

Paying for Nature: Incentives and the Future of Private Land Stewardship

C. Paxton Ramsdell

Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in
partial fulfillment of the requirements for the degree of

Master of Science
In
Forestry

Michael G. Sorice, Chair
Max O. Stephenson Jr.
Marc J. Stern

December 4, 2013
Blacksburg, VA

Keywords:
Stewardship, incentives, private lands, biodiversity, intrinsic motivation

Copyright © 2013, C. Paxton Ramsdell

Paying for Nature: Incentives and the Future of Private Land Stewardship

C. Paxton Ramsdell

ABSTRACT

Privately owned lands provide a number of benefits to humans, including food, clean air and water, and building materials. Private lands are also home to a host of wildlife species and the habitats that they rely upon for survival. As such, balancing human and ecological needs on private lands is of critical importance. Stewardship is a term popularly used to refer to this balanced approach of managing land for a host of benefits. When landowners lack the interest, ability, or willingness to incorporate stewardship into their management strategies, incentives are often provided to spur greater conservation outcomes. This two-part case study is focused on private land stewardship. Using qualitative data analysis, I first examined the behaviors that a sample of production-oriented ranchers defined as stewardship. I then explored the environmental values underlying their behaviors. Utilitarian values dominated the four broad themes that emerged from respondents' operationalization of stewardship, including: maintaining economically productive rangelands, protecting water resources, maintaining an aesthetically pleasing property, and providing for wildlife. Next, I sought to better understand the impact of incentives on durable conservation behaviors. As incentives can reduce intrinsic motivation, I used Self-Determination Theory as a framework for surveying participants in an existing conservation incentive program. The results suggest that landowners maintained their willingness to continue protecting a threatened bird species following the removal of an incentive. Each paper concludes with an analysis of findings within the context of the empirical literature, and present potential practical implications for future conservation efforts.

Acknowledgements

There are a number of people I would like to acknowledge for their guidance and support throughout this process. First, I would like to express my sincere gratitude to my advisor, Dr. Michael Sorice for his support and reinforcement over the past two years. I would also like to express my genuine appreciation to my committee members Dr. Marc Stern and Dr. Max Stephenson. Their support, assistance, and good ideas throughout this process is greatly appreciated. I would also like to thank the Rocky Mountain Bird Observatory for their openness to this project, and for providing me with virtually open access to all aspects of the Mountain Plover Program. Additionally, I would like to acknowledge Kate Donlon, whose support and encouragement was invaluable to my graduate school experience.

Table of Contents

List of Tables.....	v
List of Figures.....	vi
Chapter 1 - Introduction.....	1
Chapter 2 - Operationalizing Stewardship: Capturing Production-Oriented Landowner Perceptions of Stewardship Behaviors	5
Abstract.....	6
Introduction.....	7
Previous Research.....	9
Methods.....	15
Data Collection.....	15
Data Analysis.....	15
Results.....	16
Maintaining Economically Productive Rangelands.....	17
Capturing and Protecting Water Resources.....	21
Maintaining an Aesthetically-Pleasing Property.....	24
Providing for Wildlife.....	25
Discussion.....	27
Conclusion.....	31
Chapter 3 - Incentivizing Durable Behaviors: Landowner Willingness to Protect Biodiversity without an Incentive.....	33
Abstract.....	34
Introduction.....	35
Background.....	37
Theoretical Framework.....	39
Previous Research.....	43
Hypotheses.....	47
Methods.....	48
Data Collection.....	48
Survey Design.....	49
Measures.....	49
Data Analysis.....	53
Results.....	54
Discussion.....	64
Conclusion.....	71
Chapter 4 - Conclusion and Recommendations.....	73
References.....	79
Appendix A – IRB Approval Letter.....	98

List of Tables

Table 2.1 Kellert's (1995) typology of nine environmental values.....	12
Table 2.2 Overview of interviewees' stewardship behaviors and related values.....	16
Table 3.1 Summary of plover nests found in previous years.....	38
Table 3.2 Means, standard deviations, and medians of respondents views of the financial incentive.....	55
Table 3.3 Means, standard deviations, and medians of respondents' perceptions of autonomy, competence, and relatedness.....	56
Table 3.4 Means, standard deviations, and medians of respondents motivation for continuing in the MPP.....	58
Table 3.5 Spearman correlations relating motivation and basic needs n= 32.....	59
Table 3.6 Means, standard deviations, and medians of respondents' indications of current effort.....	60
Table 3.7 Means, standard deviations and medians of respondents' intention to participate in the MPP without an incentive.....	62
Table 3.8 Exact chi-square of respondents' indication of current effort and their indication of future effort.....	63

List of Figures

Figure 3.1 Ryan and Deci's (2000) Self-Determination Theory.....	39
Figure 3.2 Ryan and Deci's (2000) taxonomy of motivation, moving from extrinsic motivation at the left, to intrinsic motivation at right.....	41
Figure 3.3 Self-Determination Theory and the Mountain Plover Program. Conceptual model based on Ryan and Deci's (2000) Self-Determination Theory, and study hypotheses. Model moves from left to right beginning with "Basic Needs" and "Financial Incentive.".....	47
Figure 3.4 Self-Determination Theory and the Mountain Plover Program. Conceptual model based on Ryan and Deci's (2000) Self-Determination Theory.....	64

Chapter 1: Introduction

Civil society was constructed using natural resources, and today, the responsible use and protection of these resources remains one of humanity's central challenges (Diaz, Fargione, Chapin III & Tilman 2006; Freyfogle 2003). Biodiversity, broadly defined as the diversity of Earth's plant and animal life, provides humans with a number of benefits (e.g. medicine, food, and shelter), though its critical importance is often under-recognized and undervalued (Millennium Ecosystem Assessment 2005). Indeed, many of the activities that provide the comfort and prosperity of modern life degrade the ecosystems upon which society depends. For instance, modern agricultural systems provide food to a growing global population, but also degrades land, water, and wildlife habitat (Foley et al. 2011). These negative impacts are likely to worsen as a growing global population, increased rates of consumption, and climate change further stress natural resources (Millennium Ecosystem Assessment 2005).

During the twentieth century, as economic security in the United States increased, citizen demands to reduce pollution, conserve biodiversity, and protect human health spurred governmental action to address environmental degradation (Freyfogle 2003). Today, governments protect the environment through a combination of land use compulsion (regulation), direction (planning mechanisms), and inducement (incentives) (Worrell & Appleby 1999). Yet the large number and geographic dispersion of private landowners makes regulation an ineffective tool for promoting the ecologically sensitive management of private lands (Gunningham & Young 1997). Further, the social and political deference to protecting individual property rights further hinders domestic efforts to ensure that land ownership entails a conservation ethic (Freyfogle 2011). The general lack of affirmative societal expectations of land ownership has largely relegated private land conservation to a voluntary pursuit.

The term stewardship is used colloquially to refer to the environmentally-sensitive management of private land by landowners (Worrell & Appleby 1999). In the conservation literature, stewardship often refers to sustainability, the protection of environmental quality, or responsible land management (Gill, Klepeis & Chisholm 2010). Although many property owners consider their role as land stewards integral to their sense of identity, it is unclear how they define stewardship (Kilgore, Snyder, Schertz & Taff 2008; Peterson, Peterson, Lopez & Liu 2010). As a result, it remains uncertain what, precisely, stewardship describes, or to whom or to what land stewards are responsible. In the absence of government action, and a broadly understood definition of stewardship, conservationists are tasked with identifying effective strategies to encourage, limit, or prohibit the use and management of land (Fairfax, Gwin, King, Raymond & Watt 2005)

When proactive stewardship of private land is not valued or possible (e.g. disinterest, lack of knowledge/education, financial constraints etc.), conservationists often incentivize landowners to adopt conservation practices (Stern 2006). Incentives can include technical assistance in creating or improving wildlife habitat, protection from regulation, or the provision of other material benefits to landowners (Sorice, Haider, Conner & Ditton, 2011; Wilcove & Lee 2003; Wolfe Hays, Farrell & Baggett 2012). Most often, however, environmental organizations incentivize landowners by providing direct financial benefits, such as tax deductions or subsidies, for improving the management of their land (Stern 2006).

While incentives can rapidly change behavior, that change is often not maintained following the removal of an incentive (De Young 1993). As a result, organizations must continuously provide incentives for a behavior to endure. As such, Frey and Jegen (2001), Winter and Koger (2004), and Farley and Costanza (2010) are skeptical of the use of monetary

incentives due to their potential to reduce landowners' intrinsic motivation to protect the environment. Incentives that pressure, are perceived as controlling, or are tied to measurable outcomes, such as payments for ecosystem services arrangements, may further harm intrinsic motivation (Ryan & Deci 2000; Wunder, Engel & Pagiola 2008). Thus, incentives may pose greater risks than benefits if they reduce landowners' intrinsic motivation to protect the environment, or fail to foster durable conservation behaviors commonly associated with stewardship (De Young 2000; Worrell & Appleby 1999).

My two-part study centers on the notion of stewardship, and specifically whether incentives serve to induce and maintain land stewardship behaviors or if their use reduces landowners intrinsic motivation. To explore these ideas, I first examined landowners' behavioral definitions of stewardship and the values that are reflected in those land management activities. Specifically, if stewardship is an ethic, as argued by Aldo Leopold (1949), what values are evident in landowner's definitions of stewardship? By attempting to operationalize stewardship I expected to call attention to how landowners may view stewardship in a different manner than the conservation literature. I used a case study of livestock producers in central Texas to examine landowner's stewardship behaviors and values.

Second, I sought to understand the role of incentives in sustaining or hindering the stewardship behavior of protecting biodiversity. Biodiversity is operationalized as at-risk species, since the Endangered Species Act serves as the U.S.'s primary means of protecting plants and animals (Sorice 2012). First, a fundamental understanding of what motivates landowners to protect biodiversity is needed. Second, what are the implications of using financial incentives to reward the protection of biodiversity now and into the future? By answering these questions I expected to call attention to wildlife habitat on working lands, as well as uncover critical

information about the long-term implications of financial incentives as a conservation strategy.

To address the second part of this study, I evaluated an existing conservation incentive program.

Operationalizing Stewardship:
Capturing Production-Oriented Landowner Perceptions of Stewardship Behaviors

C. Paxton Ramsdell

Virginia Tech

Department of Forest Resources & Environmental Conservation

Michael G. Sorice, Chair

Max O. Stephenson Jr.

Marc J. Stern

December 4, 2013

Blacksburg, VA

ABSTRACT

Stewardship is often used in both the conservation literature and colloquially to refer to the environmentally-sensitive management of privately property. Despite the frequency with which the term is used, it is rarely and inconsistently defined. Many suggested definitions are conceptual and rarely relate the term to specific management activities. As such, it remains unclear to whom land stewards are responsible, or what, specifically, stewardship entails. As many property owners view their role as land stewards as integral to their sense of identity, the present study sought to explore landowner perceptions of stewardship behaviors and the environmental value orientations evidenced by their descriptions of these behaviors. Twelve land-owning ranchers from the Brazos River Valley in Texas were interviewed. Qualitative data analyses revealed four broad themes from respondents' operationalization of stewardship, including: maintaining economically productive rangelands, protecting water resources, maintaining an aesthetically pleasing property, and providing for wildlife. Overall, ranchers prioritized meeting their economic needs, and utilitarian values emerged as the dominant value orientation driving these land stewardship behaviors. The results suggest that stewardship is largely understood based upon personal motivations for owning land and the ecological characteristics of one's property. As such, stewardship concerns rarely included the larger community. Conservation practitioners seeking to induce stewardship on private lands may benefit from the use of marketing techniques to directly appeal to landowner's personal interests.

Keywords: Stewardship, private lands, biodiversity, social marketing, environmental values

Chapter 2: Operationalizing Stewardship: Capturing Production-Oriented Landowner Perceptions of Stewardship Behaviors

2.1 Introduction

Privately-owned lands play a critical role in protecting the structure and function of ecosystems and landscapes (Wilcox, Sorice & Young 2011). In the United States, 60% of land is privately owned, and until recently working farms, ranches, and timberlands were perceived as ecologically insignificant due to their cultivated, human-dominated form (Rickenbach, Schulte, Kittredge, Labich, & Shinneman 2011; Nickerson, Ebel, Borchers & Carriazo 2011; Daily, Ehrlich & Arturo Sánchez-Azofeifa 2001; Crossman & Bryan 2009; Lubchenco et al. 1991). Instead, environmental conservationists sought to protect parks, nature reserves, and areas of “pristine” wilderness (Kareiva, Watts, McDonald, & Boucher 2007).

In recent decades, scientists have confirmed the critical role private lands play in protecting plant and animal communities (Daily et al. 2001). In the United States, these properties are home to three-quarters of all threatened or endangered species and the myriad habitats they rely upon for survival. Privately owned lands also provide vital connectivity between habitats and protected areas (Freyfogle 2003; Firbank 2005). Though studies have confirmed that landowners generally value landscape-scale conservation outcomes, cooperative, large-scale management of private properties can be difficult to achieve (Rickenbach et al. 2011).

To realize the benefits of functional ecosystems, it is important for landowners to recognize the impact of their management decisions on the larger social and ecological landscape (Ciuzio et al. 2013; Chapin III, Pickett, Power, Jackson, Carter, Duke 2011; Karp 1993). However, awareness alone is not sufficient. Large-scale conservation is most successful when it actively includes landowners, encourages their coordination, and promotes understanding of the

ways in which individual landholdings contribute to the larger social, economic and ecological landscape (Firbank 2005; Rickenbach et al. 2011).

Existing social and political respect for property rights in the United States makes reframing landowner expectations to contribute to the common good at the landscape scale an ongoing challenge (Freyfogle 2011). Nonetheless, such rights are socially constructed and therefore, have varied greatly over time (Freyfogle 2003). For instance colonial-era land use law imposed affirmative duties on private landowners to implement societal goals. Today, with the exception of the Endangered Species Act, property rights are primarily framed as avoiding harm to others (Freyfogle 2003; Sorice, Haider, Conner & Ditton 2010). The general lack of affirmative social expectations of land ownership has relegated private land conservation to a voluntary pursuit. Accordingly, many conservation organizations rely on private landowners to implement sustainable land-use practices voluntarily. Others, meanwhile, reward such initiatives with financial incentives (Freyfogle 2003; Chan et al., 2007). However, compensating landowners for their conservation efforts reinforces the public perception of such projects as voluntary activities that require a reward, not as an expected component of landownership.

The term *stewardship* is used colloquially to refer to environmentally-sensitive management of private land (Worrell & Appleby 1999). In the conservation literature, stewardship is regularly associated with sustainability, environmental protection, or responsible land management (Gill, Klepeis & Chisholm 2010). Despite its widespread use, a broadly accepted definition of the concept has yet to emerge, and it is unclear how landowners understand the term. As a result, it remains uncertain what, precisely, stewardship describes, or to whom or to what land stewards are responsible. Many property owners view their role as land stewards as integral to their sense of identity and the dearth of information regarding these

individuals' perceptions and conceptions of stewardship is all the more conspicuous (Kilgore, Snyder, Schertz & Taff 2008; Peterson, Peterson, Lopez & Liu 2010).

This study defines stewardship from the emic perspective of landowners by qualitatively examining the activities they report as representative of stewardship. In short, I seek to define the concept behaviorally. Although this paper focuses principally on identifying stewardship behaviors, values are also important in this analysis. As individuals' value orientations influence beliefs and ultimately affect behavior, I also investigate the values reflected in respondents' specific stewardship activities (Stern & Dietz 1994). I did not set out to test a hypothesis, disprove any perceived landowner attitudes, or challenge the conceptual foundation of land stewardship. Instead, I designed this study to allow landowners to share their conceptions of stewardship in their own words.

2.2 Previous Research

Although land stewardship has been discussed in nature-society studies for more than a century, the contemporary understanding of the term evolved from biblical references of caring for the property of another (Worster 1993). In this view, the earth is God's creation and humans are charged with its care (Wunderlich 2004). For example, the American Country Life Association (ACLA), an organization focused on advancing rural affairs during the early 20th century, employed this definition of stewardship: "Land is a very special kind of property. Ownership of land does not give an absolute right to use or abuse, nor is it devoid of social responsibilities...the land steward has a duty to enrich the soil he tills and to hand it down to future generations as a thanks offering to God..." (American Country Life Association 1945 pp. 147-149). Advocates of a theological-based respect for nature believe that human beings are stewards responsible for overseeing and managing God's creation. Critics, however, contend that

viewing stewardship through the lens of human needs has resulted in a domineering, exploitive relationship with nature (White 1967). In response, religious leaders argue that dominion specifically includes the responsibility to care for the well-being of humans and other species. Nonetheless, detractors remain convinced that valuing the earth solely as a means of meeting human needs sets a dangerous precedent (Worster 1993).

To change humanity's role from conqueror to ethically driven caretaker, thinkers, including Aldo Leopold, sought to place nature on an equal footing with humans. In *The Land Ethic*, Leopold (1949) opposed the prevailing, utilitarian view of land as a commodity to be used and discarded at will. Instead, he argued that land-use decisions should be ethically grounded in the premise that humans are members of a community of interdependent parts including the soil, water, plants and animals. Leopold urged landowners to view their property as part of a larger cycle of life that surrounds *and* includes them, altering human's role from ruler to member of the land community.

Today, stewardship often refers to the responsible and moral use of land that meets both the needs of landowners and of society (Gill, Klepeis & Chisholm 2010). Similarly, some researcher have defined the concept as a set of values that engenders a respect for the land and the natural resources that provide for human prosperity (Curtis & de Lacy 1998). As a result, these scholars no longer value human dominated landscapes, such as farms or managed forestlands simply instrumentally as sources of food or fiber, but now argue they play important multifunctional roles (Crossman & Bryan 2009; Zavaleta, Pasari, Hulvey, & Tilman 2010; Pasari, Levi, Zavaleta & Tilman 2012; Maestre et al. 2012). As such, Vanclay (1992) has suggested that stewardship requires landowners to care for their land for future generations, even if doing so implies incurring financial costs.

Many property owners suggest they believe their land is an important resource for themselves and for the benefit of the larger community in which they live, but what that means in practice may vary among individuals (Miller, Bastian, McLeod, Keske & Hoag 2010). While not every landowner will adopt an ethical land-management ethos, those who do may exhibit a broad respect for their land, natural resources, and the larger human and natural community in which they live. In the late 1990's, Worrell and Appleby (1999) surveyed the various definitions of stewardship and suggested that, "Stewardship is the responsible use (including conservation) of natural resources in a way that takes full and balanced account of the interests of society, future generations, and other species, as well as of private needs, and accepts significant answerability to society" (pp. 269). Landowners who have adopted this stewardship ideal are more likely to reflect an ecocentric worldview than those solely focused on maximizing outputs from their property.

Individuals' environmental views are often defined as either ecocentric or anthropocentric (Gagnon-Thompson & Barton 1994). Although individuals holding either set of beliefs may exhibit positive attitudes toward the environment, their reasons for conservation differ. Ecocentric individuals believe that nature is worth protecting even if it does not directly benefit to humans. Thus, ecocentric individuals favor the protection of nature for its intrinsic value (Wilkinson 2013). Conversely, anthropocentric individuals may only support conservation that maintains or enhances human quality of life (Gagnon-Thompson & Barton 1994). Property owners are rarely exclusively ecocentric or anthropocentric in their orientation, rather landowners' reasons for valuing nature are often multi-faceted (Wilkinson 2013).

