the opportunities for it to be exploited as a potential perverse incentive (given that payments can be above actual market value if fall price is paid), but even so they made a commitment to offset the economic costs to local communities from wolf recovery and see value in continuing the program (Miller per comm. March 2008). As Miller states:

> It's a neighborly thing, and the rancher's respect that...they don't embrace wolf recovery, but recognize that wolves are here and here to stay and if [Defenders is] offering a way to help and stay at the table than they embrace that…a real value for compensation is that it helps us identify ranchers and where conflicts are reoccurring so we can identify resources and collaborative relationships that will help prevent further losses (per comm. 2008).

Between 1998 and 2007, Defenders of Wildlife paid $97,984.82 in compensation to ranchers for depredations caused by the Mexican wolf (DOW 2007c). Sixty-one payments were made for 148 cattle, 1 sheep, and 10 "other" animals.[x] Towns where payments were mailed, and the animals for which compensation was paid, are in Figure 9.

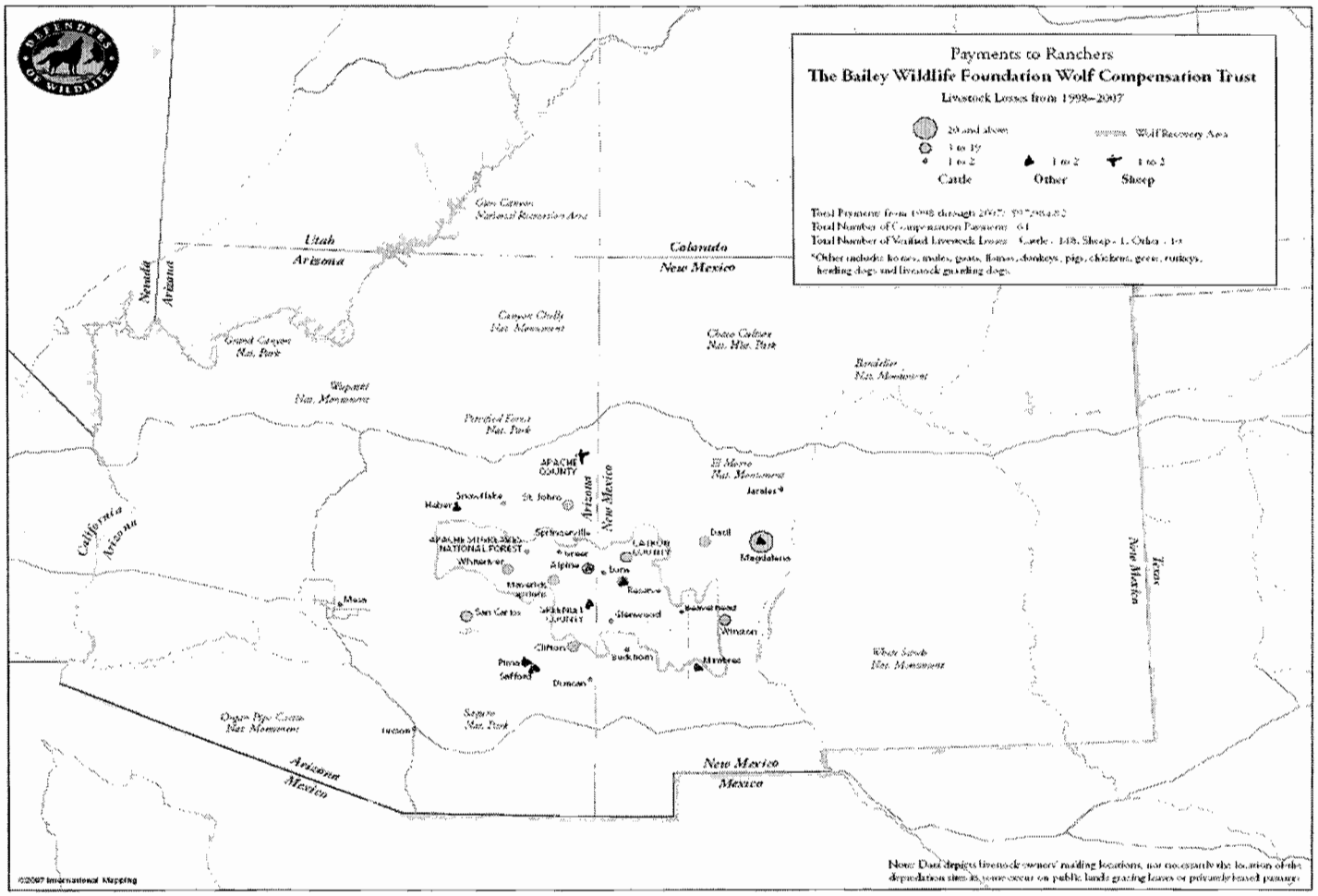

Figure 9. Defenders of Wildlife Wolf Compensation Map (Courtesy of Defenders of Wildlife 2007c.) Note the towns identified are where checks were mailed, not necessarily the site of the depredation. A table breakdown by county, town and livestock compensated is provided in Appendix C.

Given that there were 159 animals for which compensation was paid out, the average payout per animal was $616.26 and the average payment was $1606.31 (DOW 2007c). It is not possible to tell whether these were 61 separate individuals or whether some individuals received multiple payments.

Defenders of Wildlife's "Bailey Wildlife Foundation Proactive Carnivore Conservation Fund". Recognizing the value of depredation prevention, Defenders of Wildlife established a proactive fund to "make resources available to ranchers on a cost-share basis" (Miller per comm. March 2008). The Bailey Wildlife Foundation Proactive Carnivore Conservation Fund enables Defenders of Wildlife to support "...projects employing the best available measures for reducing the potential for problems with predators" (DOW 2007d, 1). Funds support reducing conflicts, preventing unnecessary killings of predators by government agencies, and improving public acceptance of predators and predator conservation. Defenders of Wildlife has funded the hire of range riders to patrol wolf and grizzly habitat, purchase of guard dogs to protect grazing livestock from wolves, building of electric and deterrent fencing, and support for aerial telemetry (DOW 2007e). From 1999 to 2007, Defenders of Wildlife funded almost 90 wolf related projects in the Western United States with a total expenditure of over $285,000 (including project related expenses and staff time) (Ibid).

Since 1998, roughly $44,570 (or 15% of total proactive expenditures) has been spent in the Southwest on approximately ten wolf-related projects (Ibid). Expenditures include purchasing of turbo fladry, hiring of range riders, supporting the movement of cattle during calving periods, and a workshop to train herdsmen to protect sheep from wolves. For the range rider program, Defenders of Wildlife often hires sons and daughters of ranchers or their neighbors, as opposed to random individuals to mitigate "concern that we are putting spies out on horseback" and pays compensation of $1,200-1,500/month (Miller per comm. March 2008).

In late 2007, Defenders of Wildlife hired an additional full-time field staff position to work with the compensation program manager to focus on ranchers and communities interested in pursuing proactive measures to prevent conflicts (Miller per comm. March 2008). While it may take some time to reach out to the communities,

progress has been made at making connections with a few individual ranchers, as described by Miller:

> One couple recently lost a valuable horse [to wolves] and had expectations of winning hundreds of thousands of dollars because they wanted it to race and breed and that's [no longer] going to happen. The husband was not comfortable having a conversation yet about wolves, but [the Defender's employee] was able to connect with the wife. The wife mentioned they'd be interested in getting llamas for guard animals. And [the employee] made the connection and we were able to identify rescue llamas that we'll now be able to provide to this operation (Miller per comm. March 2008).

Defenders of Wildlife does not publicize the names of ranchers they are working with, as there is concern that once they establish a relationship with a rancher, livestock associations may contact the ranchers to discourage them from collaborating with Defenders of Wildlife (Miller per comm. March 2008).

Mexican Wolf Fund. The Mexican Wolf Fund (MWF) works in cooperation with the IFT to identify opportunities for supporting the Mexican wolf program related projects and programs including reduction of wolf/livestock conflicts. The majority of funding is currently directed at conflict prevention and reduction, such as range riders, fladry, fencing, increased monitoring (e.g. radio collars), and volunteer support (MWF 2008). With approximately $250,000 raised from foundation grants and private donations, MWF works with the IFT and ranchers to assess projects that will reduce depredations. Examples of projects recently supported by MWF include a grant of over $40,000 to install wolf-proof fencing on a ranch that had experienced multiple depredations, and the purchase of feed whereby ranchers receive the cost of feed for keeping cows and calves in close to the ranch house during calving season (RINM1, GIAZ3 per comm. 2008; MWF 2008). The independence of MWF has helped shape its success as it offers an alternative to accepting financial support from government or environmental organizations. However, the sustainability of MWF, including management and financial basis, is currently dependent on a few dedicated individuals willing to write grant proposals and work one-on-one with ranchers.

Government Depredation Mitigation Programs

United States Fish and Wildlife Service Interdiction Program. USFWS is developing a "Wolf-Livestock Interdiction Program" (USFWS 2007a). Like the Defenders of Wildlife program, the purpose of the interdiction program is to offset the economic losses ranchers experience from the wolf recovery program. The intention is for the program to eventually be managed as a non-federal program, run by a voluntary committee comprised of stakeholders from New Mexico and Arizona with state and federal agents providing technical guidance and acting on-the-ground administration support (Morgart per comm. March 2008; USFWS 2007a; Toggle 2007). The program would provide funding for:

1. Compensation: financial reimbursement for wolf predation of livestock;
2. Interdiction: payment for measures to prevent or reduce wolf/livestock interactions (guard dogs, range riders, fencing); and
3. Incentives: upfront payments for potential livestock losses

Funding for establishing the initial principal of the endowment ($5-8 million) is currently being solicited from legislative appropriations, private donors, environmental organizations, livestock associations, government agencies (including federal, tribal, state and local), hunting groups, and other individuals. To ensure the long-term sustainability of funding for programs, the initial investment will not be spent, only the interest generated from the fund. Neither the amount of the current balance of the fund nor when payments will begin being made is publicly available, but USFWS did indicate they are waiting for an initial large donor to 'kick start' the solicitation campaign (USFWS per comm. March-April 2008). Although USFWS is working to make the program as independent as possible through management by a group of local stakeholders, in the meantime it may still be viewed as a government program, and therefore face opposition from individuals who feel the government is imposing on their property or rights.

New Mexico Department of Game and Fish Program. Some states are also taking the initiative to develop their own programs (NMDGF, MTDGF per comm. April 2008). In the Southwest, the New Mexico Department of Game and Fish is developing a

fund for supporting proactive measures. Payments for a limited number of range riders, who receive about $3000/month, have been distributed and there are plans to hire 3-4 riders in 2008. The program, however, also faces issues of securing sustainable funding, as they have had to solicit funds from private donors and foundations (MWF, NMDGF per comm. April 2008). The program may also have issues of gaining trust of individuals opposed to government intervention.

Summary of Depredation Mitigation Programs

Each of the above mentioned programs face challenges in management, funding, and acceptance by the ranching community, but they are also making advancements in offsetting economic losses and preventing livestock from being killed by wolves. Defenders of Wildlife's compensation program is not the only depredation mitigation program operating in the Southwest, but it is currently the most prominent program. A challenge for all the programs will be to further explore cross-program collaboration and ensure that efforts are complementary.

Notes

i Also called 'livestock', 'stockgrowers' or 'cattle growers' associations

ii If a species reintroduction is critical to avoid extinction, the population can be designated by the government as an "experimental" population under Section 10(j) [16 U.S.C. 1539], hence receiving a lower level of protection than what would typically be provided. This enables greater flexibility in the management of the population, and often is enacted when a species reintroduction is politically controversial (Matsumoto 2003). In addition, section 10(j) allows for reintroduction protocols to accommodate needs such as managing depredations (Schlickeisen 2001; U.S. Congress 1973). Populations can only be designated as experimental when they are geographically separated from a non-experimental population of the same species (U.S. Congress 1973). Experimental species listed under the ESA must also be designated as "essential" or "nonessential" to the continued existence of an endangered or threatened species. A classification of "nonessential" means that critical habitat will not be designated for protection of the species. According to Robinson, the classification of Mexican wolves as "experimental non-essential" was a political choice, not ecological (Robinson 1998) - the wolves would likely have not been reintroduced without this classification, but instead the proposed program would have spent decades in court.

Although the ESA requires a recovery plan for the entire species, wolves continue to be managed on a subspecies basis, and no recovery plan has been prepared at the species level (DOW/NRDC 2008). The population recovery plans are outdated (for example, as noted above the Mexican wolf plan was written in 1982) and may not include recent scientific data that could contribute to recovery on a species or subspecies level. Several conservation organizations recently bought suit challenging the United States government with fulfilling obligations to the ESA to develop recovery plans that incorporate sound science and support survival at the species and subspecies level.

iii The White Sands Missile Range in New Mexico was also proposed as a potential recovery area in the 1980s, but experienced a severe crash in deer populations and was estimated to only be able to support 30 wolves. Reintroduction, or developing a corridor system to link White Sands and BRWRA, is still proposed by some wolf advocates (CINM1, GINM1 per comm. 2008).

iv Although the wolves were marked to ensure that they were not mistaken by hunters as coyotes or wild dogs, the killing of the wolves during the initial release year was suspected to be a case of "mistaken identity" by "trigger happy hunters", not intentional killings (Aleshire 1998).

v This is the total number of visits. Kroeger et al. estimates there are approximately 1.2 million visits by 830,000 local residents (from AZ or NM) and 2.1 million out-of-state visitors each year (2006).

vi Wildlife Services is a division of the United States Department of Agriculture - Animal and Plant Health Inspection Service (USDA APHIS). One major objective of Wildlife Services is to reduce the threat posed by wildlife on livestock and agricultural property (USDA Wildlife Services 2006). They provide technical assistance so people can reduce conflicts on their own, direct assistance to manage problems that can be resolved, and scientific research to improve knowledge and future decision-making. Wildlife Services receives their funding from federally allocated funds as well as from producers, private individuals, businesses, and other Federal, State, Tribal and Local government agencies. The spread of wolves outside of BRWRA causes additional expenditures to Wildlife Services and "increased demand for WS' assistance in addressing depredation complaints, makes it difficult to respond to the number of requests" (USDA Wildlife Services 2006).

vii Livestock are declared as "unlawfully" or "illegally" present if they are on federal lands that are seasonally closed to grazing to allow for recovery of the forage lands. There have been cases of wolf depredations on trespassing or illegally present livestock. Despite being contested by conservation organizations, Fish and Wildlife has ordered the removal of a member of a pack responsible for killing illegally present cattle (CINM2 per comm. 2008).

viii Because of the timing of these changes, I have included information regarding wolf management that is current through May 2008.

ix Following the 2008 delisting of the wolf in the Northern Rockies, Montana's state-sponsored compensation program has replaced the Defenders of Wildlife program.

x Market value does not consider the time and costs for taking cattle to market since these costs vary depending on ranch location.

xi "Other" animals may include: horses, mules, goats, llamas, donkeys, pigs, chickens, geese, turkey, herding dogs and guard dogs.

CHAPTER IV

RESEARCH METHODS

This chapter describes approaches to assessing rancher's experiences and perspectives on the Defenders of Wildlife compensation program in Arizona and New Mexico. I present my research questions, hypotheses, methods, and limitations to obtain answers to the questions first posed in Chapter I, and repeated below in Figure 10.

As the objective of the compensation program is to offset the "burden" of local communities living alongside wildlife and recognize their role in conservation, I focused on whether or not the program was meeting this objective by assessing factors I believed would indicate effectiveness of, and additional needs for, the program. I also looked at relationships between the questions, for example, whether efficiency impacts effectiveness. By addressing questions of efficiency and effectiveness, I evaluated whether the program was contributing to the greater objective of supporting Mexican wolf recovery.

Questionnaires were distributed to randomly selected ranchers to assess efficiency of the compensation program, satisfaction with compensation, and influence of demographics and experience on perspectives. Surveys were used to collect experiences and perspectives from a larger sample than could be reached through interviews alone. Interviews were conducted with ranchers, government employees, and wolf reintroduction advocates to obtain further insight into factors affecting success of depredation mitigation programs. A field visit provided an opportunity to meet individuals involved in and affected by the wolf reintroduction project and livestock compensation program. In addition, I was able to experience first-hand the vastness of the BRWRA and challenges that come with preventing depredations.

