I examined value orientations and attitudes of agriculture producer’s in the Prairie Pothole Region regarding predator reduction, implementation of wildlife management projects, and enrollment in conservation easements. A self-administered mail survey was mailed to agriculture producers residing in North Dakota, South Dakota, and Minnesota, U.S.A. (N = 6,000 total, stratified to 2,000 per state). Results show value orientations were predictive of attitudes regarding predator reduction. I found differences in attitudes in terms of value orientation toward species. Fewer anthropocentrics would support a program intended to increase waterfowl production. Groups with different value orientations differed in their willingness to implement wildlife management projects and to enroll in conservation easements. Values are the most-stable in the cognitive structure (Rokeach 1973), rendering them difficult, if not impossible, to alter. However, managers can employ education strategies by targeting audiences with a variety of messages in hopes of shifting attitudes for the betterment of wildlife.

INDEX WORDS: value orientations; attitudes, predator reduction; conservation programs; land management; agriculture producers; Prairie Pothole Region; waterfowl; mail survey
VALUE ORIENTATIONS AND ATTITUDES OF AGRICULTURE PRODUCERS IN THE
PRAIRIE POTHOLE REGION

by

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BSFR, University of Georgia, 2005

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment
of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA
2008
VALUE ORIENTATIONS AND ATTITUDES OF AGRICULTURE PRODUCERS IN THE
PRAIRIE POTHOLE REGION

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December 2008
ACKNOWLEDGEMENTS

Funding for this project was provided by Delta Waterfowl. I thank them for providing me with the opportunity to further my education.

I would like to thank my major professor, Craig A. Miller and my committee, Dr. Robert Cooper and Dr. Sara Schweitzer, for all of their assistants and support throughout this process. The UGA mailing center was also pivotal to my success. Without the farmers of North Dakota, South Dakota, and Minnesota there would be no project.

I would also like to thank my office mates—Josh Agee, Kerrie Anne Loyd, Julie Sharp and Ryan Sharp for all of their love and support. Without their expertise, friendship and dart board, grad school would not have been the same.

Thanks to my mom, dad, stepmom and sister for all of their unconditional love. Rebecca, Carrie, my FC girls, Adam, Boss, Crystal, Josh C., Grey, Hayden, Kristen, and Buzz all kept me entertained when I needed it the most.

My husband, James, is an oak. Not only has he provided academic expertise and insight, he has unconditionally supported me. I love him more than I could ever say.

Finally, I’d like to thank God for everything including the patience to get through this.
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CHAPTER 1
INTRODUCTION

PROBLEM STATEMENT

The Prairie Pothole Region (hereafter, PPR) annually produces approximately 50% of North America’s waterfowl (Kirby et al. 2002). The PPR has seen many land use changes over the past century, and as a result waterfowl numbers have steadily decreased (Greenwood and Sovada 1996). The primary cause of this decline is predation on nests. Predator trapping could be a solution to this problem in some areas. Historically, Americans have trapped furbearing animals for numerous reasons, including reducing damage caused by predators, providing commodities, and enjoying the outdoors (Gerstell 1985, Daigle et al. 1998). However, the overall number of trapping licenses sold has generally declined (Daigle et al. 1998) with a variety of issues identified as the cause, including: anti-trapping sentiment, recruitment into the activity, pelt prices, public image, and access to lands (Armstrong and Rossi 2000).

Many researchers examined attitudes toward predators and distinctions have been found among attitudes of different social-demographic groups. Generally, rural residents more anthropocentric attitudes towards wildlife while urban residents have more biocentric attitudes towards wildlife (Manfredo et al. 2003). Perceptions of individual predator species originate from diverse factors including the size and intelligence of the species, perceived danger of the animal or threat to property, relationship of the animal to people, its cultural relationship and aesthetic value (Kellet 1994). Without a firm understanding of public attitudes regarding particular management techniques repercussions can spread far and wide.
While critical to waterfowl production, the PPR is also critical to crop production for human consumption. Agriculture is a dominant industry in this region with the number of farms equaling 31,300, 30,100, and 79, 00 in South Dakota, North Dakota, and Minnesota respectively (U. S. Department of Agriculture 2008a). Farms comprise 90.2%, 89%, and 54% of the total land area in the respective states. Few occupational groups have as significant an impact on wildlife and natural resources as do farmers (Conover 1994). As a result, agriculture shapes the landscape and quality of habitat of the PPR. Individual farmers make land use decisions based on expertise, lifestyle choice, tradition, and economic profitability with a dynamic interplay occurring among these factors (Ringelman, J. K. 2005). Although farmers are generally reluctant to take on radical changes in their expertise by adopting new traditions, changes are occurring within the PPR that are reshaping the landscape and quality of wildlife habitat in that region.

The conversion of grassland to cropland has increased the grazing intensity on remaining grasslands (Ringelman, J. K. 2005). Nearly 1.5 million hectares of rangeland (14% decrease) were converted to cropland during 1977-1997 in South Dakota with similar patterns existing throughout North Dakota (Higgins et al. 2002). Changes in field sizes and crop types have decreased the quality of wildlife habitat on these farm landscapes (Ringelman, 2005). Cereal crops that provided some nesting cover are now being replaced by row crops that provide no habitat for grassland birds. The use of genetically modified row crops and current emphasis in crop research to develop more drought-tolerant and herbicide-resistant varieties has led to once unviable crops being produced in new regions. Also, 4 renewable energy sources being developed in the PPR include wind power, fuels from grass biomass products, soy fuels from soybeans and ethanol from corn (Ringelman, 2005). Biofuels have the potential to reduce carbon
dioxide emissions and air pollution, with plants such as Switchgrass (*Panicum virgatum*) noted as potential biomass fuel crops.

Current information on stakeholder acceptance of predator trapping and attitudes towards predators, stakeholder attitude towards land management, and value orientations of stakeholders who enroll in conservation easements is not available. To determine management strategies that are acceptable to the public, managers need better understanding of current public attitudes. Failure to integrate public interest with resource management is a critical hindrance to both managers and the resources they are meant to conserve. To determine stakeholder attitudes regarding predator removal, attitudes towards land management and enrollment in conservation easements, I assessed stakeholder value orientations. The goals of my study were to: 1) determine value orientations of stakeholders and examine how their differences predicted their attitudes towards predator removal and 2) determine how attitudes towards land management and enrollment in conservation easements differ in terms of value orientations. This study, similar to other human dimensions studies, is not attempting to supersede biological data with public preference; rather, my hopes are to delve into avenues that allow the incorporation of public input into management strategies, discover education opportunities, and to move forward with management with the least amount of resistance.

*Project Overview*

Chapter 1 of this thesis is an introduction to the study and a literature review. Chapters 2 and 3 are in the format of journal articles and will later be submitted to scientific journals. Chapter 2 is an investigation between value orientations and stakeholder attitudes towards predators and predator removal, and it will be submitted to the journal *Human Dimensions of Wildlife*. Chapter 3 investigates value orientations and stakeholder attitudes towards land
management and enrollment in conservation easements. It will be submitted to Journal of Wildlife Management. Chapter 4 provides summaries and conclusions from the previous chapters.

**LITERATURE REVIEW**

*Changes in the Prairie Pothole Region*

The glaciated Prairie Pothole Region (PPR) is composed of approximately 207,200 km² of the north-central United States and approximately 569,800 km² in south-central Canada (Higgins 1977). In total, this area encompasses nearly 777,000 km² from Central Alberta to central Iowa and southern South Dakota (Kirby et al. 2002). The topography in the PPR is dotted with shallow basins created by glacial advances and retreats. Most of these basins hold surface water for only a short period of time. In the past, the PPR was a continuous prairie ecosystem broken up by these natural wetlands and occasional hammocks. In their natural state, the wetlands provide hydrologic benefits, such as groundwater recharge, flood control, and water quality maintenance (Brown 1976). Prairie potholes also provide habitat for an array of wildlife (Higgins 1981, Kirby et al. 2002, Brown 1976). The PPR comprises only 10% of North America’s wetlands yet it produces approximately 50% of the waterfowl annually (Kirby et al. 2002). In short, the PPR is critical waterfowl breeding habitat.

The PPR has changed dramatically over the past century; human settlement and agricultural practices resulted in wetland drainage, habitat loss, and habitat fragmentation (Ratti and Scott 1991, Sugden and Beyersbergen 1984, Cowardin et al. 1983). Grain farming, with advancing technology and a 6-month growing season, has become very attractive to many farmers, compared to the year-round effort of animal husbandry that has been more traditional for the region (Higgins 1981). That potholes contain water only temporarily allows them to be
intensely cultivated (Kirby et al. 2002); thus, the once prairie-dominated system is now
dominated by monoculture small grain farms that provide for the demands of rising human
population numbers and economic pressures (Higgins 1977). Economic pressures led to a need
for greater production efficiency from the land, and this enhanced efficiency has been achieved
by increased production on each unit of cropland, and by the conversion of wetlands, haylands,
grasslands, and parklands to cropland. This conversion has led to at least 50% of the previously
uncultivated habitats in the PPR to be converted to cropland. Less than 20 percent of the original
grasslands remain in North Dakota, and, of those that do, most are heavily grazed (Cowardin et
al. 1983). Moreover, in the past, 20-40% of the wetlands were wholly or partly drained for
cropland. Once drained, these wetlands provide arable land and eliminate the cost of tilling
around the potholes (Brown 1976). Quality of wetlands that remain intact is negatively impacted
by agricultural practices. Nearly all the land in the PPR is used to graze livestock or grow crops,
and in many counties >80% of the upland is cultivated annually (Sugden and Beyersbergen
1984). These changes have resulted in changes in both composition and abundance of predator
communities in the PPR (Cowardin et al. 1983).

Composition changes in the predator population

Predator populations in the PPR have been directly affected by humans through both the
extensive change of habitat from prairie grassland to agriculture and by human-inflicted
mortality (Sargeant et al. 1993). Suppression of fire and elimination and/or reduction of large
predators are probably the 2 factors most responsible for the altered predator community
(Rowher et al. 1997). Conversion of the PPR led to fragmented natural habitats, increased the
structural diversity of habitats, and resulted in the establishments of farmsteads with associated
shelter, human presence, and food sources. Eradication of large predators, such as coyotes
Canis latrans) and wolves (Canis lupus), increased number of trees on the prairies, and intensification of agriculture has led to the increase of medium-sized predators such as the red fox (Vulpes vulpes) and raccoon (Procyon lotor) (Sargeant et al. 1993, Cowardin et al. 1983). Changes which harmed nearly all the predator species include the destruction of wetlands, certain farming practices, and the establishment of large, annually tilled fields. Changes which favored many of the predator species include the establishment of farmsteads, road grades, brush piles, and refuse sites, as well as the planting of certain crops. Mammalian predator species that ultimately benefited most from this habitat change were the coyote, red fox, raccoon, and Franklin’s ground squirrel (Spermophilus franklinii). The striped skunk (Mephitis mephitis) has likely benefited from the agricultural development, as they make extensive use of human habitation; however, they are also frequently considered a pest by humans and are subsequently killed, but are also trapped for their fur. The Red-tailed Hawk (Buteo jamaicensis) is likely the only avian predator that has benefited from the agricultural development.

Decline of waterfowl nest success

The intensification of farming coupled with the alteration of the composition and abundance of predator species has affected prairie-nesting waterfowl (Cowardin et al. 1983). Minimum nest success necessary to maintain stability in a closed population of mallards (Anas platyrhynchos) is 15%, yet many studies found nest success to be much lower than that (Cowardin et al. 1985, Greenwood et al. 1987, 1995, Klett et al. 1988). Farming has reduced the amount of prey available during waterfowl nesting season as well as increased the concentrating predator and prey activity in untilled habitat. Many waterfowl use this untilled habitat for nesting rendering them more vulnerable to depredation by the increased concentration of predators. Red fox, raccoon, striped skunk, and Franklin’s ground squirrel are predators that
have the greatest impact on waterfowl in western Minnesota and the Dakotas (Cowardin et al. 1983, Cowardin et al. 1985). Other species that impact waterfowl populations include coyote (Canis latrans), badger (Taxidea taxus), and long-tailed weasel (Mustela frenata). Waterfowl possess many characteristics that enable them to evade predators—cryptic coloration of hens, keen eyesight, agile flight, and distractive behaviors to lure predators away from young (Cowardin et al. 1983). The most critical strategy waterfowl have for coping with both environmental stresses and predation is the overproduction of young. Waterfowl face the greatest risk of predation while on breeding grounds.