Individuals may hold a number of differing orientations toward the natural environment, and nine basic values are frequently used to examine these viewpoints (Kellert 1995). These

beliefs, like others, are not mutually exclusive, and landowners may concurrently hold a mix of several stewardship orientations (Stern & Dietz, 1994; Kellert 1995). This study employs Kellert's (1995) nine environmental values to examine the beliefs evident in a sample of landowner stewardship behaviors (Table 2.1). With the exception of dominionistic and

Table 2.1
Kellert's (1995) typology of environmental values

Value	Definition	Example
Aesthetic	Physical appeal and beauty of nature	Individuals holding an aesthetic value toward their stewardship activities may seek to ensure visually appealing rangelands, waterways, and mature stands of trees.
Dominionistic	Physical control, mastery and dominance of nature	Individuals emphasizing the need to overpower or control their land may hold dominionistic values toward stewardship.
Ecologicistic-Scientific	Urge to precisely study and understand the systematic structure, function, and interrelatedness of nature	Individuals defining stewardship with ecologicistic values may note the importance of studying rangeland function to know more about this unique ecosystem.
Humanistic	Strong emotional attachment and "love" for aspects of nature	Love of certain landscapes or actively protecting a favored species of wildlife may be indicative of a humanistic value toward nature.
Moralistic	Spiritual reverence and ethical responsibility for the right and wrong treatment of nature	Individuals who define stewardship in terms of the "proper" way to manage land, such as through protecting wildlife or water, may hold moralistic values.
Naturalistic	Direct experience and exploration of nature	Individuals who utilize their land to provide recreational opportunities such as wildlife viewing, swimming, or stargazing may hold naturalistic values.
Negativistic	Fear, aversion, or dislike of nature	Individuals who define stewardship in terms of direct hostility toward wildlife may hold negativistic stewardship values.
Symbolic	Use of nature for language and thought	Individuals who note the importance of stewardship activities as a form of expression

		or as an artistic endeavor may hold a symbolic appreciation for nature.
Utilitarian	Practical and material exploitation of nature to meet human needs	A utilitarian individual may prioritize management strategies that provide financially for his or her family.

negativistic values, the remaining values are representative, to some degree, of the stewardship ideal as expressed by Worrell and Appleby (1999).

Inducing Stewardship

In light of the important role of private lands for conservation, education and financial incentives are often used to foster active stewardship of such properties (Stern 2000; Daily et al. 2001). While both strategies can be effective, rarely does either account for the specific barriers to the adoption of the behavior, such as the socio-cultural environment within which individuals operate. For instance, education is appropriate when there is a strong and consistent self-interest among individuals to contribute to societal goals, but a lack of information often prevents this from occurring (Rothschild 1999). Incentives appeal to individuals' economic rationalism, but the requirement to comply with a program to receive an incentive can crowd out intrinsic motivation (Frey & Jegen 2001). In light of the known shortcomings of other efforts and to foster greater landowner stewardship, conservation practitioners may wish to explore the utility of other behavior changing techniques.

Land management strategies often reflect long-standing, socio-cultural knowledge that is transferred over time (Vanclay 2004). Conservation practitioners interested in influencing landowner behavior to better reflect the stewardship ideal could utilize social marketing techniques. Social marketing is particularly useful when individuals lack the self-interest to engage in a behavior and when mandating behavior change is inappropriate (McKenzie-Mohr 2000; Andreasen 2002; Kotler, Roberto & Lee 2002). Behavior changing strategies can be non-

transparent or even unethical, and caution should be taken when employing these strategies to ensure that participants are involved in the process and aware of the desired outcome of the campaign (Brenkert 2002). With these cautions in mind, attaining a stewardship ideal that protects sensitive landscapes may be more effectively achieved through directly targeting landowner behavior and using marketing techniques to influence them.

In addition to social marketing, working to establish social norms can further catalyze land management behaviors that better reflect a stewardship ideal (Kinzig et al. 2013). As the perception of others behaviors is a powerful influencer, individuals and groups have used norms to induce pro-environmental behaviors such as recycling, preventing litter, and conserving natural resources (Heberlein 2012; De Young 1993; Oskamp & Schultz 2006; Nickerson 2002). Norms are not implemented easily or quickly, but by fostering norms, conservation practitioners may bring about greater adoption of environmentally sensitive land management. In order to develop efficient strategies to protect the environment, conservation professionals need to identify the variables that influence behaviors and produce unwanted environmental impact. By examining the motivations and values that maintain such behaviors, conservation practitioners may be able to create effective marketing strategies that result in improved land management behaviors (Foxall, Oliveira-Castro, James, Yani-de-Soriano & Sigurdsson 2006).

I investigate the on-the-ground activities that landowners in Brazos County, Texas associate with stewardship. Further, employing Kellert's framework (1995), I examine whether the behaviors these individuals evidenced when interviewed were driven by ecocentric or anthropocentric values. As stewardship is often understood conceptually, this study seeks to develop a behavioral definition of stewardship (Paterson 2008; Brown & Mitchell 1998).

2.3: Methods

Data Collection

Dr. Michael Sorice conducted a total of twelve face-to-face, in-depth, semi-structured interviews with adult, land-owning residents from Texas', Brazos River Valley during the summer of 2009. Dr. Sorice used a purposeful snowball sampling technique to identify and recruit participants who were members of an agricultural producer's cooperative in Bryan, Texas (Babbie 2010). The interviews captured the specific activities in which landowners engaged that they believed constitute stewardship, their history on the land, the centrality of ranching to their livelihoods, their natural resource concerns, and their viewpoints concerning wildlife. Although all of the respondents relied upon their ranches for income, a number held jobs in other fields, including education, communications, and managing rangelands for other ranchers. To maintain confidentiality, I report interviewee observations below as arising from Participants 1 through 12, and identify them as P1 through P12 when quoting them.

Data Analysis

Dr. Sorice digitally recorded each interview, and they were transcribed in their entirety at Texas A&M University. The analytical focus of this paper is on the landowner's responses to questions designed to capture their behavioral definitions of stewardship, and the value orientations evidenced by those behaviors. I used NVivo 8 software as a data analysis and management tool, and I analyzed the data by inductively coding all of the interviews to first uncover categories of behaviors (Spradley 1979). Once I had categorized the interview results, I conducted a taxonomic analysis by identifying the parts of a larger theme, in this case landowners' stewardship behaviors. I then established the relationship between behaviors and their connections to the larger definition of stewardship. For instance, I grouped weed control

and ensuring healthy grasses under the larger theme of “economic productivity” when they were focused on cattle grazing. I then recoded the resulting themes and behaviors using Kellert’s (1995) environmental values to identify the values reflected in these activities.

2.4: Results

I present my findings based upon the aggregate pervasiveness of the activities that respondents described as indicative of their involvement with stewardship. I discerned four broad themes in respondents’ operationalization of stewardship, maintaining economically productive rangelands, protecting water resources, maintaining an aesthetically pleasing property, and providing for wildlife. Table 2.2 presents those themes and their associated behaviors and values. Overall, ranchers ranked meeting their economic needs as their highest priority. In general, utilitarian values toward land management framed their stewardship behaviors. As a result, none of the interviewees articulated their activities in light of a stewardship ideal, or spoke of the concept as Leopold, Worrell and Appleby or as other published thinkers have framed it.

Table 2.2
Overview of interviewees’ stewardship behaviors and related values

Theme	Behaviors	Values
Maintaining Economically Productive Rangelands	Eliminating weeds and woody brush, ensuring healthy grasses, and fortifying soils	Utilitarian
Protecting Water Resources	Conserving vegetation along waterways and erosion-prone areas, replanting disturbed areas, reshaping the land using heavy machinery, building dams and water catchment ponds, avoiding pollution	Moralistic Utilitarian
Maintaining an Aesthetically-Pleasing Property	Beautification of homes and gardens, maintaining gates/fences, controlling weeds, and removing/preventing trash from pastures.	Aesthetic Symbolic Utilitarian
Providing for Wildlife	Providing access to food, water, and shelter	Negativistic Utilitarian

Maintaining Economically Productive Rangelands

Eliminating Weeds and Woody Brush.

All of the ranchers discussed clearing brush and eliminating weeds as critical stewardship activities. Respondents worked hard to provide grass for their cattle, and eliminating weeds decreased competition for water and nutrients. Interviewees described weeds as a “perennial bother” and criticized owners of “unproductive” rangelands that are “grewed up in mesquites, [and] Wasatch” (P12; P6). As a result, as one rancher interviewed observed, a good land steward is one who “loves to kill every weed that comes along” (P6).

Most of the respondents’ efforts to control weeds and foster healthy grasses were driven by utilitarian values arising from their effort to earn a living. Participant 10 offered this perspective,

“It [weeds] takes a lot of nutrition away from the grass that could be growing; it takes a lot of moisture away from the grass that could be getting the moisture... We’ll start spraying weeds in February, late January, early February, and we try to get on these weeds early, before they develop, and we’ve really got a good handle on that. We’re constantly, constantly spraying weeds when we see them pop up, and the only way to do that, especially with us, with as much country as we’ve got, we’ve got to stay on it almost all year long.”

Although respondents reported eliminating weeds as a stewardship behavior, clearing vegetation solely because it does not contribute to cattle grazing seems antithetical to the stewardship ideal, especially if that ground cover provides other ecosystem functions.

Respondents’ utilitarian stewardship values also drove efforts to clear brush. Specifically, a number of interviewees discussed the use of heavy machinery to remove encroaching woody vegetation on their land. For instance, Participant 4 spoke of his desire to acquire a brush mulcher. He reasoned that this tool would allow him simultaneously to eliminate brush and incorporate the cut vegetation into the soil as fertilizer. He could then replant the cleared area with grass to increase his grazing potential. Another respondent noted that he put the stumps

from cleared vegetation into waterways to slow erosion (P10). Though the ranchers primarily cleared brush to boost grazing potential, their use of that same material to control erosion or fertilize their soil is an interesting use of undesired vegetation.

During the course of conversations related to clearing brush, a few of the respondents suggested that they also protect “desirable” vegetation. Participant 10 mentioned, for example, the importance of leaving trees and brush throughout his pastures to provide his cattle with shade in the summer and protection from winter weather. Participant 6 grazes more than 1,500 acres of land. He expressed regret concerning the fact that he had cleared so much of his land in the past, “like it is now there’s no cover for no wild game, no deer, because there’s no trees, there’s no brush, no yaupon...we didn’t think we could do it [make a living] without clearing all of it because we didn’t have enough land, you know, so we cleared all of it.” This reflection represents an infrequently-cited acknowledgement of the need to balance grazing with protecting vegetation for wildlife. As remnant vegetation can provide important environmental benefits, conserving trees is an important stewardship behavior providing ecological benefits (Costanza et al. 1997).

Ensuring Healthy Grasses.

The individuals interviewed also readily discussed the stewardship behavior of maintaining and improving grasses in their pastures. Again utilitarian values drove ranchers’ efforts to sustain healthy stands of grass. Participant 9 offered his view of healthy land, stating that while some people may prefer wildlife on their land, ranchers like to see “green grass growing.” Participant 4 was more direct, arguing that ranchers need to fundamentally change their identity from that of ranchers who graze cattle, to that of farmers who grow grass. He reasoned, “That’s the only way you can survive in the livestock business. Get it [forage] off the

ground, and not out of the feed sack, or out of the bale.” Notably, respondents’ discussion of grasses rarely referenced to overgrazing, just the importance of growing as much grass as possible.

To sustain their cattle, participants discussed both improved and native grasses. As improved grasses offer production benefits, such as increased nutrition, lower fertilizing requirements, and increased drought tolerance, most of the ranchers favored and utilized those grasses. Specifically, most cited the capability of improved grasses to allow them to graze more cattle. For instance, Participant 12’s utilitarian values drove his effort to replace his native grasses with improved grasses: “With that basically improved pasture that we have now, we’re running 630 cows on this place...if we were running straight native grass pasture, we wouldn’t have 200. We try to make this thing make money, you know, it’s here to make money, so it’s, you got to push it, but at the same time not abuse it.” The use of improved grasses to run a greater number of cattle than might be possible with native grasses raises questions about whether this accords with the spirit of the stewardship ideal, or if instead landowners should rely on native grasses and work within the land’s natural carrying capacity.

Respondents who favored native grasses also expressed utilitarian values. These individuals often favorably cited the capacity of native grasses to thrive in their region of Texas. Indeed, participant 7 began replacing his improved grasses with native grasses solely because the non-native varieties had not proven as hardy. Participant 4 offered one of the group’s most unique opinions on use of native grasses when discussing his efforts as a land steward. He argued that native grasses not only allow cattle to graze, but they are better suited to provide wildlife habitat and food. He noted, “I think wildlife and livestock go hand in hand, and I think one complements the other, quite honestly.” Despite Participant 4’s interest in balancing grazing

with wildlife conservation, a majority of respondents were solely focused on identifying the best possible grass for their cattle's grazing needs. In most cases, ranchers saw improved grasses as meeting their needs.

Fortifying Soils.

Fertilizing the land was another regularly-cited component of utilitarian land stewardship. When discussing fertilization, most interviewees called upon their knowledge of soil health and nutrients to identify inexpensive, reliable fertilizers. This strategy was becoming more important, respondents noted, as the cost of commercial fertilizers had risen in recent years. Many respondents cited phosphorus-rich chicken litter as an ideal, effective, low-cost fertilizing solution. Participant 4, a seventh generation rancher described how the chicken litter biodegrades to its elemental form and adds high levels of phosphorus to the soil. Participant 12 described himself as focused on the "bottom line", and he favored using poultry litter because he believed that it was "better for the land" than commercial fertilizers. To ensure healthy soils and grasses for their cattle, chicken waste served as an excellent use of a by-product that fits well with the stewardship ideal.

Some of the respondents also used legumes to fertilize their land. Although Participant 4 used chicken litter, he had also used alfalfas and clovers to sustain his soils. He described relying on legumes because, in addition to returning nitrogen to the soil, they provided excellent grazing for his livestock. "All of those [legumes] are nitrogen producing forages that work very well in grazing programs. Very high quality forage. You're not going to find any Bermuda grasses or summer forages that will produce the quality that your legumes will." Participant 10 also had an appreciation for the production benefits of legumes. He reasoned that "clover will resupply the ground with nitrogen, so that's kind of a two-fold deal, you're putting nitrogen back in the

ground by growing clover, plus it's good grazing for cattle." The ranchers' selection of legumes and chicken litter as fertilizer was typically couched in their utilitarian values toward protecting soil health in order to raise cattle.

Capturing and Protecting Water Resources

Preventing Soil Erosion.

Operating within this semi-arid region of Texas, the ranchers' livelihoods are inextricably tied to water. As such, avoiding erosion and capturing and protecting water for livestock were another set of regularly-cited stewardship activities. When discussing erosion, respondents frequently used language such as "tend to it right away, don't let it get bad" and "try to slow the water down as much as you can" (P10; P12). This language suggests that addressing erosion is an important component of their perceptions of land stewardship. All of the ranchers employed similar erosion control strategies, and most often conserved vegetation, replanted disturbed areas, and reshaped the land.

The most common strategies respondents used to minimize erosion relied on nature. For instance, despite eliminating brush and other woody vegetation from their pastures, respondents protected vegetation along hillsides and waterways, as "nothing but forest will keep it from eroding" (P3). When discussing whether he used his land for any other agricultural purpose aside from grazing cattle, Participant 4 argued that he was unable to farm his land because he had some of the most highly erodible land in Brazos County, and "you don't dare strip those gullies and things of vegetation unless you've got a pretty serious plan, because what little topsoil you have...will end up in the Brazos river in a pretty short period of time." Participant 12 defined good land stewardship as working to keep the land productive for raising cattle. However, when asked if he considers forestland "productive" he reasoned that you need "wooded land just to

hold it all together, your erosion would be terrible here if you didn't have some wood belts to hold the dirt, keep from washing it off or blowing away.”

When ranchers removed vegetation or operated in erosion-prone areas, they emphasized the importance of quickly replanting those areas. For instance, Participant 2's response to a question about activities that a good land steward does to address erosion included a story about how he and his father planted Coastal Bermuda grass to reduce erosion along a creeks banks. Participant 12 was even more direct during a conversation concerning preventing erosion along waterways. “We try to get grass growing, I mean cover on everything. Seasonal creeks have grass growing across them...I don't want any bare ground if I can at all help it.” Notably, none of the respondents replanted areas with trees or other larger vegetation despite how frequently they praised the effectiveness of trees and brush to slow erosion.

An infrequently discussed erosion control strategy was the use of heavy machinery to reshape the land. The cost associated with purchasing, maintaining, and running equipment limited the adoption of this method to only a few of the respondents. Those who did discussed the benefits of building terraces, and shaping, smoothing and filling gullies with dredged soil from their ponds (P3; P10; P6). Participant 12 argued that using heavy machinery to reshape the land was absolutely necessary if you are going to clear large amounts of your property, due to the potential for cleared slopes to cause erosion. The utilitarian values that emerged from respondents' use of heavy machinery to literally change the shape of the land to address erosion challenges differed from other, more passive, erosion control methods, such as preserving vegetation. Perhaps the most important finding from respondents' discussion of this concern was their exclusive focus on addressing erosion on their own property. This differs significantly from

the stewardship ideal as expressed by Worrell and Appleby (1999), which advocates for adopting a landscape-scale stewardship ethos.

Protecting Water Resources.

Though respondents struggled to minimize water erosion, the ranchers were also challenged to provide sufficient water for their cattle. Typifying this approach, Participant 7 shared a story about how he worked to establish water sources for his cattle during the first few years after he purchased his ranch. As his land initially did not have any standing water, he stated that, “every gulley, creek and everything I dammed up. And so unless I get a flood, all the water that falls on my place stays.” Similarly, to avoid erosion and provide water, Participant 6 dug a pond at the end of each of his gullies, and then built terraces to direct water into the ponds. Though the most common use of dams and ponds was for water provision and limiting erosion, some ranchers also noted ancillary benefits such as fishing and swimming opportunities (P2; P7).

Although most respondents articulated utilitarian values related to protecting water resources, moralistic values occasionally emerged. One rancher noted that after reading studies suggesting the impact to ground water from improperly discarded chemicals, he no longer discards used motor oil onto the ground (P2). Discarding oil onto the ground poses a direct impact to the public representing a lack of respect for the land. Participant 3 described how he cuts vegetation along waterways instead of employing herbicides, noting that spraying along the stream would be cheaper on his “pocket,” but that polluting the water would ultimately harm downstream users, his children, and society at large. With the exception of these two ranchers, the most striking aspect of interviewee discussions related to water was their focus on their individual properties to the exclusion of the larger watershed, other landowners, or downstream users.

Maintaining an Aesthetically-Pleasing Property

Interviewees also noted an interest in maintaining an aesthetically appealing property as a stewardship behavior. Aesthetics often emerged within the context of discussing other stewardship behaviors such as avoiding erosion or maintaining healthy grasses. However, for these ranchers, aesthetics did not include efforts to preserve beautiful vistas or habitat for large wildlife, as operationalized by Kellert (1995). Instead, respondents most often maintained the visual appearance of their ranches for its tangible reflection of their capabilities as ranchers. Indeed, respondents openly criticized those who failed to manage their natural resources in an aesthetically pleasing manner.

Interviewees undertook aesthetically focused activities less out of concern for the ecological health of their land than as a reflection of their pride, satisfaction, or feelings of competence as land managers. Participant 3 evidenced symbolic and utilitarian values related to maintaining his property's visual appearance when he noted that spraying for weeds near his corrals and painting the entrance fence are some of the activities that may not contribute to his land's profitability, but are "the right thing to do." He continued, "When you come up and you see it all tidy and everything, you think, 'Maybe this guy is doing something right, maybe I want to purchase something from him.'" Similarly, when asked to describe someone who is a good steward of the land, Participant 10 described a neighboring landowner who maintained an impeccably clean ranch. "Anytime you can go to a place and you can see the people take pride in what they've got, they're good stewards of the land, to me. You go into a place that's trashy and you can tell right away that they don't really care." Thus, aesthetics were not solely about the visual appearance of the land, but they also served as an indication of the owner's pride and capability as a rancher.