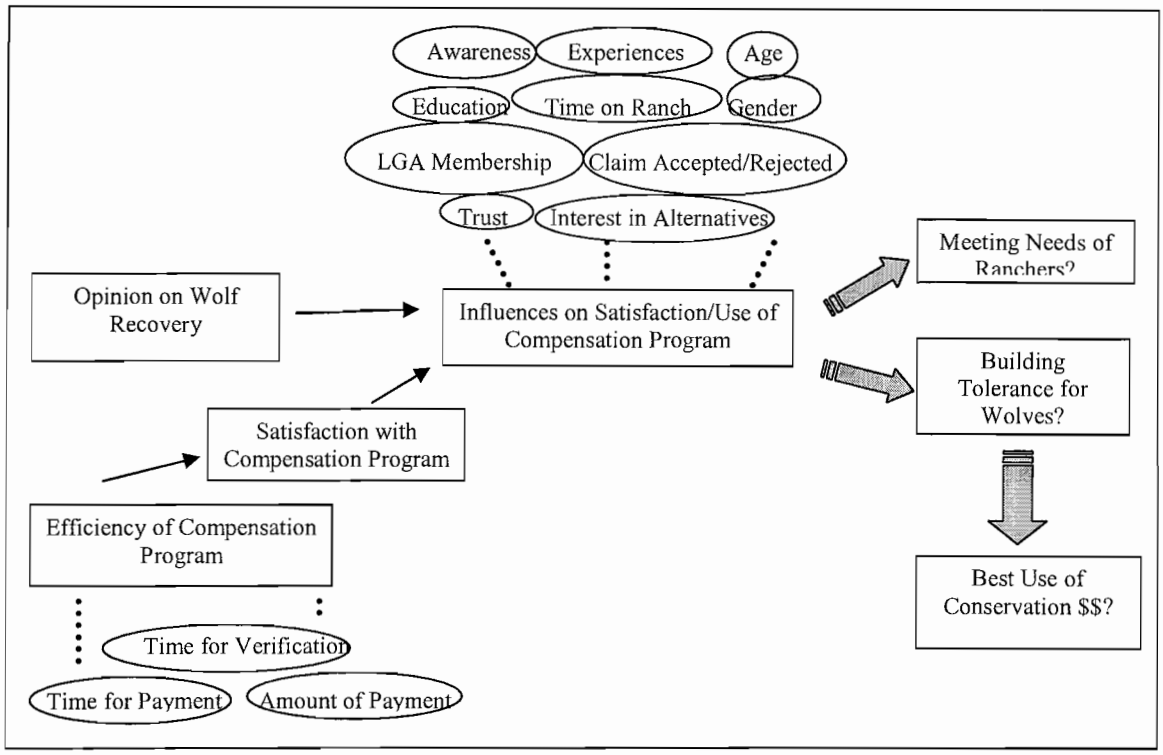

Figure 10. Key research questions with factors assessed for each question.

Based on my literature review and discussions with government and conservationists working in the region, I was aware of widespread criticism for the compensation program. I expected to find inefficiencies in management of the program; for example, long wait periods for verification and compensation or ranchers receiving less than was requested for financial reimbursement. I predicted that inefficiencies would result in dissatisfaction with the verification and compensation process. I also expected additional factors, such as livestock association membership, demographics, or experiences with wolves, to shape perspectives on, and support of, the mitigation program. Because of previous surveying on the influence of social groupings on perspectives, as well as being informed by several contacts that livestock associations in Arizona and New Mexico heavily critique the compensation program, I expected to find differences in satisfaction levels and opinions between livestock association members and nonmembers. I also expected to find some differences in demographics, such as less support for compensation from individuals that had lived through, or contributed to, wolf

eradication. I expected that the survey would identify opportunities for changes in management or outreach of the compensation program.

Mail Survey

To collect quantitative data and gather a broader perspective than could be obtained from a literature review or interviews alone, I conducted a mail survey of randomly sampled ranchers in New Mexico and Arizona. I followed the Tailored Survey Design method as outlined in Dillman (2000) and guidelines from multiple survey design books (Bourque and Fielder 2003; Bernard 1998). The Tailored Survey Design uses multiple contacts, with response rates averaging from 10-80% depending on whether a response is required by law (e.g. United States Census) or the survey is general to the point where the participant sees no personal connection to their responses.

Questionnaires were developed based on surveys of ranching communities in other parts of the country, as well as on factors hypothesized to be unique to the Southwest. Given the goal of assessing effectiveness of the compensation program and barriers that might prohibit success of the program, questions addressed awareness of the Defenders of Wildlife and USFWS programs, perspectives towards the wolf recovery and compensation programs, effectiveness of the verification and compensation process in order to identify potential weaknesses that could be improved upon, and factors that might influence opinions (see Appendix D for survey questions). Participants were also provided space to write comments. Questionnaires were reviewed and tested for clarity prior to finalization among a group of individuals not familiar with the Mexican wolf or compensation program. The survey format was guided by other questionnaires as well as recommendations from professional surveyors.

I contracted the United States Department of Agriculture National Agriculture Statistics Service (USDA-NASS) to randomly select participants from their rancher database as well as distribute and collect the surveys. NASS was select for the following reasons: 1. A survey distributed in the Northern Rockies looking at rancher needs and opinions had also used NASS for rancher selection; 2. NASS manages a database of all ranchers in New Mexico and Arizona and had access to mailing addresses; 3. NASS has

the capacity to, and experience of, administering surveys; 4. A law (mentioned above) prohibiting Wildlife Services from releasing rancher information prevented my access to mailing addresses; and 5. Confidentiality issues with Defenders of Wildlife or livestock associations prevent the release of rancher contact information to me.

The survey population included male and female ranchers over the age of 18 with ranches located in counties within the BRWRA (Apache and Greenlee in Arizona, and Catron, Grant, and Sierra in New Mexico) and those surrounding BRWRA where compensation had been distributed (Graham, Cochise, and Gila counties in Arizona; and Hidalgo, Luna, Socorro, and Cibola counties in New Mexico). Counties were selected by overlaying a map of New Mexico and Arizona counties with the BRWRA and by reviewing compensation data from Defenders of Wildlife. Originally, zip codes linked to towns that had recorded depredations or were listed as receiving compensation were identified for surveys, but through negotiations with NASS, it was agreed that individuals would be selected by counties.

United States Agricultural Census Data from 2002 shows over 5,000 ranchers living within the counties I selected to target for my survey (USDA 2002). To select a sample size, Dillman (2000) recommends taking into account the true population size, which would have been over 400 individuals for my survey. Due to financial limitations of the project, I limited my sample to 200 individuals. Using their rancher database, NASS randomly selected the 200 ranchers living in the identified counties.

Although Dillman recommends four separate contacts for surveys, my participants received a maximum of three mailings as was allowed by the University of Oregon's Office for the Protection of Human Subjects: 1) the "full package" including a letter of introduction, a survey, a return envelope, and a voluntary interview request postcard to be mailed separately from the survey; 2) a "reminder/thank you" postcard; and 3) a second "full package" for those who had not yet returned the survey. (I dropped the Dillman recommended pre-survey introduction letter.) Mailings were distributed every 10-14 days in January and February of 2008. NASS printed, packaged, distributed and collected the survey. They mailed the returned surveys to me in bulk every few weeks. Participants who were interested in participating in an interview filled out their

contact information on the postcard, which was mailed directly to me rather than being returned with the survey to NASS to ensure survey responses remained anonymous and confidential.

A few weeks after the original survey was distributed, I was contacted by the Gila Livestock Growers Association (GLGA), requesting that a set of surveys be distributed among their members who had experienced livestock depredations. A set of 25 surveys, return envelopes, and interview postcards was sent to GLGA for distribution. GLGA mailed the questionnaires in March 2008 to interested participants and the surveys and postcards were returned directly to me. This group of participants did not receive a "reminder /thank you" card or a second "full package" mailing. GLGA photocopied and distributed additional surveys, resulting in a total of 30 distributed surveys. The results and discussion of this survey are discussed separately from the survey distributed by NASS to maintain the validity of the random selection process.

Limitations of Survey Methods

Some of the limitations in the survey process include the selection of ranchers by counties, the timing of the survey, and giving control of printing and mailing to NASS. Because ranchers were randomly selected at the county level, some individuals living beyond the boundaries of the BRWRA (e.g. on the outer edges of counties) received surveys. These individuals are outside of the area where wolf-livestock conflicts occur, but they could eventually be part of the reintroduction area if the boundaries are expanded or wolves unknowingly leave the BRWRA. The survey was already printed and prepared for distribution before the final decision was made for county level distribution; therefore, the survey did not include the question "Do you live within the Blue Range Wolf Recovery Area?" A future survey should include this question to assess differences in opinions by those within and outside of the recovery area.

NASS distributed a series of surveys to ranchers during the winter of 2007-2008. Therefore, potential survey "burn-out" may have reduced return rates for my survey. Because NASS was contracted to print, mail, and collect the surveys, the amount of time and effort on my part was reduced. As a trade off, I had to give up some control, for instance on how the survey was printed and packaged (full page vs. the requested

booklet). By having NASS collect and return the surveys to me in bulk, I do not know the counties that the surveys were returned from, or the percent of surveys that were returned after the first, second or third mailing, respectively. For the GLGA surveys, I had a bit more control over the appearance and packaging of the questionnaires. However, like the NASS surveys, I am unaware of the individuals that received questionnaires and from what counties the responses were mailed. A future survey should include county information.

I recognized that individuals who had not experienced depredations or applied for compensation would receive surveys, and therefore the number of participants that could assess program effectiveness would be limited. I also recognized that I was more likely to hear from individuals who had a strong opinion: those with stronger feelings of opposition or stronger feelings of support for wolves or compensation may be more motivated to respond. However, I saw value in capturing the stronger opinions as it is these individuals who are likely to be most outspoken against the compensation and recovery effort, as well as challenge USFWS or conservation organizations in court.

I used a mixture of open and closed-ended questions. While many of these questions draw from surveys developed and tested in other regions, I recognize their limitations and that close-ended questions may portray an opinion that was not present before it was suggested. In addition, the questionnaire was only prepared in English, and therefore it is possible that non-English speaking ranchers were excluded from participating. Although there are numerous additional limitations that could be mentioned, as a final point it is important to acknowledge that the survey method can capture some experiences and comments, however it is not a replacement for one-on-one interviews and discussions with ranchers.

Data Analysis and Presentation

Survey responses were assigned a numerical value (e.g. "1" for a "supportive" response, "2" for an "unsupportive" response). This method has been used for other surveys on attitudes (Conforti and de Azevedo 2003). I also followed survey analysis recommended by Fink (2003) and Kent (2001). Questions were entered into a Microsoft Excel® (Microsoft 2003) spreadsheet and coded by response. I used Statistical Analysis

Software SAS/STAT® (SAS 2004) to assess and analyze the results of the survey with support from the University statistician and SAS guidance books (Der and Everitt 2002; Deluiche and Slaughter 2003). I reviewed summary statistics and conducted bivariate analyses looking at relationships between the various factors captured in the survey. I used Fisher's exact test for statistical analysis, as it makes no assumptions for the expected frequency of cells.

Comments from surveys and interviews are coded anonymously. When offering factual information, I use last names for wolf advocates and government employees only. To obtain honest responses, I promised anonymity to participants if they desired, through the use of coding. Coding is broken up by type of individual (R = rancher, C = wolf-advocate/conservationist, G = government employee), whether the comment was from a survey (S) or interview (I), the location where the interview took place or the state residence of the ranch (NM or AZ), and a number assigned depending on the order in which the interview took place or the survey was received. In addition, comments from the surveys are identified as a "1" for the NASS distributed survey (called "S1") and "2" for the GLGA distributed survey (called "S2"). A full set of comments from the surveys is available in Appendix E. Comments from surveys have been corrected for misspellings.

Interviews

Interviews with ranchers provided additional insight into opinions and experiences with depredations. Interviews with government staff and representatives from wolf-advocacy organizations provided a deeper understanding of the historical, economic, political, and emotional components of wolf recovery and livestock depredations, as well as ideas and recommendations for the future of the wolf recovery and compensation programs. The process for selecting individuals for interviews is described below.

Ranchers

With the questionnaires, ranchers received a postcard offering the opportunity to participate in a phone or in-person interview at a time and place of their convenience.

This occurred with both sets of surveys. The pre-stamped postcard asked volunteers to provide their name and contact information (phone or email) and was mailed directly to me, separate from the questionnaire which was returned to NASS. As postcards were returned (a total of 15), I attempted to make contact with individuals over the phone or by email. Individuals whom I was able to establish contact with were provided a consent letter in person or by email to participate in the interview. Eight ranchers, two in Arizona and six in New Mexico, were interviewed for varying amounts of time depending upon their experiences. In addition, I also received comments from some ranchers through email.

I followed a semi-structured interview process, but most interviewees were open to having an open-ended discussion and were not hesitant to voice their opinions and share their experiences. Individuals shared their experiences with wolves and the compensation program, whom they would prefer to receive compensation from (e.g. government, nonprofit, community group), and what types of programs they would like to see financially supported. The ranchers also provided valuable information on the history of dealing with government employees and wolf advocates, as well as the psychological toll of experiencing a livestock depredation.

Government Employees

Individuals from AMOC participating government agencies were solicited over email and phone to participate in interviews. These individuals were selected because of their role in the recovery or compensation program, and typically were recommended by people who I had earlier conversations with to prepare for my research. The majority of discussions with state and federal representatives took place in person. I conducted semi-structured interviews in offices, over the phone, and in pickup trucks. Question I drew from included involvement in shaping the compensation program, priorities /strengths /weaknesses of the current compensation program, and where further investment for managing depredations should be targeted. Government employees also provided me with valuable information on the history of eradication and recovery of the wolf, and insight into the political and legal controversies surrounding the program. A total of five

government employees were selected for interviews.

Wolf Advocates

Individuals supporting the recovery of the Mexican gray wolf were solicited for interviews via phone or email. I selected individuals representing organizations with extensive history working in the area. Interviews took place in person or over the phone. Sample questions drawn from for these interviews included involvement in the design of the livestock compensation program, priorities/strengths/weaknesses of the compensation program, and where further investment in managing depredations should be targeted. This group of interviewees also provided me with valuable information on the history of eradication and recovery of the wolf, psychological barriers, and insight into the political and legal controversies of the program. A total of five wolf advocates were selected for interviews.

Site Visit

I visited the BRWRA twice in 2008 to conduct interviews and experience first-hand the area where wolves were reintroduced and depredations were experienced. In March 2008, I spent two weeks in New Mexico and Arizona. I visited the USFWS Southwest Headquarters in Albuquerque, NM, and then traveled to the Gila National Forest. I drove through the southern part of BRWRA to the Defenders of Wildlife Southwest Office in Tucson, AZ. In April 2008, I visited the IFT office in Alpine, AZ and a ranch in Catron County, the area hardest hit by depredations.

CHAPTER V

KEY FINDINGS

My survey and interview results found that although the general public tends to support wolf reintroduction, ranchers (i.e., the people with the most frequent and direct contact with wolves) tends to oppose reintroduction. In addition, I found that the program developed to offset some of the costs of living alongside wolves, the Defenders of Wildlife compensation program was, for the most part, efficiently managed. Although some individuals had negative experiences with the verification or compensation process, generally speaking, individuals that filed for compensation received the amount requested in a timely manner. Despite this, ranchers saw little value in the compensation program. Although I expected differences in responses depending on demographics, livestock association membership, or experiences with wolves or the compensation program, my results instead demonstrated that across the board, ranchers were not satisfied with the current compensation program, as it was viewed as a means for environmental groups or government agencies to encroach on individual rights and could not fully compensate for losses. The majority of respondents wanted to see the program end, or favored complementary or alternative mitigation programs over the current compensation program. In addition, results demonstrate that there are major psychological, social, cultural, and historical barriers preventing the compensation program from being effective at offsetting economic losses or building rancher tolerance for wolves. These barriers must be dealt with before any progress can be made to improve the program.

For the survey of randomly selected ranchers (S1), I obtained a 40% (n = 79) response rate. For the GLGA distributed survey (S2), I received a 51% (n = 16) response rate. Because S2 was not a random sample (individuals were selected based on having

filed compensation claims) the results presented are for S1 unless otherwise noted. Only 11% of participants had requested verification for a depredation, and only 4% had filed a compensation claim. Because of this low participation, I selected to combine some of the results from S2 on questions regarding the verification and compensation process since 100% of S2 respondents had participated in the compensation program.

Q1. Does the level of rancher support for the reintroduction of Mexican gray wolves differ from the level of general public support?

Numerous surveys conducted over the last fifteen years, including one conducted in the spring of 2008, demonstrated wide-spread public support in both Arizona and New Mexico for the reintroduction of the Mexican wolf. For example, a 2005 survey conducted by Responsive Management showed general support at 62% for the reintroduction, with 60% support for reintroduction into Arizona's Apache National Forest and New Mexico's Gila National Forest (Responsive Management 2005).

My research found that within the ranching community, the wide majority of respondents (73.5%, n = 50) did not support the wolf reintroduction program. The respondents were evenly split at 13.2% (n = 9) between those who supported the reintroduction and those that expressed no opinion.