Breeding populations of many species of prairie-nesting waterfowl were greatly depressed by the end of the 1980s and are still considered very low (Greenwood and Sovada 1996). Many factors led to this decline, but the primary cause is considered to be nest loss by predation (Drever et al. 2004, Rohwer et al. 1997, Sargeant and Raveling 1992, Higgins 1977); other major causes of decline include a .5 percent annual decline in nest success (Beauchamp et al. 1996, Higgins 1977, Greenwood et al. 1987, Cowardin et al. 1985, Klett et al. 1988), predation on nesting females (Johnson and Sargeant 1977), composition of predator community (Greenwood 1986; Sovada et al. 1995), widespread habitat alteration (Greenwood et al. 1995; Robbins et al. 1989, Bethke and Nudds 1995, Johnson et al. 1989), and drought (Greenwood and Sovada 1996). Most research agrees with the findings of Sargeant and Arnold (1984)—annual recruitment of duck populations in the PPR is less than its potential mainly due to predators that take nesting females, eggs, and ducklings. Cowardin et al. (1983) found nest success to be 8% with only 15% of hens hatching a nest. Also, at least 20% of the hens were killed by predators. Concurrently, Sargeant et al. (1993) found that lower nest success of ducks and long-term changes in predator demographics have coincided with the conversion of grassland to cropland.
Predator reduction as a tool to increase nest success

Predator reduction is one of several methods utilized by managers to potentially increase waterfowl populations through increased nest success and decrease depredation on nesting hens. Reduction of mammalian predators has been found to result in a 42% nest success rate on the sites that were trapped, compared to a 23% nest success rate on the untrapped sites (Garrettson and Rohwer 2001). Similarly, a literature review comparing predator reduction programs found that removing predators had a large, positive effect on hatch rate; on average, removal areas had a 75% higher hatch rate than control sites (Cote and Sutherland 1997). Lokemoen and Woodward (1993) found combining predator removal with fencing or moats around peninsulas increased duck production in the PPR. Predator reduction also increased duckling survival (Pearse and Ratti 2004). The removal of a single predator, the striped skunk, increased nest success from 5% to 15% (Greenwood 1986). Ball et al. (1995) found dabbling ducks nesting on large grassland tracts in northcentral Montana to be 2-4 times more productive than populations study previously. They attribute these results to density and height of nesting cover, nest density, patch size, and species composition and density of predators, with rare sightings and sign of some predators.

Whereas numerous studies found an increase in nest success following predator removal, several studies did not detect an effect or that previous studies may have over-estimated of the effect. Duebbert and Kantrud (1974) found that reduction did not significantly increase net duck production on active agricultural lands. Beauchamp et al. (1996) compiled data from 37 studies conducted between 1935 and 1992. Nest success declined but declined more slowly than previous estimates. Time explained 10% of the variation. Whereas nest success declined at a similar rate among 5 species, late nesters had higher success than early nesters. Populations of 2
of the 3 late nesters did not decline, suggesting declines in nest success may not be related causally to population change. Crabtree and Wolfe (1988) found some evidence that some predators feed on duck eggs early in the season and later switch to alternative prey, perhaps making late-nests less vulnerable to predation. These findings coincide with similar studies (Cowardin et al. 1985, Clark and Nudds 1991), and recognize that nest success may not be the most important or only factor limiting population growth. Sargeant et al. (1995) compared 15 pairs of removal and control sites in the PPR, but found a hatch rate increase of only 8% on the removal sites compared to the control sites. However, the study areas were small and highly fragmented, which might allow for convenient emigration of predators from nearby habitat. Studies such as these, along with a variety of other factors, raise questions among the public regarding the necessity and effectiveness of a tool that other research has shown to be useful.

**The role of human dimensions**

In some respects, wildlife management has become as much about managing the public interest as it is about managing wildlife; managers today must consider public demands to protect wildlife from people as well as demands to protect people and property from wildlife (Treves and Naughton-Treves 2005). Goals of wildlife management have been changing, moving away from an earlier focus on maximum sustained yields of game species to maximizing wildlife values as well as holistic landscape and habitat conservation (Conover 2003). The discipline of human dimensions is a direct result of this evolution.

Human dimensions research began in the 1960s and has increased steadily since (Manfredo 1989). Manfredo et al. (1996) defined human dimensions as “an area of investigation which attempts to describe, predict, understand, and affect human thought and action.” Early work focused on hunter satisfaction as well as public relations and wildlife issues (Cain 1960,
More recently, research has shifted to human-wildlife interactions (Decker and Chase 1997). Currently, wildlife managers face many challenging tasks involving both biological and sociological influences (Decker and Chase 1997, Bath 1998). Today’s managers must identify and understand the desires and concerns of a diverse group of stakeholders, reduce conflicts between people and wildlife species, and deal with increasing numbers of user groups, and (Decker and Chase 1997, Gigliotti and Decker 1992). In short, managers are finding they must work within a complex interface of sociological and biological forces (Decker and Chase 1997). Integration of human dimensions into the decision-making process increases public acceptance, thus rendering management policy more effective and valuable (Gigliotti and Decker 1992, Johnson et al 1993).

Failure to integrate public interest with resource management has proven to be a critical hindrance to both managers and the resources they are meant to conserve. Lethal predator control elicits strong emotions from the public, and more and more Americans are lobbying for legal protection of animals. From 1940 through 1980, voters approved only one wildlife protection measure—a 1972 ban on the hunting of Mourning Doves (*Zenaida macroura*) in South Dakota, which was reversed in 1980 (Cockrell 1999, Parcelle 1997). However, there has been a recent and increase in voter’s passing ballot initiatives for wildlife protection. In the 6-year period 1990 - 1996, 10 of 13 ballot initiatives prohibiting trapping, baiting or hunting of wildlife were passed by voters (Butler 2003). Specifically, use of leg-hold (foot-hold) traps were banned in Massachusetts; and Colorado; snares were banned in Colorado; trapping opportunities were reduced on public lands in Arizona certain hunting practices were banned in Alaska, Washington, and Massachusetts, and Colorado banned the hound, bait, and spring hunting of bears (Manfredo et al. 1999). In an apparent backlash to animal protection initiatives, Utah
voters amended their constitution to require a two-third majority for ballot measures to affect wildlife, and Minnesota amended their constitution to preserve hunting, fishing and trapping (Cockrelle 1999). Values, attitudes and opinions regarding natural resources fall along a continuum in the US.

Value orientations and attitudes

The cognitive hierarchy is comprised of behaviors, behavioral intentions, norms, attitudes, basic beliefs, and values (Ball-Rokeach, et al. 1984, Homer and Kahle 1988, Kahle and Timmer 1983, Rokeach 1973, 1979). Like an inverted pyramid with values as the basis of the foundation and behaviors forming the top, these cognitions theoretically build upon one another.

Fundamental values are first order cognitions and are the most central to the cognitive structure, and are the most-stable and fewest in number (Rokeach 1973). Studies have designated various numbers of values ranging from 8 (Kahle and Timmer 1983) to 36 (Rokeach 1973). Values regarding wildlife were not recognized in any of the value typologies. Rokeach (1973) found that values are limited in number because they represent basic needs; they address only a few fundamental social and biological human needs. Values are not focused on specific situations but are abstract and concerned with general modes of conduct and desirable end-states. They therefore transcend specific situations and influence and direct the remaining cognitions of the cognitive hierarchy; serving both an influence on and a powerful explanation of behavior (Rokeach 1973, Schwartz 1992). Attitudes are much more numerous than values and are easily articulated. Behavioral intentions and behaviors top off the inverted pyramid of the cognitive hierarchy. Behavioral intentions are described as the endeavor of an individual while behavior is the actual action taken or displayed by an individual. Behaviors are manifestations of attitudes.
Stern et al. (1995) found that the influence of values in the cognitive hierarchy is primarily indirect through their influence on higher-order cognitions such as basic beliefs. Values are background factors that influence behaviors indirectly by directing an individual’s beliefs and attitudes (Daigle et al. 2002). In other words, influence of values on attitudes and behaviors occurs indirectly by means of other components in the cognitive hierarchy (Vaske and Donnelly 1999). An example of this connection is basic beliefs strengthen and give meaning to values. Fulton et al. (1996) defined basic beliefs as second and third order cognitions that are proximate to fundamental values. They serve to give individual meaning to and strengthen the more general values; they serve to orient higher order cognitions in a way that makes these cognitions consistent with fundamental values while simultaneously introducing individual differences within the cognitive structure.

Value orientations are described as a pattern of direction and intensity among a set of basic beliefs (Fulton et al. 1996). They represent an individual’s application of values to concrete issues; value orientations guide cognitions which influence behaviors. Moreover, they give organization and meaning to an individual’s values and as a result link them to an array of specific attitudes and behaviors (Zinn et al. 2002). Value orientations therefore provide a foundation for attitudes and norms which, in turn, guide behavior (Manfredo et al. 2003). Value orientations concerning natural resources can be arrayed along a continuum ranging from biocentric to anthropocentric (Steel et al. 1994, Vaske and Donnelly 1999). Anthropocentric value orientations represent a human-centered view of the non-human world (Eckersely 1992). Anthropocentric value orientations are the basis of traditional natural resource management. Conversely, biocentric value orientations are nature-centered and elevate all components of ecosystems to hold the same rights as humans (Eckersely 1992). While human needs and desires
are still important, those with biocentric value orientations tend to see the big picture. Steel et al. (1994) note that biocentric and anthropocentric value orientations are not mutually exclusive. As a result, the two views fall on opposite ends of a continuum with the midpoint representing a mixture of the two extremes.

Inglehart (1990, 1997) posed a theory of value shift in modern society. He theorized that value changes at the societal level are caused by the shifting of needs in our post industrialized country; economic development in the U.S. has shifted values away from basic human needs such as security and shelter (defined as Materialistic) to higher-order psychological needs (defined as Post-Materialistic). Following World War II, industrialized nations, such as the U.S., began a period of increased economic security. Inglehart’s theory claims that an individual’s values are formed during an early age. At the societal level, changes occur over a period of generations. As a result of these assumptions, Inglehart suggested that the prosperity following World War II created a generation of individuals who emphasized Post-Materialistic values, and that those values remain evident today.

Public value orientations may be becoming more biocentric and less anthropocentric (Inglehart 1990, 1997, Manfredo and Zinn 1996). Manfredo et al. (2003) explored the issue of value change. Guided by Inglehart’s (1990, 1997) research, they surveyed residents of 6 states to assess Materialist/Post-Materialist values, attitudes toward selected management actions, wildlife value orientations, participation in wildlife-related recreation, and socio-demographic traits. The found the proportion of traditionalists within a state was strongly and inversely related to education, income, and urbanization, and positively related to residential stability. Similar to other research, Manfredo et al. (2003) concluded that wildlife value orientations change within
the broader context of value change in society. They attribute such value change to increased mobility, urbanization, and growth of education and affluence.

The general shift in value orientation, particularly those of wildlife concern, has also caused a shift in attitudes and thus, behaviors. Much research has studied these changes. Fulton et al. (1996) developed a conceptual framework to study human values towards wildlife and use these values to test the value-attitude behavior hierarchy. Values were considered within the broader context of the cognitive hierarchy model suggesting that wildlife value orientations affect behavioral intentions and behaviors. Because of this, wildlife value orientations are considered important as determinants of attitudes which, in turn, help explain patterns of behavioral intentions towards wildlife. The authors focused on the relationship of three levels of constructs in the cognitive hierarchy: behavioral intentions, higher order attitudes, and basic beliefs and the wildlife value orientations derived from them. Eight basic wildlife belief dimensions were recognized as issues concerning wildlife on their study site: wildlife use, wildlife rights, recreational wildlife experience, bequest and existence, hunting/anti-hunting, residential wildlife experience, wildlife education, and fishing/anti-fishing. They found that the pattern with which participants responded to value orientations predicted support of natural resource management strategies and participation in fishing and hunting. Results also suggest value orientations should not be expected to be direct predictors of specific behaviors; the best predictor of a specific behavior or act is the attitude towards that behavior or act.

*Attitudes towards predators and predator removal*

Attitudes are often measured in survey questionnaires because public perceptions regarding management techniques evolve over time creating a need to maintain current understanding of various stakeholder perspectives. Attitudes can both be indicators of behaviors
towards wildlife and provide insight to the value orientations of respondents regarding wildlife and related concepts. Without a firm understanding of public attitudes regarding particular management techniques conflict can result.

Researchers have examined attitudes toward predators and found distinctions between different social-demographic groups. Generally, rural residents have been found to hold more anthropocentric attitudes towards wildlife whereas urban residents possess more biocentric attitudes towards wildlife (Manfredo et al. 2003). Positive attitudes towards predators are correlated with pro-environmental beliefs whereas negative attitudes are connected to beliefs that humans are superior in relation to nature and wildlife (Kaltenborn et al. 1998). Groups found to be most affectionate towards wildlife were members of wildlife and environmental protection agencies, those who hunt to be close to nature, backpackers, and bird watchers (Kellert 1985).