Providing for Wildlife

During the course of the interviews, Dr. Sorice asked each of the ranchers to describe any actions they had taken or were undertaking to provide for wildlife. Only a few ranchers did anything for wildlife, and those who did provided food, shelter, and water. Participant 5 offered a broad overview of his approach, remarking, “When you manage it (the land) as a stewardship type thing, then you manage it not only for the cattle, but you have to leave something for the wildlife.” Although some of the landowners sought to provide all types of wildlife with food, most prioritized game species.

Many respondents were hunters or leased their land to other hunters to supplement their income. Participant 7 noted that he allows hunting on his land and reflecting a utilitarian orientation, provides food specifically for deer. In addition to planting plots of cow peas and other crops for the deer, he noted that since both the deer and cattle like to eat certain forbs, he has a dedicated deer pasture from which he excludes cattle. Other respondents simply left areas uncut or unmanaged as wildlife forage with the assumption that wildlife would or could eat that vegetation.

Setting aside habitat for wildlife was another stewardship behavior driven by utilitarian and naturalistic values. When asked whether he managed his land for wildlife or any particular species, Participant 11 noted that he has “probably 200 acres that’s fenced off, [where] cattle don’t go, as kind of a wildlife refuge.” Participant 3 responded to a similar question by stating “we have a wildlife area that is behind my house all the way down to the river; we don’t cut brush in there...we just leave it, so deer can travel in there and squirrels hang there.” Notably, only Participant 4 acknowledged the fact that the excess brush on his land is actually detrimental to wildlife.

Ensuring wildlife had access to water was an ancillary benefit resulting from efforts to build ponds for cattle or to control erosion. For instance, participant 7 described his water provision strategy as digging “little gullies here and there for the deer, wildlife, cows.” He continued, “You’re doing three things at one time, kill three birds with one stone, so you do things that will not only benefit wildlife, cattle, you, everything.” Participant 11 was primarily interested in hunting and his description of damming up waterways to provide for deer and waterfowl was similar to other respondents with utilitarian values toward ensuring hunting opportunities.

Although the ranchers’ behavioral definition of stewardship included protecting wildlife, an examination of their values toward non-game wildlife portrays a different view. Instead of speaking about the pleasure they receive from hosting or viewing wildlife on their land, many of the ranchers described “pest” species. For instance, despite Participant 3 setting aside land as a wildlife area, he clarified that he was “not trying to preserve snakes.” Participant 5 sought to limit the number of coyotes near his land due to the threat he believed they posed to his cattle. Participant 7 lamented an influx of beavers that had cut down trees along a waterway on his ranch. The resulting beaver dam attracted river otters that ate all of his fish. Feral hogs are a major problem throughout the south, damaging waterways and pastures, and Participants 2 and 10 expressed their frustration with the necessity of dealing with these animals on their land.

Among the interviewees, Participant 3 expressed the strongest negativistic values toward wildlife. “Some people come around talking about endangered species, but who in the heck wants to save a diamondback or a timber rattler? Who cares?! That’s the way we feel about it in the south. Who wants to save a coyote?” Participant 12 was also uninterested in wildlife. “I’m not much of a wildlife person...but this place is 4,800 acres and about half of it is wooded and

we probably have as many deer and as much wildlife on this place as there is. I mean there may be too much wildlife. If I was being a really good steward of the wildlife, I probably would manage, spend more of my time managing wildlife, but that doesn't float my boat.”

2.5 Discussion

The dominance of the ranchers' utilitarian stewardship values accords with their focus on maintaining the economic productivity of their land. Landowners' stewardship activities primarily served to sustain and enhance their cattle operation by eliminating weeds and woody brush, fostering healthy grasses and soil, minimizing erosion, and capturing and protecting water. Maintaining the aesthetic appearance of rangelands, homes, and yards was of secondary interest, and most often reflected the ranchers' symbolic values. Interviewees indicated that visually appealing homes and rangelands served as evidence of their competence in managing their land, and the pride they took in their operation. Lastly, when the interviewees offered wildlife food, water, and habitat they did so most often for game species that offered hunting opportunities. When respondents discussed wildlife more broadly, they tended to express negativistic values toward species they considered to be pests. In short, respondents' discussions of stewardship rarely aligned with Worrell and Appleby's (1999) definition, providing valuable insights into landowner perceptions of stewardship.

The largely utilitarian findings should not overshadow the fact that stewardship is occurring on respondent's lands. Ranches and rangelands are home to sensitive ecosystems that provide important services such as wildlife habitat, food production, and public benefits such as the protection of rural view sheds, livelihoods, and sense of place (Olenick, Kreuter, & Conner 2005; Goldstein et al. 2011; Swinton, Lupi, Robertson, & Hamilton 2007; Skaggs 2008). While

the interviewees favored activities that improved cattle grazing, their collective stewardship behaviors are nevertheless providing important environmental and cultural services.

As a result of their focus on cattle production, most interviewees' land stewardship concerns rarely extended beyond the boundaries of their fence lines. Respondents expressed limited concern about the larger region in which they operate, which may suggest a lack of communitarian values related to identifying with, belonging to, or seeking to sustain one's community (Bozeman 2002; Stern 2000; Van Vugt 2002). This differs from the more holistic approach to managing natural resources as multifunctional landscapes often espoused by an ecosystem-based perspective, and reflected in Worrell and Appleby's references to social accountability as land stewards (Layzer 2008; Worrell & Appleby 1999; Maestre et al. 2012; Chazdon et al. 2009). The production-oriented, anthropocentric, and geographically limited behaviors and values identified in this analysis suggest that the pro-social, ecocentric stewardship ideal lacks salience among these particular landowners.

For decades, conservationists and ecological thinkers such as Aldo Leopold (1949) have sought to align landowner's management techniques and values with an ecocentric land stewardship ethic. These efforts have most often relied on education and awareness campaigns, reflecting the belief that individuals will change their behavior if they are informed of the deleterious impacts of their land management activities (Heberlein 2012). This strategy, however, has rarely proven successful due to the time needed for landowners to understand, accept, and adopt a new behavior. Further, changes in knowledge *alone* do not typically spur behavior change, as meeting humans' immediate needs and desires often takes precedence over the long-term conservation of natural resources (Heberlein 2012; Schultz 2011 Villacorta, Koestner, & Lokes 2003; De Young 1993). For example, despite decades of education, financial

incentives, and other efforts, soil erosion from agricultural activities remains an ongoing challenge (Heathcote, Filstrup & Downing 2013; Wu 2000; Goodwin & Smith 2003). The limited success and time needed for educational campaigns to change landowner perspectives suggests that other strategies should be pursued if landowners are to be expected to adopt the stewardship ideal (Heberlein 2012; Tilman 2012; Ciuzio et al. 2013; Chapin III et al. 2011).

A critical mass of landowners and properties are necessary to provide landscape scale conservation (Sorice et al. 2013); however, these benefits can only be realized by reaching and influencing individuals' at the property level (e.g. Klein & Wolf 2007; Erickson, Lovell & Méndez 2011). Indeed, the predominance of ranchers' stewardship activities and concerns that center solely on their own property suggests that focusing on landowners and their specific needs is critical to bringing about greater conservation outcomes. This study's identification of production-oriented stewardship initiatives, and the utilitarian values that drive those activities presents an opportunity for conservation practitioners to implement a social marketing campaign to induce landowner adoption of a pro-social, ecocentric stewardship ethic.

Social marketing is one of a number of strategies used to adjust individuals' behaviors. A strength of social marketing is its application of traditional marketing techniques that target and influence individuals to voluntarily accept, abandon, or modify a behavior for the benefit of themselves, others, or society at larger (Kotler, Roberto & Lee 2002). This individualized approach identifies existing barriers to behavior change, as well as individuals' viewpoints and attitudes, such as the values and stewardship behaviors identified in this study, to design effective programs (Rothschild 1999). By respecting and incorporating landowner needs, a social marketing campaign may present conservationists with an opportunity to create programs that bring about increased adoption of a behavior, and greater environmental protection.

The utilitarian values and production-oriented stewardship behaviors expressed by the ranchers offer conservation practitioners an opportunity to utilize a social marketing approach to spur greater natural resource conservation. For instance, despite acknowledging the importance of water, the ranchers rarely discussed the health of the larger watershed. Conservation practitioners seeking to improve watershed health could tap into the ranchers' utilitarian values for water quality. For instance, instead of presenting watershed protection as an environmental concern, a social marketing campaign could position watershed health as a way for the ranchers to sustain a reliable and clean supply of water for their cattle now and into the future. Another opportunity emerging from the data is to capitalize on the ranchers' interest in hunting and fishing. Marketing watershed protection as a way to sustain healthy populations of deer, ducks, and fish may further influence behavior change. This strategy may also foster the moralistic values related to protecting water quality for human benefits as expressed by Participant's 2 and 3. Though social marketing is not a panacea to address land and water degradation, the values and behaviors discussed by the ranchers in this study offer an important starting point to increase voluntary adoption of the stewardship ideal.

Social Marketing also capitalizes on norms to influence behavior. Norms are another means by which conservationists can imbue a stewardship ideal by positioning this type of stewardship as an expectation of land ownership (Kinzig et al. 2013). As individuals are often influenced by their perception of others' behaviors, social approval and disapproval can be important drivers of behavior by adding accountability to actions (e.g. feelings of personal obligation to complete an activity, sanctions for violating norms) (De Young 1993; Oskamp & Schultz 2006; Hamilton, Nickerson & Owan 2003). For instance, the Leliefontein herders of South Africa have shared and grazed the same area of land for more than 200 years, and the

community's norms governing the use of their rangelands has deterred virtually all violations of established rules (Allsopp, Laurent, Debeaudoin, & Igshaan Samuels 2007). This example is not to suggest that norms are implemented easily or quickly, but by positioning stewardship behaviors that account for other species and other individuals as an accepted and expected norm of managing one's land, akin to clearing brush or addressing erosion, more landowners may change their land management decisions.

As with any effort to influence or change individuals' behaviors, caution should be taken by marketers to ensure that the process is transparent, ethical and moral (Brenkert 2002). As curtailing self-expression through behavior change can harm individual freedoms as well as the democratic process, awareness of the power and scope of these methods is critical (Rothschild & Stephenson 2009). Assuring that any organization or individual employing a behavior change strategy is accountable to the public and their organization may help assuage concerns of societal harm from misuse of such tools (Stephenson 2007). Although social marketing is not a panacea to the global challenge of conserving sensitive landscapes, it represents an additional tool to align land management behaviors with the stewardship ideal. If successfully implemented, a social marketing campaign may result in a changed worldview among ranchers who equate a pro-social, ecocentric stewardship ethic as a norm of owning land.

2.6: Conclusion

The ecological impact of global agriculture, economic development, and natural resource use requires landscape-scale conservation (Tallis & Kareiva 2006). This study adds to the literature on land conservation, and provides useful information on landowner perceptions of the meaning of stewardship. Nonetheless, several limitations of the study should be noted. This case study solely involved landowning ranchers in Texas, limiting the generalizability of the results.

This study was also limited to production-oriented ranchers enrolled in an agricultural cooperative. Nonetheless, the findings from this study provide rich opportunities for future research on landowners' understanding of stewardship. In particular, future research into whether landowners with different ownership motivations or those in other regions of the United States and abroad view land stewardship differently or conduct different land stewardship behaviors would add to this study's findings.

In light of increasing political partisanship, economic deregulation, increased self-interest, and limited faith in the effectiveness of government, social marketing offers a balance between protecting the rights of the individual and the rights of society (Rothschild 1999). By offering free choice, as well as an incentive to adopt socially desirable behaviors, social marketing is an intriguing option to further imbue the stewardship ethic in landowners, which otherwise develops slowly over many generations. As private lands remain crucial to conserving the earth's natural resources, using a proven behavior changing tool with existing landowner data may enable the adoption of a stewardship ideal where other interventions have fallen short (Heberlein 2012; De Young 1993; McKenzie-Mohr 2000).

Incentivizing Durable Behaviors:
Landowner Willingness to Protect Biodiversity without an Incentive

C. Paxton Ramsdell

Virginia Tech

Department of Forest Resources & Environmental Conservation

Michael G. Sorice, Chair

Max O. Stephenson Jr.

Marc J. Stern

December 4, 2013

Blacksburg, VA

ABSTRACT

Self-Determination Theory (SDT) posits that individuals are driven by intrinsic and extrinsic motivation. Intrinsically motivated individuals complete an activity for the fun that it entails, or due to its alignment with their values, whereas extrinsically motivated individuals complete an activity in order to attain a separable outcome, such as earning praise or avoiding criticism. Financial incentives can change behavior to implement societal goals such as environmental conservation, but existing literature suggests that their use often harms intrinsic motivation. To sustain intrinsic motivation, or to make extrinsically driven behaviors more self-driven, SDT postulates that individuals require autonomy, competence, and relatedness. Based on the principles of SDT, I designed a survey and distributed it to all ($n = 77$) members of an existing wildlife conservation incentive program focused on protecting the threatened mountain plover (*Charadrius montanus*). Information regarding landowner perceptions of the incentive program, their intrinsic motivation for protecting wildlife, and their willingness to continue protecting wildlife without an incentive was included in the survey. A total of 41 respondents completed the survey. Overall, the respondents indicated the program allowed for a high degree of autonomy, a moderate degree of competence, a low degree of inter-personal relatedness, and a moderate degree of organizational relatedness. The majority of landowners (65%) indicated a low current level of effort in protecting the plover, while 71% indicated they would be willing to continue to protect the plover without an incentive. Results of the present study support previous findings that under certain circumstances financial incentives may not harm intrinsic motivation and in some instances may actually increase individuals' willingness to complete a behavior.

Keywords: Stewardship, incentives, private lands, biodiversity, intrinsic motivation

Chapter3: Incentivizing Durable Behaviors: Landowner Willingness to Protect Biodiversity without an Incentive

3.1: Introduction

Private property, especially large contiguous farms, ranches, and timberlands, host a variety of ecosystems and provide habitat to three-quarters of all threatened or endangered species (Freyfogle 2003). In the United States 60% of land is privately owned, and until recently, working farms, ranches, and timberlands, were perceived as ecologically insignificant due to their cultivated, human-dominated state (Rickenbach, Schulte, Kittredge, Labich, & Shinneman 2011; Nickerson, Ebel, Borchers & Carriazo, 2011; Daily, Ehrlich & Arturo Sánchez-Azofeifa 2001; Crossman & Bryan 2009; Lubchenco et al. 1991). Yet, the remarkable amount of plant and animal life found on privately owned lands makes conserving these areas critical to ensure the ongoing provision of a multitude of ecosystem services (Daily, Ehrlich, & Sanchez-Azofeifa 2001).

In the United States, societal respect for individual property rights has relegated private land conservation to a largely voluntary pursuit (Freyfogle 2003). This was not always the case, as American's property rights have varied greatly over the course of time and geographic location. For instance many colonial-era land use regulations imposed affirmative duties on landowners to help implement societal goals such as the provision of natural resources. Today, the Endangered Species Act (ESA) is a rare instance where property rights may be curtailed for the benefit of wildlife (Sorice 2012; Norris 2004). Thus, modern day property rights are primarily framed though avoiding harm to others, with less emphasis on the protection of the larger social and ecological landscape.

The United States' limited use of regulation, and strong property rights, positions incentives as a favorable strategy to induce private land conservation (Key & Roberts 2006;

Kilgore, Snyder, Schertz, & Taff 2008; Claassena, Cattaneo & Johansson 2007). Payments for protecting natural resources on privately owned lands began with dustbowl-era soil conservation efforts, and expanded during the property rights movement and subsequent shift away from environmental regulation during the 1980's (Echeverria 2005). Today, incentives remain a popular tool among conservation practitioners as they can effectively result in the provision of desired ecosystem services, such as wildlife habitat or watershed protection, from willing landowners (Derissen & Quaas 2013). Though incentives induce and reward conservation activities on private lands, their use further positions conservation as a voluntary pursuit that necessitates compensation, instead of an inherent component of land ownership.

While incentives rapidly change behavior, there can be unforeseen consequences to their use (De Young 1993). Of primary concern is the failure of incentives to ensure landowners sustain a behavior over time. For instance, Dwyer, Leeming, Cobern, Porter & Jackson (1993) reviewed a number of studies since 1980, and found that after the introduction of an incentive the behavior in question returned to its baseline status when the incentive was removed. Moreover, the type of activity being incentivized had no impact on the durability of the behaviors without the incentive. As a result, a consequence stemming from the use of incentives to adjust behavior is that they must be continuously provided for that behavior to last (De Young 1993). Notably intrinsic motivation, or the completion of a behavior for its inherent satisfaction, can protect against this from occurring (Deci & Ryan 2002).

This study examines the role of incentives in sustaining or hindering conservation behaviors, objectives are to: 1) understand incentive program participant's opinions of their conservation program; and 2) understand whether existing conservation incentive program participants intend to continue with program activities should the incentive no longer be

provided. This research may provide valuable information to both academics and conservation practitioners into the design, use, and wisdom of employing financial incentives to reward conservation.

3.2: Background

In the United States, the loss of grassland habitat is one of the greatest threats to ground nesting bird populations (Green, Cornell, Scharlemann & Balmford 2005). As the majority of native grasslands have been converted to agricultural uses, ground-nesting birds have adapted to use these fields for habitat (Siegel & Lockwood 2010). An outcome from this adaptation is the accidental tillage of ground nesting bird nests. For instance, in Nebraska, the destruction of mountain plover nests in farm fields has contributed to the plover's State-threatened status, warranting further consideration for protection under the U.S. Endangered Species Act (Schneider, Stoner, Steinaure, Panella & Humpert 2011).

I am collaborated with The Rocky Mountain Bird Observatory (RMBO), a non-profit organization that protects birds through monitoring, research, education and habitat conservation (Hanni, White, Sparks, Blakesley, Levandoski & Birek 2010). Since 2003, RMBO has recruited and incentivized farmers in western Nebraska to protect the nests of the mountain plover (*Charadrius montanus*).

When RMBO staff or the landowner discovers plover nests in their fields, they mark them with brightly colored wooden stakes and avoid them during farm activities (Schneider et al. 2011). Despite the brightly colored stakes, mechanized farm activities often stir up dust, reducing visibility, and increasing the potential for accidental tillage. Nonetheless, program participation minimally impacts farm activities as nesting sites need only a limited amount of space, and once hatched, chicks leave their nest within three hours allowing agricultural activities to resume.

As payment is conditional upon finding, marking and protecting the plover's nest until the eggs hatch, this type of incentive program is commonly referred to as completion-contingent (Deci, Koestner & Ryan 1999). When staff from RMBO identifies and marks nests, landowners are paid \$100 per nest. Farmers who identify and mark nests themselves receive \$200 per nest. As such, motivated program participants are free to search for nests themselves, while those who may not feel as confident in their capabilities, or have less interest, can call upon RMBO's staff biologists to search for nests. Table 3.1 illustrates that historically, staff from RMBO have found most of the plover nests. However, these data does not account for landowners who were unsuccessful in their efforts to find nests.

Table 3.1
Summary of plover nests found in previous years

Year	Nests Found	Nests Found by Landowner	Total Landowners in Program	Percentage of Nests Found by Landowner
2006	86	13	63	15%
2007	111	2	68	2%
2008	69	14	58	20%
2009	80	16	61	20%
2010	103	18	72	18%
2011	65	22	76	34%
2012	66	27	77	41%
2013	65	6	77	9%

Source: Rocky Mountain Bird Observatory.