Q2. Is the compensation program run efficiently?

Of a combined total of 42 individuals from S1 and S2 who experienced at least one depredation, 25 individuals, or 60% of those that had experienced depredations, requested verification of at least one kill. The 25 individuals included nine (11%) of S1 participants, and 16 (100%) participants of S2. Depredations were reported mostly for cattle, with a few depredation incidents involving horses, dogs, pigs, chickens and sheep. Six individuals from S2 had experienced over 20 depredations each. Individuals that reported higher numbers of wolves on their property were more likely to have suspected depredations and requested verification.

The majority of respondents (73% n =11) from S2 waited at least 48 hours for someone to arrive to verify the depredation. Verification of the kill resulted in a non-

wolf causes for 26% of requests (21 out of 80 requests); the most common reasons for denial included lack of carcass (n = 10), lack of evidence to link kill to wolf (n = 5), and other cause of death (n = 6).

For the 19 respondents who filed for compensation (3 from S1 and 16 from S2), payment was typically received within 6 months of the depredation, although one individual reported receiving payment within one month, while two individuals reported never receiving compensation. The number of compensation requests filed for a single individual varied from one to thirty-four. Individuals in general received the amount of compensation they expected.

Q3. Are ranchers satisfied with the compensation program?

Despite general efficiency in management of the verification and compensation process, over 68% (n = 17) of respondents from S1 and S2 that had requested verification reported that they were "very dissatisfied" (n =12) or "dissatisfied" (n=5) with the verification process. Although over 50% (n = 9) of respondents reported satisfaction with the amount of compensation they received, 100% reported dissatisfaction with the compensation process.

Q4. What factors affect use of, and satisfaction with, the compensation program?

Survey and interview results demonstrated a variety of factors that influenced rancher satisfaction or use of the compensation program. These factors included experiences with the program, awareness of the program, opinions on compensation, interest in alternatives programs or management, demographics, concern for costs that could not be compensated, perceptions of inefficiencies, and ranching culture.

There was no relationship between the level of satisfaction with the verification program and the number of suspected depredations, the time it took for the investigator to arrive for verification, or whether or not a depredation was verified as a wolf kill. There was no relationship between the level of satisfaction with the compensation program and whether someone received compensation payment, the amount of compensation they received, and the length of time it took to receive compensation payment.

Demographics, including age, sex, ranch location, education level, number of years someone had lived on their ranch, ranch size, or type of livestock, and membership in a livestock association, did not influence satisfaction with the verification or compensation program. A breakdown of participant demographics are available in Appendix F.

Experiences with the verification and compensation process. Ranchers expressed concern that both the verification and compensation process were unfair and biased. A major concern was the challenge that came with verifying kills in the Southwest, in which "the way the program is set up, the level of documentation is so high…there is no way you will find a kill soon enough to get it covered up and get someone out there in a reasonable amount of time" (RINM2). One rancher indicated they were treated "unprofessionally" and "accused of lying" by Wildlife Services, which deterred them from requesting additional verifications (RSNM1.2). Other respondents felt the government was working to "verify as few wolf kills as possible" (RSNM2.2) and that the verification process was "subjective" (RSNM7.2) and "one sided and unfair" (RSNM9.2).

One interviewee painted a fairly grim picture of his experience with the compensation program. After filing several requests for compensation, his mailings and phone calls were not returned and he received no payment [RINM3]. He stated that before this negative experience with Defenders of Wildlife, he had not cared one way or another whether the wolves were present on the land, but now he wanted both the wolves and Defenders of Wildlife out of the picture.

Ranchers that had a depredation verified, but that did not file for compensation (57% or n= 14) reported previous negative experiences with the program, hearing from a neighbor who had a negative experience, or lack of awareness of compensation program (discussed below).

Lack of awareness. Awareness of the compensation program may have inhibited some individuals from participating in the program. Participants were more familiar with the existing Defenders of Wildlife compensation program than the proposed USFWS Interdiction Program. Almost 57% (n = 42) of respondents had heard of Defenders of

Wildlife's program, while only 12% (n = 9) had heard of the USFWS program. There was higher awareness from Arizona residents for the Defenders of Wildlife program, and higher awareness in New Mexico for the USFWS program (e.g. 89% or n = 8 of those aware of the USFWS program were from New Mexico).

Compensation is not the answer. Respondents were asked to rank their level of agreement with a series of eight statements (Figures 11-12). (Only results from S1 are presented below. Results from S2 are available in Appendix G.) This series of close-ended questioning was based on statements made in other surveys (namely the Northern Rockies survey) and was intended to better understand perspectives on the compensation, even for individuals who had not applied for compensation.

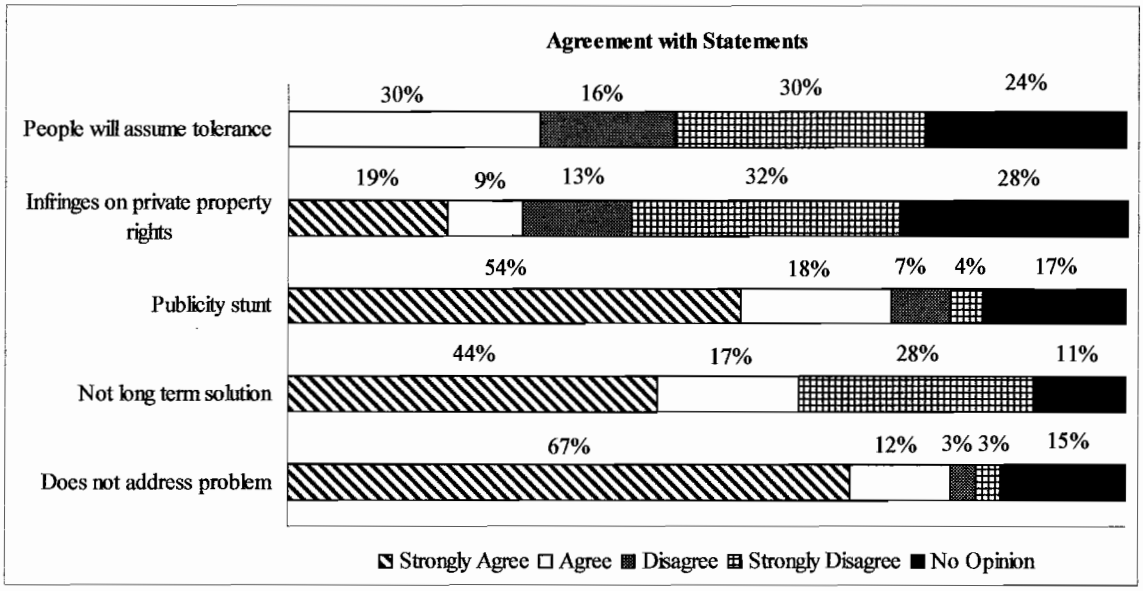

Figure 11. Respondent agreement with various statements regarding compensation. Closed ended statements read: "By accepting compensation, others may think that I tolerate predators killing livestock"; "Compensation infringes on private property rights"; "Compensation programs are 'publicity stunts' for environmental groups and don't address the real issues"; "Compensation is not a long term solution, just a short term 'Band-Aid' approach"; "Compensation does not address the actual problem of wolf-livestock interactions"

Respondents felt strongly that compensation was neither a long term solution, nor did it appropriately address the issue of depredations. There was lower agreement, or less concern, that compensation programs were a tool for infringing on private property rights.

Almost 72% of survey participants indicated that they viewed compensation as a publicity stunt by environmental organizations and that programs were not designed with the rancher's needs in mind. Ranchers did not trust that Defenders of Wildlife has local community interests in mind when developing programs intended to offset economic losses from wolf recovery. Many respondents said they would never support a compensation program as they saw it as part of a plan to move ranchers off their land and "herded together into towns" (RSAZ2.1). As one individual expressed, "[The compensation program has allowed for Defenders to have] undue influence into [wolf] program and leverage against [local] communities" (RIAZ6). This mistrust was extended to government agencies. One respondent stated that he felt government agencies were "…not being totally honest with landowners…" (RSNM63.1) and another felt he was "lied to about the impact" (RSAZ3.1) of wolves on ranchers.

Defenders of Wildlife acknowledged the challenge of working with individuals that had negative perceptions of the organization and the compensation program:

> [The] problem is that many ranchers have [a negative] perspective of Defenders and may sit on a depredation report for weeks thinking, 'These guys are the enemy, why do I want to send them my personal information?' That has been a significant obstacle for us…Ranchers may feel they have to 'sell their souls' to the devil by mailing their information to Defenders (Miller per comm. March 2008).

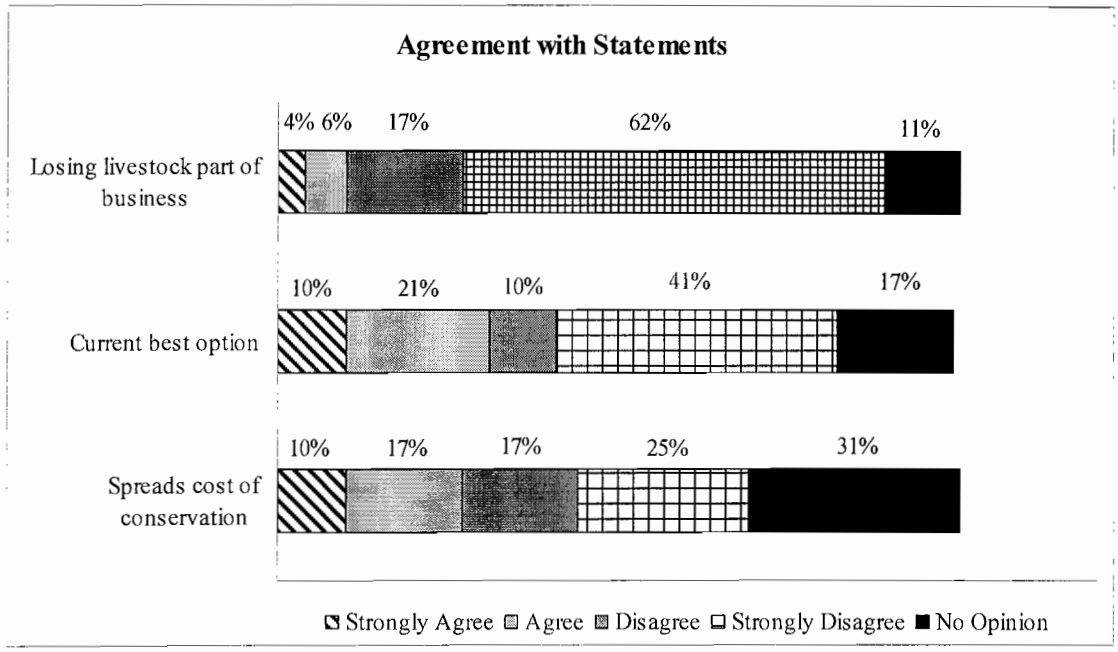

Figure 12. Respondent agreement with second set of statements regarding compensation. Closed ended statements read: "Losing livestock to wildlife is part of the business and compensation should not be provided"; "Compensation is currently the best available option for dealing with livestock-predator conflicts"; "Compensation spreads the cost of predator conservation more fairly among society"

Less than 30% of participants viewed compensation as a means for spreading the cost of wolf conservation efforts across society. There was also disagreement (58%) with the statement that compensation was the current "best option" for dealing with depredations, which was further reflected with the desire for alternative or additional compensation/incentive mechanisms (discussed below).

There was strong disagreement, over 80%, that losing livestock to predators was part of ranching business. Many survey and interview participants had lived on their ranch for decades, personally participating in the eradication of the wolf or hearing stories of fathers and grandfathers removing the animals from the land. Because of the history of eradication, wolves were no longer seen as a natural part of the landscape. As one rancher expressed, "I lived through the history of the extermination and feel that animals were put on earth for human use" (RINM1). Another rancher applauded the historic removal of the wolf, "Our grandparents with the help of a just and service oriented government eliminated the wolf from the area" (RSNM10.2).

Ranchers, despite their level of support for wolf recovery, showed relative agreement on the above statements; however, individuals that did not support wolf reintroduction, compared to those that supported recovery or had no opinion, felt more strongly that:

- Compensation was not a long term solution ($p < 0.05$)
- Compensation was a publicity stunt ($p < 0.001$)
- Losing livestock to wolves was not part of the business ($p < 0.001$)
- Compensation was not the best option ($p < 0.05$)
- Ranchers should have the right to kill wolves that come in close proximity to their livestock ($p < 0.001$)

Support for adjustments or alternatives to compensation. Figures 13-14 show participant interest in including additional programs to complement the current compensation program, such as including compensation for vet costs, and interest in programs that could replace financial compensation.

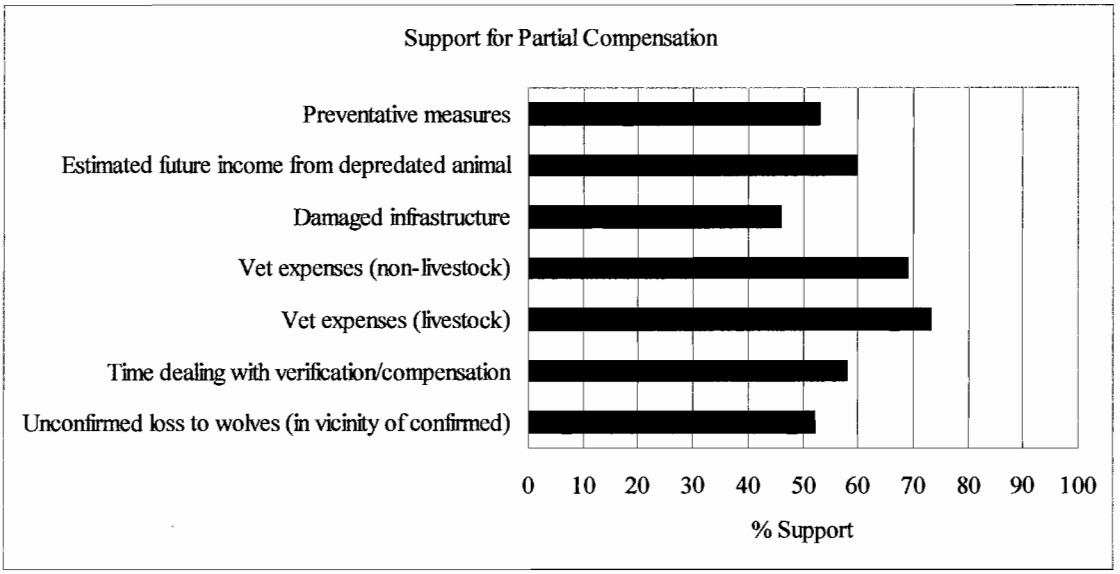

Figure 13. Respondent support for instances in addition to confirmed depredations that should receive partial compensation. Note: Options available in questionnaire included: "Unverified livestock loss, assumed by rancher to be caused by wolf"; "Veterinary bills for injury to livestock"; "Damage to infrastructure"; "Estimated future income that would have come from livestock killed"; "Worker time lost for installing preventative measures"; "Worker time lost for filing verification and compensation claims"; "Other"

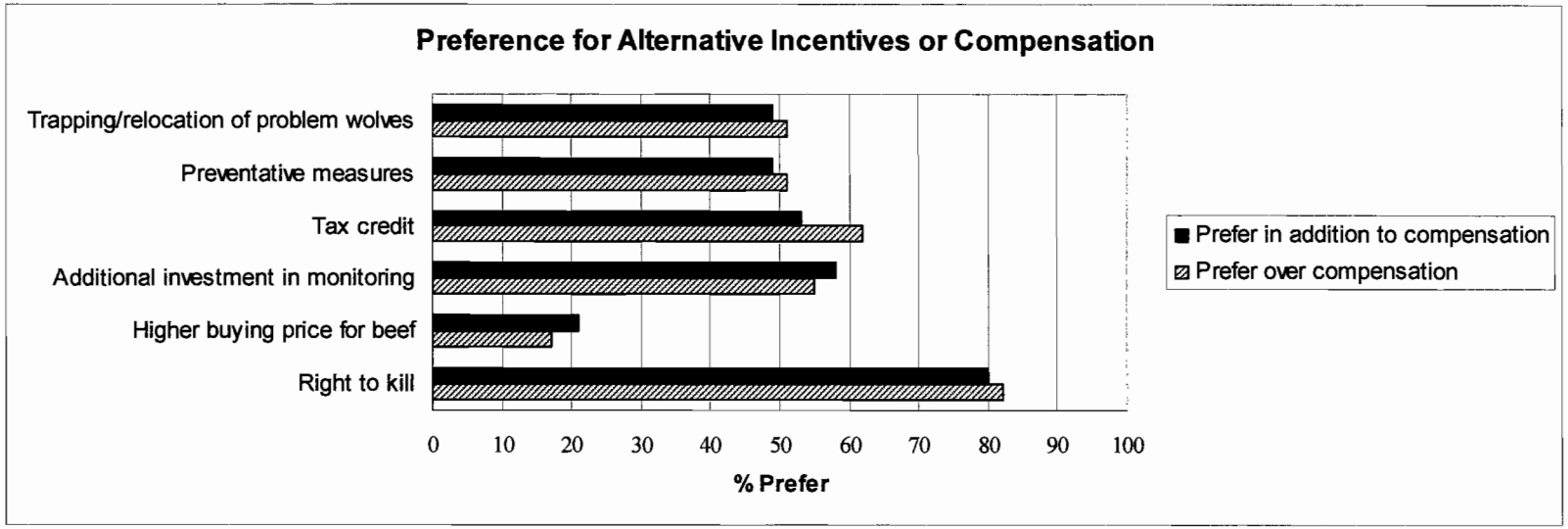

Figure 14. Respondent preference for alternative incentives or compensation instead of current compensation program or in addition to current compensation program.
Note: Questions read: "Providing livestock owners the right to kill wolves coming in close proximity to their livestock"; "Higher buying price for livestock grown in areas where wolves are present"; "Closer monitoring of wolves to inform livestock owners of their location"; "Tax credits for livestock loss of damage to ranch inflicted by wolves"; "Reimbursement for livestock owners for taking preventative measures towards reducing conflicts with wolves"; "Trapping/relocating problem wolves"; "Other"

Including additional components that are eligible for financial reimbursement was supported. Respondents showed less interest in receiving compensation for unconfirmed losses or damage to infrastructure, but were supportive of compensation for the depredated animal's estimated future value and vet expenses. Receiving compensation for infrastructure, time, or installation of proactive measures each received around 50% support.