Though they are far removed from the animals themselves, educated urban youth are most supportive of carnivore conservation efforts (Schwartz et al. 2003). In contrast, the attitudes of farmers, livestock owners and rural residents who have direct contact and experience with predators are likely to have the strongest negative attitudes towards carnivore conservation efforts; tolerance of these animals has direct negative economic consequences for this group (Williams et al. 2002). Messemer et al. (1999) conducted a random survey among U.S. households and found Americans to be generally knowledgeable about predators and very supportive of predator rights to exist.

Perceptions of individual predator species originate from many factors including the size and intelligence of the species, perceived danger of the animal or threat to property, relationship of the animal to people, its cultural relationship and aesthetic value (Kellet 1984). Kellert (1985) found predators as a group to be generally disliked in comparison to birds and domestic animals.
However, Americans were much fonder of mammalian species than reptiles or fish. Animals were also favored if they were charismatic or belonged to an evolutionarily advanced class (Kellert 1985). Predators were least liked by the following social groups: those of low income or education, nonwhites, ranchers, residents of the south, and those of older ages. Such respondents possessed greater fear of predators.

Similar to studies that examined general attitudes towards predators, several studies conducted to survey public attitudes and perceptions of predator removal found distinctions when contrasting attitudes of different social-demographic groups, different situations, and different regions of the country. One study surveyed Michigan residents, as well as all employees of the Michigan Department of Natural Resources (Koval and Mertig 2004). Whereas both groups were found to support various lethal wildlife management methods the agency personnel were generally more supportive of these methods than the public. Public support was found to vary by management situation. Understanding these variations could decrease conflicts between the agency and the public, thus allowing the agency more time and money to research and implement management technique while maintaining a positive relationship with stakeholders. A similar study of American households found that the public supports the federal government’s role in engaging in public education, ensuring public safety, and continuing research of non-lethal control methods, with less support shown for lethal methods considered to be inhumane (Reiter et al. 1999). Messmer et al. (1999) also surveyed American households with regard to public attitudes towards medium-sized predator removal to enhance avian recruitment—the first survey of its kind. Respondents strongly supported predators’ rights to exist, but did not support an outright ban on predator hunting or trapping.
Given specific predator control scenarios, stakeholders supported predator control to increase avian recruitment, except scenarios that included controlling raptors.

Acceptance or rejection of wildlife management strategy and actions often depends on circumstances specific to the situation (Manfredo et al. 1998) but trends in management tolerance are now being identified. Predator control is a wildlife management tool that can and has been used in many situations. Predator control techniques range from trapping and removal of individual nuisance animals to eradication of predator populations. Results vary by situation as mentioned previously. Predator control is of increasing concern to agencies as a more vocal public opposes this common management technique, especially when used in the name of game production, such as waterfowl (Schwartz et al. 2003). Many individuals favor using methods that managed the individual animal responsible for causing a problem, and chose relocation as a solution to predator-livestock conflicts (Kellert 1985). Many public stakeholders will most likely accept lethal control when it is implemented on private lands, by government agencies using sharp-shooters or live traps followed by euthanization, in situations where humans have been attacked by wildlife, and when the target species is aggressive, intelligent, highly abundant, ill or injured (Treves and Naughton-Treves 2005). Uniform acceptance of predator removal does not exist. Non-farmers in Utah and Wyoming preferred non-lethal methods of predator management while farmers chose whichever lethal or non-lethal method would work best (McIvor and Conover 1994).

Predator control to minimize loss of prey populations has been controversial for decades. Though timber wolf control programs in Alaska were challenged during the 1990s and judged as unacceptable treatment of the animals, Decker et al. (2006) found support among Alaskans for lethal control of wolves and grizzly bears (Ursus horribils) for the purpose of reducing predation
on moose (Alces alces) and caribou (Rangifer tarandus). Support was linked to perceived impact on human access to the prey and associated concern for these animals for food or recreational hunting—when impact was perceived to be less severe, lethal control was not supported as strongly. The authors termed this observation “impact dependency” and also observed changes in support when asked about the severity of local economic impact. Decker et al. (2006) concluded that opinions about predator control could be influenced by situational context even if individuals are not personally affected by the management decisions.

Whereas lethal predator control was once acceptable for many reasons, recently it has been found to be acceptable in only a few circumstances such as controlling disease, ensuring species survival, managing population levels, and public safety (Koval and Mertig 2004). Martinez-Espineira (2006) studied the controversy over public rejection of different methods of coyote control and found lethal control to be acceptable only when coyotes are causing damage. Messmer (1999) found that public support for predator management in situations where control is recommended to reverse population declines of desirable species or when used in conjunction with indirect management techniques that have greater long-term benefit, such as habitat restoration. Public stakeholders may more readily support predator control when it is used in a surgical manner rather than when applied broadly. Kellert and Berry (1980) found the major variables affecting public attitudes towards animal damage control to be: specific preferences, ethics of control, cost of control method, specificity of control, environmental impact, competing values and safety of control. Without gauging public opinion, lethal management will inevitably lead to disputes. Public education may also change attitudes. Ball (1996) noted, “…a public may answer differently if they understand that the problem of high predation rates [on waterfowl] is real, is largely human caused, and negatively affects a diversity of species. They
also may answer differently if they trust us to conduct predator control humanely and to continually seek non-lethal alternatives.”

**Farming practices and land management in the Prairie Potholes**

Although critical to waterfowl production, the PPR is also critical to crop production for human consumption. Agriculture is a dominant industry in this region with the number of farms equally 31,300, 30,100, and 79, 00 in South Dakota, North Dakota, and Minnesota respectively (U.S. Department of Agriculture, 2008). These farms compose 90.2%, 89%, and 54% of the total land area in their respective states. Few occupational groups have as significant an impact on wildlife and natural resources as have farmers (Conover 1994). As a result, agriculture shapes the landscape and quality of habitat of the PPR. Individual farmers make land use decisions based on expertise, lifestyle choice, tradition, and economic profitability with a dynamic interplay occurring among these factors (Ringelman, 2005). Although farmers are generally reluctant to take on significant changes in their expertise by adopting new traditions, changes are occurring within the PPR that are reshaping the landscape and quality of wildlife habitat in that region.

In less than 100 years in South Dakota the average farm size has more than quadrupled; however, the proportion of South Dakotans residing on farms declined three-fold despite statewide population increases (Higgins et al. 2002). In 1995, South Dakota’s urban population exceeded its rural population for the first time since statehood. Diminishing rural economics of the northern Great Plains suppressed agricultural commodity prices and forced farmers and rancher to seek alternative employment (Licht 1997). Many families choose to sell their farms to larger operations and move to town (Higgins et al. 2002). Similar trends are occurring in North
Dakota with the number of farms declining from 86,000 in 1993 to 30,100 in 1997. Minnesota also exhibits similar declines with 98,537 farms in 1974 and 80,865 in 2002.

Conversion of grassland to cropland has increased grazing intensity on remaining grasslands (Ringelman 2005). Nearly 3.5 million acres of rangeland (14% decrease) were converted to cropland during 1977-1997 in South Dakota with similar patterns existing throughout North Dakota (Higgins et al. 2002). Nearly 420,000 acres of North Dakota CRP were converted in cropland in 2007 alone (DU Press Release 2008). Recent increase in sizes of individual livestock animals intensifies poor range conditions with the need to produce more forage on fewer acres to feed cattle currently up to 30% heavier than 60 years ago. Moreover, drainage of wetlands for conversion to cropland has resulted in wetland loss estimated at 35% and 49% in the PPR of South Dakota and North Dakota, respectively (Dahl 1990).

Changes in field sizes and crop types have decreased the quality of wildlife habitat on these farm landscapes (Ringelman 2005). Cereal crops that provided some nesting cover are now being replaced by row crops that provide no habitat for grassland birds. Use of genetically modified row crops and current emphasis in crop research to develop more drought-tolerant and herbicide-resistant varieties has led to once unviable crops being produced in new regions. For example, sixty years ago North and South Dakota were considered too dry to grow soybeans yet these states now produce larger quantities of soybeans than corn (Higgins et al. 2002). Moreover, four renewable energy sources being developed in the PPR include wind power, fuels from grass biomass products, soy fuels from soybeans and ethanol from corn, (Ringelman 2005). Biofuels have the potential to reduce carbon dioxide emissions and air pollution, with plants such as Switchgrass (*Panicum virgatum*) noted as potential biomass fuel crops. Unlike the now-
popular row crops, switchgrass has the potential to provide quality habitat for numerous species of grassland birds.

Declining numbers of farm families and loss of native rangeland has coincided with changes in farm equipment (Ringelman, 2005). Modern equipment increases efficiency and has led to “cleaner” farming practices; operators can now farm ditch-to-ditch, removing grass along field borders and rendering as much land plow-able as possible. Field size has increased to efficiently utilize modern equipment (Cowardin et al. 1983). Currently, farmers can till and plant 3 times as many wheat and corn acres using tractors that have horsepower ratings quadruple of those available in 1960 (Higgins et al. 2002). These changes are apparent from the elimination of fencerows, tillage of road ditches, drainage of wetlands, increased use of herbicides and insecticides and burying of rock piles (Cowardin et al. 1983). Intensification of farming has concentrated prey and predator activity in the remaining untilled habitats and reduced the amount of prey available to predators during waterfowl nesting, ultimately resulting in a decline in waterfowl nest success.

*Effect of farming on wildlife habitat*

Wetland function and quality are degraded primarily by agricultural activities associated with annual crops including cultivation of wetland basins, siltation due to soil erosion, drainage, and agricultural chemicals (Kantrud et al. 1989). Agricultural activities that also effect upland habitats effect duck populations (Bethke and Nudds 1995) and production—most dabbling ducks nest in grasses, forbs, and shrubs of the uplands (Johnson et al. 1987, Klett et al. 1988). Sugden and Beyersbergen (1984) found 82.7% of uplands in Saskatchewan were annually tilled, with half of the plots in their study containing little or no potential for wildlife production. Poor upland habitat is related to heavy grazing which increases predation, drought, lack of cover,
annual tillage, and tillage operations on croplands which can be fatal to both the hen and the nest. Klett et al. (1988) show that native prairie and planted cover are the most preferred by ducks and have the highest nest success compared to other habitats. Idle stands of cool-season, introduced grasses in combination with legumes were found to produce the maximum number of upland nesting ducks (Duebbert and Kantrud 1974). Good duck production on untilled, quality, upland habitat occurs regularly if water conditions are also optimal, and poor production is most often associated with poor upland vegetation or drought (Higgins 1975). Ducks are not the only species which benefit from good quality upland habitat--both shorebirds and game birds have had greater nest and successful nest densities on untilled upland than on annually cultivated land (Higgins 1975).

Although agricultural practices have changed the landscape, they have also altered the predator community within the PPR. Predator populations in the PPR have been directly affected by humans through both the extensive change of habitat from prairie grassland to agriculture and by human-inflicted mortality (Sargeant et al. 1993). Conversion of the PPR led to fragmented natural habitats, increased the structural diversity of habitats, and resulted in the establishments of farmsteads with associated shelter, human presence, and food sources. Reduction of eradication of large predators, such as coyotes and wolves, increased number of trees on the prairies, and intensification of agriculture has led to increased populations of medium-sized predators such as the red fox and raccoon (Sargeant et al 1993, Cowardin et al 1983). Mammalian predator species that ultimately benefited most from this habitat change were the coyote, red fox, raccoon, and Franklin’s ground squirrel. The striped skunk has likely benefited from the agricultural development, as they make extensive use of human habitation. However, they are also frequently considered a pest by humans and are subsequently killed, but
are also trapped for their fur. The Red-tailed Hawk (*Buteo jamaicensis*) is likely the only avian predator that has benefited from the agricultural development.

*Conservation easements*

Approximately 43% of the United States (932 million acres) was managed as private cropland, pastureland, or rangeland during 2006 rendering agricultural the dominant user of the land (U.S. Census Bureau 2006). Decisions America’s ranchers and farmers make directly affect the land’s soil, water, plant life and wildlife. These stewardship decisions cannot be understood apart from the landowners’ basic need to support themselves and their families. Despite many technological advances, farming is not an easy way to make a living from the land. Many agricultural programs and policies available to farmers and ranchers have influenced the management of their land.