Today, participants continue to receive compensation for successfully protecting nests; however, RMBO's ability to fund the Mountain Plover Program (MPP) into the future is uncertain. RMBO is concerned that without the financial incentive, their program participants will no longer protect the mountain plover.

3.3: Theoretical Framework

Ryan and Deci's (2000) Self-Determination Theory (SDT) is an appealing lens with which to investigate landowners intention to protect the mountain plover without an incentive, as it helps clarify individuals motivation to complete an activity. SDT asserts that individuals are driven by both intrinsic and extrinsic motivation. Intrinsically motivated individuals complete an activity for the fun or challenge that it entails, or due to the behaviors alignment with their

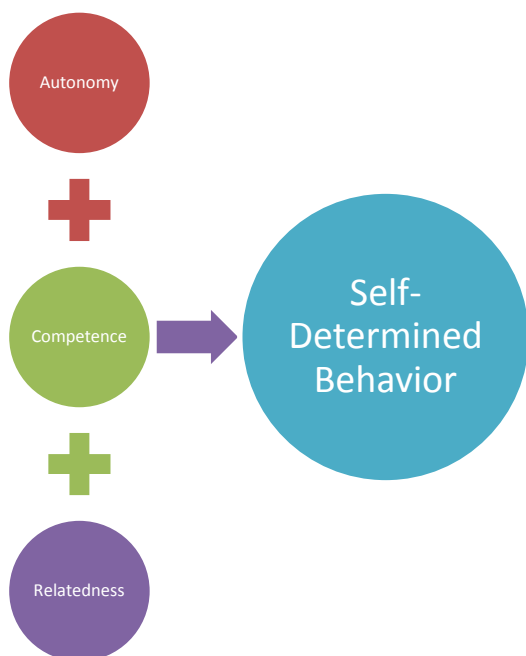


Fig. 3.1. Ryan and Deci's (2000) Self-Determination Theory

values. Conversely, extrinsically motivated individuals complete an activity in order to attain a separable outcome, such as praise, avoiding criticism, or obtaining a financial incentive. Completion-contingent incentive programs, such as the MPP, can be perceived as controlling due to the need for RMBO to confirm that nests have hatched for landowners to obtain payment (Ryan, Mims & Koestner 1983; Deci, Koestner & Ryan 1999).

For individuals to sustain intrinsically driven behaviors, they require a sense of autonomy, experiencing choice and feeling like the initiator of one's own action; competency, the capability to achieve desired outcomes and to succeed at challenging tasks; and relatedness, a sense of community, mutual respect, and reliance on others (See Figure 3.1; Ryan & Deci 2000; Baard, Deci, & Ryan 2004). The provision of these needs has proven successful in empowering individuals to adopt environmentally responsible behaviors such as recycling, conserving energy,

and maintaining a small ecological footprint (Osbaldiston & Sheldon 2003; Pelletier & Bellier 1999; Dwyer et al. 1993; Sheldon, Nichols & Kasser 2011). Moreover, individuals may require differing quantities of each of the basic needs depending on their own unique characteristics or the sociocultural climate in which the behavior is taking place (Ryan & Deci 2000). Although all three needs are posited to be necessary to sustain intrinsic motivation, autonomy and competence are often considered most important, as many intrinsically interesting or rewarding activities are completed in isolation. Nonetheless, a secure relational base is important for protecting intrinsic motivation.

Because my study is situated within an organizational setting, I broadened the conceptual scope of relatedness to include *organizational affinity*. This form of relatedness includes organizational commitment, affective commitment, organizational identity, and organization-based self-esteem. Organizational commitment is the strength of an individual's identification with, and level of involvement with, a particular organization (Porter, Steers, Mowday & Boulian. 1974). Affective commitment is an individual's emotional attachment to, identification with, and involvement with an organization (Meyer & Allen 1991). Organization-based self-esteem (OBSE) is the degree to which organizational members believe that they can satisfy the requirements associated with membership (Pierce, Gardner, Cummings & Randall 1989). Organizational identity is the "ways in which individuals define themselves in terms of their membership in a particular organization" (Cole & Bruch 2006, Pg. 588).

A strong relationship with an organization can help meet individuals' needs for approval, esteem, affiliation, and emotional support (Eisenberger et al. 2010). The provision of this form of relatedness also results in higher task completion, increased satisfaction, and commitment to an organization, and reduces the likelihood of leaving an organization (Ferris, Brown & Heller

2009; Griffin, Hogan, Lambert, Tucker-Gail & Baker 2010; Li, Liang & Crant 2010; Bowling, Eschleman, Wang, Kirkendall & Alarcon 2010). As RMBO seeks to sustain participant involvement with the MPP, the field of organizational studies provides a valuable element to my study.

The Organismic Integration Theory

Motivation is influenced by varying levels of self-direction, and the Organismic Integration Theory (OIT) is Deci and Ryan's (1985) sub-theory used to identify individual's levels of intrinsic and extrinsic motivation. The OIT describes the conditions considered necessary for an extrinsically motivated behavior to be a) internalized, which Deci and Ryan (1985) define as an individual's acceptance that completing an initially undesirable activity is beneficial to their goals; b) integrated, the process by which an individual's level of self-determination increases; and c) self-determined, completing an activity out of choice rather than

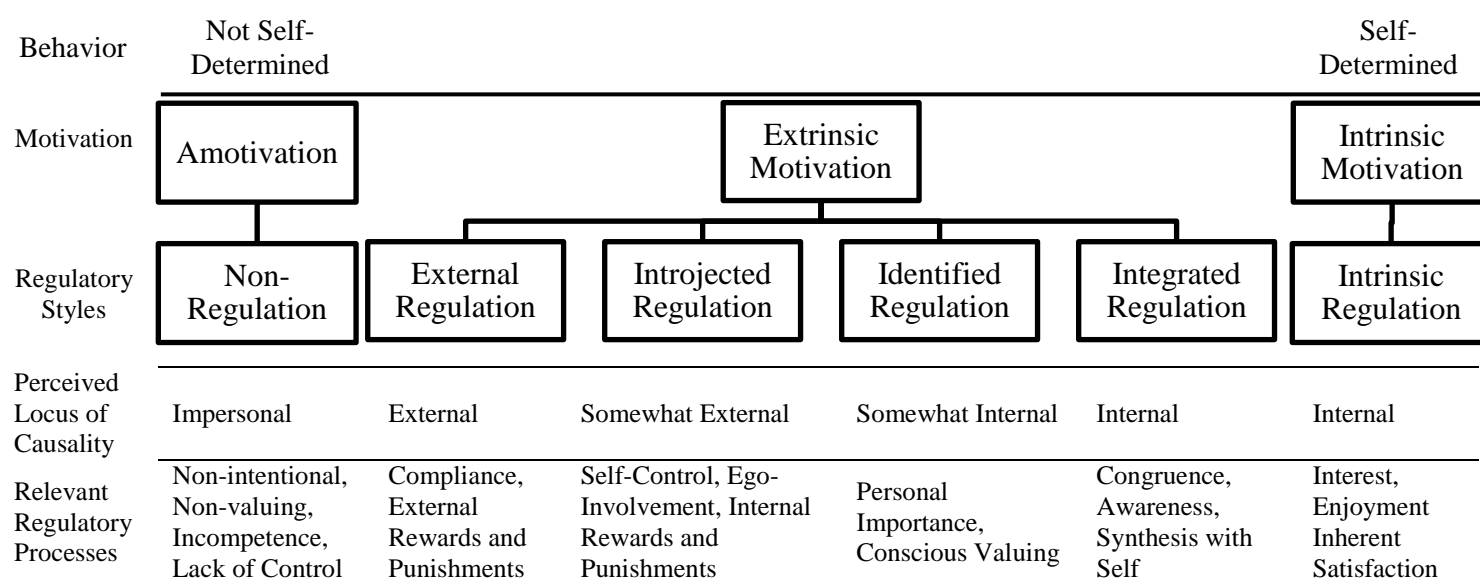


Fig. 3.2. Ryan and Deci's (2000) taxonomy of motivation, moving from extrinsic motivation at the left, to intrinsic motivation at right

obligation or coercion.

Ryan and Deci's (2000) continuum of motivations range from amotivation and exclusively externally-driven behavior to completely intrinsic behavior (Figure 3.2). There is no predictable progression between orientations, and individuals can move forward or backward along the continuum.

- **Amotivation** occurs when one does not value, does not feel capable, and/or does not believe that completing an activity will yield a desired outcome.
- **External Regulation** is the least autonomous state, and occurs when behaviors are performed to satisfy an external demand or to receive a reward.
- **Introjected Regulation** is a less autonomous form of behavior and occurs when an individual completes an activity solely to avoid feelings of guilt or anxiety, or to maintain self-esteem, pride, or sense of worth.
- **Identified Regulation** is a more autonomous form of motivation, and occurs when an individual identifies with, accepts, and values a behavior as personally important.
- **Integrated Regulation** is the most autonomous form of extrinsic motivation, and occurs when an action is fully integrated with one's values. Although integrated motivation shares qualities with intrinsic motivation, behaviors are completed to attain a separable outcome rather than for its inherent enjoyment.
- **Intrinsic Motivation** is the most self-determined type of behavior, and is characterized by completing an activity for the inherent satisfaction it provides.

The OIT positions an individual's internalization of a behavior as a process, not as a dichotomy (Deci & Ryan 2002). As a behavior or external requirement becomes internalized, it becomes part of an individual's sense of self, and completing the behavior becomes characterized by increased self-direction. Within the OIT, amotivation, external regulation, and introjected regulation all involve completing an activity solely to obtain an external reward or avoid a consequence. That is, without the threat of a consequence, or the promise of a reward, individuals would not complete those activities. Conversely, identified regulation represents the transition from external regulation into self-regulation, when an individual completes an activity because it is personally valued.

Other studies have divided the OIT into three groups, autonomous motivation, controlled motivation and amotivation (Ratelle, Guay, Vallerand, Larose & Senecal 2007). Autonomous motivation includes intrinsic, integrated, and identified motivations, and reflects the importance, and relevance of a behavior to an individual's core values and interests. Individuals possessing these motivations will complete a behavior willingly, even if it is done to obtain an external outcome such as personal satisfaction or to achieve a desired future goal. Controlled motivation, includes introjected and external regulation, and occurs when individuals complete an activity due to pressure or a self-imposed sense of responsibility to complete a task. The difference is that identified, integrated, and intrinsic motivations all emerge from identification with the behavior, and the personal importance ascribed to completing that behavior (Deci & Ryan 2002).

SDT posits that payments, such as the one offered by RMBO, fail to foster the type of self-directed motivation that will allow individuals to protect the plover without an incentive (Osbaldiston & Sheldon 2003). Conversely, individuals with a greater degree of autonomous motivation (intrinsic motivation, integrated regulation, and identified regulation) are more likely to willingly take action to care for the environment (Seguin, Pelletier & Hunsley 1998). As individuals are more likely to continue an activity when the motivation to complete that behavior is self-directed rather than externally imposed, my study solely investigates identified, integrated and intrinsic motivations. As the most self-determined motivations, they are the most likely to sustain durable behaviors without an incentive (Pelletier, Tuson, Green-Demers, Noels & Beaton 1998; Ryan & Deci 2000).

3.4: Previous Research

Conservation incentives reward landowners who protect, actively manage, and restore private lands and waters (Casey, Vickerman, Hummon & Taylor 2006). Moreover, incentives

represent an appealing solution to influence individuals' behavior when regulation is too forceful, inefficient, or opposed by landowners (Stern 2006). For instance, Poudyal and Hodges (2009) argue that incentives can change landowner management practices to better incorporate soil protection and the provision of wildlife habitat. Incentives may include technical assistance, such as habitat restoration advice, regulatory protection, such as the Endangered Species Act's Safe Harbor Program, or other material benefits to landowners (Sorice, Haider, Conner & Ditton 2011; Wilcove & Lee 2003; Wolfe, Hays, Farrell & Baggett 2012). But most often, incentives are tax deductions or direct subsidies to landowners (Stern 2006).

While incentives may increase a desired behavior, pursuit of financial rewards may also result in noncompliance, cheating, and falsification of data. For instance, Kirwan, Lubowski and Roberts (2005) found that landowners adjusted environmental quality reporting to increase the likelihood of enrolling in an incentive program. In 2006, investigators uncovered evidence that up to fifteen farmers may have altered soil samples and improperly received over \$280,000 in conservation payments from Washington State (Stucke 2006 cited in Stern 2006). Similarly, Jack, Kousky and Sims (2008) caution that incentives can cause landowners to adopt ransom behaviors by threatening undesirable action (e.g. creating land development plans on property targeted for conservation) to obtain greater compensation. Key and Roberts (2006), and Lennox, Dallimer and Armsworth (2010) found similar behaviors among landowners who leveraged their willingness to accept a payment for conservation activities or land protection. In some instances landowners were able to obtain a 200% increase in compensation for providing a conservation agreement on their property.

Analysts have also raised concerns that incentive programs, such as the Conservation Reserve Program (CRP), are failing to ensure the ecological gains and public benefits that the

program compensates landowners to provide (Norris & Batie 1987; Cattaneo, Claassen, Johansson & Weinberg 2005). The CRP, established in 1985 as a part of the Farm Bill, compensates landowners who voluntarily cease cultivation on environmentally-sensitive cropland (Kirwan, Lubowski & Roberts 2005). The U.S. spends over \$1 billion per year on CRP payments, and given the programs cost and scope it is concerning that it may not be providing its intended environmental benefits (Armsworth, Acs, Dallimer, Gaston, Hanley & Wilson 2012).

The reliance on incentives to drive private land conservation warrants additional attention to the psychological impact of their use. Winter and Koger (2004), Farley and Costanza (2010), and De Young (1993) all argue that incentives can reduce landowners intrinsic motivation and sense of responsibility to care for the land. Incentives that pressure or coerce landowners into desired actions may further harm intrinsic motivation (Ryan & Deci 2000). Vohs, Mead, and Goode (2006) found that in all nine of their multi-person experiments, participants who were prompted with money exhibited more individualistic behaviors, such as a decreased likelihood of helping others, donating less money when asked, and a reduced willingness to engage with peers. Similarly, Frank, Gilovich and Regan (1993) found that university students studying economics behaved in a more self-interested manner in social dilemma games than students in other areas of study. Murayama, Matsumoto, Izuma and Matsumto (2010), found that prior to completing an incentivized behavior the parts of the brain associated with reward and motivation, became activated in study subjects. When the incentive was removed these areas were no longer activated suggesting that the removal of an incentive also poses neurobiological implications. While, non-monetary or unexpected rewards may not be as problematic as cash incentives, care should be taken anytime individuals use money to change behavior (Frey & Jegen 2001).

Researchers argue that financial incentives are harmful as they fundamentally change the nature of a request (Frey & Jegen 2001). That is, completing a behavior to obtain an incentive changes the nature of the requested task from one potentially done willingly, to one done out of necessity to obtain the reward, an event Frey and Jegen (2001) term “crowding out” (Pg. 590). For instance, Frey and Oberholzer-Ghee (1997) found that individuals’ willingness to site a nuclear waste storage area decreased by 25% when a financial incentive was offered. In this instance compensation fundamentally changed the nature of the request or behavior, and resulted in less undesirable outcome.

Despite these challenges, Frey and Jegen (2001) also note that financial incentives can have the opposite effect. Incentives can boost an individual’s motivation to perform a task, support their intrinsic motivation, and ultimately increase an individual’s willingness to complete a behavior. They refer to this phenomenon as “crowding in,” and suggest that under the right circumstances, incentives may prove beneficial to long term behaviors (Pg. 593). For instance, conservation incentives expose individuals to the benefits of new management techniques, which can ultimately spur greater willingness to protect the environment (Van Herzele et al. 2013). Bandura (1986) argues that as most of the activities people intrinsically enjoy were not of initial interest, rewards can help establish interest in these behaviors. Further, verbal rewards, non-material rewards, and small payments are all posited to be less harmful to intrinsic motivation (Deci, Koestner & Ryan 1999; Cameron, Banko & Pierce 2001). Thus, under the right conditions, rewards may not always prove as harmful as commonly believed.

A considerable body of research has already investigated the adoption of pro-environmental behaviors, landowner motivations for conducting conservation activities, and the demographic and landowner characteristics of existing or likely conservation program

participants (e.g. Sullivan, Amacher & Chapman 2005; Kaetzel Hodges, Houston & Fly 2009). However, less is known about the conditions necessary to transition landowners away from existing incentives while maintaining desired behaviors. This research gap warrants greater investigation by examining an existing conservation organization, incentive program, and enrolled participants.

3.5: Hypotheses

The MPP is a completion-contingent reward program, where compensation is solely provided when a marked nest is protected and subsequently hatches (Deci, Koestner & Ryan 1999; Ryan, Mims & Koestner 1983). This reward structure is posited to be highly controlling as

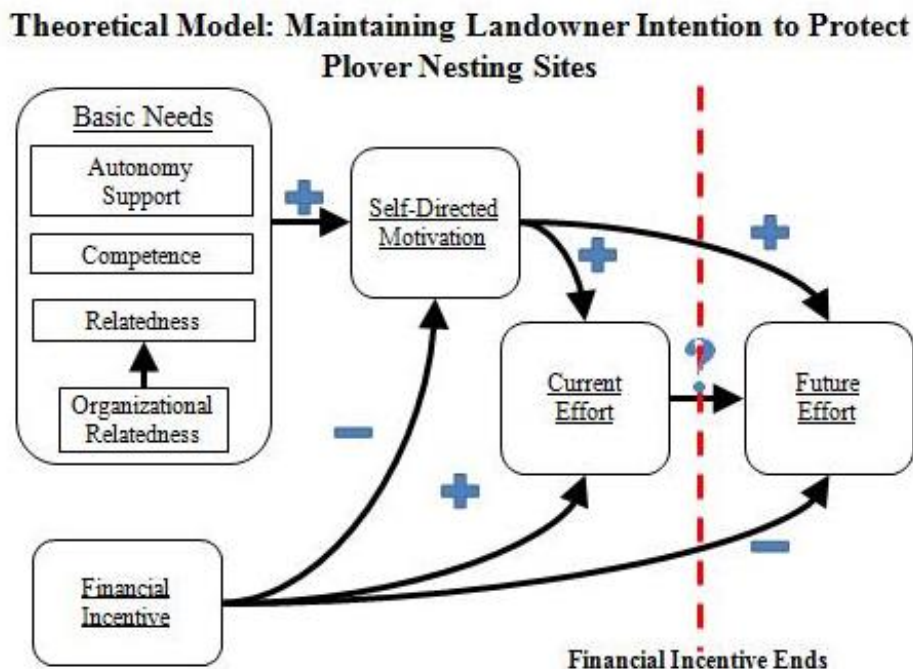


Fig. 3.3. Self-Determination Theory and the Mountain Plover Program. Conceptual model based on Ryan and Deci's (2000) Self-Determination Theory, and study hypotheses. Model moves from left to right beginning with "Basic Needs" and "Financial Incentive."

+ = Positively support next variable
 - = Harm next variable

organizations must rely on greater levels of surveillance and evaluation, both of which undermines intrinsic motivation (Deci & Ryan 1985). Building off of Ryan and Deci's (2000) SDT, I investigated the perceived impact of the cessation of existing incentive payments on landowners' future intention to protect plover nests. Specifically, I was interested in whether program participants believe that they will continue protecting the plover if they no longer receive an incentive to do so. Autonomy, competence and relatedness were the independent variables for this study. Current effort and future effort are the dependent variables.