Eighty-percent (n = 47) of ranchers supported the right to kill wolves that come in close proximity to their livestock either as a replacement for the current compensation program, or to complement the current program. Support for investment in proactive measures over compensation hovered around 50%. Besides general fencing (used by over 86% or n = 58 of respondents), less than half of respondents used proactive measures to prevent wolves from interacting with their livestock: 22% (n = 14) used electric fencing; 36% (n = 23) used guard dogs; 29% (n = 19) used other guard animals; 39% (n = 23) used horse patrol or range riders; 42% (n = 26) increased human visibility around ranch; 11% (n = 7) changed the calving time so cows were brought in closer to humans during vulnerable times; and over 33% (n = 24) changed livestock grazing locations. Use of proactive measures did not influence the number of times ranchers had seen evidence of wolves on their property, depredations, or the number of depredations suspected. Use of guard dogs, however, resulted in higher instances of evidence of wolves on the property and a higher number of suspected depredations. Of individuals using guard dogs, 47.6% experienced depredations. Individuals without dogs were more likely to have not experienced attacks ($p < 0.05$). Use of horse patrol also showed more instances of evidence of wolves on property ($p < 0.05$).

Approximately 50% (n = 32) of individuals supported further investment in monitoring or relocating problem wolves. Increasing the buying price for beef received a low level of support, while interest in a tax credit as an addition to compensation received support from just over 50% (n = 32) of respondents.

Preference for management by peers. Ranchers widely preferred a compensation program managed by a group of community stakeholders. Compared to nonmembers, members of LGAs showed higher preference for this option over federal

management, state management or nonprofit management. Over 77% (n = 17) of LGA members preferred community management compared to a preference level of 49% (n = 21) for nonmembers ($p < 0.05$). Community management received the greatest percentage of support among nonmembers as well, but nonmembers also showed some level of support for state or federal management and nonprofit management.

In other predator opinion surveys, strong associations were found between self-defined social groups and perspectives. Because my survey was only distributed to ranchers and not other defined social groupings (such as hunters or general public) the main social grouping I focused analysis on was membership in a livestock growers association (LGA). However, I found little significant difference in responses for members and nonmembers.

Concern for costs that cannot be compensated. In addition to financial needs, many respondents indicated that money could never compensate them for the psychological toll that came with depredations. One respondent stated that Defenders of Wildlife should "do away with the program because it does not compensate for the whole loss which includes stress on livestock and rancher" (RSNM10.2). Ranchers shared stories of depredations for which financial compensation could never replace finding carcasses or half-eaten dogs, horses or livestock. As one commented, "[Wolves] killed my dog "Dillan" - no amount of compensation could replace her! I called the wolf number but no one seemed to care" (RSNM13.2). Other ranchers expressed the psychological toll wolf presence had on families, for there was widespread fear of attacks on humans by wolves. Some claimed they "can no longer let the grandkids play outside unsupervised and we have to carry a gun when taking daily walks" (RSAZ39.1) and that the "loss of a human cannot be compensated" (RSNM68.1).

Others found compensation to be inadequate in meeting their financial needs as they are finding huge losses in cattle and despite trying "everything" to prevent kills, "nothing has worked" and they "will soon be out of business" (RSNM7.2). Many ranchers lost calves that could not be confirmed as wolf depredations, "...so each calf is a [$]600.00 loss, we eat...due to wolf presence we lost jobs that paid- we spent 2x what we

would have on fuel, groceries and day work, we were only compensated for 1 wolf event, the 2 were ignored" (RSNM4.2).

Perceptions of inefficiencies in program management and recommendations for improvements. Ranchers critiqued the management of the compensation program, calling it a "joke" (RSNM7.2) or "farce" (RSNM10.2). "No one who has been affected by the [reintroduction] program … appreciates Defenders of Wildlife's handling of compensation [and I do not] approve of a private organization [Defenders] handling compensation for public programs" (RIAZ6). Some of the criticism for the program was a reflection of the lack of responsiveness individuals received after contacting Defenders of Wildlife, for instance one individual stated he had "sent confirmed kill reports to DOW several times [and had] NEVER received any response" (RSNM4.2). Others felt they had to be coerced into cooperating with the wolf program to receive compensation (RSNM11.2).

Some ranchers offered feedback on ways to improve the program. For instance, some requested compensation for "replacement livestock" (RSNM72.1), "mental stress" (RSNM75.1), or a new type of program that would make them feel "whole again" (RSNM55.1). Specific types of compensation proposed included for loss of business (e.g. one individual had a guest ranch that was no longer able to operate because, he claims, of the wolf reintroduction (RSNM73.1)), flat-line compensation for those living in the recovery area (RSNM52.1), "weight loss" of stressed cattle (RINM3), compensation based on "historical records of calf crop" (RSNM55.1), compensation "paid on basis of what losses were over 3 to 4 years prior to wolves coming in" (RINM2), or, at the very least, additional financial support for daily tracking and monitoring of wolves (RSNM51.1). Many felt that because not all carcasses could be located, they should be paid "compensated seven cattle for every one found" (RINM5). One conservationist recommended a compensation program based on wolf density:

> [Compensations should be] not for losses but for density of predators [ranchers are] willing to live with. More predators discovered in monitoring, the more money they get. That offers an incentive. It's the only way to get compensated is that they have to live with predators. To extent they can monitor their livestock to reduce losses they still get some amount of money. ...takes out all the ugliness [of finding dead livestock, removing wolves for depredations] (CINM1).

Varying opinions were provided on who should manage the compensation program and for what reasons. Some felt compensation should be managed by the government. As one individual pointed out "... a compensation program should NOT be dependent upon a special interest group" (RSUnknown45.1) as Defenders of Wildlife "most certainly pick and choose whom they compensate [however] it is their money, they have that right. Compensation money should not come from such groups, it is the governments program and they should be responsible" (RSNM76.1). Additional support for a government funded program was expressed by another individual, acknowledging that, "While it is generous of Defenders to do this [offer compensation] this is a government program and therefore compensation should be done by government and not by an outside organization" (RINM2). However, others felt it was not government responsibility to give ranchers "another payout" (CINM2) while others felt "a private organization managing the [compensation] program will be more efficient than government [management]" (RINM4).

A few survey and interview participants stated that compensation should not be provided as "the loss of livestock is unfortunate for ranchers and farmers...but this is has been the way of life for centuries, all over the world" (RSUnknown18.1) and that "dealing with predators is a part of ranching" (RSAZ39.1). One respondent stated that it was the responsibility of ranchers to "monitor their cattle more closely, especially during calving times" (RSAZ39.1).

Ranching culture. Related to the historical connection to the eradication of predators, is ranching culture. Almost 50% (n = 29) of respondents had lived on their

ranch for over twenty years, and for many the wolf recovery was perceived as a threat to their way of life. As one wolf advocate recognized:

> [It is] not coincidental that ranchers are so hostile towards wolves even before [wolves] arrive on the ground…one of the attributes of livestock industry culture is that because of all the subsides they have been spared the wrenching change that most Americans have gone through in the past 120 years. When lifestyles don't change all that much, there is not much of an engine for changing values. Because of stability in ranching culture… [for which there are] many nice things, neighborliness, [ranchers are] also remarkably conservative…values don't change in a subculture that is remarkably stable (CINM2).

One rancher stated, "I can manage my own ranch. I'm not looking for compensation. I would just like to be left alone. Rancher's do more for wildlife, without even thinking about it than you can imagine" (RSAZ36.1). Ranchers felt strongly that they helped protect the environment and should be allowed to maintain the land upon which they worked and lived.

Perceived threat of wolves towards humans, the ecosystem, and economics. Ranchers in Arizona and New Mexico believe that wolves are a threat, not only to their own safety, but to the ecosystem in general as well as ranching business. Some ranchers expressed fear for diseases, such as rabies, that a wolf could carry, while others expressed concern that wolves are "killers" that kill for "pleasure and impulse" and that people can no longer go outside without carrying guns (RSNM47.1, RSAZ39.1, RINM1). One rancher stated that, "Wolves are not good for the ecosystem in our state. That is scientific fact. Our balance of nature was fine before the introduction of this wolf" (RSAZ7.2). Despite studies by USFWS (1996) that have attempted to resolve ecological and economic concerns, several ranchers feared that prey populations would be depleted by the wolves and that businesses that relied on hunting would go bankrupt. There was great concern for the cost of the recovery program: as one rancher commented, "$1 million per animal is a huge cost when we already have a terrible budget deficit. What do the wolves contribute?" (RSAZ37.1). Many respondents felt that they had been lied to about the

amount of money put into the wolf recovery and that information on the costs were intentionally undisclosed.

Q5. Is the compensation program the best use of conservation dollars?

From the perspective of the majority of ranchers, the compensation program is not meeting their needs and there is little interest in participation. The program is not contributing to the conservation of the Mexican wolf by building tolerance for predators among the ranching community and may be igniting further tension between the different stakeholders, as highlighted by one individual: "Now so called 'environmentalists' who live in cities have convinced government employees, who also live in cities that they know best what is best for all. The human has evolved because it has taken control. Now some would have us be eaten by animals. Priorities! Priorities!" (RSNM10.2).

Although results found that the compensation program was well-managed and helping to offset livestock losses to some ranchers, there was resistance to participate or support continuation of the program. Both respondents that had participated in the compensation process and those that had only heard of the program through neighbors or friends wrote "end the program" on the survey in reference to both the wolf and compensation programs. Ranchers opposed the wolf recovery and compensation program as they saw it as "a losing situation for the wolf, the tax payer and livestock producers" (RSAZ36.1). Although the compensation program is undoubtedly relieving some individual ranchers of financial losses from depredations, for the most part, ranchers indicated that the program had not provided a substantial contribution towards economic relief.

Some respondents felt compensation was a potential solution for dealing with depredations. There were no demographic differences between the individuals expressing support or satisfaction with those that were unsupportive or dissatisfied. One rancher stated that he felt "the loss of livestock is unfortunate for ranchers and farmers. But this is has been the way of life for centuries, all over the world" (RSUnknown18.1). A few individuals expressed respect for the "importance" and "value" of wolves and the need for coexistence (RSNM59.1, RSAZ39.1, RINM4.0, RIAZ8). Another individual

stated that cattle, sheep, and wolf populations were so low in the Southwest compared to one-hundred years ago, that depredations and dependency on compensation was not an issue (RINM4).

Summary of Results

Ranchers that participated in the survey did not support Mexican wolf recovery and were widely critical of the program that was developed to offset losses experienced by conservation efforts. Criticism and resistance to financial compensation occurred despite efficient management of the program. Dissatisfaction with the program was based on personal experiences with filing claims, interest in alterative programs that would better meet the financial needs of ranchers, and concern for costs that could never be compensated. The results of my research may seem discouraging, as ranchers widely supported disbanding efforts to reintroduce wolves or compensate for livestock losses, however, the survey and interviews provide insight into barriers that need to be overcome and tactics that can be used to increase the opportunity for success as will be presented in Chapter VI.

CHAPTER VI

DISCUSSION AND RECOMMENDATIONS

The results of the survey and interviews provide insight into why the current compensation program is not succeeding and identify issues to be addressed that may improve the effectiveness of the Defenders of Wildlife compensation program, as well as other depredation mitigation initiatives in the Southwest and around the globe. In this section I discuss reasons for low level of rancher support for wolves and dissatisfaction with the compensation program. I review factors preventing rancher use of, and satisfaction with, the compensation program and how these barriers can be addressed and overcome. Specific recommendations are provided for the Defenders of Wildlife compensation program, complementary initiatives, Mexican wolf management, and research to help provide direction for a future of wolf and rancher coexistence in the Southwest.

Discussion on Survey and Interview Findings

Q1. Does the level of rancher support for the reintroduction of Mexican wolves differ from the level of general public support?

Ecological or economic benefits that can come with wolf reintroduction, such as ecosystem services or increased tourism, do not outweigh the costs for ranchers in the Southwest. The general public typically views predator conservation as a benefit for society as a whole, while ranchers see wolf conservation as a threat to their own livelihood and lifestyle. Ranchers living in or near BRWRA face perceived or actual conflicts with wolves on a daily basis, whereas the general public only comes into contact

with wolves when they seek out the opportunity by traveling to the recovery area. As has been found for other predator conservation programs, perceived or actual conflict with wolves can lead to resentment and opposition of conservation actions, as ranchers in the Southwest may feel ignored and that the biological needs of wildlife are favored over local communities rights.

Q2. Is the compensation program run efficiently?

There are some inconsistencies in management of the verification and compensation process, with ranchers indicating varied times for verification investigators and compensation checks to arrive. As Wildlife Services conducts the verification investigation, Defenders of Wildlife cannot be held responsible for inefficiencies in this component of the process. With an average of two days before investigators arrive, it is possible that livestock carcasses or evidence of the source of kill will be destroyed, and therefore losses cannot be verified. Wildlife Services is increasing standards for when investigators are dispatched, however, travel to some depredation sites can take hours and this must be recognized by ranchers as well as considered when designing the methods used for the investigation. To process the compensation check, Defenders of Wildlife is dependent on Wildlife Services filing the verification report, and the rancher submitting the claim. Reports by some ranchers of long wait times or never receiving compensation may be due to this multi-step procedure or limited Defenders of Wildlife support staff for the program.

Q3. Are ranchers satisfied with the compensation program?

A fairly small number of ranchers had experienced a depredation, possibly a reflection of concentrated "hotspots" where depredations occur. Neither the time it took for someone to arrive to verify a depredation, whether the depredation was verified, the amount of compensation received, nor the time to receive compensation influenced a respondent's level of satisfaction with the verification or compensation program. Almost all respondents were "very dissatisfied" with the various components of the program. This is in contrast to my hypothesis, as I had assumed those who had negative

experiences with wolves or the verification procedure would express a lower level of satisfaction with the process. However, each respondent indicated they were "very dissatisfied" despite program efficiency or they were reimbursed for the depredations, indicating that there are other factors that affect satisfaction.

Q4. What factors prevent use of, and satisfaction with, the compensation program?

My findings do not necessarily align with previous studies on rancher attitudes that were presented in Chapter II. Rancher attitudes were not dependent on interactions with wildlife, education, knowledge, availability of different programs, or social affiliation. Instead, rancher responses were more dependent on the factors discussed below, emphasizing the importance of region-specific depredation mitigation programs and studies.

Experience. While the compensation process and issues of inefficiency are not a factor for dissatisfaction among most of the respondents, experiences dealing with personnel, such as being made to feel uneducated or lied to, have led to mistrust for individuals working with wolf recovery and compensation. This mistrust does not only develop within individuals that have personal experiences, but through talking with neighbors, friends, family, and other members of livestock associations, suspicion of wolf advocates and government personnel has spread throughout much of the ranching community.