During 1985, Congress passed the Food Security Act of 1985 (hereafter, Farm Bill) which included a chapter on conservation for the first time (U.S. Department of Agriculture 2008,). As a result of the conservation provisions, United States Department of Agriculture (USDA) programs are required to adhere to environmental standards on certain categories of land in order to remain eligible for other USDA farm program benefits. The 1985 Farm Bill created three substantial new conservation provisions: the Conservation Reserve Program (CRP), Wetlands Conservation (Swampbuster), and Highly Erodible Land (HEL). The Swampbuster and HEL provisions halted access to federal farm program benefits to landowners who did not meet conservation program requirements (Zinn 2000) while the CRP took highly erodible/eroding cropland out of production with a 10 to 15-year rental payment in return.

Swampbuster provisions withdraw program benefits from producers who convert wetlands for the production of agricultural commodities, thus helping to protect wetlands from
drainage and conversion (U.S. Department of Agriculture 2008c). However, Swampbuster provisions do not create or restore drained wetlands or require management on them.

HEL land, defined by the USDA, has a high soil erodibility index rendering fields as HEL if more than a third of the area of the field is considered HEL (U.S. Department of Agriculture 2008c). Producers were required to fully implement an approved conservation plan by 1995; those out of compliance were at risk of losing eligibility for most farm support programs. However, in 1992 only about 28% of cropland in the U.S. qualified as HEL.

Sodbuster provisions apply to HEL that is converted from permanent cover to agricultural production and requires producers to follow an approved conservation plan or they will lose eligibility for programs. By requiring the application of conservation practices Sodbuster provisions discourage HEL, thus preventing adverse effects of cropping HEL such as reduced water quality, sedimentation, increased erosion and decreased wildlife diversity.

Whereas Swampbuster and HEL minimize habitat loss, CRP helps build quality habitat for a variety of wildlife. Landowners who enroll in CRP convert cropland to perennial grass or tree cover and receive annual payments for 10 to 15 years (U.S. Department of Agriculture 2008c). During 1993, North Dakota and South Dakota had approximately 2.2 million and 1.2 million acres enrolled, respectively. Studies reveal that nest success of waterfowl in CRP fields exceeds levels necessary to maintain population levels (Kantrud 1993, Reynolds et al. 1994) and CRP cover is the preferred nesting habitat for 5 species of upland-nesting ducks (mallard [Anas platyrhynchos] gadwall [Anas strepera], blue-winged teal [Anas dicors], northern shoveler [Anas clypeata], and northern pintail [Anas acuta] (Reynolds 2001). CRP was estimated to be responsible for producing an additional 2.1 million ducks annually in the PPR during the period 1992-1997 (Reynolds 2001).
Landowners, under the Continuous Enrollment Conservation Reserve Program, enroll small acreages into selection conservation practices such as riparian forest buffers, grassed waterways, field breaks, shelterbelts, filter strips, and contour buffers and receive monetary compensation in return (U.S. Department of Agriculture 2008c). Goals of this program are to protect soil, conserve biodiversity, beautify the landscape, improve air and water quality, and enhance fish and wildlife habitat.

The Wetland Reserve Program (WRP) is a voluntary wetland restoration program in which landowners establish conservation easements of either 30-year or permanent duration, or enter into restoration cost-share agreements where no easement is involved (U.S. Department of Agriculture 2008c). In return for permanent easements, landowners receive 100% of the costs involved in restoring wetlands while the payment is 75% of what would be provided for a permanent easement on the same site and 75% of the restoration cost for a 30-year easement. Where no easement is involved, cost-share agreements have duration for a minimum of 10 years and provide 75% of the cost of restoring wetlands. Landowners maintain access to their land and may be permitted to utilize the easement (grazing, timber harvesting, etc) if they are consistent with long-term wetland protection and enhancement objectives.

Farmers and ranchers who face serious threats to water, soil, and other natural resources can enroll in the Environmental Quality Incentive Program (EQIP). It offers financial, educational, and technical assistance for installing structural conservation practices, implementing management practices, and establishing vegetation.

The 2008 Farm Bill was enacted during June 2008 and will govern the majority of Federal agriculture and related programs over the next 5 years (U.S. Department of Agriculture 2008b). The 2008 Farm bill continues many of the commodity programs already introduced with
adjustments made to payment levels and eligibility. Wetland restoration and farmland preservation programs also continue. The bill also introduces a new average crop revenue election program, a permanent disaster assistance program and adjusts some details of the long-standing crop insurance program. Beginning and socially disadvantaged farmers and ranchers are consistently provided with enhanced support across most of the titles in the legislation. The 2008 bill also benefits “green” operations. New titles provide for horticultural crops and organic agriculture, with programs established to support producers transitioning to organic agriculture, tailor conservation programs to organic practices, and increase research into organic agriculture. Also, the Energy Title expands existing programs and adds a number of new ones to encourage production, use, and development of biobased and other renewable energy sources. The bill includes a number of tax provisions, including several related to biofuels, including a tax credit for ethanol after the Renewable Fuel Standard for ethanol is reached, a tax credit for cellulosic biofuels and an extension of the additional duty on ethanol imported for fuel use through 2010.

Attitudes towards land management and conservation easements

The significant anthropogenic landscape changes identified above had major impacts on wildlife, habitat, and ecosystems. Management strategies intended to deal with these problems will require landscape-scale solutions (Wilmot and Brunson 2008). These solutions must reduce, reverse, or mitigate ecosystem degradation while being economically feasible and socially acceptable. For most farmers, economics and social acceptability go hand-in-hand. As agricultural producers control 43% of the total surface area of the United States (U.S. Bur. Of Census 2008) impact on wildlife resources in the U.S. is immense (Kellert and Berry 1980). Their perceptions about wildlife and conservation programs are a crucial issue to wildlife management (Conover 1994). However, perceptions of agricultural producers tend to differ
from those held by the general public (Kellert and Berry 1980, McIvor and Conover 1994). Therefore, a firm understanding of their attitudes towards both land management for wildlife and conservation easements is critical to conserving quality habitat on a landscape-level.

Conover (1994) surveyed grass-root leaders of the agricultural community and found that most respondents spend both time and money to improve wildlife habitat on their land. However, for many agricultural producers an abundance of wildlife on their property brings costs as well as benefits (Conover 1997). Most farmers report lost income due to wildlife damage (Conover 1994, Wywialowski 1994). Perceptions of high levels of wildlife damage can reduce a farmer’s tolerance of the species at fault (Conover 1997) with landowners who derive a moderate to high proportion of income from their land being less tolerant of wildlife damage than other landowners (Decker and Brown 1982, Daley et al. 2004). Pease (1993) found a significantly greater proportion of farmers who were not wildlife oriented reported damage than those who were wildlife oriented. Similarly, farmers not wildlife oriented reported nearly twice the dollar value of wildlife damage than wildlife oriented farmers. A consensus was noted among professionals working for federal or state wildlife or agricultural agencies across the U.S. that wildlife-induced damage reduces the profitability of agricultural producers, with the problem worsening over the past few decades (Conover and Decker 1991).

A 1994 survey of agricultural producers throughout the United States revealed that over half (51%) purposely managed for wildlife on their land in the form of providing cover near fields, providing a water source, leaving crop residue in the field, leaving a portion of the crop unharvested, and providing salt licks—a large portion of farmers and ranchers place a high value on wildlife that inhabit their lands (Conover 1994). However, 80% of the respondents suffered wildlife damage in 1993 with 53% reporting damage that exceeded their tolerance, with the
problem species including deer (*Odocoileus* spp.), raccoons, coyotes, and ground hogs (*Marmota* spp.). Over 40% of agricultural producers in Conover’s (1997) study reported that wildlife damage on their farms or ranches was so severe that they would oppose the creation of a wildlife sanctuary nearby.

Many farmers paradoxically enjoy having abundant wildlife on their property but do not like the damage caused by wildlife; therefore, they take steps to try to accomplish both objectives (Conover 1994). Farmers who allowed hunting were more likely to have wildlife damage and were more likely to consider the damage unacceptable than farmers who prohibited hunting. These results suggest farmers who experience wildlife damage are more likely to allow hunting in an effort to reduce wildlife damage. Attitudes towards wildlife are also species specific (Conover 1997)—sunflower growers in North Dakota, for instance, simultaneously spent resources to protect their crop from blackbirds while attempting to increase pheasant populations for hunting. Most agricultural producers of southern Utah believed the federally listed “threatened” Utah prairie dog (*Cynomys parvidens*) has a right to exist only on public land (Elmore 2006).

Farmers have also revealed a paradoxical viewpoint in terms of government regulations. Svoboda (1984) surveyed private agriculture and forest landowners in Minnesota and found that 82% either disagreed or strongly disagreed that government should regulate private land for wildlife purposes. However, 90% of the same respondents considered the opportunity to observe wildlife on their land as important to highly important. Moreover, 70% of the respondents agreed that government should provide incentives. They also felt little obligation regarding wildlife management—18% said they had little or no obligation, 11% said that landowners have a social or moral obligation, and 23% said the choice should be voluntary. For example, individual acceptance and implementation of riparian forest buffers is tied to positive attitudes
towards government programs, poor water quality, and perceived outcome effectiveness of adopted practices (Skelton 2004).

The type of agriculture by which a landowner derives his income also affects his attitudes towards specific species. For example, livestock producers were found to most frequently cite carnivores, with coyotes the most specified species, as the cause of wildlife damage on their property (Wywialowski, 1994). However, in the Northern Great Plains, prairie dogs and gophers (Geomyidae) were frequently cited. Those who produce field crops cited hoofed mammals (deer), rabbits and rodents, omnivores, and birds as damaging their property. Specifically, Pronghorn (*Antilocarpa Americana*), elk (*Cervus elaphus*), woodchucks, gophers (Geomyidae), squirrels (*Spermophilus* spp. and *Sciurus* spp.), and raccoon were most-often cited. Conover and Decker (1991) results show that deer (*Odocoileus* spp.), blackbirds (Icterinae), beaver (*Castor canadensis*), geese (Anserini), Blackbirds and European starlings (*Sturnus vulgaris*) were ranked the highest causes of damage by wildlife and natural resource professionals.

With the passage of stricter environmental laws, private property owners may feel their property rights are being violated. Many farmers in the PPR are a prime example of private property owners who distrust the government and are less willing to cooperate with programs aimed at increasing quality wildlife habitat. Conservation programs often times have the illusion of loss of property rights (perpetual easements, 15-year contract periods, etc.). As noted above, however, it is crucial to maintain agriculture producers’ trust and willingness to participate in these programs.

Landowners generally want to reduce annual expenses while still holding title to and administrative control of the land (Noonan and Zagata 1982). Conover and Decker (1991) found that state agencies provided a greater level of assistance to farmers during 1987 than they did
during 1957. With the passage of numerous conservation easement programs since 1987, we may be able to assume that agencies are still providing reasonable assistance to farmers. However, a lack of communication can foster the idea among farmers that government agencies are not sensitive to their needs or aware of their problems, and that their interests are being sacrificed for those of hunters, recreationists, and other wildlife users (Decker et al. 1984). Conflicts that are handled improperly can be the source of continued public frustration and both further reduce the credibility of the agency administering the program and detract from long-term objectives (Hewitt and Messmer 1997). However, economic, personal and social incentives can be used to overcome landowner conflicts with agencies or government programs and encourage landowners to manage for wildlife (Svoboda 1984).

Conclusion

Understanding attitudes related to controversial issues is crucial for biologists and managers in order to perform their jobs. No previous research has specifically targeted the three states of my study—North Dakota, South Dakota, Minnesota—with respect to understanding the public’s attitudes toward predator control to enhance waterfowl recruitment and stakeholder attitudes toward land management and enrollment in conservation easements. Understanding current attitudes regarding these issues will enhance the ability of managers and biologist to perform their job while concurrently increase public trust towards agencies.
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CHAPTER 2
VALUE ORIENTATIONS OF AGRICULTURE PRODUCERS IN THE PRARIE POTHOLE REGION TOWARDS PREDATOR REDUCTION

INTRODUCTION

Changes in the Prairie Pothole Region

The glaciated Prairie Pothole Region (PPR) is composed of approximately 207,200 km² of the north-central United States and approximately 569,800 km² in south-central Canada (Higgins 1977). In total, this area encompasses nearly 777,000 km² from Central Alberta to central Iowa and southern South Dakota (Kirby et al. 2002). The topography in the PPR is dotted with shallow basins created by glacial advances and retreats. Most of these basins hold surface water for only a short period of time. The PPR was once a continuous short grass ecosystem broken up by these natural wetlands and occasional hammocks. As it did then, this system of prairie potholes still provides habitat for an array of wildlife (Higgins 1981, Kirby et al. 2002, Brown 1976). The PPR comprises only 10% of North America’s wetlands yet it produces approximately 50% of the waterfowl annually (Kirby et al. 2002). In short, the PPR is critical waterfowl breeding habitat.