Following Ryan and Deci's (2000) SDT, my theoretical hypotheses include autonomy, competence, relatedness, and organizational relatedness supporting individuals' self-directed motivation to protect plover nests (Figure 3.3). Self-directed motivation was expected to support individuals' level of current effort in identifying and protecting nesting sites, as well as their intention to continue once the program ends. Given the unknown impact of the existing financial incentive, and the degree to which MPP members are self-directed, it was unclear whether current effort will indicate a likelihood of protecting the plover without an incentive (future effort). However, I expected that respondents with higher levels of current effort would result in an increased likelihood of future effort.

3.6: Methods

Data Collection

I used a modified version of the drop off-pick up distribution method along with the multiple-phase reminder method using the U.S. Postal Service (USPS) (Dillman 2009; Allred & Ross-Davis 2010). Staff from RMBO mailed all program participants ($n = 77$) a pre-survey letter outlining the purpose of the study. After approximately two weeks, a staff member from RMBO distributed surveys to all possible respondents at their homes. For those who were unreachable at

home, or whose primary residence was outside of the study area, a staff member from RMBO mailed a copy of the survey via USPS and followed up with a personalized telephone call explaining the study. Included with all surveys was a small incentive as a thank you (RMBO magnetic calendar), and information directing participants to return the completed survey, or a blank survey to indicate disinterest in participating, using the provided pre-paid envelope. RMBO sent reminder postcards roughly two weeks after initial survey distribution. Three weeks after mailing postcards, RMBO sent individuals who had still not responded a reminder letter and duplicate survey before sending final postcard reminders to non-respondents two weeks after that date (Dillman 2009).

Survey Design

To develop the study instrument I adapted existing, validated survey measures whenever possible. I received assistance from RMBO in the creation of the unique measures of current effort and future effort.

Measures.

Demographics.

I collected basic demographic information to understand the participants' identities as farmers. I asked questions related to generating income on their farm, including how much land respondents owned or leased, and the percentage of their overall income that comes from farming. To gauge their tenure as farmers, I asked respondents how many generations farming has been in their family, how much of their childhood was spent on a farm, as well as the total number of years that they have personally operated their farm. I also collected information on whether individuals live on their farm or live elsewhere, and if respondents are enrolled in other conservation incentive programs.

Mountain Plover Program Participation

I also created questions to capture information on how the respondents participate in the MPP. I asked how participants first learned about the program (e.g. finding the program on a website, or a personal invitation from an RMBO staff member), and the program characteristics that they felt were most influential in their decision to enroll in the program (e.g. the money offered for each successfully protected nest, or their personal interest in helping wildlife). I also asked how many years MPP members had been enrolled in the program.

Autonomy.

I used three questions adapted from The Work Climate Questionnaire, and the Basic Need Satisfaction at Work Questionnaire to gauge respondents' perception of autonomy as Mountain Plover Program members (See Table 3.3) (Baard, Deci & Ryan 2004). These questions were evaluated to ensure internal consistency and combined to create a general measure of autonomy. Respondents were instructed to respond on a seven-point scale from 1 = Not at all true, to 4 = Somewhat True, to 7 = Very True.

Competence.

I also adapted The Basic Psychological Needs Scale to measure respondents' perception of competence in protecting wildlife, including the plover (Table 3.3). I instructed respondents to provide their answer using the same scale, selecting either 1 = Not at all true, 4 = Somewhat True, or 7 = Very True (Baard, Deci, & Ryan 2004). For analysis, questions measuring competence were evaluated for internal consistency before being combined.

Relatedness.

To measure respondents' perception of relatedness, I adapted Kim, Scott, Thigpen, and Kim's (1998) behavioral commitment scale (Table 3.3). I also adapted the Intrinsic Motivation

Inventory and the Basic Psychological Needs scales (Baard, Deci & Ryan 2004; Plant & Ryan 1985). All measures were evaluated for internal consistency and combined for analysis.

Participants responded on the same 7-point scale, indicating either 1 = Not at all true, 4 = Somewhat True, or 7 = Very True.

Organizational Affinity.

To measure respondents' sense of relatedness to RMBO, I adapted a number of measures from organizational management, including Porter et al.'s (1974) measure of organizational commitment, Meyer and Allen's (1991) measure of affective commitment, and Pierce et al.'s (1989) measure of organizational based self-esteem (Table 3.3). I also measured respondents' perception of organizational identity using statements such as, "I feel that the plover program's successes are my successes." I refer to this grouping of variables as organizational affinity.

Respondents were asked to indicate their degree of agreement with each of the organizational affinity measures using a 7-point scale beginning with 1 = Strongly Disagree, 2 = Moderately Disagree, 3 = Slightly Disagree, 4 = Neutral, 5 = Slightly Agree, 6 = Moderately Agree, and ending with 7 = Strongly Agree.

Self-Directed Motivation.

I adapted the Motivation Toward the Environment Scale (MTE) to examine respondents' motivation for protecting plovers (Villacorta, Koestner & Lakes 2003). As I was solely interested in the effect of the financial incentive on self-determined motivation, I combined identified, integrated, and intrinsic motivations. I tested for internal consistency before combining these measures (Table 3.3). Ryan and Deci (2000) note that other studies have combined these measures to form an autonomous motivation composite, and I refer to this composite as Self-Directed Motivation.

I reduced the original MTE scale from 23 items to 17 items, presented the questions in a randomized order, and adapted the questions to focus on the Mountain Plover Program.

Questions instructed respondents to indicate the extent to which each item corresponded to their personal motives for continuing to participate in the plover program on a 7-point scale, ranging from 1 (Does not correspond at all) to 4 (Corresponds moderately) to 7 (Corresponds exactly).

Evaluation of the Financial Incentive.

I created six questions to capture baseline information on the respondents' opinions of the existing financial incentive. Each question included a uniquely corresponding seven point scale with individualized ratings (See Table 3.2).

Current Effort.

To evaluate current effort, staff from RMBO assisted me in creating nine activities indicative of actively participating in the plover program (Table 3.6). Respondents evaluated each activity using the same 5-point scale, beginning with 1 = Almost Never, 2 = Rarely, 3 = Occasionally, 4 = Often, and ending with 5 = Almost Always.

To understand the ways in which individuals are currently participating in the plover program, I conducted a hierarchical cluster analysis using Ward's linkage (Hair Jr., Black, Babin & Anderson 2009; Ward 1963). This method groups respondents into subsets on the basis of their similarity to the nine current effort items, while also minimizing the variance within each cluster (Punj & Stewart 1993). I selected the number of clusters that allowed me to effectively discriminate between the groupings of farmers, and to make the most meaning out of the results.

Indication of Future Effort.

With input from RMBO, I created seven questions to examine respondents intention to continue certain MPP activities should the financial incentive no longer be provided (Table 3.7). This measure is based upon respondents stated intention to continue marking and avoiding

plover nests without an incentive (Fishbein & Ajzen 2010). Respondents indicated the likelihood of future effort without an incentive on a 7-point scale ranging from 1 = Extremely Unlikely, 2 = Moderately Disagree, 3 = Slightly Disagree, 4 = Neutral, 5 = Slightly Agree, 6 = Strongly Agree, and ending with 7 = Extremely Likely.

I again grouped farmers using a hierarchical cluster analysis using Ward's linkage to understand whether individuals anticipate protecting the plover should the incentive no longer be provided (Hair Jr., Black, Babin & Anderson 2009; Ward 1963). I used participants' responses to the seven measures of future effort as the source of this classification, and selected the number of clusters that were most effective in differentiating the results.

Data Analysis

I used descriptive statistics to investigate respondents' perception of the financial incentive, autonomy, competence, and relatedness as participants within the MPP. I also used descriptive statistics to explore respondents' perceptions of their level of current effort, and their likelihood of protecting the plover and its nests without an incentive. Given this study's small sample size, I employed non-parametric statistics for analyses. Non-parametric statistical analyses are ideal when working with smaller samples as they make fewer assumptions about the population distribution (Pallant 2007). When combining measures I used Cronbach's alpha to examine internal consistency. The number of observations reported in the statistical analysis varies due to item nonresponse.

To examine the strength of relationships between two variables, I used Spearman's rho, the non-parametric alternative to Pearson correlation. The strength of the relationship is presented using the following criteria: small = 0.10 to 0.29; medium = 0.30 to 0.49; and large = 0.50 to 1.0 (Pallant 2007).

To test for differences between groups, I used Mann-Whitney *U* tests. This test is the non-parametric alternative to t-tests for independent samples. The Mann-Whitney *U* test ranks responses from lowest to highest, and then identifies differences in the ranked scores of the two groups. When I conducted Mann-Whitney *U* tests, I calculated and reported the effect size using Cohen's (1988) criteria of 0.1 = small effect, 0.3 = medium effect, 0.5 = large effect. I report effect sizes as *f*.

To examine whether two categorical variables were related, I used an exact Chi-square test. The standard Chi-square test assumes that the minimum expected cell frequency is five or greater, but due to my small sample size this assumption was not met (Pallant 2007). The exact Chi-square uses an exact distribution to calculate the *p* value, instead of approximating the *p* value. This helps protect the findings against the influence of the smaller sample size.

3.7: Results

Participant Information

Of the 77 surveys that were initially distributed to my target population, 41 were returned, and two individuals indicated that they were not enrolled in the program, for an effective response rate of 55%. Respondents were primarily male (94%), and ranged in age from 26 to 86 with a mean age of 60.3 years. Many of the respondents (83%) had spent most or all of their childhood on a farm, and most (77%) came from families who had been farming for three or four generations. Respondents personally operated their farm for as few as 2 years, and as many as 63 years. The majority (83%) of respondents resided on their farm, and most (77%) farmed 2,000 or more acres of land. As such, the majority (79%) of the respondents earned at least half of their annual income from their farm.

Most (89%) of the respondents first learned about the MPP through an RMBO employee, and 71% of respondents indicated that their reasoning for enrolling in the program was to a large or very large extent influenced by their interaction with RMBO staff. Respondents' time in the MPP ranged from less than a year to the full ten years of the program's existence, with a mean enrollment period of 5.4 years. Notably, 81% of respondents also participate in at least one other conservation incentive program, with the Conservation Reserve Program (CRP) among the most popular (60%).

Evaluation of the Financial Incentive

The farmers were generally supportive of the financial incentive, though 91% of respondents felt that the financial incentive was "A Bit Too Low" (Table 3.2).

Table 3.2

Means, standard deviations, and medians of respondents views of the financial incentive

Financial Incentive: <i>Would you say the financial incentive offered in this program is:</i>	<i>Mean</i>	<i>SD</i>	<i>Median</i>
Undesirable or Desirable?	5.94	1.32	6
Bad or Good?	5.70	1.60	6
Unnecessary or Necessary?	5.06	1.66	5
Ineffective or Effective?	5.03	1.90	6
Unimportant or Important?	5.03	2.13	6
Too Low or Too High?	3.34	1.10	3

Note: All variables were measured on a scale specific to each question. (E.g. 1 = Extremely Undesirable to 7 = Extremely Desirable; 1 = Very Ineffective to 7 = Very Effective 1 = Much Too Low to 7 = Much Too High).

Autonomy, Competence, & Relatedness

On average the respondents in this study felt that the MPP fostered a feeling of autonomy, which allowed them to participate in the program freely (mean = 6, SD = 1.20, median = 6.67). While respondents indicated that it was somewhat true that they had the necessary competence to protect the plover (mean = 4.46, SD = 1.44, median = 4.40), they did

not feel that it was true that the MPP provided a sense of relatedness among program participants (mean = 2.78, SD = 1.18, median = 2.83) (Table 3.3).

Respondents indicated a greater feeling of organizational affinity, slightly agreeing that they were committed to RMBO (mean = 5.41, SD = 1.64, median = 5.75). The MPP members rated the remaining measures of organizational affinity similarly, suggesting a neutral to slight agreement with affective commitment (mean = 4.84 SD = 1.52, Median = 5), organizational identity (mean = 4.84, SD = 1.62, median = 5), and organization-based self-esteem (mean = 4.47, SD = 1.84, median = 5). These findings further illustrate respondents' greater sense of relatedness to RMBO than their fellow program participants.

Table 3.3

Means, standard deviations, and medians of respondents' perceptions of autonomy, competence, and relatedness.

<i>We would like to know the extent to which each item corresponds to your experience with the Mountain Plover nest protection program.</i>	<i>Mean</i>	<i>SD</i>	<i>Median</i>
Autonomy ($\alpha = 0.86$)	6.00	1.20	6.67
I am free to express my ideas and opinions about the plover program to the staff	5.90	1.37	7
How I participate in the plover program is completely up to me	6.12	1.39	7
The plover program provides me with choices and options	6.00	1.34	7
Competence ($\alpha = 0.93$)	4.46	1.44	4.40
I have been able to learn interesting new skills as a part of the plover program	4.16	1.67	4
In general, I feel a sense of accomplishment from my participation in the plover program	4.45	1.75	4
As part of the plover program I am able to achieve my goals of protecting nongame wildlife on my land	4.58	1.50	4
I am confident in my ability to protect nongame wildlife on my land	4.61	1.41	4

After working with the plover program, I feel confident in my ability to identify and protect plover nests	4.52	1.80	4
Relatedness ($\alpha = 0.69$)	2.77	1.18	2.83
Since I began the program, I've gotten to know many of the other participants	3.19	1.62	3
I consider plover program participants to be a close-knit group of landowners	3.52	1.50	4
If I stopped participating in the plover program I would probably lose touch with a lot of my friends	1.66	0.97	1
Organizational Affinity			
Organizational Commitment ($\alpha = 0.92$)	5.41	1.64	5.75
I am proud to tell others that I am a part of the plover program	5.38	1.64	6
I really care about the fate of the plover program	5.48	1.79	6
Affective Commitment ($\alpha = 0.81$)	4.82	1.52	5
When someone praises RMBO's plover program, it feels like a personal compliment	4.47	1.85	5
I enjoy discussing the plover program with people outside of it	5.16	1.81	5
I feel that the plover program's successes are my success	4.97	1.74	5
Organizational Identity	4.82	1.63	5
Being part of the plover program is an important reflection of who I am			
Organization-Based Self Esteem ($\alpha = 0.95$)	4.47	1.84	5
I am a valuable part of the plover program	4.47	1.87	5
I am an important part of the plover program	4.48	1.95	5

Note: Numbers next to bolded terms are descriptive statistics specific to the combined measures. Autonomy, competence, and relatedness questions were measured using this 7 point scale (1 = Not at all true, 4 = Somewhat true, 7 = Very true). Organizational Relatedness was measured using this 7-point scale (1 = Strongly Disagree 2 = Moderately Disagree 3 = Slightly Disagree 4 = Neutral 5 = Slightly Agree 6 = Moderately Agree 7 = Strongly Agree).

Self-Directed Motivation

I combined identified regulation, integrated regulation, and intrinsic motivation to create a larger measure of self-directed motivation. I uncovered a good internal consistency ($\alpha = 0.91$) of the combined measure of self-directed motivation (Table 3.4). On average respondents'

Table 3.4

Means, standard deviations, and medians of respondents motivation for continuing in the MPP.

<i>Please indicate the extent to which each item corresponds to your personal motives for protecting the plover using a 7-point scale from 1 (does not correspond at all) to 7 (corresponds exactly).</i>	<i>Mean</i>	<i>SD</i>	<i>Median</i>
Self-Directed Motivation ($\alpha = 0.91$)	4.71	1.47	4.83
Identified Regulation	--	--	--
Because it is a reasonable thing to do.	4.85	1.89	5
Integrated Regulation ($\alpha = 0.86$)	4.68	1.56	5
A fundamental part of who I am involves protecting wildlife species, like the Mountain Plover.	4.74	1.68	5
Because caring for wildlife like the Mountain Plover is part of the way I've chosen to live my life.	4.58	2.00	5
Because it's a way I've chosen to contribute to wildlife protection.	4.74	1.68	4.5
Intrinsic Motivation ($\alpha = 0.83$)	4.67	1.55	4.83
For the satisfaction I experience while I am mastering new ways of helping wildlife, like Mountain Plovers.	4.68	1.53	5
Because I like the feeling I have when I've successfully helped a plover nest.	5.06	1.84	5
For the pleasure I experience while helping Mountain Plovers	4.42	1.85	5

Note: All responses provided on a 7-point scale from 1 (does not correspond at all) to 7 (corresponds exactly).

agreed to a moderate extent that their reason for continuing to participate in the MPP was due to self-directed motivation.

Basic Needs and Self-Directed Motivation

The results from the Spearman's correlations of autonomy, competence, and relatedness revealed that two of the three broad measures of basic needs were positively correlated with self-directed motivation (Table 3.5). I uncovered a strong, positive, correlation between competence and self-directed motivation ($r_s = 0.66$, $n = 32$, $p = <0.01$), and a medium, positive correlation between relatedness and self-directed motivation ($r_s = 0.43$, $n = 31$, $p = 0.02$). Autonomy, however, was not correlated with self-directed motivation ($r_s = 0.25$, $n = 32$, $p = 0.17$).

In addition, every measure of organizational affinity was strongly and positively related to self-directed motivation. The strongest correlation was between organizational commitment and self-directed motivation ($r_s = 0.74$, $n = 31$, $p = <0.01$), followed by organization based self-esteem ($r_s = 0.58$, $n = 31$, $p = <0.01$), organizational identity ($r_s = 0.58$, $n = 31$, $p = <0.01$), and affective commitment ($r_s = 0.55$, $n = 31$, $p = <0.01$). The strong, positive relationships between the organizational affinity items and self-directed motivation suggest that an increased sense of

Table 3.5

Spearman correlations relating motivation and basic needs n= 32.

Variable	1.	2.	3.	4.	5.	6.	7.
1. Self-Directed Motivation							
2. Autonomy	0.25						
3. Competence	0.66**	0.32					
4. Relatedness	0.43*	0.02	0.68**				
5. Org. Self-Esteem	0.58**	0.16	0.63**	0.59**			
6. Affective Commitment	0.55**	<-0.01	0.73**	0.63**	0.74**		
7. Org. Identity	0.58**	0.12	0.68**	0.48**	0.61**	0.69**	
8. Org. Commitment	0.74**	0.27	0.77**	0.46**	0.70**	0.80**	0.74**

* $p = <0.05$

** $p = <0.01$

affiliation with RMBO is associated with a greater degree of self-directed motivation for protecting the plover. Together my findings from the correlation suggest that three of the four basic needs were satisfied. Thus, respondents in my study with greater levels of competence and both measures of relatedness were associated with a greater sense of self-directed motivation.

Current Effort

I used a hierarchical cluster analysis with Ward's linkage to create two meaningful and interpretable clusters of current effort. In examining the responses, the farmers in the first cluster

Table 3.6

Means, standard deviations, and medians of respondents' indications of current effort.

Current Effort ($\alpha = 0.86$) <i>Please tell us how frequently or infrequently you engage in each action below.</i>	Overall Current Effort		Low Effort Group		High Effort Group	
	<i>M (SD)</i>	<i>Median</i>	<i>M (SD)</i>	<i>Median</i>	<i>M (SD)</i>	<i>Median</i>
I avoid marked nests until the nest hatches	4.54 (0.95)	5	4.53 (0.72)	5	4.56 (1.33)	5
When I see a nest, I mark it myself	3.12 (1.61)	3	2.65 (1.46)	3	4.00 (1.58)	5
When I see a plover, I stop my tractor and watch for it to return to its nest	3.08 (1.55)	3	2.47 (1.33)	3	4.22 (1.30)	5
I wait for an RMBO biologist to call me to schedule a time to search for plover nests	2.50 (1.61)	2	1.82 (1.24)	1	3.78 (1.48)	4
I call an RMBO biologist before I till to have them search for plover nests	2.46 (1.42)	2.5	2.00 (1.17)	2	3.33 (1.50)	4
Each nesting season, I purposely create habitat for plovers to nest in	2.23 (1.11)	2	2.06 (1.25)	2	2.56 (0.73)	3
When I'm in my fields and see a plover, I call an RMBO biologist	2.19 (1.50)	1.5	1.41 (0.71)	1	3.67 (1.50)	4
I assist RMBO biologists with plover nest searching	1.89 (1.24)	1	1.41 (0.87)	1	2.78 (1.39)	2
I drive the fields looking for plover nests before I till	1.65 (0.94)	1	1.35 (0.70)	1	2.22 (1.10)	2

Note: Current effort measured using the following scale (1 = Almost never, 2 = Rarely, 3 = Occasionally, 4 = Often, 5 = Almost Always).