Lack of awareness. The differences in awareness for the Defenders of Wildlife program and USFWS program (higher awareness of Defenders of Wildlife in Arizona, and higher awareness of USFWS in New Mexico) could be due to the locations of the offices (Defenders of Wildlife is in Tucson and the USFWS Southwest headquarters in Albuquerque) as well as the remoteness of many ranches. Of great concern is the low level of awareness for the USFWS program. Although I was told that USFWS have been presenting the concept at public meetings and workshops across both states, there is a need for further outreach to the ranching community to ensure the program is developed in a way that meets the needs of ranchers.

Opinions on compensation. Because individuals with higher incidences of wolf evidence on their property were more likely to file for compensation, this may indicate that it takes several depredation incidences before individuals will call for verification or file a compensation claim. They may not feel it is worth the perceived time and effort to do so until they have experienced multiple depredations.

In regards to the statements on compensation, I expected more agreement with the statement that compensation infringes on private property rights given the numerous comments on questionnaires and during interviews on how wolf recovery and Defender's involvement is a reflection of the debate over public and private lands. In addition, the low level of agreement with this statement differs from survey results in other areas. This may be due to the wording and placement of the statement in the survey, or could reflect ranchers do not necessarily see compensation as a reflection on private property infringement as much as the wolf recovery. Other surveys have demonstrated concern that neighbors or other association members may assume they are tolerable of conservation efforts if they accept compensation from an environmental organization. The low level of agreement expressed with the tolerance statement, especially after the stories I heard about LGA pressure against working with conservation organizations, may reflect that individuals in the Southwest are comfortable with their own decisions and see compensation merely as a financial support mechanism or an individual choice.

The low level of support for the statement that compensation more fairly spreads the cost of conservation across society likely reflects the belief that since the wolf recovery is a government program, government, and not the public, should pay for compensation. Alternatively, ranchers may not feel that compensation is successfully spreading the costs. The strong disagreement with the statement that compensation is currently the best option for dealing with depredations is further reflected with the desire for alternative or additional compensation/incentive mechanisms. I suspect the strong level of disagreement that losing livestock to predators is part of business is a reflection of the long history of eradication and government-supported predator control: predator control in the Southwest is seen as a right, not a privilege.

Alternatives to compensation. Ranchers are not interested in getting all they can from compensation as they expressed support for some level of restriction and proof requirement (i.e. not just "suspected" depredations). These results, I believe, also are somewhat reflective of the disinterest in the current compensation program as many individuals wrote that they wanted to see both wolf recovery and compensation dissolved, or at least significantly overhauled. Respondents were interested in compensating for future income lost from depredations and supported veterinary care of animals injured by wolves. There was less interest in obtaining compensation for installing proactive measures as many people were unsure whether such measures were effective.

Participants showed a high level of interest for incentive or compensation programs that could be instated as a replacement to the current compensation program or as a complement of the current program. Interest for incentive programs as a substitute for compensation was about the same level as interest for incentive programs to be added as a complement to compensation. "Right to kill" was expected to gain a high level of support, and in fact demonstrated over 80% support. Many of the comments by ranchers indicated that giving ranchers a right to kill wolves that they felt threatened their livestock would give them a stronger feeling of control over their property (livestock) and allow them to feel better about their family's safety. There was little interest in having a higher buying price for beef raised in "wolf county", an incentive used in the United States and other countries similar to "bird-friendly coffee" or "dolphin-safe: tuna. Many ranchers indicated on their survey that they didn't think people would pay more for "wolf-friendly" beef. Although the Willingness-To-Pay research discussed above demonstrates some interest from the public in paying a higher price for wolf country beef, there is little belief from the ranchers that this type of program would succeed. There was support for addition agency investment in monitoring, trapping or relocating of wolves (and, as many ranchers wrote in "killing" of wolves), which would also give ranchers more control over knowing where wolves are present and increasing the likelihood of their removal should livestock be harmed. Support for proactive measure investment as well as a tax credit, either as a replacement or additional program, hovered

just around 50%. This low level of support is likely an indication that people just want the wolves gone and do not believe there is any fair way for ranchers to be compensated, nor do they want anyone to tell them how to change the way their livestock or ranch is managed.

In the Southwest, proactive measures are not extensively employed. Low usage may be because ranchers consider proactive measures to be ineffective, management-intensive, expensive, or ranchers may still rely on government to protect livestock from predators. As was communicated through the results of the surveys, written comments and interviews, guard dogs do not seem to be the most effective means for protecting livestock in the Southwest, at least among this group of respondents. Several individuals informed me that guard dogs should not be intended as a means of 'guarding' livestock, but used more as an early warning system (e.g. to bark when predators are present). Some ranchers have also expressed the dogs may attract wolves, as they are seen as either competitors or playmates for the wolves.

Despite the potential lack of effectiveness of some proactive measures, ranchers are willing to use them, but may need to be encouraged to do so, have access to financial support, or be informed of what measures are most effective and efficient for their ranch size. Electric fencing is more likely to be used on smaller ranches because of costs and maintenance. Even though they have less livestock exposed to wolves than large ranches, as was found through the survey, smaller ranches may experience a higher number of reported depredations as it is easier for them to find carcasses as their livestock are more concentrated. Fencing may help prevent depredations. A larger ranch is more likely to invest in horse patrol to track livestock, as riders also provide the benefit of identifying sick livestock, removing carcasses and monitoring wildlife.

Program management responsibility. Support for a compensation program managed by a group of community stakeholders as opposed to an environmental group or government managed program, is a reflection of rancher mistrust of these groups and the strong desire for ranchers to feel like they have more control over programs that affect them. Ranchers do currently participate as advisors to all of the current depredation mitigation programs, but currently there is not a program independently managed by

ranching communities. Studies in other regions have shown successful community managed compensation programs when run in tandem with incentive or insurance schemes; however, such a program would need to be approached carefully in the Southwest given the current widespread disinterest in compensation.

Demographics. I hypothesized a strong influence of the LGAs on participant opinion given the history of influence of associations on predator eradication and opposition to the wolf recovery, as well as based on interviews and literature review. Given the lack of strong difference in opinions on wolves or compensation between members and nonmembers could demonstrate the level of dissatisfaction in the recovery and compensation program among the entire ranching community.

There is little difference in perspectives between LGA members and nonmembers, but there is also little difference in perspectives from those who have owned their property for different lengths of time, or those who have had negative experiences with wolves. For example, I assumed the LGAs would have been influential in shaping the opinions of members who had lived on their ranches for less than 5 years, but does not appear to be a factor. In general, rancher opinions and interests are guided more by psychological and cultural factors than by demographics. The inability for compensation to cover the emotional costs of finding livestock or domestic animal carcasses, overcome perceptions of threat to safety, or make ranchers feel whole again, will challenge the success of the program.

That demographic differences among ranchers are not influential in shaping opinions on wolves or compensation is an indicator that ranchers, in general, are unsupportive of wolf recovery or the current compensation program. Again, this is likely because ranchers deal with wolves on a daily basis, either through personal experiences or hearing stories from neighbors and friends.

Culture. Ranchers feel that their contribution to society is not being recognized, and that wolf recovery is a means for dismissing their role and threatens their way of life. The feeling of ranching culture being under threat may be a result of the major changes that have been made in the region over the last 150 years: a transition of the "wild west" to a "tamed" cattle country, followed by an attempt to recapture some of the "wildness"

through wolf recovery. Many of the ranchers that have lived on the land for decades have ties to wolf eradication, while some of their newer neighbors have moved to the area to fulfill a ranching dream that has been inconvenienced by the wolf recovery. In addition, many ranchers are under the impression that the government and conservation organizations are attempting to buy them out and force them off the land. Whether a real or perceived threat, it is a major concern for the ranchers that are living out a lifestyle that has been unchanged for decades.

Perceived threat of wolves towards humans, the ecosystem, and economics. . Ranchers in Arizona and New Mexico believe that wolves are a threat, not only to their own safety, but to the ecosystem in general as well as ranching business. Concern for human safety and loss of livelihood are justifiable: wolves are wild animals that can harm humans and individual ranchers that experience multiple depredations may find their business in jeopardy. However, there is a lack of acknowledgement that other species, such as cougars, bears, snakes and domestic dogs, pose a greater threat to safety than wolves, while cougars, bears, lightning, geography, and thieves are likely to be a greater threat to livelihood. While the USFWS and AMOC have attempted to disclose information via a variety of means, many ranchers still believe there is a lack of transparency, further deepening feelings of mistrust. These perceived threats are spread amongst the community in articles, news reports, and listservs, further ingraining distrust and lack of acceptance for any program associated with wolf recovery, including compensation.

Q5. Is the compensation program the best use of conservation dollars?

On paper, and for a select number of individuals, the compensation program appears to offset the financial "burden" of living alongside wildlife; however, in reality it is not able to do so because of the range of barriers, such as mistrust, misperceptions, and the ranching history of the Southwest. Because there was no evidence that the compensation program has built tolerance for wolves or contributed to wolf conservation, I found that the program is not the best use of conservation dollars. The program may in fact further encourage conflict as ranchers pit themselves against government and

environmental groups. While I argue that it is not the best use of conservation dollars, I believe that the Defenders of Wildlife livestock compensation program is a necessary investment for the following reasons: Defenders of Wildlife made a commitment to the program, and to dissolve it at this point would further fuel mistrust from the ranching community; efforts to work one-on-one with ranchers are advancing relationships between the organization and ranching community; the program is working for some ranchers, as reflected in the respondents that showed support for compensation; and ranchers need a range of programmatic and management options to select from which will enable them to work with the program that best meets their needs.

Recommendations for the Southwest and Beyond

There is no global standard that can be applied for mitigating human-wildlife conflicts, including livestock depredations. Site specific assessments of perspectives of the community most affected by conservation programs can provide guidance for programs. The recommendations that I provide are based on research for the Southwest, yet many points are relevant across any compensation program. The first set of recommendations I provide below draw directly from my research findings. The second set of recommendations, some of which overlap with those proposed in AMOC's Five Year Review, are supported by my findings but draw primarily from my literature review, general observations, and conversations.

Recommendations Guided by Research Findings

Recommendation #1. Increase outreach and education to offset misperceptions on wolves and compensation. The threat of wolves to human safety, as well as to the economy and ecology of the Southwest, was a major concern of many survey respondents. In addition, there was also fear of governmental agencies and environmental organizations plotting to end the ranching lifestyle. Although these threats are unproven and often guided by misperceptions, the belief in these threats is detrimental to the compensation program and the wolf recovery efforts. Although USFWS and wolf advocacy groups have conducted educational outreach to communities, tactics such as

brochures and flyers may be feeding the fear as ranchers still see wolves as a threat to livelihoods and safety. Releasing findings from the USFWS assessment of social and economic costs of the wolf reintroduction project (to be completed within the next year) may help to reduce misperceptions. Educational programs on wolves and compensation could be developed through collaboration with ranchers or livestock associations and presented by the ranching community to schools, livestock associations and communities in counties that overlap the recovery area. These programs could address benefits that wolves provide to the ecosystem that are relevant for ranchers, and share successful stories of participation in depredation mitigation programs to offset misperceptions.

Recommendation #2. Provide additional options for ranchers, including compensation for veterinary costs, incentives, and proactive measures. I do not recommend dissolving any of the Defenders of Wildlife compensation program, nor any of the other existing programs, for the issues identified above (fueling mistrust, advancement in efforts, and providing a variety of options). Ranchers need options for mitigation so they can find the program that best meets their needs. Although my survey captured ideas for the types of programs that interest ranchers, such as covering vet costs, providing tax credits, or installing proactive measures, further consultations with associations and individuals through surveys, meetings, or visits to ranches could support development of additional programs that are of interest. These consultations would be valuable for all agencies and organizations that are involved in developing means to offset the impacts of reintroduction on ranchers. Because of the complexities of factors involved in determining a single program's success, providing a range of options for ranchers will be the most effective means for preventing and compensating depredations. In addition, it is difficult to know which program will prove to be most successful in the Southwest: in five to ten years, programs could be reevaluated and those that are not contributing to economic offsets or wolf conservation, or those that are found to be a duplication of efforts, can be dissolved.

Recommendation #3. Build awareness of the Defenders of Wildlife compensation program. Awareness of the Defenders of Wildlife compensation

program was greater than 50%, but further outreach to ranchers is needed. In addition, it often takes multiple depredations before individuals file a claim, and building awareness of the ease of the process may help individuals feel more comfortable in taking advantage of the program. The LGAs could provide a means for reaching members: while there may continue to be tension between some of the LGAs and Defenders of Wildlife, further development of a professional relationship between the groups would be beneficial to all. Additional awareness of the compensation program can be developed through a peer network (see Recommendation #6).

Additional Recommendations

Recommendation #4. Increase Defenders of Wildlife support staff to further develop existing and additional programs. Although the Defenders of Wildlife compensation program has for the most part been run efficiently, many ranchers complained of a lack of communication or responsiveness when filing claims. There is currently one staff member managing the compensation program, although an individual has also been hired to work in the field with ranchers. Additional field staff would allow Defenders of Wildlife to develop and experiment with alternative compensation programs that act less as a disincentive; for example, developing compensation based on historical cattle losses or wolf abundance on property. As recommended by many individuals, it may be more effective to invest in programs focused on compensation for predator abundance as an incentive for improving wolf habitat on one's property (Bulte and Rondeau 2005; Beeland 2008; Parsons per comm. March 2008).

Even if compensation programs shift their management strategies, they will continue to be challenged by barriers, such as mistrust, that deter success. Therefore, further investment in minimizing depredations is essential as it will reduce the need for compensation and may reduce the opposition of predator conservation by ranching communities. The potential of the Defenders of Wildlife managed proactive program has not been fully realized in the Southwest, but Defenders of Wildlife has been working one-on-one with individual ranchers to identify proactive measures that they might be able to support in the Southwest. While they should realize there are individuals that will

never collaborate with them, there is great potential to ramp up the depredation prevention program to the level being spent on compensation. Funding research on the most effective measures would be a valuable investment of conservation dollars. Further assessments of WTP options could also be researched and explored to see if marketing of beef grown in wolf country is economically viable in the Southwest.

Another important reason for hiring additional staff is that much of the program is dependent on trust and relationships: ranchers must trust not only the organization that they are accepting money from, but the individual. If personalities between one staff member and a rancher clash, there should be other Defenders of Wildlife staff available to step in and work with the rancher.

Recommendation #5. Begin implementation of the USFWS Interdiction Program and evaluate opportunities for transferring management to local communities. Although there are mixed reactions to the proposed USFWS Interdiction Program, there is strong potential for this program to provide an alternative option for ranchers who do not want to file for compensation with Defenders of Wildlife. However, there is little awareness about the program and it continues to be discussed as opposed to implemented. Individuals should be appointed to manage the program and consult with Defenders of Wildlife to ensure the programs are complementary.

Although the Interdiction Program is being developed by USFWS, the goal is to have the program managed by a variety of stakeholders with expert consultants. For the program to be affective, however, it needs to be adopted and managed by the ranching communities. The participants of the survey had a strong desire for a depredation mitigation program managed by peers, and until there is a transfer of management of the Interdiction Program from USFWS to the local communities, it will likely not be adopted by the livestock associations or the ranchers. However, if seen as a peer managed program, ranchers may be more likely to become involved.

As was recommended for Defenders of Wildlife, the Interdiction Program should continue to develop a range of options for ranchers. These should include market value compensation, as well as testing the effectiveness of depredation compensation based on

historic losses, incentives (such as predator-density compensation), and proactive measures.

Recommendation #6. Install a sense of rancher ownership for mitigating depredations and develop a "peer" support network. A model such as the non-affiliated Mexican Wolf Fund, where no financial or labor contribution is required for the rancher to receive funding for proactive measures, is valuable for attaining rancher buy-in. However, I argue that ranchers also need to take ownership over the protection of their livestock and contribute to the advancement of depredation mitigation in return for receiving financial support for projects such as fencing, feed, or horse patrol. After a rancher receives support, they could give back a certain number of hours of volunteer time by acting as a resource for other ranchers, providing input to researchers on which mitigation techniques are effective, and helping spread the word about options that are available for ranchers. If an individual rancher has a positive experience working with one program (whether Defenders of Wildlife, the Interdiction Program, MWF or another), this should be shared with neighbors, friends and the livestock associations. Ranchers are more likely to trust their peers and test out techniques that neighbors or friends recommend.