The PPR has changed dramatically over the past century; human settlement and agricultural practices resulted in wetland drainage, habitat loss, and habitat fragmentation (Ratti and Scott 1991, Sugden and Beyersbergen 1984, Cowardin et al. 1983). That potholes contain water only temporarily allows them to be cultivated (Kirby et al. 2002); thus, the once prairie-dominated system is now dominated by monoculture small grain farms that provide for the
demands of rising human population numbers and economic pressures (Higgins 1977). Economic pressures led to a need for greater production efficiency from the land, and this enhanced efficiency has been achieved by increased production on each unit of cropland, and by the conversion of wetlands and grasslands, and parklands to cropland. Conversion has led to at least 50% of the previously uncultivated habitats in the PPR to be converted to cropland. Less than 20% of the original grasslands remain in North Dakota, and, of those that remain, most are heavily grazed (Cowardin et al. 1983). Moreover, in the past, 20-40% of the wetlands were wholly or partly drained for cropland. Once drained, these wetlands provide arable land and eliminate the cost of tilling around the potholes (Brown 1976). Quality of wetlands that remain intact is negatively impacted by agricultural practices. Nearly all the land in the PPR is used to graze livestock or grow crops, and in many counties >80% of the upland is cultivated annually (Sugden and Beyersbergen 1984). These land use alterations have resulted in changes in both composition and abundance of predator communities in the PPR (Cowardin et al. 1983).

Predator populations in the PPR have been affected by humans through both the extensive change of habitat from prairie grassland to agriculture and by human-inflicted mortality (Sargeant et al. 1993). Conversion of the PPR led to fragmented natural habitats, increased the structural diversity of habitats, and resulted in the establishments of farmsteads with associated shelter, human presence, and food sources. Eradication of large predators, such as coyotes (Canis latrans) and wolves (Canis lupus), increased numbers of trees on the prairies, and intensification of agriculture has led to an increase in medium-sized predators such as the red fox (Vulpes vulpes), raccoon (Procyon lotor), striped skunk (Mephitis mephitis) and Franklin’s ground squirrel (Spermophilus franklinii) (Sargeant et al. 1993, Cowardin et al. 1983, Cowardin et al. 1985).
Decline of waterfowl nest success

Breeding populations of many species of prairie-nesting waterfowl were greatly depressed by the end of the 1980s and are still considered very low (Greenwood and Sovada 1996). Many factors lead to this decline. The primary cause of lower reproduction rates is considered to be nest loss by predation (Sargeant and Raveling 1992, Higgins 1977); other major causes of decline include a .5 percent annual decline in nest success (Beauchamp et al. 1996, Higgins 1977, Greenwood et al. 1995, Cowardin et al. 1985, Klett et al. 1988), predation on nesting females (Johnson and Sargeant 1977), composition of predator community (Greenwood 1986; Sovada et al. 1995), widespread habitat alteration (Greenwood et al. 1995; Robbins et al. 1989, Bethke and Nudds 1995, Johnson et al. 1989), and drought (Greenwood and Sovada 1996). Most research agrees with the findings of Sargeant and Arnold (1984)—annual recruitment of duck populations in the PPR is less than its potential mainly due to predators that take nesting females, eggs, and ducklings. Concurrently, Sargeant et al. (1993) found that lower nest success of ducks and long-term changes in predator demographics have coincided with the conversion of grassland to cropland.

Predator reduction as a tool to increase nest success

Predator reduction is one of several methods used by managers to increase waterfowl populations through increased nest success rates and decreased depredation rates on nesting hens. Reduction of mammalian predators resulted in a 42% nest success rate on sites that were trapped, compared to a 23% nest success rate on the untrapped sites (Garrettson and Rohwer 2001). Removing predators results in increased hatch rates; on average, removal areas had a 75% higher hatch rate success than control sites (Cote and Sutherland 1997). Predator reduction also increased duckling survival (Pearse and Ratti 2004).
Whereas numerous studies found an increase in nest success following predator removal, several studies found predator removal to have insignificant effect, or that previous studies may have over-estimated of the effect. Duebbert and Kantrud (1974) found that reduction did not significantly increase net duck production on active agricultural lands. Beauchamp et al. (1996) compiled data from 37 studies conducted between 1935 and 1992. Nest success declined but declined more slowly than previous estimates. Time explained 10% of the variation. Whereas nest success declined at a similar rate among 5 species, late nesters had higher success than early nesters. Populations of 2 of the 3 late nesters did not decline, suggesting declines in nest success may not be related causally to population change. Crabtree and Wolfe (1988) found some evidence indicating that some predators feed on duck eggs early in the season and later switch to alternative prey, perhaps making late-nests less vulnerable to predation. These findings coincide with similar studies (Cowardin et al. 1985, Clark and Nudds 1991), and recognize that nest success may not be the most important or only factor limiting population growth. Studies such as these, along with a variety of other factors, raise questions among the public regarding the necessity and effectiveness of a tool that other research has shown to be useful.

Value orientations and attitudes

The cognitive hierarchy is comprised of behaviors, behavioral intentions, norms, attitudes, basic beliefs, and values (Ball-Rokeach, et al. 1984, Homer and Kahle 1988, Kahle and Timmer 1983, Rokeach 1973, 1979). Like an inverted pyramid with values as the basis of the foundation and behaviors forming the top, these cognitions theoretically build upon one another.

Fundamental values are first order cognitions and are the most central to the cognitive structure, and are the most-stable and fewest in number (Rokeach 1973). Rokeach (1973) found that values are limited in number because they represent basic needs; they address only a few
fundamental social and biological human needs. Values are not focused on specific situations but are abstract and concerned with general modes of conduct and desirable end-states. They therefore transcend specific situations and influence and direct the remaining cognitions of the cognitive hierarchy; serving both an influence on and a powerful explanation of behavior (Rokeach 1973, Schwartz 1992). Attitudes are much more numerous than values and are easily articulated. Behavioral intentions and behaviors top off the inverted pyramid of the cognitive hierarchy. Behavioral intentions are described as the endeavor of an individual while behavior is the actual action taken or displayed by an individual. Behaviors are manifestations of attitudes.

Value orientations are described as a pattern of direction and intensity among a set of basic beliefs (Fulton et al. 1996). They represent an individual’s application of values to concrete issues; value orientations guide cognitions which influence behaviors. Moreover, they give organization and meaning to an individual’s values and as a result link them to an array of specific attitudes and behaviors (Zinn et al. 2002). Value orientations therefore provide a foundation for attitudes and norms which, in turn, guide behavior (Manfredo et al. 2003).

Research has shown that value orientations concerning natural resources can be arrayed along a continuum ranging from biocentric to anthropocentric (Steel et al. 1994, Vaske and Donnelly 1999). Anthropocentric value orientations are defined as representing a human-centered view of the non-human world (Eckersely 1992). Anthropocentric value orientations are the basis of traditional natural resource management. Conversely, biocentric value orientations are nature-centered and elevate all components of ecosystems to hold the same rights as humans (Eckersely 1992). While human needs and desires are still important, those with biocentric value orientations tend to see the big picture. Steel et al. (1994) note that biocentric and
anthropocentric value orientations are not mutually exclusive. As a result, the two views fall on opposite ends of a continuum with the midpoint representing a mixture of the two extremes.

Public value orientations likely are becoming more biocentric and less anthropocentric (Inglehart 1990, 1997, Manfredo and Zinn 1996). They attribute such value change to increased mobility, urbanization, and growth of education and affluence (Manfredo et al. 2003). The general shift in value orientation, particularly those of wildlife concern, has also caused a shift in attitudes and thus, behaviors. Research suggests value orientations should not be expected to be direct predictors of specific behaviors; the best predictor of a specific behavior or act is the attitude towards that behavior or act.

*Attitudes towards predators and predator removal*

Attitudes are often measured in survey questionnaires because public perceptions regarding management techniques evolve over time creating a need to maintain current understanding of various stakeholder perspectives. Attitudes can both be indicators of behaviors towards wildlife and provide insight to the value orientations of respondents regarding wildlife and related concepts. Without a firm understanding of public attitudes regarding particular management techniques conflict can result.

Researchers have examined attitudes toward predators and found distinctions between different social-demographic groups. Generally, rural residents have been found to hold more anthropocentric attitudes towards wildlife whereas urban residents possess more biocentric attitudes towards wildlife (Manfredo et al. 2003). Positive attitudes towards predators are correlated with pro-environmental beliefs whereas negative attitudes are connected to beliefs that humans are superior in relation to nature and wildlife (Kaltenborn et al. 1998). Groups found to be most affectionate towards wildlife were members of wildlife and environmental protection
agencies, those who hunt to be close to nature, backpackers, and bird watchers (Kellert 1985). Messemer et al. (1999) conducted a random survey among US households and found Americans to be generally knowledgeable about predators and very supportive of predator rights to exist.

Though they are far removed from the animals themselves, educated urban youth are most supportive of carnivore conservation efforts (Schwartz et al. 2003). In contrast, the attitudes of farmers, livestock owners and rural residents who have direct contact and experience with predators are likely to have the strongest negative attitudes towards carnivore conservation efforts; tolerance of these animals has direct negative economic consequences for this group (Williams et al. 2002). As agricultural producers control nearly 43% of the total surface area of the United States (U.S. Bur. Census 2006) impact on wildlife resources in the U.S. is immense (Kellert and Berry 1980). Their perceptions about wildlife and conservation programs are a crucial issue to wildlife management (Conover 1994). Pease (1993) found a significantly greater proportion of farmers who were not wildlife oriented reported damage than those who were wildlife oriented. However, perceptions of agricultural producers tend to differ from those held by the general public (Kellert and Berry 1980, McIvor and Conover 1994).

Perceptions of individual predator species originate from a diversity of factors including the size and intelligence of the species, perceived danger of the animal or threat to property, relationship of the animal to people, its cultural relationship and aesthetic value (Kellet 1984). Kellert (1985) found predators as a group to be generally disliked in comparison to birds and domestic animals. However, Americans were much fonder of mammalian species than reptiles or fish. Animals were also favored if they were charismatic or belonged to an evolutionarily advanced class (Kellert 1985). Predators were least liked by the following social groups: those
of low income or education, nonwhites, ranchers, residents of the south and those of older ages. Such respondents possessed greater fear of predators.

Similar to studies that examined general attitudes towards predators, several studies conducted to survey public attitudes and perceptions of predator removal found distinctions when contrasting attitudes of different social-demographic groups, different situations, and different regions of the country. One study surveyed Michigan residents, as well as all employees of the Michigan Department of Natural Resources (Koval and Mertig 2004). Whereas both groups were found to support various lethal wildlife management methods the agency personnel were generally more supportive of these methods than the public. Public support was found to vary by management situation. Understanding these variations could decrease conflicts between the agency and the public, thus allowing the agency more time and money to research and implement management technique while maintaining a positive relationship with stakeholders. A similar study of American households found that the public supports the federal government’s role in engaging in public education, ensuring public safety, and continuing research of non-lethal control methods, with less support shown for lethal methods considered to be inhumane (Reiter et al. 1999). Messmer et al. (1999) also surveyed American households with regard to public attitudes towards medium-sized predator removal to enhance avian recruitment—the first survey of its kind. Respondents strongly supported predators’ rights to exist, but did not support an outright ban on predator hunting or trapping. Given specific predator control scenarios, stakeholders supported predator control to increase avian recruitment, except scenarios that included controlling raptors.

Acceptance or rejection of wildlife management strategy and actions often depends on circumstances specific to the situation (Manfredo et al. 1998) but trends in management
tolerance are now being identified. Predator control is a wildlife management tool that can and has been utilized in a variety of situations. Predator control techniques range from trapping and removal of individual nuisance animals to eradication of predator populations. Results vary by situation as mentioned previously. Predator control is of increasing concern to agencies as a more vocal public opposes this common management technique, especially when used in the name of game production, such as waterfowl (Schwartz et al. 2003). Many individuals favor using methods that managed the individual animal responsible for causing a problem, and chose relocation as a solution to predator-livestock conflicts (Kellert 1985). Public stakeholders will most likely accept lethal control when it is implemented on private lands, by government agencies using sharp-shooters or live traps followed by euthanasia, in situations where humans have been attacked by wildlife, and when the target species is aggressive, intelligent, highly abundant, ill or injured (Treves and Naughton-Treves 2005). Uniform acceptance of predator removal does not exist. Non-farmers in Utah and Wyoming preferred non-lethal methods of predator management while farmers chose whichever lethal or non-lethal method would work best (McIvor and Conover 1994).