($n = 17$) were characterized by lower scores, while the second group ($n = 9$) had higher scores (Table 3.6). For instance, when asked how frequently respondents who see a plover stop their tractor and watch for it to return to its nest, respondents in the first group indicated that they rarely stopped their tractor (mean = 2.47, SD = 1.33, median = 3). Conversely, respondents in the second group indicated that they often stop their tractor to watch the plover return to its nest (mean = 4.22, SD = 1.30, median = 5). As the other current effort activities had similar results, I labeled the first group as the low effort group and the second group as the high effort group. Overall, most (65%) of the MPP members fell into the lower current effort category, while 35% were in the higher current effort category. Avoiding marked nests until they hatched represented the only behavior that respondents in both the higher current effort group (mean = 4.56, SD = 1.33, median = 5) and the lower current effort group (mean = 4.53, SD = 0.72, median = 5) often completed.

Self-Directed Motivation & Current Effort

The Mann-Whitney U test comparing self-directed motivation by current effort revealed a large, significant difference between the lower current effort group (median = 4.11), when compared with the respondents who had higher levels of current effort (median = 5.89; $z = -3.20$, $p < 0.01$, $r = 0.64$). Thus, when asked for their reasons for participating in the MPP, individuals with a lower level of current effort also had a lower rating of self-directed motivation, (median = 4.11). Conversely, respondents with a higher level of current effort had a higher rating of self-directed motivation as participants in the MPP (median = 5.89).

Future Effort

I used the seven measures of future effort as the basis for a second hierarchical cluster analysis to group farmers. Two clusters were determined to be sufficiently meaningful and interpretable when examining respondents' likelihood of continuing with the program without an

incentive. Respondents in the first cluster (n = 9) were characterized by lower scores on the future effort measures, while the second cluster (n = 22) represented the respondents with higher scores (Table 3.7). For instance, respondents in the first cluster were uncertain if they would report sightings of plover nests to RMBO without an incentive (mean = 2.78, SD = 1.40, median = 3). The farmers in the second cluster were moderately likely to report plover nest sightings without an incentive (mean = 6.10, SD = 0.81, median = 6). In light of these findings, I labeled the first group as having a lower level of future effort, and labeled the second group as having a higher level of future effort. Overall, a majority (71%) of the survey respondents were willing to continue with the program without an incentive.

Table 3.7.

Means, standard deviations and medians of respondents' intention to participate in the MPP without an incentive

Future Effort ($\alpha = 0.88$) <i>For the following questions, indicate how likely or unlikely each statement is. If the financial incentive ends in 2014:</i>	Overall Future Effort		Lower Likelihood of Future Effort		Higher Likelihood of Future Effort	
	<i>M (SD)</i>	<i>Median</i>	<i>M (SD)</i>	<i>Median</i>	<i>M (SD)</i>	<i>Median</i>
I will allow RMBO volunteers to mark nests on my land	6.32 (1.38)	7	5.44 (2.30)	6	6.68 (0.48)	7
I will allow RMBO biologists to continue marking nests on my land	6.00 (1.78)	7	5.22 (2.78)	6	6.32 (1.46)	7
I will watch for and avoid plover nests on my own	5.48 (1.90)	6	3.22 (1.99)	4	6.41 (0.73)	7
I will report sightings of plover nests to RMBO	5.13 (1.82)	6	2.78 (1.39)	3	6.10 (0.81)	6
I will report sightings of plovers to RMBO	5.00 (1.81)	5	2.67 (1.41)	2	5.95 (0.79)	6
I will actively search for plover nests on my own	4.13 (1.86)	5	1.78 (1.10)	1	5.10 (1.06)	5
I will end my involvement with the program	2.74 (1.93)	2	4.22 (1.92)	4	2.14 (1.61)	2

Scale: 1 = Extremely Unlikely, 2 = Moderately Unlikely, 3 = Slightly Unlikely, 4 = Unsure, 5 = Slightly Likely, 6 = Moderately Likely, 7 = Extremely Likely.

Self-Directed Motivation & Future Effort

The results from the Mann-Whitney U test did not uncover a significant difference in self-directed motivation among the respondents who indicated a lower likelihood of participating in the plover program without an incentive (median = 4.06), and those who indicated a greater likelihood of protecting the plover without an incentive (median = 5.33; $z = 1.71$, $p = 0.09$, $r = 0.32$). Both groups indicated moderate agreement with self-directed motivation regardless of their likelihood of continuing with the program.

Current Effort & Future Effort

Finally, I investigated whether there was a relationship between current effort and future effort. Approximately 65% ($n = 17$) of respondents indicated a lower level of current effort; however, approximately 71% ($n = 22$) indicated a greater likelihood of future effort without an incentive. The exact chi-square test failed to reveal a significant relationship between current effort and future effort ($X^2_1 = 0.19$, $p = 0.15$, $\phi = 0.10$, $n = 24$). Thus, the likelihood of continuing with the plover program without an incentive was independent of respondents' indication of current effort. The results in Table 3.8 suggest that individuals with both a higher and lower level of current effort are likely to remain involved in the MPP without an incentive.

Table 3.8

Exact chi-square of respondents' indication of current effort and their indication of future effort.

Current Effort	Higher Level of Future Effort	Lower Level of Future Effort	Total
Lower Level of Current Effort	60% ($n = 9$)	40% ($n = 6$)	100% ($n = 15$)
Higher Level of Current Effort	89% ($n = 8$)	11% ($n = 1$)	100% ($n = 9$)
Total	71% ($n = 17$)	29% ($n = 7$)	100% ($n = 24$)

3.8: Discussion

Researchers have used Self-Determination Theory (SDT) to explore environmental concerns, but this work has most often investigated the more general subject matter of adoption of pro-environmental behaviors (e.g. Pelletier, Tuson, Green-Demers, Noels, & Beaton 1998; Sheldon, Nichols, & Kasser 2011). My study represents a novel use of SDT to investigate the impact of an existing financial incentive on future behavior. I explored the degree to which participants in the Mountain Plover Program (MPP) believed that the program sustained or hindered their sense of

autonomy, competence, relatedness, and organizational affinity.

Further, I examined participants' level of current effort, and whether their

participation in the program would change should Rocky Mountain Bird Observatory (RMBO) no longer

provide payments to farmers to protect plover nests (Figure 3.4). My use of SDT as a lens to investigate an existing organization and financial incentive may offer conservation practitioners and academics practical information on the implications of incentivizing conservation.

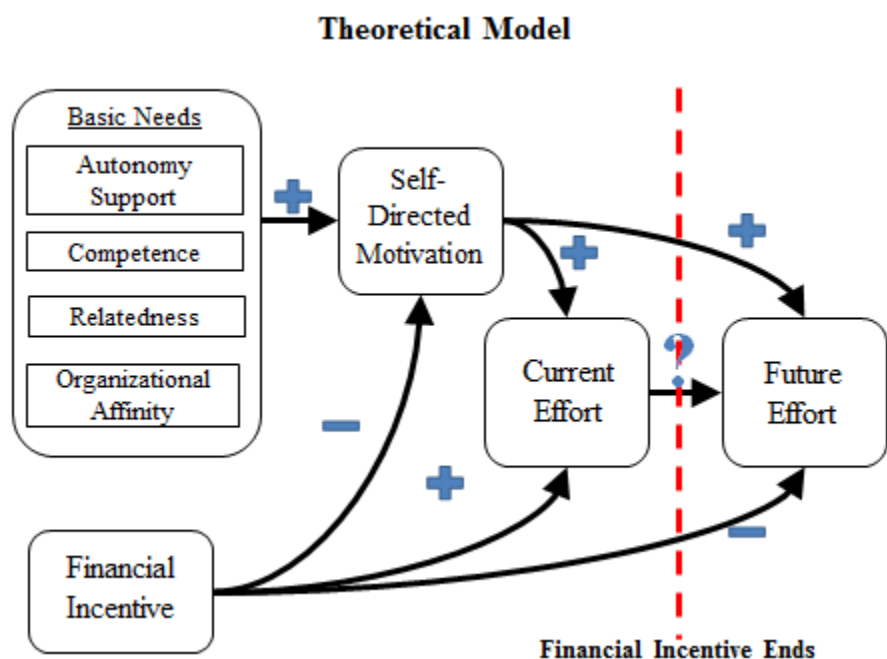


Fig. 3.4. Self-Determination Theory and the Mountain Plover Program. Conceptual model based on Ryan and Deci's (2000) Self-Determination Theory.

+ = Positively support next variable
 - = Harm next variable

On average, the farmers participating in the MPP had a high level of autonomy, a moderate degree of competence, a low level of inter-personal relatedness, and a moderate degree of organizational affinity (See Table 3.3). These findings are similar to other studies that have found differing levels of each of the basic needs depending on situational and individual characteristics (Deci, Koestner & Ryan 1999). Among the basic needs, I found that competence, relatedness, and organizational affinity were significantly correlated with self-directed motivation. Autonomy was not significantly related to self-directed motivation, and the MPP members' overwhelming perception of autonomy may explain this finding. I also found that most of the farmers were characterized by a lower level of current effort. This sample of respondents indicated a lower sense of self-directed motivation, while those with higher levels of current effort indicated greater sense of self-directed motivation. Regardless of current effort, a majority (71%) of respondents intend to continue to protect the plover without an incentive (See Table 3.8).

Respondents' indication of a higher level of future effort, and the lack of statistical significance between self-directed motivation and future effort, as well as current effort and future effort warrants further discussion. A few factors may help explain these results. First, the findings could reflect a social desirability bias among participants (e.g. Klassen, Hornstra & Anderson 1975; Nederhof 1985) who want to remain in good standing with RMBO. That is, people's responses may be positively biased to be viewed favorably by RMBO. The second point is related to this bias-- I only collected information on respondents' future intention to act. Although behavioral intentions tend to be the best predictor of behavior (Bamberg & Moser 2007), intentions do not always correspond to overt behavior (Bagozzi 1992; McCleery 2006). Variables outside the scope of this project, such as the perceived effectiveness of the program,

could influence the results. As Chouinard, Paterson, Wandschneider & Ohler (2008) argue, the literature on agricultural conservation often assumes that a “rational” farmer accepts conservation practices when they do not harm profits. They note, however, that this may not hold if other factors trump profit-maximizing behavior. As the majority of farmers’ intended to remain involved in the program without an incentive, this finding suggests that other factors are at play in this study. My study, however, found that landowners’ basic needs are being met to a large degree.

Third, many investigations of conservation incentive programs focus on landowner characteristics (e.g. Sullivan, Amacher & Chapman 2005; Kaetzel Hodges, Houston & Fly 2009), with less focus on how the design of the program influences and sustains landowner enrollment (Sorice et al. 2013). As the design of conservation programs can facilitate or hinder efforts to induce landowner commitment to protect biodiversity, the design of the MPP may shed light on the farmers’ willingness to continue to protect the plover. The MPP is landowner-centric, has no enrollment criteria that farmers must satisfy (e.g. habitat characteristics), and has few participation requirements. Further, once nests are found, marked, and RMBO confirms that the nest hatched landowners face no further restrictions.

The MPPs limited requirements compare favorably to other, more restrictive conservation programs such as the Conservation Reserve Program (CRP), which many of the MPP members are also enrolled. For instance, enrollment in the CRP is a competitive process by which landowners with specific land features (e.g. marginal cropland) submit conservation plans that are ranked on six factors including benefits to wildlife habitat, water quality, farmland improvement (e.g. erosion control), air quality, and cost (points are deducted for higher cost proposals) (Kirwan, Lubowski & Roberts 2005; USDA Farm Service Agency 2013). If accepted,

those areas need to be maintained for the length of the contract agreement. Conversely, the MPPs ease of participation and limited management requirements is likely of critical importance in sustaining future effort among the participants.

The farmers' overall agreement that the MPP allows for a sense of autonomy, competence, and organizational affinity, may offer additional insights into the role of program design in sustaining behavior (Ryan & Deci 2000). For instance autonomy is of primary importance to many working landowners and to SDT, and the degree to which conservation programs allow for autonomy can influence landowner willingness to enroll in a program, as well as complete a behavior willingly (Ryan & Deci 2000; Sorice et al. 2013; Peterson & Horton 1995; Bergmann & Bliss 2004). The MPPs ease of enrollment and minimal participation requirements is a feature of the program that actively allows for landowner freedom. Farmers have the option to participate at various levels. At the most passive level, farmers wait for RMBO to contact them, RMBO marks the nests, and all farmers have to do is avoid the marked nest until it hatches. At the most involved level, a farmer can search the fields and mark the nests before calling RMBO to monitor them.

As completion-based rewards, like the MPP, necessitate a certain degree of competence to complete the incentivized task, the moderate degree of competence expressed by the farmers is perhaps unsurprising (Frey & Jegen 2001; Ryan & Deci 2000). Again the MPPs design may have contributed to respondents' perceived capability in protecting the plover. This is particularly important as competence *and* autonomy are necessary to sustain behaviors as self-determined (Ryan & Deci 2000). Although it is clear that the population of farmers who find nests without RMBOs assistance have the capability to do so, the requirement of avoiding marked nests until they hatch may further educate the farmers on the amount of space necessary

for nest survival, encourage farmers to monitor the status of nests, and provide a sense of accomplishment when the nest successfully hatches. Certainly these behaviors require an element of landowner interest or curiosity, but the personalized interaction with RMBO staff may contribute to respondents' competence in protecting the plover. Moreover, the tangible nature of avoiding marked nests until the chicks hatch further differentiates the MPP from other more passive conservation efforts such as reforestation, where habitat provision is the outcome. Thus, the farmers' willingness to protect the plover into the future may be a function of the programs design, which increased awareness of the imperiled plover, adjusted their management techniques to account for its protection, and provided landowners with a sense of autonomy, and competence, as well as staff support to ensure its future protection.

Although inter-personal relatedness was low—farmers do not feel attached to other farmers in the program—organizational affinity may also help explain why the self-determined motivation was not related to future effort. The MPP is primarily focused on each member and protecting the nests found on their property. This individualized approach may explain farmers' lower indication of relatedness with other members. Relatedness is an important component of sustaining behaviors, and this is a clear opportunity for improving the MPP (Ryan & Deci 2000). Nonetheless, Ryan and Deci (2000) also note that many self-directed activities are completed independently, and that proximal relationships can be equally important. As such, respondents' greater indication of organizational affinity, may serve to supplant or satisfy farmers' need for relatedness. This finding suggests that the relatedness concept can be expanded to include feelings of attachment to the organization itself. Indeed, the field of organizational sciences has long accepted that commitment to an organization is critical to workplace happiness, employee satisfaction, reduced turnover, and intrinsic motivation (Deci and Ryan 2000; Wright,

Cropanzano & Bonett 2007; Paulin, Ferguson & Bergeron 2006; Porter, Steers, Mowday, & Boulian 1974; Meyer, Paunonen, Gellatly, Goffin, & Douglas 1989).

One reason for the strength of organizational affinity with self-determined behavior may be because of local ties. Although RMBO is based in Colorado, the MPP is managed by a local staff member in Kimball, Nebraska. This individual recruits MPP members, coordinates plover nest searches, confirms that nests have been protected, and serves as the “face” of RMBO. In this role he has an important influence on MPP members, and may help ensure that participants feel valued as MPP members, care about the program, and feel committed to RMBO. Indeed Shore and Wayne (1993) found that employees who receive greater organizational support are more likely to hold positive feelings toward their organization, and are more likely to go beyond the requirements of their specific job. This may help shed light on respondents’ willingness to remain involved in the program without compensation. By fostering organizational affinity through boundary spanners, such as the MPPs manager, with the trust necessary to work with scientists, public policy leaders, and private landowners (See Williams 2002), organizations may find an effective means of sustaining behaviors. Greater research into whether differing, or multiple types of relatedness can serve as a substitute or a complement to existing perceptions of autonomy and competence would advance efforts to sustain durable conservation behaviors (e.g. Klassen, Perry & Frenzel 2012).

The availability of RMBO staff members to search for nests in farmers’ fields is perhaps the most important feature of the MPP’s design. Four of the top five-ranked future effort activities (Table 3.7) rely on RMBO or its volunteers to protect the plover. Though assistance from RMBO may promote farmers’ sense of competence and provide other benefits, it might become a liability should the incentive end. If respondents are willing to remain in the program

given that RMBO completes most of the work searching for and marking nests, RMBO would need to boost expenditures on staff time. Thus, RMBOs concern about a sustained funding source is important to their future conservation efforts (e.g. Froelich 1999; Blery, Katseli & Tsara 2010; Rentschler & Potter 1996); however, instead of seeking to sustain funding to reward conservation, RMBO may need to focus on their sustaining their organizational funding.

Despite the potential harm to durable behavior, conservation practitioners rely on financial incentives to induce private land conservation (Deci & Ryan 2000; Freyfogle 2003). My findings related to future effort suggest that when designed to allow for autonomy, competence and organizational affinity, completion-contingent reward programs, such as the MPP, may not necessarily harm future effort (Deci, Koestner & Ryan 1999; Deci & Ryan 1985). Program managers and designers who are able to provide a greater sense of inter-personal relatedness may yield even greater outcomes. This calls attention to the importance of program design, instead of payment levels to ensure conservation on private lands.

Future Research

Ryan and Deci (2000) maintain that autonomy, competence, and relatedness are innate, essential, and universal needs that foster motivations to engage in behavior for their inherent satisfaction. However, they caution that the degree to which individuals require each of these basic needs is dependent upon the sociocultural context within which the behaviors exist. Recommendations to RMBO can be made based upon my findings, but less is known about the unique or collective degree to which working landowners require autonomy, competence and relatedness to internalize a behavior. Greater research should prioritize identifying and quantifying the role of each basic need in sustaining self-directed motivation among farmers asked to incorporate conservation into their land management techniques. By better

understanding landowner needs for autonomy, competence and relatedness, conservation program designers may be able to efficiently foster greater adoption of incentive-free environmental protection.

Identifying the criteria necessary for a behavior to be crowded in by financial incentives is another opportunity for future research (Frey & Jegen 2001). Although there is a wealth of information available on how financial incentives crowd out (or undermine) intrinsic motivation, less is known about crowding in and how to manage it with the goal of promoting positive outcomes. Supporting basic needs through program design and implementation is likely one way to crowd in self-determine behavior. The frequency with which financial incentives are used to reward environmental conservation warrants further research into this positive externality stemming from the use of incentives. As landowners are a primary component of successful conservation programs, it is critical to address these issues.

3.9: Conclusion

My study examined the degree to which autonomy, competence and relatedness were related to self-directed motivation, and how motivation was related to both current and future effort to protect the mountain plover. The farmers enrolled in the Mountain Plover Program are a part of RMBO's historic successes and are critical to its future efforts to protect the plover. The findings from the present study suggest a willingness to continue with the program provided that RMBO continues to offer assistance in searching for nests. The results further suggest that due to the landowner-focused design of the program, the incentive offered by RMBO may not have been as detrimental to the farmers' level of future effort (Ryan & Deci 2000).