Recommendation #7. Make changes to grazing allotment allocations and wolf management. Reducing depredations is not only essential to wolf recovery, but also to maintaining the livelihood of many ranchers in the Southwest. Depredations can be reduced through installation of proactive measures; however, there are also adjustments to the recovery program that may also support depredation mitigation. Recommendations include:

- Increase the grazing fee to offset costs for depredation management;
- Require immediate removal of carcasses (that may act as attractants) on federal lands and hire range riders to locate and dispose of carcasses;
- Develop incentives for removal of carcasses from private lands[i]; and
- Strengthen incentives for voluntary buyouts of grazing permits, especially in depredation "hotspots" to reduce the number of cattle that are present in the BRWRA [ii]

Recommendation # 8. Perform further research on depredation mitigation and economic impacts. Additional research on the ecology of depredations and the effectiveness of various proactive techniques may reduce the need for compensation programs. Depredation investigators are being trained to speculate how and why depredations occur, and further assessments may help provide guidance for appropriate forms of compensation, proactive methods, and improved wolf management. I recommend an in-depth, independent economic assessment of the actual impact of Mexican wolves on ranching in Arizona and New Mexico. Even if wolves are only responsible for 1% of losses per year, understanding how this impacts rancher profit margin may provide insight on the level of financial support required for a compensation program. However, an updated and thorough evaluation of actual losses compared to what has been paid out by these programs, would provide a better picture of the financial costs to ranching communities.

As effectiveness proactive measures may be site-specific, investments should be made in assessing which measures work best in the Southwest. Conducting studies to test various measures on neighboring ranches (one ranch that uses proactive measures, one that does not) may provide more insight on proactive measures that can be effectively implemented to deter wolves from depredating.

Recommendation # 9. Pursue one-on-one consultations with ranchers to build trust and capture experiences. Collaboration among major stakeholders has been attempted through consultations in the development of compensation programs, advisory groups, and the AMOC model. However, despite these efforts the tension between the wolf advocates, government agencies, and ranchers is still so heated that if the situation continues in this manner, there is little opportunity for a successful recovery or implementation of depredation mitigation programs. While efforts to bring all the stakeholders to the table to find a point of compromise should continue, a shift to focus on building individual trust and buy-in may prove to be a better investment for the compensation and wolf recovery program.

The research conducted for this thesis reached approximately 100 ranchers in the Southwest. To better assess the effectiveness of the compensation program, needs of the

ranchers and changes that can be made to reduce depredations, a more comprehensive study providing more ranchers with an opportunity to provide input is necessary. While the one-on-one connections made by Defenders of Wildlife, USFWS, the Mexican Wolf Fund and other government and non-governmental organizations are admirable, I recommend initiating "listening" projects conducted by non-affiliated individuals with no agenda (e.g. students). These individuals could meet with ranchers that have had negative experiences with wolves and compensation, as well as ranchers that have been satisfied by depredation mitigation services they have received. By working over an extensive period of time to build trust with ranchers affected by wolf recovery, experiences and needs can be collected to help improve the effectiveness of existing mitigation programs.

Recommendation #10. Develop a global platform for sharing lessons-learned from depredation-mitigation programs. While every conflict is unique, there are lessons to be learned from the successes and challenges faced by depredation mitigation programs around the world. A platform is needed for sharing depredation mitigation experiences with the global community that is dealing with predator conservation. A group such as HWCC could manage a database of projects, which could be accessed by individuals or communities that are interested in testing different approaches for reducing livestock depredations. Reports could be filed on techniques that proved effective, or ineffective, for certain species and conditions. The platform could also provide a space for sharing frustrations or challenges and receiving input from experts around the world.

Conclusions

Less than a generation ago, men were paid to hunt down and kill wolves across the western United States. Removing wolves from livestock grazing areas was celebrated and seen as a means for improving nature. Within the last fifty years, the United States has moved from a policy of wolf eradication to wolf reintroduction. Individuals living in cities away from the recovery areas donate money or advocate for wolf reintroduction; however, the impact of these conservation efforts on local communities is often overlooked. Livestock compensation programs developed as a means for recognizing the

toll that wolf recovery has on ranching communities, but as this research shows, these programs are producing mixed results and their value is questioned.

As depredation mitigation programs around the world are evaluated for their achievements and challenges, lessons can be drawn that are applicable across all regions. In the Northern Rockies, as well as in countries such as India, Burma, Italy, Namibia, Brazil, and Kenya, depredation mitigation programs are tailored to meet the specific needs of the community impacted by predator conservation. Many of these programs have accomplished their goal of offsetting financial losses and building tolerance of predators, yet the success of these programs have relied on substantial investment of time, money, and innovation. Some of the key lessons that are transferable across regions, and which are touched on by Nyhus et al. (2003), include the following: involve of local communities in the development and implementation of programs; provide multiple, complementary programs to cover for shortfalls within one program; build trust among the stakeholders; develop transparency with clear guidelines and rules for the program; and ensure ranchers take on some level of ownership or responsibility for management of the program. While these global lessons are valuable for all programs, there are great differences between regions, communities, and the circumstances surrounding predator conservation; therefore compensation programs, as well as other depredation mitigation efforts, should adapt to local needs.

While Defenders of Wildlife intended to tailor their program in the Southwest to meet local needs, the livestock depredation compensation program for Mexican gray wolves in the southwestern United States has not met its purpose of offsetting economic losses to rancher, or the grander goal of building tolerance for wolf conservation. Although for the most part the program is managed efficiently, the current program can not be considered a success: ranchers express dissatisfaction with verification and compensation processes, alternative compensation or incentives are preferred over the current program, there is mistrust of environmental organizations managing compensation, and many individuals want to see the compensation as well as wolf recovery come to an end. Dissatisfaction occurs despite demographics or experience with wolves or the compensation program, as interest in and acceptance of compensation

is more tied to history, culture, and perceptions. Although the compensation program has offset financial losses for some individuals, overall it does not appear to be supporting or improving the wolf recovery effort and may in fact be developing a further divide between wolf advocates and ranchers. Despite this, the compensation program is still a useful and necessary tool. If used in conjunction with other depredation mitigation programs, the Defenders of Wildlife program may better meet the needs of ranching communities as well as support wolf conservation, therefore becoming a more valuable use of conservation dollars. However, success is dependent on meeting local community needs as they are defined by that community, as well as identifying and overcoming factors that can act as barriers to a compensation program's effectiveness. Coupled with further investments in outreach, development of alternative incentive opportunities for ranchers, and depredation research, the current compensation programs and wolf recovery efforts will be strengthened.

While the Defenders of Wildlife compensation program has not yet reached its potential, there are lessons that can be drawn from it as well as other programs in the Southwest that are applicable to other regions. Some of these lessons include: the development of multiple complementary depredation mitigation programs (even if not all are widely known) to provide a range of options to ranchers; the use of sustainable funding, such as drawing funds from endowments; and building connections with individual ranchers to better understand their experiences and tailor compensation to meet their needs.

As predator and other wildlife conservation projects expand across the globe, this research demonstrates the importance of considering community impacts and perspectives when developing programs that compensate for economic losses caused by conservation efforts. Even if it takes years or potentially generations to achieve, working to understand these impacts and the perspectives of the affected community will improve the ability of conservation organizations and government agencies to better meet the needs of ranchers while also building trust among the stakeholders and tolerance for wolf presence in the Southwest.

Notes

i Government cannot mandate carcass disposal on private lands.

ii Some conservation organizations are backing the payout for ranchers to forfeit grazing permits and remove their cattle from the public lands in the BRWRA (Dougherty 2007; C1NM1, C1NM2 per comm.. 2008). While a buyout would be costly, the government would no longer have to spend money on management that comes at the expense of taxpayers as discussed in the GAO report. However, according to Dougherty, "ranchers…have made it clear that they have no intention of giving up their grazing rights without a fights…there is a palpable fear that violence could break out if the government tries to force the ranchers off the land" (Dougherty 2007, 17). A voluntary buyout, however, could be possible and there is some indication that some ranchers are willing to sell their land and cattle (CIAZ3 per comm. 2008). One proposal for grazing permit buyouts is to pay ranchers $200/head of cattle authorized to graze- the going rate plus an incentive add-on. This is happening in Yellowstone and other areas where wolves have been reintroduced. In the Southwest, this would provide an opportunity for people to retire or purchase another ranch that is not dependent on public lands (CINM1 per comm. 2008).

APPENDIX A

ACRONYMS

AMOC: Adaptive Management Oversight Committee
AUM: Animal Units per Month
AZGFD: Arizona Game and Fish Department
BRWRA: Blue Range Wolf Recovery Area
CBD: Center for Biological Diversity
DOW/Defenders: Defenders of Wildlife
ESA: Endangered Species Act
GAO: Government Accountability Office
GLGA: Gila Livestock Growers Association
HWC: Human Wildlife Conflicts
HWCC: Human-Wildlife Conflict Collaboration
IFT: Interagency Field Team
LGA: Livestock growers associations
NASS: National Agricultural Statistics Service (part of USDA)
NMCGA: New Mexico Cattle Grower's Association
NMDGF: New Mexico Department of Game and Fish
SOP: Standard Operating Procedures
SSP: Mexican Wolf Species Survival Plan
TRI: The Rewilding Institute
USDA: United States Department of Agriculture
USFS/FS: United States Forest Service
USFWS/FWS: United States Fish and Wildlife Service
WWF: World Wide Fund for Nature (previously known as World Wildlife Fund)

APPENDIX B

SAMPLE DEPREDATION REPORT FORM

Resource Owner:

Mailing Address Phone: County: Ranch Name:

SITE DESCRIPTION:

Nearest Town: Allotment Name (if applicable): Approximate Location:

Coordinates: UTMN: UTME:

Elevation _____ Slope_____ % Aspect _____

Vegetative Cover: _____

Topography (riparian, S. slope, bench, etc.) _____

General description of area: _____

Date Complaint Received:_____ Date Investigated:_____

Land Ownership: [ ] Private [ ] FS [ ] BLM [ ] State [ ] Tribal [ ] Other_____

Type of Animal: [ ] Sheep [ ] Lamb [ ] Bull [ ] Cow [ ] Calf [ ] Horse [ ] Colt [ ] Dog [ ]

Other____

Number of Selected Animal:_____

Damage Type: [ ] Killed [ ] Injured [ ] Harassment [ ] Stillborn [ ]

Other_____ Breed _____

Ear Tag #_____

Sex _____

Est. time Since Death or Injury: _____ Estimated Age of Resource _____

Are there other livestock in the area? [ ] Y [ ] N Describe (how many, behavior, composition, distance from mortality) _____

EVIDENCE:

Detection method: [ ] Report from owner [ ] Birds [ ] Other:_____

Carnivore Tracks Present: [ ] Mexican wolf [ ] coyote [ ] mountain lion [ ] black bear [ ] other:_

Scat Present: [ ] Mexican wolf [ ] coyote [ ] mountain lion [ ] black bear [ ] other:_____

Carnivores observed in area? Describe:_____ Carcass hidden or in the open?_____

Carcass covered ? [ ] Y [ ] N Carcass moved? [ ] Y [ ] N Drag marks present? [ ] Y [ ] N

Collared wolves in area? [ ] Y [ ] N If yes, then number_____

Blood on vegetation? [ ] Y [ ] N Describe:_____

Apparent point of first feeding:_____

Percentage of Carcass Remaining

[ ] 0-25%---No soft tissue, hide present, disarticulated.

[ ] 26-50%--All organs consumed, all or most of quarters consumed, partial disarticulation.

[ ] 51-75%--All organs and portions of the hind quarters consumed, front quarters and neck intact, articulated.

[ ] 76-100%--some organs consumed, most soft tissue intact, skeleton articulated.

Describe any additional evidence that is discovered in the area: _____

Describe hemorrhages and corresponding marks seen while skinning the hide or other abnormalities (Location and type, e.g. claw marks on right hind leg, or canine marks on neck)

_____

Canine spread (if applicable):_____mm

Cause of Damage:

[ ] Confirmed Carnivore (list species) _____

[ ] Probable

[ ] Possible

[ ] Accident

[ ] Unknown

[ ] Other

ADDITIONAL INFORMATION:

Were photos taken of the site? [ ] Y [ ] N Attached? [ ] Y [ ] N

Was a veterinarian involved in cause of death determination? [ ] Y [ ] N

If yes, is a veterinarian report attached [ ] Y [ ] N

SUMMARY OF INCIDENT (including preface and actions taken):

_____

Lead Investigator:_____

APPENDIX C

DEFENDERS OF WILDLIFE COMPENSATION BY COUNTY

Table 3. Locations where compensation check was mailed and number and type of livestock compensated. * indicates towns outside of BRWRA. Based on data from Defenders of Wildlife (DOW 2007c).

State	County	Town	Number and Type of Livestock Compensated
AZ	Apache	Not listed*	1-2 Sheep
AZ	Apache	Alpine	3-19 Cattle, 1-2 Other
AZ	Apache	Maverick Springs	3-19 Cattle
AZ	Apache	St. Johns*	3-19 Cattle
AZ	Apache	Springerville	1-2 Cattle
AZ	Navajo	White River	3-19 Cattle
AZ	Navajo	Herber*	1-2 Other
AZ	Navajo	Snowflake*	1-2 Cattle
AZ	Apache Sitgreaves National Forest		1-2 Cattle
AZ	Not listed	Greerer	1-2 Cattle
AZ	Greenlee	Not listed	1-2 Other
AZ	Greenlee	Clifton*	3-19 Cattle
AZ	Greenlee	Duncan	1-2 Cattle
AZ	Maricopaca	Mesa	1-2 Cattle
AZ	Gila	San Carlos*	3-19 Cattle
AZ	Graham	Pima*	1-2 Cattle, 1-2 Other
AZ	Graham	Safford	1-2 Other
AZ	Pima	Tucson	1-2 Cattle
NM	Catron	Not listed	3-19 Cattle
NM	Catron	Datil*	3-19 Cattle
NM	Catron	Luna	1-2 Other
NM	Catron	Reserve	3-19 Cattle, 1-2 Other
NM	Catron	Glenwood	1-2 Cattle
NM	Socorro	Magdelena*	20+ Cattle, 1-2 Other
NM	Socorro	Beaverhead	1-2 Other
NM	Sierra	Winston*	3-19 Cattle
NM	Valencia	Jorales*	1-2 Cattle
NM	Grant	Buckhorn*	1-2 Cattle
NM	Grant	Mimbres	1-2 Other

APPENDIX D

LIVESTOCK COMPENSATION SATISFACTION SURVEY

For the full survey, please contact the author.

A. INTERACTIONS WITH MEXICAN GRAY WOLVES. The first group of questions concerns your interactions with Mexican gray wolves, since their reintroduction to Arizona and New Mexico, on the land where your livestock graze.

1. **Please mark the statement that best reflects your opinion about the Mexican gray wolf.**
   - ☐ I support the presence of the Mexican gray wolves in the Southwest
   - ☐ I do not support the presence of Mexican gray wolves in the Southwest
   - ☐ I do not have an opinion about the presence of Mexican gray wolves in the Southwest

2. **Have you ever seen a wolf, or evidence of a wolf, on the land where your livestock graze?**
   - ☐ Yes
   - ☐ No

2a. How many times have you seen a wolf, or evidence of a wolf, on that land, approximately?
   - ☐ Rarely (1-5 times)
   - ☐ Occasionally (5-10 times)
   - ☐ Often (more than 10 times)

B. COMPENSATION PROCESS. The next group of questions is about the ways in which some ranchers have been compensated when wolves harass or kill their livestock. ***If you have never had a verified or suspected wolf harassment or kill, please skip to Section C, page 10.***

1. **Have you ever filed a claim for financial compensation for livestock loss?**

   ☐ Yes
   ☐ No → **1a. Why did you not file for compensation?**

Continue with question 2

_____

_____

_____

Please skip to Section C, page 10

2. **How many times, approximately, have you filed a claim for compensation?**

   _____ number

3. **Have any of those compensation claims been settled yet?**

   ☐ Yes
   ☐ No → *Please skip to Section C, page 10*

4. **How many claims were approved?**

   _____ number

5. **On how many claims have you actually received compensation?**

   _____ number

6. **What was the amount of compensation you received in comparison to what you requested?**

   ☐ Less than requested
   ☐ About what requested
   ☐ More than requested

7. **Approximately how long, on average, have you had to wait to receive compensation?**

   ☐ Less than one month
   ☐ One to two months
   ☐ Three to four months
   ☐ Five to six months
   ☐ More than six months

C. TELL US YOUR OPINION. This next section is about your opinion towards different management strategies for protecting livestock from wolves. (The livestock compensation program offered by Defenders of Wildlife provides financial compensation to ranchers who lose livestock to wolves. Even if you are not familiar with this program, your opinion on the following questions is still very important.)

1. For each of the following statements, please indicate your level of agreement or disagreement.

	Strongly Agree ▽	Somewhat Agree ▽	Somewhat Disagree ▽	Strongly Disagree ▽	Don't Know ▽
Livestock compensation does not address the actual problem of wolf-livestock interactions					
Compensation is not a long term solution, just a short term 'band aid' approach					
Compensation programs are 'publicity stunts' for environmental groups and don't address the real issues					
Compensation spreads the costs of predator conservation more fairly among society					
Compensation infringes on private property rights					
Compensation is currently the best available option for dealing with livestock-predator conflicts					
Losing livestock to wildlife is part of the business and compensation should not be provided					
By accepting compensation, others may think that I tolerate predators killing livestock					

2. Which organization or agency would you prefer as taking primary responsibility for managing a livestock compensation program?