Whereas lethal predator control was once acceptable for many reasons, recently it has been found to be acceptable in only a few circumstances such as controlling disease, ensuring species survival, managing population levels, and public safety (Koval and Mertig 2004). Martinez-Espineira (2006) studied the controversy over public rejection of different methods of coyote control and found lethal control to be acceptable only when coyotes are causing damage. Messmer (1999) found that public support for predator management in situations where control is recommended to reverse population declines of desirable species or when used in conjunction with indirect management techniques that have greater long-term benefit, such as habitat
restoration. Public stakeholders may more readily support predator control when it is used in a surgical manner rather than when applied broadly. Kellert and Berry (1980) found the major variables affecting public attitudes towards animal damage control to be: specific preferences, ethics of control, cost of control method, specificity of control, environmental impact, competing values and safety of control. Without gauging public opinion, lethal management will inevitably lead to disputes. Public education may also change attitudes. Ball (1996) noted, “…a public may answer differently if they understand that the problem of high predation rates [on waterfowl] is real, is largely human caused, and negatively affects a diversity of species. They also may answer differently if they trust us to conduct predator control humanely and to continually seek non-lethal alternatives.”

The role of human dimensions

In some respects, wildlife management has become as much about managing the public interest as it has about managing wildlife; managers today must consider public demands to protect wildlife from people as well as demands to protect people and property from wildlife (Treves and Naughton-Treves 2005). Goals of wildlife management have been changing, moving away from an earlier focus on maximum sustained yields of game species to maximizing wildlife values as well as holistic landscape and habitat conservation (Conover 2003).

Currently, wildlife managers face many challenging tasks involving both biological and sociological influences (Decker and Chase 1997, Bath 1998). Contemporary managers must identify and understand the desires and concerns of a diverse group of stakeholders, reduce conflicts between people and wildlife species, deal with increasing numbers of user groups, and (Decker and Chase 1997, Gigliotti and Decker 1992). Managers are finding they must work within a complex interface of sociological and biological forces (Decker and Chase 1997).
Integration of human dimensions into the decision-making process increases public acceptance, thus rendering management policy more effective and valuable (Gigliotti and Decker 1992, Johnson et al. 1993). The study presented here is a direct outcome of these changes.

Objectives of this study were to determine value orientations of agricultural producers in the PPR and establish correlations between value orientation and attitudes towards predators in terms of individual species and reduction. We hypothesized stakeholder value orientations will be predictive of their attitudes towards predators.

METHODS

*Population Sampled*

I surveyed agricultural producers in 3 states of the prairie pothole region of the upper central plains (North Dakota, South Dakota, Minnesota). Agriculture is a dominant industry in this region with the number of farms equally 31,300, 30,100, and 79,000 in South Dakota, North Dakota, and Minnesota respectively (U. S. Department of Agriculture, 2008). These farms compose 90.2%, 89%, and 54% of the total land area in their respective states. A total of 6,000 agriculture producers were randomly selected (2,000 per state) using SIC codes from the U.S. Census Bureau (2005) with the names and addresses obtained from a commercial sampling firm. To avoid possible complications encountered by farms owned by partnerships or corporations the sample frame was delimited to individual-owned farms. Survey participants were randomly selected by county for western counties in the state of Minnesota and throughout the states as a whole for farms in North and South Dakota. No effort was made to stratify producers by type of agriculture operation (e.g., row crop, pasture). Sample sizes were determined at the 95% confidence interval with ±3% sample error.
Questionnaire Development and Administration

Data for this study were gathered via a self-administered return mail 8-page questionnaire (including cover and comments section, leaving 7 pages for items) for each of the population samples (Appendix A). The questionnaire was developed in cooperation with biologists with Delta Waterfowl. The survey questionnaire examined attitudes towards enrollment in conservation easements, attitudes towards management practices implemented to benefit wildlife, past experience with predators, knowledge of and attitudes toward predators, and attitudes toward predator management. We implemented the survey using a modified Dillman (2007) methodology and employed an initial mailing of questionnaire, cover letter, and stamped return envelope (questionnaire packet), with non-respondents receiving a reminder postcard (Appendix B and C). A survey wave comprised of a questionnaire mailing and a postcard reminder. Data from 2 waves were used in this thesis. The first mailing was sent June 19\textsuperscript{th}, June 23\textsuperscript{rd}, and June 26\textsuperscript{th} 2008 for South Dakota, North Dakota, and Minnesota, respectively. Reminder postcards were sent on July 10\textsuperscript{th}, 2008. The second mailing was sent August 13\textsuperscript{th}, 2008 with the reminder postcard sent August 27\textsuperscript{th}, 2008. Data were coded and entered in an SPSS database for analysis.

RESULTS

Descriptive findings

Of the total sample of 6,000 agricultural producers, 369 (6\%) were returned undeliverable. We also received 9 direct requests from individuals to remove them from the mailing list. Also, 65 (1.15\%) individuals returned incomplete questionnaires. We received a total usable response of 1,226 (22.0\%) usable questionnaires, for a confidence interval of ± 2.05\% at a 95\% (α = 0.05) confidence level. Of the questionnaires returned, 347 (18.5\%) were
from North Dakota, 411 (22.2%) were from South Dakota, and 468 (25.3%) were from Minnesota.

Most respondents (91.9%) were male, and the average response age was 60 years old. Ninety-five percent of the respondents reported having their land in production during the upcoming farming season with 73.3% farming the land themselves. Most (83.5%) producers planted row crops, followed by 43.8% raising livestock, 40.4% planting forage crops, 18.1% planting wheat or small grain, 6.9% other, and 3.6% had dairy operations. A majority (75.3%) said farming is their primary source of income, and the mean number of acres owned is 807.

**Analysis**

The 15 Likert-type questions were subjected to principal component factor analysis with varimax rotation (PCA) using SPSS 16.0 (Chicago, Illinois) for Windows. PCA identified 3 components with eigenvalues exceeding 1.0, explaining 30.11%, 18.32%, and 9.16% of the variance, respectively (Table 2.1). The third component pertained to government regulation rather than value orientations; as such, it was not used in further analysis seeking to describe value orientations. The 2 component solution explained 54.33% of the variance, with 33.30% and 21.02% contributed by Component 1 and 2, respectively. Cronbach’s Alpha test for reliability was .811.

Whereas most research examines 2 anthropocentric/biocentric (occasionally termed ecocentric) groups (Bright and Burtz 2006, McFarlane and Boxall 2000, Vaske and Donnelly 1999), we followed the study by Manfredo et al. (1999) and split the respondents into 3 groups—anthropocentric, biocentric, and moderate. We then performed chi-square tests for independence, checking group size effect with eta.
Attitudes towards species

When comparing value orientations of respondents we found significant differences in attitudes towards problem species on their property. More than twice as many anthropocentric (64.1%) respondents responded that Canada Geese and birds caused problems on their land compared to biocentric respondents (30.8%); 35.9% moderate respondents said Canada Geese were problematic (Table 2.2). Nearly twice as many anthropocentric (74.9%) respondents reported deer cause problems on their land compared to biocentric (38.9%) respondents; 53.4% of moderate respondents said deer cause problems. More than 3 times as many anthropocentric (14.8%) respondents reported muskrats caused problems compared to biocentric (4.3%) respondents. Also, 49.8% of anthropocentric respondents reported coyotes were problematic, compared to 34.1% and 42.3% of biocentric and moderate respondents, respectively. A third (33.6%) of anthropocentric respondents reported birds caused problems while 15.4% of moderate and 13.3% of biocentric respondents had similar responses.

When asked to describe the acceptability of trapping a species, most respondents, regardless of value orientation, found it either ‘acceptable in some cases’ or ‘acceptable in all cases’ to reduce foxes, raccoons, coyotes, muskrats, ground squirrels and skunks (Table 2.3). Surprisingly, 62.2% of biocentric respondents found it acceptable to trap foxes while only 52.2% of anthropocentric respondents agreed. Similarly, 85% of biocentric respondents, 78.8% of moderate respondents, and 69.6% of anthropocentric respondents it was acceptable to trap raccoons. Similar responses were found for trapping coyotes (81.8%, 82.1%, 69.5%, respectively). Trapping skunks was acceptable for most respondents from each group: 82.6%, 80.9%, and 78.5%. Mink were the least acceptable to trap for respondents in each group. We found significant differences in the acceptability of trapping foxes and raccoons among value
orientation groups—a greater percentage of biocentric respondents (62.5% and 85%, respectively) found it acceptable to trap foxes and raccoons “in some cases” or “in all cases” than anthropocentric respondents (52.2% and 69.6%, respectively). However, a greater percentage of anthropocentric respondents than either biocentric or moderate respondents reported it was ‘acceptable in all cases’ to trap raccoons, mink, and muskrats. A slightly greater percentage of moderate respondents found it ‘acceptable in all cases’ to trap foxes, coyotes, ground squirrels and skunks than anthropocentric respondents.

*Attitudes towards trapping*

When asked to describe the acceptability of trapping under different circumstances, significant differences were found among value orientation groups (see Table 2.4 for itemized $\chi^2$ and $p$-values). Most anthropocentric respondents (63.1% and 72.4%, respectively) found trapping to prevent economic loss and to protect livestock and property ‘acceptable in all cases.’ Thirty four point nine percent of biocentric and 52.8% of moderate respondents found trapping to prevent economic loss ‘acceptable in all cases.’ Approximately 55% of biocentric and 70.6% of moderate respondents found trapping to protect livestock and property “acceptable in all cases.” However, 84.6%, 88.5% and 85.8% of biocentric, moderate and anthropocentric respondents, respectively, agreed that trapping was acceptable in some or in all cases to prevent economic loss. Similarly, 92.5%, 91.8% and 89.6% of biocentric, moderate and anthropocentric respondents, respectively, agreed that trapping is acceptable in some or in all cases to protect livestock and property. Approximately half of all respondents found trapping for recreation ‘acceptable in some cases’ or ‘acceptable in all cases.’ Most (88.66%) respondents found trapping to prevent the spread of disease ‘acceptable in some cases’ or ‘acceptable in all cases.’ The only situation that a minority (43.0%) of all respondents found it acceptable to trap in some
or all cases is when it’s done primarily to get money. No differences ($\chi^2 = 1.423, p = .491$ and $\chi^2 = 5.533, p = .063$, respectively) among value orientation groups were detected when asked if respondents currently allow trappers on their land or if they would allow trappers on their land in the spring or summer with most respondents saying ‘yes’ (Table 2.5). However, significantly ($\chi^2 = 85.341, p = .000$) more biocentric (85.9%) and moderate (81.8%) respondents than anthropocentric (54.1%) respondents would either outright support a program to reduce predators on private land if the program was intended to increase waterfowl production or would support it under certain conditions.

Whereas 57.6% of anthropocentric respondents agreed to support a program intended to increase waterfowl production if financial incentives for landowners were offered, only 38.3% of moderate and 21.2% of biocentric respondents agreed ($\chi^2 = 25.723, p \leq .001$) (Table 2.6). Interestingly, when landowners were offered control of who traps, when and how many animals were trapped 73.7% of biocentric, 84.8% of moderate, and 69.4% of anthropocentric respondents agreed to support the program ($\chi^2 = 12.470, p \leq .05$).

DISCUSSION

Results of this study support the examination of value orientation influence on attitudes similar to findings of previous research (Vaske and Donnelly 1999, Fulton et al. 1996). However, currently no research exists that examines value orientations of agricultural producers in terms of species that cause damage and the acceptability of removing species. That twice as many anthropocentric as biocentric respondents claimed Canada geese and other birds caused problems on their land, and nearly as many responded similarly in terms of deer is not surprising. Geese, other birds (blackbirds, starlings, pheasants, etc), and deer are all known crop depredators (Dolbeer et al. 1994); as such, it is plausible that anthropocentric respondents, those who have a
human-centered view of the non-human world (Eckersely 1999), are more likely to view them as a pest than biocentric respondents who have an appreciative view of wildlife. Similarly, Conover and Decker (1991) results show that deer (*Odocoileus* spp.), blackbirds (*Icterinae*), beaver (*Castor canadensis*), geese (*Anserini*), Blackbirds and European starlings (*Sturnus vulgaris*) were ranked the highest causes of damage by wildlife and natural resource professionals. It is interesting to note that almost half (49.8%) of anthropocentric respondents said coyotes cause problems whereas over a third (34.1%) of biocentric and 42.3% of moderate respondents made the same claim. Our results revealed significant differences in attitudes toward a variety of species—both predators and non-predators—in terms of value orientation.