Despite the contribution of this study to RMBO's mission and the literature on conservation incentives more generally, several limitations of the study should be noted. This is a

case study, and as such it is bounded by the geographic location of the study area, and context of the incentive program. This limits the generalizability of the results. Further, this study solely investigated respondents' stated intention to continue with the program. It is unclear whether the farmers will follow through on their stated intentions. Nonetheless, the findings from this study provide rich opportunities for future research on the use of financial incentives to spur private land conservation.

Chapter 4: Conclusion and Recommendations

While previous conservation efforts primarily targeted nature reserves and other areas of “pristine” wilderness, purchasing and protecting landscapes is neither economically feasible nor effective on a global level (Kareiva, Watts, McDonald, & Boucher 2007; Fairfax et al. 2005). Today, there is increased public awareness of the important role that human-dominated landscapes, particularly working lands, provide in sustaining human, plant, and animal communities (Daily et al. 2001; Foley et al. 2007). My research investigated private land stewardship, incentives, and the important role of landowners in conserving natural resources. Together, the findings call attention to the critical role of individuals in implementing conservation actions.

The ranchers’ self-described stewardship behaviors differed significantly from the stewardship ideal as expressed by Worrell and Appleby (1999). The ranchers’ held overwhelmingly utilitarian values and their production-oriented stewardship behaviors illustrate that meeting immediate economic needs may take priority over concerns for the larger ecosystem or community in which one lives and operates. Indeed, the majority of the interviewees focused their stewardship behaviors on their own lands with minimal references to coordinating with other landowners to address stated concerns such as erosion, pest wildlife, or woody brush encroachment. Thus, should conservation practitioners desire to boost landowner adoption of an ecocentric stewardship ideal, they might benefit from implementing a targeted social marketing campaign. By directly appealing and marketing to landowners, obstacles to behavior change may be identified and overcome, resulting in greater conservation outcomes (Heberlein 2012).

The second part of my study emerged from RMBO’s expressed concern about the future funding of the Mountain Plover Program (MPP). RMBO was uncertain whether MPP members

would protect the plover without a financial incentive. Indeed, the finding that the majority of MPP members would continue to protect the plover was unexpected given the literature on motivation and incentives (Ryan & Deci 2000). Further, the potential that the design of the MPP, and provision of staff support in finding plover nests may have affirmed landowner motivation to protect the plover into the future. Though it remains unclear how MPP members' indications of high future effort will ultimately manifest on the ground, the fact that so many MPP members are willing to protect the plover is valuable for RMBO's future conservation efforts (e.g. Fishbein & Ajzen 2010). RMBO should continue to monitor operational expenses to ensure that the farmers' reliance on RMBO staff or volunteers does not strain the organizations financial security. Nonetheless, the results suggest cause for optimism in sustaining plover populations into the future.

Contribution to the Literature

Most of the existing research on stewardship focuses largely on the conceptual foundations of the term (See Chapter 2). As a result, it is less common for researchers to take a behavioral approach and examine how landowners operationalize stewardship. By exploring the values underlying those stewardship behaviors, my study offers additional information on how landowner's view the management of their land and natural resources. Overall, my study offers an important starting point to further examine landowner perceptions of stewardship. As illustrated through my case study, landowners' interpretations of stewardship are discrepant from the definition of stewardship outlined by Worrell and Appleby (1999). If landowners and conservation practitioners do not share a similar language, then collaborations to achieve desired conservation outcomes are unlikely to be successful. By seeking to continuously understand how

landowners define, and implement stewardship activities on their land, conservation practitioners may achieve more effective collaborations with landowners.

Most studies of incentive programs tend to investigate program metrics (e.g. Gibbons, Nicholson, Milner, Gulland, & Jones 2011), or participant demographics (e.g. Onianwa et al. 2004) with less emphasis placed on the long-term implications of relying upon incentives. Moreover, despite Self-Determination Theory's (SDT) apprehension about the implications of using incentives, rarely does SDT investigate an existing financial incentive program. By exploring the psychological impacts from the use of an existing financial incentive, my study provides an important, real-world setting to support the SDT literature. Perhaps most importantly is the potential that under the right circumstances, individuals will remain involved in conservation programs without an incentive.

As the design of the MPP may have sustained participants' willingness to protect the plover without an incentive, the MPP model may serve as a useful template for other conservation organizations to adopt. This finding is all the more important as other program designs may not foster the same degree long-term behavior maintenance. As a result, conservation organizations should be cognizant of the need to balance measurable outcomes with protecting landowner motivation when seeking conservation on private lands.

Future Research

My study presents a number of opportunities for future investigation using my existing data. In particular, there are a number of variables included in the survey that fell outside of the scope of my study that would benefit from further analysis. As explored in Chapter 3, the majority of landowners heard about and enrolled in the MPP after interacting with an RMBO staff member. One opportunity for future research is to examine how the farmers' perceived

value similarities with RMBO's staff members might influence their current levels of effort, and their intention to continue the program without an incentive. Another opportunity is to explore the survey variables examining the role of trust. As trust is an important component in fostering productive relationships between groups (e.g. Stern 2008), it would be worthwhile to examine the trust data as it relates to respondents' future effort to protect the plover without an incentive. Finally, greater research is warranted in investigating the role of organizational affinity, and whether it can serve as a substitute or complement to other forms of relatedness in SDT. By examining these and other collected measures I may be able to further explore the characteristics of landowners willing to remain involved in a program without an incentive.

Another opportunity for future research in the stewardship realm is to examine potential differences in stewardship behaviors among landowners from various geographic areas, as well as those with varying motivations for purchasing and maintaining land. The ranchers in my study were primarily focused on sustaining their income from raising cattle, which may have uniquely affected their land stewardship behaviors and values. Investigating how other landowners (e.g. absentee, amenity, wildlife focused) define stewardship behaviors, and their related values, would considerably advance the conservation literature.

Stewardship is often presented as an implied responsibility of landownership, suggesting that incentives could be incongruous with stewardship (Worrell & Appleby 1999). I would be interested in combining the themes underlying my two studies, to examine whether incentive program participants' definition of stewardship includes the conservation behavior they are incentivized to provide. For instance, do MPP members consider protecting the plover to be a stewardship behavior, or do they view it as an external requirement separate from their

stewardship efforts? Further research should be conducted to investigate possible discrepancies in the role of incentives in contributing to, or harming landowner understanding of stewardship.

Implications

My study offers a number of important lessons for both conservation organizations and researchers. First, it remains important to acknowledge the important role landowners play in the process of enacting conservation practices and improving environmental quality (Sorice, Oh, Gartner, Snieckus, Johnson & Donlan 2013). Arguably the most important outcome from the stewardship chapter for conservation practitioners is to work to ensure that landowners and conservationists have a shared vocabulary and spatial scale of environmental foci. If conservation practitioners are working to instill a landscape scale stewardship ethic that includes plants, animals, and resource users within the larger community, while landowners primarily understand the concept as working to maintain their land's productivity, improved conservation outcomes are unlikely. Properly understanding stewardship from the landowner perspective is a worthy step for conservationists to promote future conservation outcomes.

Given the motivation literature (Ryan & Deci 2000; Frey & Jegen 2001), and findings from the RMBO chapter, conservation organizations would be wise to continue to evaluate the design of incentive programs, and examine the potential impact to motivation from proposed or existing incentives. By ensuring that program designs allows respondents to feel a sense of autonomy, competence, and relatedness in carrying out the program activities, durable conservation behaviors may be more likely to result. Additionally, ensuring that program participants' feel a strong sense of affinity to the conservation organization may also sustain behaviors. Thus, conservation outcomes are most likely to occur when programs are able to

successfully balance the need to achieve measurable conservation outcomes while providing for the needs of the individuals carrying out the conservation behaviors.

Conclusion

I found that landowners generally view stewardship in a different light than conservation practitioners. In the absence of a shared understanding of stewardship, incentive programs may serve to induce greater protection of select conservation targets (e.g. wildlife, soil, etc.). While incentives often harm motivation for completing an activity, especially when they are perceived as controlling, my study suggests that this may not occur in all circumstances (Ryan & Deci 2000). Looking forward, it is important to determine how to best appeal to landowners, and encourage the on-going protection of sensitive habitats and wildlife. This may require a combination of strategies including incentivizing the protection of certain species, or working within landowners' existing understandings of stewardship, or implementing a social marketing campaign. Despite the unique or collective efforts taken, it is important to acknowledge and respect landowners unique viewpoints and land ownership priorities.

References

- Allred, S. B., & Ross-Davis, A. (2011). The Drop-off and Pick-up Method: An approach to reduce nonresponse bias in natural resource surveys. *Small-Scale Forestry*, *10*(3), 305-318.
- Allsopp, N., Laurent, C., Debeaudoin, L., & Igshaan-Samuels, M. (2007). Environmental perceptions and practices of livestock keepers on the Namaqualand Commons challenge conventional rangeland management. *Journal of Arid Environments*, *70*(4), 740-754.
- American Country Life Association, Proceedings of National Country Life Conferences (1919–1976).
- Andreasen, A. R. (2002). Marketing social marketing in the social change marketplace. *Journal of Public Policy & Marketing*, *21*(1) 3-13.
- Armsworth, P. R., Acs, S., Dallimer, M., Gaston, K. J., Hanley, N., & Wilson, P. (2012). The cost of policy simplification in conservation incentive programs. *Ecology Letters*, *15*(5), 406-414.
- Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. *Journal of Applied Social Psychology*, *34*(10), 2045-2068.
- Babbie, E. R. (2010). *Introduction to Social Research*. Wadsworth Cengage learning.
- Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions, and behavior. *Social psychology quarterly*, 178-204.

- Bamberg, S. & G. Moser. 2007. Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology* 27:14-25.
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology*, 4(3), 359-373.
- Bergmann, S. A., & Bliss, J. C. (2004). Foundations of cross-boundary cooperation: resource management at the public–private interface. *Society & Natural Resources*, 17(5), 377-393.
- Blery, E. K., Katseli, E., & Tsara, N. (2010). Marketing for a non-profit organization. *International Review on Public and Nonprofit Marketing*, 7(1), 57-68.
- Bowling, N. A., Eschleman, K. J., Wang, Q., Kirkendall, C., & Alarcon, G. (2010). A meta-analysis of the predictors and consequences of organization-based self-esteem. *Journal of Occupational and Organizational Psychology*, 83(3), 601-626.
- Bozeman, B. (2002). Public-value failure: When efficient markets may not do. *Public Administration Review*, 62(2), 145-161.
- Brenkert, G. G. (2002). Ethical challenges of social marketing. *Journal of Public Policy & Marketing*, 21(1), 14-25.
- Brown, J.L. & Mitchell, B. (1998). Stewardship: A working definition. *Environments* 26(1): 8-7.
- Casey, F., Vickerman, S., Hummon, C., & Taylor, B. (2006). Incentives for biodiversity conservation: An ecological and economic assessment. *Defenders of Wildlife, Washington, DC*.
- Cameron, J., Banko, K. M., & Pierce, W. D. (2001). Pervasive negative effects of rewards on

- intrinsic motivation: The myth continues. *The Behavior Analyst*, 24(1), 1-44.
- Cattaneo, A., Claassen, R., Johansson, R., and Weinberg, M. (2005). Economic Research Report No. 5, Flexible Conservation Measures on Working Land. *Economic Research Service., U.S. Department of Agriculture*. 1-79.
- Chapin III, F. S., Pickett, S. T.A., Power, M. E., Jackson, R. B., Carter, D. M., Duke, C. (2011). Earth stewardship: A strategy for social-ecological transformation to reverse planetary degradation. *Journal of Environmental Studies and Sciences*, 1(1) 44–53.
- Chan, K., Pringle, R. M., Ranganathan, J. A. I., Boggs, C. L., Chan, Y. L., Ehrlich, P. R., ... & Macmynowski, D. P. (2007). When agendas collide: Human welfare and biological conservation. *Conservation Biology*, 21(1), 59-68.
- Chazdon, R. L., Harvey, C. A., Komar, O., Griffith, D. M., Ferguson, B. G., Martínez-Ramos, M., ... & Philpott, S. M. (2009). Beyond reserves: A research agenda for conserving biodiversity in human-modified tropical landscapes. *Biotropica*, 41(2), 142-153.
- Chouinard, H. H., Paterson, T., Wandschneider, P. R., & Ohler, A. M. (2008). Will farmers trade profits for stewardship? Heterogeneous motivations for farm practice selection. *Land Economics*, 84(1), 66-82.
- Ciuzio, E., Hohman, W. L., Martin, B., Smith, M. D., Stephens, S., Strong, A. M. & Vercauteren, T. (2013). Opportunities and challenges to implementing bird conservation on private lands. *Wildlife Society Bulletin*. 37(2), 267-277
- Claassen, R., Cattaneo, A., & Johansson, R. (2008). Cost-effective design of agri-environmental payment programs: U.S. experience in theory and practice. *Ecological Economics*, 65(4), 737-752.

- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Routledge.
- Cole, M. S., & Bruch, H. (2006). Organizational identity strength, identification, and commitment and their relationships to turnover intention: does organizational hierarchy matter? *Journal of Organizational Behavior*, 27(5), 585-605.
- Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., ... & Van den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature*, 387(6630), 253-260.
- Crossman, N. D., & Bryan, B. A. (2009). Identifying cost-effective hotspots for restoring natural capital and enhancing landscape multifunctionality. *Ecological Economics*, 68(3), 654-668.
- Curtis, A., & de Lacy, T. (1998). Landcare, stewardship and sustainable agriculture in Australia. *Environmental Values*, 59-78.
- Daily, G. C., Ehrlich, P. R., & Sanchez-Azofeifa, G. A. (2001). Countryside biogeography: Use of human-dominated habitats by the avifauna of southern Costa Rica. *Ecological Applications*, 11(1), 1-13.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. New York, NY: Springer.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological bulletin*, 125(6), 627-668.
- Derissen, S., & Quaas, M. F. (2013). Combining performance-based and action-based payments to provide environmental goods under uncertainty. *Ecological Economics*, 85, 77-84.

- De Young, R. (1993). Changing behavior and making it stick: The conceptualization and management of conservation behavior. *Environment and Behavior*, 25(3), 485-505.
- De Young, R. (2000). New ways to promote pro-environmental behavior: Expanding and evaluating motives for environmentally responsible behavior. *Journal of Social Issues*, 56(3), 509-526.
- Díaz, S., Fargione, J., Chapin III, F. S., & Tilman, D. (2006). Biodiversity loss threatens human well-being. *PLoS biology*, 4(8), e277.
- Dillman, D. A. (2009). *Mail and Internet Surveys: The Tailored Design Method* (Vol. 2). New York: Wiley.
- Dwyer, W. O., Leeming, F. C., Cobern, M. K., Porter, B. E., & Jackson, J. M. (1993). Critical review of behavioral interventions to preserve the environment research since 1980. *Environment and Behavior*, 25(5), 275-321.
- Echeverria, J. D. (2005). Regulating versus paying land owners to protect the environment. *Journal of Land Resources & Environmental Law*, 26(1), 1-46
- Eisenberger, R., Karagonlar, G., Stinglhamber, F., Neves, P., Becker, T. E., Gonzalez-Morales, M. G., & Steiger-Mueller, M. (2010). Leader–member exchange and affective organizational commitment: The contribution of supervisor's organizational embodiment. *Journal of Applied Psychology*, 95(6), 1085-1103.
- Erickson, D. L., Lovell, S. T., & Méndez, V. E. (2011). Landowner willingness to embed production agriculture and other land use options in residential areas of Chittenden County, VT. *Landscape and Urban Planning*, 103(2), 174-184.
- Fairfax, S. K., Gwin, L., King, M. A., Raymond, L. and Watt, L. A. (2005). *Buying Nature: The*

- Limits of Land Acquisition as a Conservation Strategy, 1780-2004*. Cambridge, MA: MIT Press.
- Farley, J., and Costanza, R. (2010). Payments for ecosystem services: from local to global. *Ecological Economics*, 69(11), 2060-2068.
- Ferris, D. L., Brown, D. J., & Heller, D. (2009). Organizational supports and organizational deviance: The mediating role of organization-based self-esteem. *Organizational Behavior and Human Decision Processes*, 108(2), 279-286.
- Firbank, L. G. 2005. Striking a new balance between agricultural production and biodiversity. *Annals of Applied Biology* 146:163–175
- Fishbein, M. and I. Ajzen. 2010. *Predicting and Changing Behavior*. Psychology Press: New York.
- Foley, J. A., Ramankutty, N. B., Cassidy, K. A., Gerber, E. S., Johnston, J. S., Mueller, M., Nathaniel D., O'Connell, C., Ray, D. K., West, P. C., Balzer, C. Bennett, E. M., Carpenter, S. R., Hill, J. M., C. Polasky, S., Rockstrom, J., Sheehan, J., Siebert, S., Tilman, D., Zaks, D. P. M. (2011). "Solutions for a Cultivated Planet" *Nature*. 478(7369). 337-342.
- Foxall, G. R., Castro, J. O., James, V. K., Yani-de-Soriano, M. M., & Sigurdsson, V. (2006). Consumer behavior analysis and social marketing: The case of environmental conservation. *Behavior and Social Issues*, 15(1), 101-124.
- Frank, R. H., Gilovich, T., & Regan, D. T. (1993). Does studying economics inhibit cooperation? *The Journal of Economic Perspectives*, 7(2), 159-171.
- Frey, B. S., & Jegen, R. (2001). Motivation crowding theory. *Journal of Economic Surveys*, 15(5), 589-611.

- Freyfogle, E. T. (2003). *The Land We Share: Private Property & the Common Good*. Washington, D.C.: Island Press/Shearwater Books.
- Freyfogle, E.T. in Grinlinton, D., & Taylor, P. (Eds.). (2011). *Property Rights and Sustainability: The Evolution of Property Rights to Meet Ecological Challenges* (Vol. 11). Martinus Nijhoff Publishers.
- Froelich, K. A. (1999). Diversification of revenue strategies: Evolving resource dependence in nonprofit organizations. *Nonprofit and voluntary sector quarterly*, 28(3), 246-268.
- Gagnon-Thompson, S. C., & Barton, M. A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, 14(2), 149-157.
- Gibbons, J. M., Nicholson, E., Milner-Gulland, E. J., & Jones, J. P. (2011). Should payments for biodiversity conservation be based on action or results? *Journal of Applied Ecology*, 48(5), 1218-1226.
- Gill, N., Klepeis, P., & Chisholm, L. (2010). Stewardship among lifestyle oriented rural landowners. *Journal of Environmental Planning and Management*, 53(3), 317-334.
- Goldstein, J. H., Presnall, C. K., López-Hoffman, L., Nabhan, G. P., Knight, R. L., Ruyle, G. B., & Toombs, T. P. (2011). Beef and beyond: Paying for ecosystem services on western US rangelands. *Rangelands*, 33(5), 4-12.
- Goodwin, B. K., & Smith, V. H. (2003). An ex-post evaluation of the conservation reserve, Federal crop insurance, and other government programs: Program participation and soil erosion. *Journal of Agricultural and Resource Economics*, 201-216.
- Griffin, M. L., Hogan, N. L., Lambert, E. G., Tucker-Gail, K. A., & Baker, D. N. (2010). Job involvement, job stress, job satisfaction, and organizational commitment and the burnout of correctional staff. *Criminal Justice and Behavior*, 37(2), 239-255.