- ☐ Federal government
- ☐ State agency
- ☐ Nonprofit organization/nongovernmental agency
- ☐ Community advisory board (appointed or elected group of ranchers, and representatives from state/federal agencies and nonprofit organizations)
- ☐ Other (please describe): _____

D. TELL US MORE. This section asks questions about ranch and demographic information.

1. **Which state is your ranch located in?**
   - ☐ New Mexico
   - ☐ Arizona

2. **Are you a member of a cattle grower's association?**
   - ☐ Yes → **2a. Please list the association(s) you are a member of:**
     _____
     _____
   - ☐ No

3. **What is your position at the ranch?**
   - ☐ Owner
   - ☐ Manager/caretaker
   - ☐ Ranch hand
   - ☐ Other (Please specify): _____

4. **Approximately how long have you owned/occupied the ranch?**
   - ☐ Less than one year
   - ☐ 1-5 years
   - ☐ More than 5 years, but less than 10 years
   - ☐ More than 10 years, but less than 20 years
   - ☐ More than 20 years

APPENDIX E

FULL SET OF COMMENTS FROM SURVEYS

History

- "The ranchers and landowners worked hard to get rid of the wolves. Now you bring them back. Why?" RSAZ2.1
- "It took many years and a lot of good men to eradicate the vicious predators from the western range, and they should never been reintroduced." RSAZ4.1
- "Our ancestors eliminated wolves for good reason!" RSAZ5.1
- "Our grandparents with the help of a just and service oriented government eliminated the wolf from the area. Now so called 'environmentalists' who live in cities have convinced government employees, who also live in cities that they know best what is best for all. The human has evolved because it has taken control. Now some would have us be eaten by animals. Priorities! Priorities!" RSNM10.2
- "I'm totaling against [reintroduction] my ancestors got rid of them making a safe place for people, cows, horses, dogs, grandkids to visit is my thinking." (RSAZ28.1)
- "Do not introduce (re) the wolf. People in this country took care of the problem once." RSNM8.1
- "Sadly to say, it has been missing too long- the West is not ready for the wolf to be put back in the wild- keep this animal where it doesn't crowd the rancher. The West hasn't changed enough for a lot of men to say, 'Move over for the wolf.' " RSNM79.1

- "The reintroduction program for the gray wolf, in only designed to harm ranchers. It took years for my grandfather and great grandfather to rid themselves of wolves." RSNM13.1
- "…it is not the 1800s. People are more important than wolves!" RSNM18.1
- "I do not wish to see the wolf become extinct, however keep them in remote areas where population growth has not invaded." RSNM12.1
- "There are certain wild animals that cant [sic] live where people are." RSAZ22.1
- "I simply think that they are not compatible with the growth of our human population. As in the case of other animals that have become extinct, their time has passed. Since all of Mexico has moved up here maybe there is room down there for the wolves." RSNM25.1
- "Man affects nature regardless of intent and location, and not everything as nature and man evolves is meant to be reversible" RSNM13.1
- "[The] Mexican wolf program is a failure there are too many people in the area." RSNM5.2

Us V. Them

- "The compensation program is run by people who don't want cattle or people in the area." RSNM20.1"
- The people that are pushing for the wolves [sic] reintroduction are not the people that suffer from the effects." RSNM24.1
- "The Defenders of Wildlife would like to see everyone off of the land and herded together in towns, but that is not equitable! If people want wolves, they can buy land, fence it, and enjoy the wolves on their own property. In the 21st century, there is no place that wolves should be allowed to roam free to ruin people's financial and mental well-being." RSAZ2.1
- "Wolves are being destroyed and are suffering for the egos of a few people who are living in an unreal dream world. "RSNM14.1

- "Why can't ranches alone [deal with the wolves]- we take care of the land. Why are you trying to get rid of us. Aren't there better jobs out there for you? Than hurting other people. They aren't native here anyway! Have you ever seen a baby calf laying there with no hind parts still alive??? Take them to New York and put them in your backyard if you insist on having them!" RSUnknown16.1
- "As a farmer and rancher in this valley for over 50 years it seems to me that people involved with the introduction of wolves have forgotten why they were eliminated to begin with and now in this time and future, looks like wildlife of this nature have more rights than the local landowner. People with this type of mentality forget where their fresh streak comes from. It's not WalMart." RSNM35.1

Economics

- "When we had occasional wolf presence last year we lost 10-15 calves out of 170. This past year when a pack of wolves were located on our ranch we turned up 40-50 calves short. Our gross income has fallen from $75,000 to 45,000 in the past 4 years. We will soon be out of business. We have tried everything- extra riders, moving our cows, calving close to home- nothing has worked. Either pay us for our calves or buy us out." RSNM7.2
- "A few dollars do not replace the loss of livestock." RSAZ12.2.
- "[We are having issues regarding the impact on] game -deer and elk- for which we sell hunting permit for and [wolf recovery] directly affect that income source." RSNM69.1
- "We had enough hardships i.e. disease, etc. before the reintroduction. Now this is just another cost to our livelihoods." RSNM26.1
- "The program is a disaster. The money [spent] on the wolf program could and should have been spent on a program that would benefit all instead of wages for people and ... enviros." RSNM47.1
- "Stop the huge waste of tax dollars." RSUnknown16.1

- "[Reintroduction is] not cost effective. $200,000 per wolf is obscene." RSNM24.1
- "The program should be stopped it is not cost effective. Besides livestock the cost to wildlife is extreme. I can not find any facts. They don't want us to know the true cost of the Mexican gray wolf." RSNM15.1
- "[Compensation is an] unnecessary cost." RSAZ42.1
- "Ranchers that have been on their land for many generations should not be driven off of their land because their calf crop was less than half of what it should have been. They can't make a living when wolves kill so many calves and cows." RSUnknown25.1
- "It is just very difficult to get wolf killed baby calves confirmed w/o confirmation there is no compensation- so each calf is a 600.00 loss, we eat…due to wolf presence we lost jobs that paid- we spent 2x what we would have on fuel, groceries and day work, we were only compensated for 1 wolf event, the 2 were ignored." RSNM4.2
- "Preventative measures are too costly. Eliminate the program. Quit spending money. Let them survive if they can on their own like they use to do." RSNM10.2
- "$1 million per animal cost is a huge cost when we already have a terrible budget deficit. What do the wolves contribute? To society? To the ecosystem? We already have hunting. We can go where they already are established if we want to see them in the wild. There is absolutely no valid reason for spending public money on this program." RSAZ37.1 (has had no evidence of wolves, but neighbors have suffered attacks)
- "It's a waste of federal and state money that may be more utilized elsewhere." RSNM78.1
- "They are good for nothing. They are a terrible expense for tax payers and government. We have many reasons not to waste money. Wolf introduction should be stopped!" RSNM65.1

Challenges of verification procedure

- "There is no confirmation on a calf that has been eaten! Or for cattle that were run to death in the heat for lack of evidence." RSAZ12.2
- "[Verification]…takes too long, and young animals who are completely consumed are often overlooked. Injuries are often not compensated even though annual value is lost." RSNMAZ34.1
- "The process is very biased in favor of the wolf, all strikes were not issued even when evidence was present." RSNM9.2
- "We never contacted [Wildlife Services] when cow died or when we found calf carcass due to the unprofessional way we were treated and dismissed when we called them…accused of lying is not going to promote unity between government officials and ranchers." RSNM1.2
- "Rules [for] verification…too narrow. [It is] extremely difficult to prove a depredation and once proven there is no guarantee you will be compensated." RSNM5.2
- "The main problem is one must be on hand when the attack take place to save the carcass from being consumed as well as preserve all tracks or the examining personal will try to say that it is not a wolf kill. The USFS wants to verify as few wolf kills as possible." RSNM2.2
- "[The] verification process is almost impossible- to find a carcass soon enough (usually within 12 hrs of kill) and then have it examined before it is eaten is hard. Calves killed by wolves are consumed in their entirety- so no evidence. verification determination by USDA employees is very subjective. I was denied a confirmation (ruled possible) by a USDA wildlife service employee because he was in bed (literally) with a F&W employee." RSNM7.2
- "[It is] almost predicted that verifiers will say something other than wolf was cause of death." RSNM11.2
- "Verification [is] impossible to administer except in limited cases" RSAZ36.1

- "Ranchers are hardworking, very honest people and their words should be seriously considered in any claim. After a livestock killing is reported to the authorities it takes 2 weeks or more for a group of people (paid by our taxes) to show up to inspect the area, by then most evidence has either vanished or been compromised by other tracks, storms, etc. all of this costs thousands of dollars and proves little or nothing and the rancher lost another cow!" RSNM58.1
- "Wolf personnel are not pathologists and at best just guess about what killed the livestock." RSAZ12.2
- "Our county wolf investigator is very thorough and I trust him completely. The fed investigators are very one sided and biased toward the innocence of the wolf often over-finding the findings of our county investigator. Any time a state wildlife services investigator verifies two or more kills in a row, he gets reprimanded and told not to verify too many. Often times when a report is turned in the NM wildlife services offices in Las Crucas it's changed, minimizing the depredation of the wolves. We have a three strikes and out rule. Many times the feds or state will give the 3rd strike to a wolf that doesn't have a stroke just so the guilty wolf or wolves won't have to be removed. As far as the ranchers are concerned, this is so one sided and completely unfair." RSNM9.2
- "By the time the identifier got there evidence was tracked over by crows and other scavengers [the cause of death] could not be determined. We lost a cow and calf. About 3 days later a known wolf was located and removed from our ranch. This wolf had previously been known to take down and kill other cattle and calves." RSNM8.2
- "[I have experienced a] major decrease in calf crop. Caves were branded and ear tagged and then paired up with cows before they disappeared. have seen wolves and wolf tracts throughout [sic] ranch! In 2003- 3 wolves were 20 ft from my bedroom window. they killed my dog "Dillan" - no amount of compensation could replace her! I called the wolf number but no one seemed to care." RSNM13.2

Fear/threat of wolves

- "More recent home owners near forest land should not be continually afraid to leave their homes, let their children and pets play in the yard or walk to the bus stop." RSNM.11.2
- "I do not like the reintroduction of the Mexican gray wolf. To me it is very scary." RSNM78.1
- "There was a reason the old-timers got rid of them. They're a danger to humans also- especially kids- and the loss of a human cannot be compensated!!!" RSNM68.1
- "I would hesitate to camp with my family in areas where wolves are introduced." RSNM3.2
- "Too many people live in and use the reintroduction area. How will you compensate for the loss of human life. The wolf is a killer. He kills for pleasure and impulse." RSNM47.1
- "They [wolves] are a danger to humans as well [as cattle and elk], especially the young and old." RSAZ38.1
- "We can no longer let the grandkids play outside unsupervised and we have to carry a gun when taking daily walks." RSAZ39.1

Ecology

- "Are you also going to have a reintroduction program for the deer and elk in thirty years when they are all gone due to the wolves?" RSNMAZ63.1
- "Wolves are not good for the ecosystem in our state. That is scientific fact. Our balance of nature was fine before the introduction of this wolf." RSAZ7.2
- "I don't believe they should be brought back- they are vicious- they eat half of animals without killing them and then go off and leave them-that's cruel. My son has worked for different ranches that have them and seen this. How awful!!! We kill our animals before we eat them- lions and bears at least kill them first!" RSAZ28.1

- "Why[reintroduce the wolves]? They've whipped out the elk in Yellowstone- 75% or more- they kill people, dogs, cattle, sheep." RSAZ28.1
- "Wolf population declined because they couldn't survive naturally. Reintroducing them only causes threat to domestic species." RSAZ26.1
- "Quit the entire program. The wolves are not going extinct." RSNM10.1
- "A huge amount of time, money and harassment of individuals is being wasted on a crossbred animal that is not a true Mexican wolf. In the area where it is found it is not welcome. This makes for very poor relationships with everyone concerned." RSNM49.1
- "It was not only man but mother nature who forced the wolf to find other areas to adapt and survive as nature evolved -on its own-and I question the wisdom of those who feel they should force the grey wolf back into an area that mother nature has already rejected it. Remember, given the same circumstances the coyote has survived, why? why didn't the wolf? those were natures choices not ours. what will 100 wolves eat in a year? 1000 wolves? 10,000 wolves? where will the game go when there are no calf crops? then what?" RSNMAZ63.1
- "Your reintroduction of the wolf is cruel and inhumane not only to the rancher and his livestock but TO THE WOLF: - stress and death of many wolves from trapping- transporting- etc. You are playing GOD in a cruel and unrealistic manner!" RSNM13.2

Criticism of compensation

- "Found a kill of my neighbors- FWS didn't arrive until next day." RSNM3.2
- "Compensation cannot replace time or animal reared." RSNM8.
- "I have sent confirmed kill reports to DOW several times. Have NEVER rec'vd any response." RSNM4.2

- "[To receive compensation] we had to talk to someone on the phone and give the impression that we were co-operative with wolf program and would continue to be. The interviewer admitted this." RSNM11.2
- "Compensation program [is] not the answer. Very small percent of kills are found, also how do you compensate for the time lost in animal reproduction, cost, etc. Paying for only killed animals is only a small portion of the total loses." RSNMAZ34.1
- "Compensation does not being to address the problem. Too many calves are completely eaten, and a tight bagged bawling mother cow is not "proof" of a kill. Many cows and calves are killed before a rancher can 'prove' one kill." RSNM35.1
- "Some larger ranches and especially those in rougher/mountain areas are very difficult to patrol regularly. I have had cattle literally disappear without a trace even after several years of gathering. We suspected wolves for the loss, but how would we ever be able to prove this for compensation or tax write-off purposes (assuming the cattle were not home grown). Maybe they were stolen, died in a remote area, or other things." RSAZ43.1
- "[Compensation] only paid part of wages for range rider, we supplied $500, food, lodging, gas & feed for horses." RSNM47.1
- "It is not going to work, unless they take private property rights away & get hunters, campers and other people who use our national forest & private land off of the recovery area." RSAZNM46.1
- "[Game and Fish] employee said teeth marks have to be a certain size [to verify wolf kill]. This was 3 freshly killed adult sheep not more than 3-4 hours old. The wolf was seen here the same day as the kills. Tracks were not conclusive according to G&F. We are ranchers not biologists so how can we argue with that...providing ranchers the right to kill wolves that have been harassing livestock and dogs or in close proximity to corrals, barns and homes [is preferred]. The compensation program doesn't work because the 'biologist' is the only one who says if it is a verified wolf kill supposedly by measuring the bite marks or method of kill or taking down an animal. The sheep

that were killed were within 12 hr of kill when the G&F was notified. a wolf was in the area and seen several times, our guard dogs had died and this happened within 3 days of his death. most ranchers on forest permits doesn't see every animal (cow, calves) every day and the kill is several days old before a "biologist" get there and then says it is not a verified kill. Wolves will eat a calf completely up at one time so what is left to verify a kill. We keep close watch on our sheep and cattle, penning the sheep at night and having a guard dog with them all the time." RSNM57.1

- "Do away with the program because it does not compensate for the whole loss which includes stress on livestock and rancher. It is a farce." RSNM10.2
- "It is impossible too [sic] find wolf kills in time to have them verified. Game & fish officials tell me they only find 1 out of 7 kills… don't turn your dogs/wolves loose on the cattle. There are very little food for them except cattle." RSNM51.1
- "Not sure any type of management program would work correctly or in a timely manner or to the ranchers benefit." RSNM54.1
- "Defenders of wildlife doesn't understand the cost to a rancher to replace cow- travel expense to auction, acclimating animal, etc." RSNM7.2
- "[The] present livestock compensation program is a joke. It doesn't do anything." RSNM7.2
- "Now DOW states they will not compensate if they do not like your management. they claimed they would help w/other methods but we invested, trained and feed guard dogs and nothing from them." RSNM4.2

Recommendations for compensation

- "I also operated a [successful]guest ranch. Wolves forced us out. Comp. for loss of business income [should be included]." RSNM73.1
- "They should go buy replacement livestock and bring them to my ranch." RSNM72.1

- "Providing livestock owners the right to kill wolves that are killing livestock" as an alternative to financial compensation. RSAZ41.1
- "… a compensation program should NOT be dependent upon a special interest group. Why? Because the tax payers need to have an accurate account of the overall impact, including cost, that this mandated program is causing their rural and agricultural communities. The wolf reintro. program needs to pay for these cost and be held accountable." RSUnknown45.1
- "[I would like to see] compensation for the mental stress coming from not being allowed to remove a problem wolf ourselves." RSNM75.1
- "Again, let honest ranchers decide if a wolf is enough of a threat and allow us to deal with this 'extreme' predator as we are allowed to other predators. We haven't wiped out lions, bears and coyotes- just kept them controlled." RSNM48.1
- "[Recommends compensation for] damage to future or next year production of young." RSNM4.2
- "[Wants compensation for] loss or vet bills for dogs- herding, hunting, watch and guard dogs." RSNM6.2
- "[Wants compensation for] worker time for preventing [wolf depredation] and extra time with cattle during wolf presence." RSNM4.2
- "[Wants] prompt removal of problem and killer wolves rather than letting killing and problems escalate as is now occurring." RSNM11.2
- "Allow rural dwellers more wolf management authority and tools." RSNM4.2
- "[Wants] general compensation to make the wolf economically attraction." RSNM48.1
- "[Wants] incentives which will make wolves and their presence economically productive." RSNM49.1
- "[Wants] payment for loss of weight on cattle, loss of calf crop." RSNM11.2

- "Ranchers [should] just receive a flat-line compensation in "reintroduced wolf area" based on the fact that not all livestock killed by wolves will be found in time to verify." RSNM52.1
- "A helicopter and crew should be present to monitor the wolf kills, they should fly daily with tracking device to find the kills." RSNM51.1 has had suspected kills
- "[Wants compensation for] stress on whole family and community." RSNM78.1
- "Only a compensation program that would make the rancher's whole again would work. This should be based on historical records of calf crop, etc not confirmed kills." RSNM55.1
- "[Wants] comparison between past calf crops and present calf crops where wolves present…[compensation would work] if done correctly." RSNM7.2
- "Compensation should cover anything that takes time away from cattle." RSNM56.1
- "Ranchers should be compensated for mental anguish." RSNM69.
- "[Wants compensation for] time patrolling herd." RSNM54.1
- "Allow rancher to protect private property (livestock) without harassment [sic] from government officials regardless whether it is on federal, state or private land." RSNM1.2.