We found no significant differences in the groups’ responses when asked if they currently allow trappers on their land and if they would allow trappers on their land in the spring and summer to reduce predators. However, significantly fewer anthropocentric respondents would support a program to reduce predators on private land if it was intended to increase waterfowl production compared to the other two groups. Respondents with anthropocentric value orientation reported Canada geese and other birds (often identified by the respondents as ‘ducks’) were problematic on their property more often than the other value orientation groups; as such, anthropocentric respondents would more likely oppose a program intended to increase those populations. Conversely, biocentric respondents may be more aware of low population numbers, thus fueling greater support for a program intended to bolster those numbers. Biocentric respondents belonged to environmental organizations in greater numbers than moderate or anthropocentric respondents (Martin and Miller 2008). Many organizations provide conservation information to members. As such, biocentric respondents are likely more informed regarding conservation issues, particularly the issue of low duck production in the PPR. This
falls in line with the findings of Vaske and Donnelly (1999) – those with higher education were more biocentric. Those respondents may also be more opposed to lethal predator reduction than anthropocentric respondents (Manfredo et al. 1999). Conversely, attitudes of farmers, livestock owners and rural residents who have direct contact and experience with predators are likely to have the strongest negative attitudes towards carnivore conservation efforts; tolerance of these animals has direct negative economic consequences for this group (Williams et al. 2002).

The responses of individuals with biocentric value orientations regarding the acceptability of trapping a species to increase waterfowl number to likely be related to greater awareness of the situation (McFarlane and Boxall 2000); however, further research is needed to determine the causes of this difference. The red fox is a severe predator of nesting ducks in uplands (Johnson and Sargeant 1977, Johnson et al. 1989). Coyotes are believed to be less detrimental to duck production than foxes (Johnson et al. 1989), and coyotes and red foxes are territorial but in sympatric populations coyotes exclude foxes (Sargeant et al. 1993). As coyotes have declined since the 1930s, foxes have increased in the eastern half of the PPR (Sargeant 1982). McFarlane and Boxall (2000) found a group of stakeholders to be unaware of management strategies, thus affecting their attitudes. In a similar manner, it may be possible that biocentric respondents are more aware of the environmental implications red foxes have in the PPR. This is partially supported by the greater number of biocentric respondents’ membership in environmental organizations (Martin and Miller 2008) as well as the findings of Vaske and Donnelly (1999). Public stakeholders have been found to be favorable towards predator reduction to increase bird production. Messmer et al. (1999) surveyed American households with regard to public attitudes towards medium-sized predator removal to enhance avian
recruitment. Given specific predator control scenarios, stakeholders supported predator control to increase avian recruitment, except scenarios that included controlling raptors.

Our findings suggest that for all species except mink, a majority of respondents found trapping acceptable to bolster waterfowl numbers. Kellert (1985) found predators as a group to be generally disliked in comparison to birds and domestic animals; animals were favored if they were charismatic or belonged to an evolutionarily advanced class.

Whereas most moderate and biocentric respondents found trapping acceptable in some or in all cases to prevent economic loss, to protect livestock and property, and for recreation significantly more anthropocentric respondents believed trapping was acceptable in all cases in those situations. Unlike Manfredo’s et al. (1999) results, an overwhelming majority of respondents in all three groups believed trapping to prevent the spread of disease to be acceptable in some or in all cases. Previous studies found trapping to be acceptable in only a few situations—controlling disease (Koval and Mertig 2004, Manfredo et al. 1999), preventing damage (Manfredo et al. 1999, Koval and Mertig 2004, Martinez-Espineira 2006) and protecting livestock and crops (Reiter et al. 1999). Manfredo et al. (1999) found utilitarians (anthropocentrics) and moderates believed trapping an acceptable practice to prevent economic loss, but all three groups disapproved of trapping when conducted primarily for income or recreation. Manfredo et al. (2003) found rural residents held more anthropocentric attitudes towards wildlife whereas urban residents possessed more biocentric attitudes towards wildlife. All of our respondents were rural residents for at least a portion of the year; therefore, it may be possible that the level of biocentricity in the PPR may differ from those in urban settings. Further research is needed to determine those differences.
MANAGEMENT IMPLICATIONS

We found majority public support for most lethal management situations presented in this study, however some situations received greater support than others. Respondents, regardless of value orientation, were overwhelmingly supportive of trapping wildlife to protect livestock and property, prevent the spread of disease and prevent economic loss. Respondents were less supportive of trapping primarily for income or recreation. Significantly fewer anthropocentric respondents than biocentric and moderate respondents would support a program to reduce predators on private land if the program was intended to increase waterfowl production. However, no significant differences were found when each group was asked if they currently allow trappers on their land or if they would be willing do so. Moreover, most respondents believed trapping foxes, raccoons, coyotes, ground squirrels, muskrats, and skunks was acceptable in some or in all cases.

Results of this study may assist managers striving to increase waterfowl numbers. Agricultural producers in the prairie pothole region, like most rural Americans (Manfredo et al. 2003), are perhaps more anthropocentric than urbanites in other parts of the country. This difference, paradoxically, may prove beneficial for some wildlife species. They are supportive of predator reduction in most situations, and would find it acceptable to trap numerous species that are known duck predators. Whereas significantly fewer anthropocentric respondents would support a program intended to increase waterfowl numbers than the other respondents, a majority (54.1%) said they would either outright support the program or would support it under certain conditions—mostly, if they were given financial incentives to do so and if they controlled who trapped, when and how many animals were trapped. Values, and thus value orientations, are the most-stable in the cognitive structure (Rokeach 1973), rendering them difficult, if not
impossible, to alter. However, with a firmer understanding of anthropocentric respondent’s resistance to increasing waterfowl numbers—mainly, crop depredation, and the desire for financial incentives to do so and control over how it’s done—managers can decipher steps in creating programs that appeal to both agricultural producers and biologists hoping to increase waterfowl numbers.
<table>
<thead>
<tr>
<th>Item</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not enjoy seeing wildlife during my daily routine</td>
<td>.839</td>
<td>.021</td>
</tr>
<tr>
<td>Having wildlife on my land is not important to me.</td>
<td>.823</td>
<td>.090</td>
</tr>
<tr>
<td>I do not enjoy seeing waterfowl in my wetlands</td>
<td>.785</td>
<td>.183</td>
</tr>
<tr>
<td>Encountering wildlife is not a natural part of farming</td>
<td>.746</td>
<td>-.156</td>
</tr>
<tr>
<td>Prairie potholes are not crucial for waterfowl production</td>
<td>.647</td>
<td>.218</td>
</tr>
<tr>
<td>Set aside programs do not provide benefits beyond subsides</td>
<td>.516</td>
<td>.065</td>
</tr>
<tr>
<td>Landowners have the right to use their land as they see fit</td>
<td>-.058</td>
<td>.773</td>
</tr>
<tr>
<td>Agricultural producers are the best judges of how to use their land</td>
<td>.048</td>
<td>.764</td>
</tr>
<tr>
<td>Property owners should have more control over wildlife on their land.</td>
<td>-.030</td>
<td>.719</td>
</tr>
<tr>
<td>Farmers should be able to remove problem wildlife without first getting state permits or permission.</td>
<td>.032</td>
<td>.685</td>
</tr>
<tr>
<td>Farming is a better use of land than retaining wetlands</td>
<td>.361</td>
<td>.654</td>
</tr>
<tr>
<td>Crop production is more important than wildlife production on agricultural land</td>
<td>.315</td>
<td>.575</td>
</tr>
<tr>
<td>% variance explained</td>
<td>33.3</td>
<td>21.0</td>
</tr>
</tbody>
</table>
Table 2.2 Agriculture producer perceptions of problem wildlife species on agricultural lands, Prairie Pothole Region, 2008. (n = 1046)

| Species              | Biocentric | | Moderate | | Anthropocentric | | \(\chi^2\) | \(\eta\) |
|----------------------|------------|-------------|--------|-------------|--------|--------|--------|
|                      | Yes | No | Yes | No | Yes | No |        |        |
| **Canada geese**     | 65  | 146 | 220 | 392 | 143 | 80  | 64.860** | 0.221 |
|                      | %   |    | 30.80 | 69.20 | 35.90 | 64.10 | 64.10 | 35.90 |
| **Deer**             | 82  | 129 | 327 | 285 | 167 | 56  | 58.461** | 0.234 |
|                      | %   |    | 38.9 | 61.1 | 53.4 | 46.6 | 74.9 | 25.1  |
| **Birds**            | 28  | 183 | 94  | 518 | 75  | 148 | 41.052** | 0.17  |
|                      | %   |    | 13.3 | 86.7 | 15.4 | 84.6 | 33.6 | 66.4  |
| **Muskrats**         | 9   | 202 | 58  | 551 | 33  | 190 | 13.923*  | 0.115 |
|                      | %   |    | 4.3 | 95.7 | 9.5 | 90.5 | 14.8 | 85.2  |
| **Coyotes**          | 72  | 139 | 259 | 353 | 111 | 112 | 10.889*  | 0.102 |
|                      | %   |    | 34.1 | 65.9 | 42.3 | 57.7 | 49.8 | 50.2  |
| **Raccoons**         | 84  | 127 | 278 | 334 | 101 | 122 | 2.126  | 0.035 |
|                      | %   |    | 39.8 | 60.2 | 45.4 | 54.6 | 45.3 | 54.7  |
| **Skunks**           | 50  | 161 | 191 | 421 | 70  | 153 | 4.611  | 0.053 |
|                      | %   |    | 23.7 | 76.3 | 31.2 | 68.8 | 31.4 | 68.6  |
| **Rabbits**          | 44  | 167 | 139 | 473 | 61  | 162 | 2.873  | 0.05  |
|                      | %   |    | 20.9 | 79.1 | 22.7 | 77.3 | 27.4 | 72.6  |
| **Foxes**            | 15  | 196 | 62  | 550 | 30  | 193 | 4.767  | 0.067 |
|                      | %   |    | 7.1 | 92.9 | 10.1 | 89.9 | 13.5 | 86.5  |
| **Beavers**          | 40  | 171 | 115 | 497 | 51  | 172 | 1.81   | 0.032 |
|                      | %   |    | 19  | 81  | 18.8 | 81.2 | 22.9 | 77.1  |
| **GroundSquirrels/ Gophers** | 82  | 129 | 230 | 382 | 82  | 141 | 0.207  | 0.014 |
|                      | %   |    | 38.9 | 61.1 | 37.6 | 62.4 | 36.8 | 63.2  |

\(**p \leq 0.001\)

\(*p \leq 0.05\)
Table 2.3. Agriculture producer perceptions of the acceptability of trapping a species to increase waterfowl production on agricultural lands, Prairie Pothole Region, 2008. (n = 652)

<table>
<thead>
<tr>
<th>Species</th>
<th>Biocentric</th>
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** **p ≤ 0.001  
* p ≤ 0.05
Table 2.4. Acceptability of trapping given different situations by wildlife value orientation, Prairie Pothole Region, 2008. (n = 776)

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** p≤.001
• p≤.05
Table 2.5  Responses of agricultural producers in the Prairie Pothole Region regarding trapper access by value orientation, Prairie Pothole Region, 2008. (n = 990)

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<td>Yes*</td>
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<td>Do you currently allow trappers on your land?</td>
<td>n 125</td>
<td>75</td>
<td>382</td>
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<tr>
<td></td>
<td>% 62.5</td>
<td>37.5</td>
<td>65.1</td>
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<td>Would you allow trappers on your land to reduce predators in the spring and summer?</td>
<td>n 139</td>
<td>57</td>
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<td>% 70.9</td>
<td>29.1</td>
<td>77.1</td>
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<td>Would you support a program to reduce predators (trapping) on private land if the program was intended to increase waterfowl production?</td>
<td>n 171</td>
<td>28</td>
<td>475</td>
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<td></td>
<td>% 85.9</td>
<td>14.1</td>
<td>81.8</td>
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** p≤.001  
* 'Yes' and 'Yes under certain conditions' combined
Table 2.6 Conditional support for trapping program to increase waterfowl production, Prairie Pothole Region, 2008. (n = 1046)

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<td>Financial incentives for landowners</td>
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<td>78</td>
<td>111</td>
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<td>Landowner controls who traps, when and how many animals are trapped</td>
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<td>73</td>
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<tr>
<td>Program administered by federal agency</td>
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<td></td>
<td>%</td>
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<td>Program administered by a private organization, NOT a government agency</td>
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\( ** \) \( p \leq 0.001 \)

\( * \) \( p \leq 0.05 \)
Literature Cited


CHAPTER 3

VALUE ORIENTATIONS OF AGRICULTURE PRODUCER’S IN THE PRAIRIE POTHOLE REGION TOWARDS LAND MANAGEMENT AND ENROLLMENT IN CONSERVATION PROGRAMS

INTRODUCTION

Changes in the Prairie Pothole Region

The glaciated Prairie Pothole Region (PPR) is composed of approximately 207,200 km² of the north-central United States and approximately 569,800 km² in south-central Canada (Higgins 1977). In total, this area encompasses nearly 777,000 km² from Central Alberta to central Iowa and southern South Dakota (Kirby et al. 2002). The topography in the PPR is dotted with shallow basins created by glacial advances and retreats. Most of these basins hold surface water for only a short period of time. The PPR was once a continuous short grass ecosystem broken up by these natural wetlands and occasional hammocks. As it did then, this system of prairie potholes still provides habitat for an array of wildlife (Higgins 1981, Kirby et al. 2002, Brown 1976). The PPR comprises only 10% of North America’s wetlands yet it produces approximately 50% of the waterfowl annually (Kirby et al. 2002). In short, the PPR is critical waterfowl breeding habitat.