- Green, R. E., Cornell, S. J., Scharlemann, J. P., & Balmford, A. (2005). Farming and the fate of wild nature. *Science*, 307(5709), 550-555.
- Gunningham, N., & Young, M. D. (1997). Toward optimal environmental policy: The case of biodiversity conservation. *Ecology Law Quarterly*, 24(243). 244-281
- Hair Jr., J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate Data Analysis. 6th Edition*, Pearson Education Inc., Upper Saddle River, NJ.
- Hanni, D. J., White, C. M., Blakesley, J. A., Levandoski, G. J., & Birek, J. J. (2009). Field protocol for spatially-balanced sampling of landbird populations. *Unpublished report. Rocky Mountain Bird Observatory, Brighton, Colorado, USA.*
- Heathcote A.J., Filstrup C.T., & Downing J.A. (2013) Watershed sediment losses to lakes accelerating despite agricultural soil conservation efforts. *PLoS ONE* 8(1): e53554.
- Heberlein, T. (2012). *Navigating Environmental Attitudes*. New York, NY: Oxford University Press.
- Jack, B. K., Kousky, C., and Sims, K. R.E. (2008) Designing payments for ecosystem services: lessons from previous experience with incentive-based mechanisms. *Proceedings of the National Academy of Sciences* 105(28,) 9465-9470.
- Kaetzl, B. R., Hodges, D. G., Houston, D., & Fly, J. M. (2009). Predicting the probability of landowner participation in conservation assistance programs: A case study of the Northern Cumberland Plateau of Tennessee. *Southern Journal of Applied Forestry*, 33(1), 5-8.
- Kareiva, P., Watts, S., McDonald, R., & Boucher, T. (2007). Domesticated nature: shaping landscapes and ecosystems for human welfare. *Science*, 316(5833), 1866-1869.

- Karp, J. P. (1993). Private property duty of stewardship: Changing our land ethic. *Environmental Law*, 23, 735.
- Kauneckis, D. and York, A. M. (2009). An empirical evaluation of private landowner participation in voluntary forest conservation programs. *Environmental Management*, 44(3), 468-484.
- Kellert, S. R. (1995). *The value of life: Biological diversity and human society*. Island Press.
- Key, N., and Roberts, M. J. (2006) Government payments and farm business survival. *American Journal of Agricultural Economics* 88(2) 382-392.
- Kilgore, M. A., Snyder, S. A., Schertz, J., & Taff, S. J. (2008). What does it take to get family forest owners to enroll in a forest stewardship-type program? *Forest Policy and Economics*, 10(7), 507-514.
- Kim, C., Scott, D., Thigpen, J. F., & Kim, S. S. (1998). Economic impact of a birding festival. *Festival Management and Event Tourism*, 5(1-2), 1-2.
- Kinzig, A. P., Ehrlich, P. R., Alston, L. J., Arrow, K., Barrett, S., Buchman, T. G., ... & Saari, D. (2013). Social norms and global environmental challenges: The complex interaction of behaviors, values, and policy. *BioScience*, 63(3), 164-175.
- Kirwan, B., Lubowski, R. N., and Roberts, M. J. (2005). "How cost-effective are land retirement auctions? Estimating the difference between payments and willingness to accept in the Conservation Reserve Program." *American Journal of Agricultural Economics*, 87(5), 1239-1247.
- Klassen, D., Hornstra, R. K., & Anderson, P. B. (1975). Influence of social desirability on symptom and mood reporting in a community survey. *Journal of Consulting and Clinical Psychology*, 43(4), 448-552.

- Klassen, R. M., Perry, N. E., & Frenzel, A. C. (2012). Teachers' relatedness with students: An underemphasized component of teachers' basic psychological needs. *Journal of Educational Psychology, 104*(1), 150-165.
- Klein, J. A., & Wolf, S. A. (2007). Toward Multifunctional Landscapes: Cross-Sectional Analysis of Management Priorities in New York's Northern Forest*. *Rural Sociology, 72*(3), 391-417.
- Kotler, P., Roberto, N., & Lee, N. R. (2002). *Social marketing: Improving the quality of life*. Sage.
- Layzer, J. A. (2008). *Natural experiments: ecosystem-based management and the environment*. MIT Press.
- Lennox, G. D., Dallimer, M., & Armsworth, P. R. (2012). Landowners' ability to leverage in negotiations over habitat conservation. *Theoretical Ecology, 5*(1), 115-128.
- Leopold, A. *A Sand County Almanac* (1949) New York, NY: Oxford University Press.
- Li, N., Liang, J., & Crant, J. M. (2010). The role of proactive personality in job satisfaction and organizational citizenship behavior: a relational perspective. *Journal of Applied Psychology, 95*(2), 395-404.
- Lubchenco, J., Olson A. M, Brubaker, L.B., Carpenter, S.R., Holland, M.M, Hubbell, S.P., Levin, S. A., et al. (1991). The sustainable biosphere initiative: An ecological research agenda: A report from the Ecological Society of America. *Ecology, 72*(2), 371-412.
- Maestre, F. T., Quero, J. L., Gotelli, N. J., Escudero, A., Ochoa, V., Delgado-Baquerizo, M., ... & Val, J. (2012). Plant species richness and ecosystem multifunctionality in global drylands. *Science, 335*(6065), 214-218.
- McCleery, R. A., Ditton, R. B., Sell, J., & Lopez, R. R., (2006). Understanding and

- improving attitudinal research in wildlife sciences. *Wildlife Society Bulletin* 34:237-541.
- McKenzie-Mohr, D. (2000). New ways to promote proenvironmental behavior: Promoting sustainable behavior: An introduction to community-based social marketing. *Journal of Social Issues*, 56(3), 543-554.
- Meyer, J. P., & Allen, N. J. (1991). A three-component conceptualization of organizational commitment. *Human Resource Management Review*, 1(1), 61-89
- Meyer, J. P., Paunonen, S. V., Gellatly, I. R., Goffin, R. D., & Jackson, D. N. (1989). Organizational commitment and job performance: It's the nature of the commitment that counts. *Journal of Applied Psychology*, 74(1), 152-156.
- Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-Being: Our Human Planet: Summary for Decision-Makers* (Vol. 5). Island Press.
- Miller, A. D., Bastian, C. T., McLeod, D. M., Keske, C. M., and Hoag, D. L. (2010). Factors impacting agricultural landowners' willingness to enter into conservation easements: A case study. *Society and Natural Resources*, 24(1), 65-74.
- Murayama, K., Matsumoto, M., Izuma, K., & Matsumoto, K. (2010). Neural basis of the undermining effect of monetary reward on intrinsic motivation. *Proceedings of the National Academy of Sciences*, 107(49), 20911-20916.
- Nederhof, A. J. (1985). Methods of coping with social desirability bias: A review. *European Journal of Social Psychology*, 15(3), 263-280.
- Nickerson, C., Ebel, R., Borchers, A., and Carriazo, F. (2011). *Major uses of land in the United States* EIB-89, U.S. Department of Agriculture, Economic Research Service
- Norris, P. E., and Batie, S. S. (1987). Virginia farmers' soil conservation decisions: An application of Tobit analysis. *Southern Journal of Agricultural Economics* 19(1) 79-90.

- Norris, K. (2004). Managing threatened species: the ecological toolbox, evolutionary theory and declining-population paradigm. *Journal of Applied Ecology*, 41(3), 413-426.
- Olenick, K. L., Kreuter, U. P., & Conner, J. R. (2005). Texas landowner perceptions regarding ecosystem services and cost-sharing land management programs. *Ecological Economics*, 53(2), 247-260.
- Onianwa, O., Wheelock, G., Gyawali, B., Gan, J., Dubois, M., & Schelhas, J. (2004). An analysis of factors affecting participation behavior of limited resource farmers in agricultural cost-share programs in Alabama. *Journal of Agribusiness*, 22(1), 17-30.
- Osbaldiston, R., & Sheldon, K. M. (2003). Promoting internalized motivation for environmentally responsible behavior: A prospective study of environmental goals. *Journal of Environmental Psychology*, 23(4), 349-357.
- Oskamp, S., & Schultz, P. W. (2006). Using psychological science to achieve ecological sustainability. In Donaldson, S. I., Berger, D. E., & Pezdek, K. (Eds.). (2012). *Applied psychology: New frontiers and rewarding careers*. Psychology Press. 81-106.
- Pallant, J. (2007). *SPSS Survival Manual, 3rd. Edition. McGrath Hill*.
- Paterson, J. L. (2008). Conceptualizing stewardship in agriculture within the Christian tradition. *Environmental Ethics*, 25(1), 43-58.
- Pasari, J. R., Levi, T., Zavaleta, E. S., & Tilman, D. (2013). Several scales of biodiversity affect ecosystem multifunctionality. *Proceedings of the National Academy of Sciences*, 110(25), 10219-10222.
- Paulin, M., Ferguson, R. J., & Bergeron, J. (2006). Service climate and organizational commitment: The importance of customer linkages. *Journal of Business Research*, 59(8), 906-915.

- Pelletier, L. G., & Bellier, P. (1999). How difficult is it to recycle? Self-determination and the level of difficulty of recycling behaviors. *Manuscript in preparation, University of Ottawa.*
- Pelletier, L., Tuson, K. M., Green-Demers, I., Noels, K., & Beaton, A. M. (1998). "Why are you doing things for the environment? The Motivation Toward the Environment scale" *Journal of Applied Social Psychology, 28*(5), Pg. 437-468.
- Peterson, T. R., & Horton, C. C. (1995). Rooted in the soil: How understanding the perspectives of landowners can enhance the management of environmental disputes. *Quarterly Journal of Speech, 81*(2), 139-166.
- Peterson, M. N., Peterson, T. R., Lopez, A., & Liu, J. (2010). Views of private-land stewardship among Latinos on the Texas–Tamaulipas border. *Environmental Communication, 4*(4), 406-421.
- Pierce, J. L., Gardner, D. G., Cummings, L. L., & Dunham, R. B. (1989). Organization-based self-esteem: Construct definition, measurement, and validation. *Academy of Management Journal, 32*(3), 622-648.
- Plant, R. W., & Ryan, R. M. (1985). Intrinsic motivation and the effects of self-consciousness, self-awareness, and ego-involvement: An investigation of internally controlling styles. *Journal of Personality, 53*(3), 435-449.
- Porter, L. W., Steers, R. M., Mowday, R. T., & Boulian, P. V. (1974). Organizational commitment, job satisfaction, and turnover among psychiatric technicians. *Journal of Applied Psychology, 59*(5), 224-227.
- Poudyal, N. C., and Hodges, D. G. (2009). Factors influencing landowner interest in managing wildlife and avian habitat on private forestland. *Human Dimensions of Wildlife, 14*(4),

- Punj, G., & Stewart, D. W. (1983). Cluster analysis in marketing research: review and suggestions for application. *Journal of Marketing Research*, 20(2), 134-148.
- Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Senécal, C. (2007). Autonomous, controlled, and amotivated types of academic motivation: A person-oriented analysis. *Journal of Educational Psychology*, 99(4), 734-746.
- Rentschler, R., & Potter, B. (1996). Accountability versus artistic development: the case for non-profit museums and performing arts organizations. *Accounting, Auditing & Accountability Journal*, 9(5), 100-113.
- Rickenbach, M., Schulte, L. A., Kittredge, D. B., Labich, W. G., & Shinneman, D. J. (2011). Cross-boundary cooperation: A mechanism for sustaining ecosystem services from private lands. *Journal of Soil and Water Conservation*, 66(4), 91A-96A.
- Rothschild, M. L. (1999). Carrots, sticks, and promises: A conceptual framework for the management of public health and social issue behaviors. *The Journal of Marketing*, 63(4) 24-37.
- Rothschild, J., & Stephenson, M. J. (2009). The meaning of democracy in nonprofit and community organizations. *American Behavioral Scientist*, 52(6), 800-806.
- Ryan, R. M., Mims, V., & Koestner, R. (1983). Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of Personality and Social Psychology*, 45(4), 736-750.
- Ryan, R. M., and Deci, E. L. (2000). Self-Determination Theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78.
- Ryan, R. M & Deci, E. L. (2002). Overview of Self-Determination Theory: An Organismic

- Dialectical Perspective. In Deci, E. L., & Ryan, R. M. (Eds.). *Handbook of Self-Determination Research*. University Rochester Press.
- Schneider, R., Stoner, K., Steinaure, G., Panella, M., and Humpert, M. (Eds.). (2011). The Nebraska Natural Legacy Project: State Wildlife Action Plan. 2nd ed. The Nebraska Game and Parks Commission, Lincoln, NE.
- Schultz, P. W. 2011. Conservation Means Behavior. *Conservation Biology*, 25, 1080-1083.
- Seguin, C., Pelletier, L. G., & Hunsley, J. (1998). Toward a model of environmental activism. *Environment and Behavior*, 30(5), 628-652.
- Sheldon, K. M., Nichols, C. P., & Kasser, T. (2011). Americans recommend smaller ecological footprints when reminded of intrinsic American values of self-expression, family, and generosity. *Ecopsychology*, 3(2), 97-104.
- Shore, L. M., & Wayne, S. J. (1993). Commitment and employee behavior: comparison of affective commitment and continuance commitment with perceived organizational support. *Journal of Applied Psychology*, 78(5), 774.
- Siegel, A. B., and Lockwood, J. L. (2010) "How increasing levels of private land enrollment in conservation agreements affect the population viability of grassland. *Biodiversity and Conservation* 19(8) 2343-2357.
- Skaggs, R. (2008). Ecosystem services and western US rangelands. *Choices*, 23(2), 37-41.
- Sorice, M. G. (2012). Retooling the traditional approach to studying the Belief–Attitude Relationship: Explaining landowner buy-in to incentive programs. *Society & Natural Resources*, 25(5), 499-512.
- Sorice, M. G., Haider, W., Conner, J. R., and Ditton, R. B. (2011). Incentive structure and

- private landowner participation in an endangered species conservation program
Conservation Biology 25: 587-596.
- Sorice, M. G., Oh, C. O., Gartner, T. M., Snieckus, M., Johnson, R., & Donlan, C. J. (2013).
Increasing participation in incentive programs for biodiversity conservation. *Ecological
Applications*.
- Spradley, James P. 1979. *The Ethnographic Interview*. New York: Holt, Rinehart and
Winston.
- Stephenson, M. (2007). The "permanent things" and the role of the moral imagination in
organizational life: Revisiting the foundations of public and nonprofit
leadership. *Administrative Theory & Praxis*, 29(2), 260-277.
- Stern, M. J. (2008). Coercion, voluntary compliance and protest: the role of trust and legitimacy
in combating local opposition to protected areas. *Environmental Conservation*, 35(03),
200-210.
- Stern, P. C. (2000). Information, incentives, and proenvironmental consumer
behavior. *Journal of Consumer Policy*, 22(4), 461-478.
- Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social
Issues*, 50(3), 65-84.
- Stern, S. (2006) Encouraging conservation on private lands: A behavioral analysis of
financial incentives. *Arizona Law Review*. 48 541 - 583.
- Sullivan, J., Amacher, G. S., Chapman, S. (2005). "Forest banking and forest landowners
forgoing management rights for guaranteed financial returns" *Forest Policy and
Economics*, 7(3) 381-39
- Swinton, S. M., Lupi, F., Robertson, G. P., & Hamilton, S. K. (2007). Ecosystem services and

- agriculture: Cultivating agricultural ecosystems for diverse benefits. *Ecological Economics*, 64(2), 245-252.
- Tallis, H. M., & Kareiva, P. (2006). Shaping global environmental decisions using socio ecological models. *Trends in Ecology & Evolution*, 21(10), 562-568.
- Tilman, D. (2012). Biodiversity & Environmental Sustainability amid Human Domination of Global Ecosystems. *Daedalus*, 141(3), 108-120.
- USDA. (2013). Conservation Programs: Conservation Reserve Program. U.S. Department of Agriculture Farm Services Agency, Washington D.C., USA.
<http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp>
- Vanclay, F. (1992). The social context of farmers' adoption of environmentally sound farming practices. *Agriculture, Environment and Society*, 94-121.
- Vanclay, F. (2004). Social principles for agricultural extension to assist in the promotion of natural resource management. *Animal Production Science*, 44(3), 213-222.
- Van Herzele, A., Gobin, A., Van Gossum, P., Acosta, L., Waas, T., Dendoncker, N., & Henry de Frahan, B. (2013). Effort for money? Farmers' rationale for participation in agri-environment measures with different implementation complexity. *Journal of Environmental Management*, 131, 110-120.
- Van Vugt, M. (2002). Central, individual, or collective control? Social dilemma strategies for natural resource management. *American Behavioral Scientist*, 45(5), 783-800.
- Villacorta, M., Koestner, R., & Lekes, N. (2003) Further validation of the Motivation Toward the Environment Scale. *Environment and Behavior* 35, No. 4: 486-505.
- Vohs, K. D., Mead, N. L., & Goode, M. R. (2006). The psychological consequences of money. *Science*, 314(5802), 1154-1156.

- Ward Jr, J. H. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association*, 58(301), 236-244.
- White Jr, L. (1967). The Historical Roots of Our Ecologic Crisis. *Science*, 155(3767), 1203-1207.
- Wilcox, B. P., Sorice, M. G., & Young, M. H. (2011). Dryland ecohydrology in the anthropocene: Taking stock of human–ecological interactions. *Geography Compass*, 5(3), 112-127.
- Wilcove, D. S. and Lee, J. (2004). Using economic and regulatory incentives to restore endangered species: Lessons learned from three new programs. *Conservation Biology*, 18, 639–645.
- Wilkinson, S. (2013). Conceptual understanding of sustainability in Australian property organizations. *Property Management*, 31(3), 6-6.
- Williams, P. (2002). The competent boundary spanner. *Public administration*, 80(1), 103-124.
- Winter, D. D., and S. M. Koger. (2004). *The Psychology of Environmental Problems*, 2nd edition. Lawrence Erlbaum Assoc. Publishers, Mahwah, New Jersey.
- Wolfe, D. W., Hays, B. K., Farrell, S. L., & Baggett, S. (2012). Regional credit market for species conservation: Developing the Fort Hood recovery credit system. *Wildlife Society Bulletin*, 36(3), 423-431.
- Worster, D., 1993. *The Wealth of Nature: Environmental History and the Ecological Imagination*. New York: Oxford University Press.
- Worrell, R. and Appleby, M. C. (2000). Stewardship of natural resources: Definition, ethical and practical aspects *Journal of Agricultural and Environmental Ethics*, 12 (3), 263–277

- Wright, T. A., Cropanzano, R., & Bonett, D. G. (2007). The moderating role of employee positive well-being on the relation between job satisfaction and job performance. *Journal of Occupational Health Psychology, 12*(2), 93.
- Wu, J. (2000). Slippage effects of the conservation reserve program. *American Journal of Agricultural Economics, 82*(4), 979-992.
- Wunder, S., Engel, S., & Pagiola, S. (2008). Taking stock: A comparative analysis of payments for environmental services programs in developed and developing countries. *Ecological economics, 65*(4), 834-852.
- Wunderlich, G. (2004). Evolution of the stewardship idea in American country life. *Journal of Agricultural and Environmental Ethics, 17*(1), 77-93.
- Zavaleta, E. S., Pasari, J. R., Hulvey, K. B., & Tilman, G. D. (2010). Sustaining multiple ecosystem functions in grassland communities requires higher biodiversity. *Proceedings of the National Academy of Sciences, 107*(4), 1443-1446.

Appendix A: IRB Letter



Office of Research Compliance
 Institutional Review Board
 North End Center, Suite 4120, Virginia Tech
 300 Turner Street NW
 Blacksburg, Virginia 24061
 540/231-4606 Fax 540/231-0959
 email irb@vt.edu
 website <http://www.irb.vt.edu>

MEMORANDUM

DATE: April 22, 2013
TO: Michael G Sorice, Chadwick Paxton Ramsdell
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)
PROTOCOL TITLE: Paying for Nature: Incentives and the Future of Private Land Stewardship
IRB NUMBER: 13-204

Effective April 19, 2013, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: Exempt, under 45 CFR 46.110 category(ies) 2
 Protocol Approval Date: April 19, 2013
 Protocol Expiration Date: N/A
 Continuing Review Due Date*: N/A

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
 An equal opportunity, affirmative action institution