Criticism/Recommendations for recovery

- "Releasing the wolves in an environment such as ours has caused many problems. Many of the wolves released in our area are not tagged (supposedly) untraceable. The few we have seen and dealt with have had collars. There is not enough man power to deal with reports of problems." RSNM8.2
- "As a general comment, to clear up the issue the wolves should be kept away from these rancher/farming areas with whatever means possible." RSNM35.2
- "Harass wolves to make them fearful of humans." RSNM10.2

- "Wolves shouldn't be released in the Southwest since they will never survive in this area of the nation. Stop the recovery of wolves in the Southwest. This program is a losing situation for the wolf, the tax payer and livestock producers." RSAZ36.1
- "I'm not sure they needed to be 'reintroduced'. But if they are here I don't have a problem with them if they don't bother domesticated animals. However, I have seen the effect other rancher have had- one friend had a horse attacked in the corral and was torn up pretty bad. Another had to put down a cow who had her back hind part ate off her and she was still alive! That makes me sad to see animals suffer like that. So, if you put them out there- watch them!" (original emphasis) RSAZ43.1
- "We need to know when wolves are in the area. A wolf that has killed livestock should not be relocated to someone else's ranch. They don't quit killing. The mexican gray wolf reintroduction program doesn't work except in a fenced wilderness area with no livestock." RSNM75.1
- "National parks were established to preserve our wild and natural resources, not our agricultural areas." RSAZ12.2
- "The program was flawed from the beginning. We were lied to about the blood line, we were lied to about the impact. The wolves have been trouble every place they were released. That's why they have to recapture and release all the time. The people pushing this program, call themselves experts, but they don't know a damned thing about animal behavior. wolves will take deer and elk sure, until they find out how easy domestic animals are." RSAZ3.1
- "I can protect my dogs and livestock from bears, cougars and coyotes. I can not protect my animals from wolves! Big DIFFERENCE!" RSNM6.2
- "Hard to find kills in adverse terrain." RSNM3.2

Rancher Responsibility

- "Ranchers in wolves areas need to monitor their cattle more closely, especially during calving times." RSAZ39.1

- "Allow ranchers the freedom to take necessary measures to ensure proper care of their livestock." RSAZ36.1

Management Responsibility

- "The agencies responsible for the management of the wolves are not being totally honest with landowners as to the location of the wolves." RSNM63.1
- "The federal government put these wolves out here and they should be responsible for them and the compensation should be paid out of their budget, not the Defenders of Wildlife." RSNM9.2
- "The wolf program is merely another reflection of anything our government manages- utter failure!" RSNM1.2
- "Defenders of Wildlife are a special interest group and they most certainly pick and choose whom they compensate. It is their money, they have that right. Compensation money should not come from such groups, it is the governments program and they should be responsible." RSNM76.1

Support for the program

- "The loss of livestock is unfortunate for ranchers and farmers. But this is has been the way of life for centuries, all over the world." RSUnknown18.1
- "Wildlife also holds importance and value." RSNM59.1
- "I have no problem with the Mexican gray wolf reintroduction program. Its [sic] part of our ecosystem." RSAZ39.1

Misc

- "We are not against compensation programs. Dealing with predators is a part of ranching." RSAZ39.1
- "What a tragedy for the public as well as the wolf. No-one or nothing is benefiting." RSNM55.1

- "Priority on production of food for humans rather than aesthetics of being able to see or hear a wolf." RSNM10.2
- "According to the constitution of the united states of america, the role of the federal government is to protect its citizens, protect their property, privacy and freedom. Our hands are tied when our property is in danger. Why did our gov at the turn of the 20th century help in eliminating this vicious predator? Not only for livestock but also other wildlife. The wolves do not need to be here! Is this what our men and women in uniform fought and died for since the beginning of our country to destroy the freedom, privacy and property of its citizens? All of this eco-terrorism brought about by those who would destroy our country- this is just one phase of it. any time a law is passed in congress that's not according to our constitution, it is not law!" RSNM9.2
- When asked to provide additional comments on the program, "Don't get me started." RSNM 79.1
- "Look- I can manage my own ranch. I'm not looking for compensation. I would just like to be left alone. Rancher's do more for wildlife, without even thinking about it than you can imagine. But wolves!! Stupid." RSAZ36.1

APPENDIX F

DEMOGRAPHIC BREAKDOWN OF SURVEY PARTICIPANTS

Table 4. Demographic breakdown of survey participants. Numbers are rounded and may not add up to 100%.

	S1		**S2**	
	%	**n / N**	**%**	**n / N**
Ranch Location				
AZ resident	35%	25/71	6%	1/16
NM resident	61%	43/71	94%	15/16
AZ/NM resident	4%	3/71		
Sex				
Male	84%	57	60%	9/15
Female	15%	10	40%	6/15
Both (Spouses completed together)	1%	1		
LGA Membership	32%	23/72	88%	14/16
Arizona	24%	9/35		
New Mexico	35%	22/61		
AZ/NM	33%	1/3		
LGAs Represented	NMCGA, AZCGA, Graham-Greenlee Cattle Grower's Association, Montano Cattle Growers		NMCGA, Greenlee County Cattle Growers, GLGA	
Education				
Did not finish high school	3%	2/67	13%	2/15
High school diploma/GRE	20%	14/67	33%	5/15
Some college	28%	19/67	13%	2/15
Technical college	10%	7/67		
Bachelor's degree or beyond	37%	25/67	40%	6/15

Table 4. continued

	S1		S2	
	%[1]	n / N	%[2]	n / N
Age				
20-30	0	0	0	0
31-40	5%	3/67	7%	1/14
41-50	18%	12/67	14%	2/14
51-60	22%	15/67	14%	2/14
61-70	25%	17/67	36%	5/14
71-80	22%	15/67	14%	2/14
81+	7%	5/67	14%	2/14
Years on Ranch				
1-5 Years	11%	8/71		
6-10	11%	8/71		
11-20	28%	20/71	19%	3/16
21+	49%	35/71	81%	13/16
Ranch Size	Range from <5ac to >2000, with over 44% (n = 31) with ranches larger than 2000 ac		5ac – 18,000ac 81% over 2000ac	
Type and Avg Size Livestock Herd	Number (n / 79)	Size Herd	Number (n / 16)	Size Herd
Cattle	57	Majority 40-500 head	13	100-1600
Sheep/Goats	11	Majority 15-20	1	<10
Pigs	3	Majority 1-4	1	<10
Other (dogs, horses, mules, llamas, chickens)	38	Majority 5-6 horses, 50-100 chickens, 3-4 dogs	13	<10

[1] Numbers are rounded and may not add up to 100%
[2] Numbers are rounded and may not add up to 100%

APPENDIX G

SURVEY TWO RESULTS

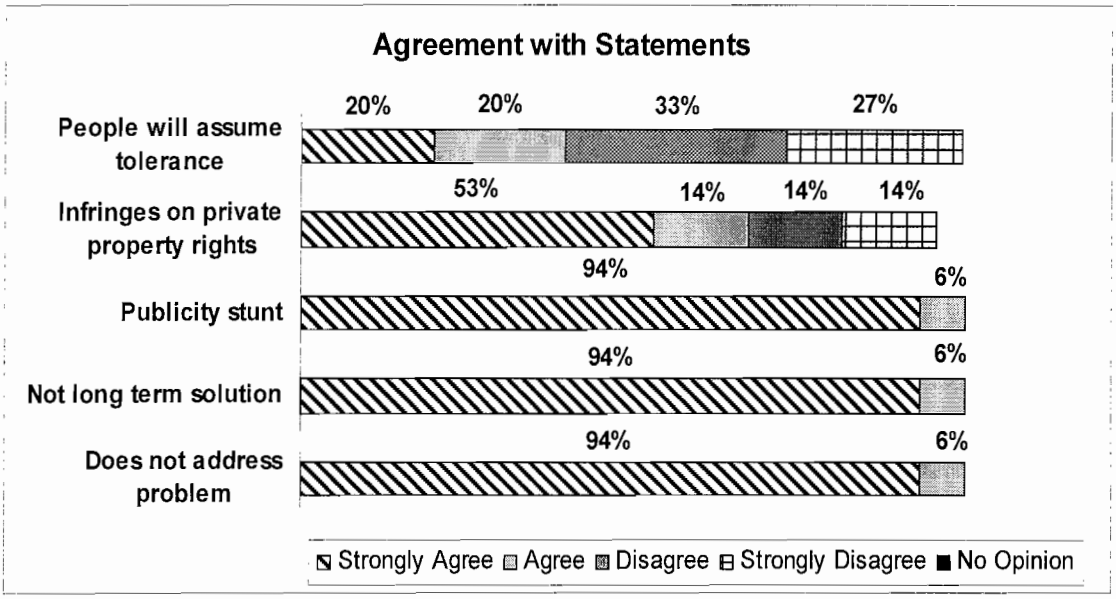

Figure 15. S2 respondent agreement with various statements regarding compensation.

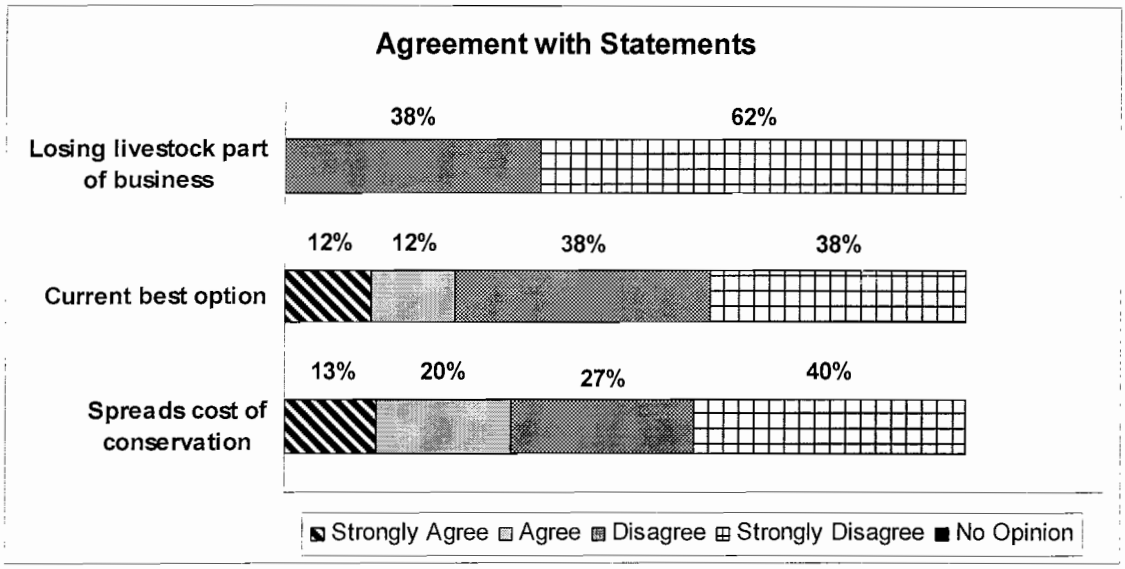

Figure 16. S2 respondent agreement with second set of statements regarding compensation.

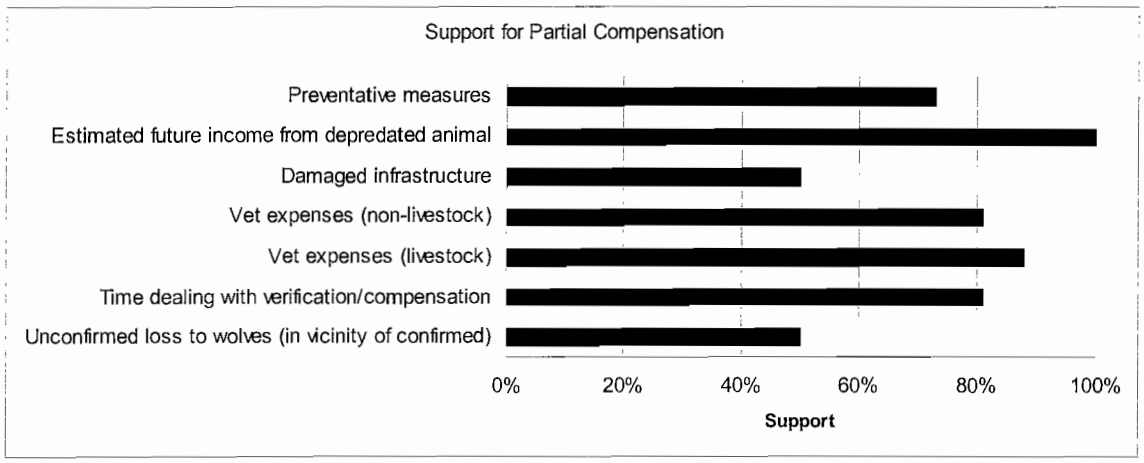

Figure 17. S2 respondent support for instances in addition to confirmed depredations that should receive partial compensation.

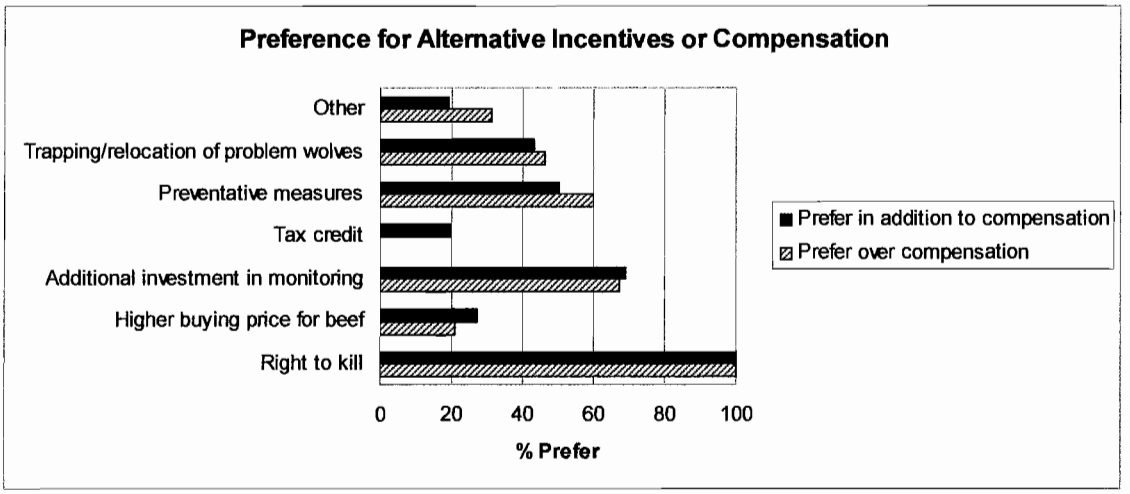

Figure 18. S2 respondent preference for alternative incentives or compensation instead of current compensation program or in addition to current compensation program.

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