The PPR has changed dramatically over the past century; human settlement and agricultural practices resulted in wetland drainage, habitat loss, and habitat fragmentation (Ratti and Scott 1991, Sugden and Beyersbergen 1984, Cowardin et al. 1983). That potholes contain water only temporarily allows them to be cultivated (Kirby et al. 2002); thus, the once prairie-
dominated system is now dominated by monoculture small grain farms that provide for the
demands of rising human population numbers and economic pressures (Higgins 1977).
Economic pressures led to a need for greater production efficiency from the land, and this
enhanced efficiency has been achieved by increased production on each unit of cropland, and by
the conversion of wetlands and grasslands, and parklands to cropland. Conversion has led to at
least 50% of the previously uncultivated habitats in the PPR to be converted to cropland. Less
than 20% of the original grasslands remain in North Dakota, and, of those that remain, most are
heavily grazed (Cowardin et al. 1983). Moreover, in the past, 20-40% of the wetlands were
wholly or partly drained for cropland. Once drained, these wetlands provide arable land and
eliminate the cost of tilling around the potholes (Brown 1976). Quality of wetlands that remain
intact is negatively impacted by agricultural practices. Nearly all the land in the PPR is used to
graze livestock or grow crops, and in many counties >80% of the upland is cultivated annually
(Sugden and Beyersbergen 1984). These land use alterations have resulted in changes in both
composition and abundance of predator communities in the PPR (Cowardin et al. 1983).

Predator populations in the PPR have been directly affected by humans through both the
extensive change of habitat from prairie grassland to agriculture and by human-inflicted
mortality (Sargeant et al. 1993). Conversion of the PPR led to fragmented natural habitats,
increased the structural diversity of habitats, and resulted in the establishments of farmsteads
with associated shelter, human presence, and food sources. Eradication of large predators, such
as coyotes (*Canis latrans*) and wolves (*Canis lupus*), increased number of trees on the prairies,
and intensification of agriculture has led to the increase of medium-sized predators such as the
red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*) and

**Farming practices and land management in the Prairie Potholes**

Although critical to waterfowl production, the PPR is also critical to crop production for human consumption. Agriculture is a dominant industry in this region with the number of farms equally 31,300, 30,100, and 79, 00 in South Dakota, North Dakota, and Minnesota respectively (U.S. Department of Agriculture, 2008). These farms compose 90.2%, 89%, and 54% of the total land area in their respective states. Few occupational groups have as significant an impact on wildlife and natural resources as have farmers (Conover 1994). As a result, agriculture shapes the landscape and quality of habitat of the PPR. Individual farmers make land use decisions based on expertise, lifestyle choice, tradition, and economic profitability with a dynamic interplay occurring among these factors (Ringelman 2005). Although farmers are generally reluctant to take on radical changes in their expertise by adopting new traditions, changes are occurring within the PPR that are reshaping the landscape and quality of wildlife habitat in that region.

In less than 100 years in South Dakota the average farm size has more than quadrupled; however, the proportion of South Dakotans residing on farms declined three-fold despite statewide population increases (Higgins et al. 2002). In 1995, South Dakota’s urban population exceeded its rural population for the first time since statehood. Diminishing rural economics of the northern Great Plains suppressed agricultural commodity prices and forced farmers and rancher to seek alternative employment (Licht 1997). Many families choose to sell their farms to larger operations and move to town (Higgins et al. 2002). Similar trends are occurring in North
Dakota with the number of farms declining from 86,000 in 1993 to 30,100 in 1997. Minnesota also exhibits similar declines with 98,537 farms in 1974 and 80,865 in 2002.

Conversion of grassland to cropland has increased grazing intensity on remaining grasslands (Ringelman 2005). Nearly 3.5 million acres of rangeland (14% decrease) were converted to cropland during 1977-1997 in South Dakota with similar patterns existing throughout North Dakota (Higgins et al. 2002). Almost 420,000 acres of North Dakota CRP were converted to cropland in 2007 (DU Press Release 2008). Recent increase in sizes of individual livestock animals intensifies poor range conditions with the need to produce more forage on fewer acres to feed cattle currently up to 30% heavier than 60 years ago. Moreover, drainage of wetlands for conversion to cropland has resulted in wetland loss estimated at 35% and 49% in the PPR of South Dakota and North Dakota, respectively (Dahl 1990).

Changes in field sizes and crop types have decreased the quality of wildlife habitat on these farm landscapes (Ringelman 2005). Cereal crops that provided some nesting cover are now being replaced by row crops that provide no habitat for grassland birds. Use of genetically modified row crops and current emphasis in crop research to develop more drought-tolerant and herbicide-resistant varieties has led to once unviable crops being produced in new regions. For example, sixty years ago North and South Dakota were considered too dry to grow soybeans yet these states now produce larger quantities of soybeans than corn (Higgins et al. 2002). Moreover, four renewable energy sources being developed in the PPR include wind power, fuels from grass biomass products, soy fuels from soybeans and ethanol from corn, (Ringelman 2005). Biofuels have the potential to reduce carbon dioxide emissions and air pollution, with plants such as Switchgrass (*Panicum virgatum*) noted as potential biomass fuel crops. Unlike the now-
popular row crops, switchgrass has the potential to provide quality habitat for numerous species
of grassland birds.

Declining numbers of farm families and loss of native rangeland has coincided with
changes in farm equipment (Ringelman 2005). Modern equipment increases efficiency and has
led to “cleaner” farming practices; operators can now farm ditch-to-ditch, removing grass along
field borders and rendering as much land plow-able as possible. Field size has increased to
efficiently utilize modern equipment (Cowardin et al. 1983). Currently, farmers can till and
plant 3 times as many wheat and corn acres using tractors that have horsepower ratings
quadruple of those available in 1960 (Higgins et al. 2002). These changes are apparent from the
elimination of fencerows, tillage of road ditches, drainage of wetlands, increased use of
herbicides and insecticides and burying of rock piles (Cowardin et al. 1983). Intensification of
farming has concentrated prey and predator activity in the remaining untilled habitats and
reduced the amount of prey available to predators during waterfowl nesting, ultimately resulting
in a decline in waterfowl nest success.

Effect of farming on wildlife habitat

Wetland function and quality are degraded primarily by agricultural activities associated
with annual crops including cultivation of wetland basins, siltation due to soil erosion, drainage,
and agricultural chemicals (Kantrud et al. 1989). Agricultural activities that effect upland
habitats also effect duck populations (Bethke and Nudds 1995) and production—most dabbling
ducks nest in grasses, forbs, and shrubs of the uplands (Johnson et al. 1987, Klett et al. 1988).
Sugden and Beyersbergen (1984) found 82.7% of uplands in Saskatchewan were annually tilled,
with half of the plots in their study containing little or no potential for wildlife production. Poor
upland habitat is related to heavy grazing which increases predation, drought, lack of cover,
annual tillage, and tillage operations on croplands which can be fatal to both the hen and the nest. Klett et al. (1988) found native prairie and planted cover are most selected by ducks and the highest nest success rates occur in these habitats compared to other habitats. Idle stands of cool-season and legumes produced the maximum number of upland nesting ducks (Duebbert and Kantrud 1974). Good duck production on untilled, quality, upland habitat occurs regularly if water conditions are also optimal, and poor production is most often associated with poor upland vegetation or drought (Higgins 1975). Ducks are not the only species that benefit from good quality upland habitat—both shorebirds and upland game birds have had greater nest and successful nest densities on untilled upland than on annually cultivated land (Higgins 1975).

Although agricultural practices have changed the landscape, they have also altered the predator community within the PPR. Predator populations in the PPR have been affected directly by humans through both the extensive change of habitat from prairie grassland to agriculture and by human-inflicted mortality (Sargeant et al. 1993). Conversion of the PPR led to fragmented natural habitats, increased the structural diversity of habitats, and resulted in the establishments of farmsteads with associated shelter, human presence, and food sources. Reduction of eradication of large predators, such as coyotes (Canis latrans) and wolves (Canis lupus), increased number of trees on the prairies, and intensification of agriculture has led to increased populations of medium-sized predators such as the red fox (Vulpes vulpes) and raccoon (Procyon lotor) (Sargeant et al 1993, Cowardin et al 1983). Mammalian predator species that ultimately benefited most from this habitat change were the coyote (Canis latrans), red fox (Vulpes vulpes), raccoon (Procyon lotor), and Franklin’s ground squirrel (Spermophilus franklinii). The striped skunk (Mephitis mephitis) has likely benefited from the agricultural development, as they make extensive use of human habitation. However, they are also frequently
considered a pest by humans and are subsequently killed, but are also trapped for their fur. The Red-tailed Hawk (*Buteo jamaicensis*) is likely the only avian predator that has benefited from the agricultural development.

*Conservation easements*

Approximately 43% of the United States (377 million hectares) was managed as private cropland, pastureland, or rangeland during 2007 rendering agricultural the dominant user of the land (U.S. Census Bureau 2006). Decisions America’s ranchers and farmers make directly affect the land’s soil, water, plant life and wildlife. These stewardship decisions cannot be understood apart from the landowners’ basic needs to support themselves and their families. Despite many technological advances, farming is not an easy way to make a living from the land. Many agricultural programs and policies available to farmers and ranchers have influenced the management of their land.

During 1985, Congress passed the Food Security Act of 1985 (hereafter, Farm Bill) which included a chapter on conservation for the first time (U.S. Department of Agriculture 2008c). As a result of the conservation provisions, United States Department of Agriculture (USDA) programs are required to adhere to environmental standards on certain categories of land in order to remain eligible for other USDA farm program benefits. The 1985 Farm Bill created 3 substantial new conservation provisions: the Conservation Reserve Program (CRP), Wetlands Conservation (Swampbuster), and Highly Erodible Land (HEL). The Swampbuster and HEL provisions halted access to federal farm program benefits to landowners who did not meet conservation program requirements (Zinn 2000), while the CRP took highly erodible and eroding cropland out of production with a 10 to 15-year rental payment in return. These programs are beneficial to wildlife—studies have shown landscape-level changes brought about
by the U.S. Farm Bills have resulted in an increase in the average nest success of ducks breeding in the PPR (Reynolds et al. 2001, Drever et al. 2007).

Swampbuster provisions withdraw program benefits from producers who convert wetlands for the production of agricultural commodities, thus helping to protect wetlands from drainage and conversion (U.S. Department of Agriculture 2008c). However, Swampbuster provisions do not create or restore drained wetlands or require management on them.

Whereas Swampbuster and HEL minimize habitat loss, CRP helps build quality habitat for a variety of wildlife. Landowners who enroll in CRP convert cropland to perennial grass or tree cover and receive annual payments for 10 to 15 years (U.S. Department of Agriculture 2008c). During 1993, North Dakota and South Dakota had approximately 2.2 million and 1.2 million acres enrolled, respectively. Studies reveal that nest success of waterfowl in CRP fields exceeds levels necessary to maintain population levels (Kantrud 1993, Reynolds et al. 1994) and CRP cover is the preferred nesting habitat for 5 species of upland-nesting ducks (mallard [Anas platyrhynchos] gadwall [Anas strepera], blue-winged teal [Anas dicors], northern shoveler [Anas clypeata], and northern pintail [Anas acuta] (Reynolds 2001). CRP was estimated to be responsible for producing an additional 2.1 million ducks annually in the PPR during the period 1992-1997.

Landowners, under the Continuous Enrollment Conservation Reserve Program, enroll small acreages into selection conservation practices such as riparian forest buffers, grassed waterways, field breaks, shelterbelts, filter strips, and contour buffers and receive monetary compensation in return (U.S. Department of Agriculture 2008c). Goals of this program are to protect soil, conserve biodiversity, beautify the landscape, improve air and water quality, and enhance fish and wildlife habitat.
The Wetland Reserve Program (WRP) is a voluntary wetland restoration program in which landowners establish conservation easements of either 30-year or permanent duration, or enter into restoration cost-share agreements where no easement is involved (U.S. Department of Agriculture 2008a). In return for permanent easements, landowners receive 100% of the costs involved in restoring wetlands while the payment is 75% of what would be provided for a permanent easement on the same site and 75% of the restoration cost for a 30-year easement. Where no easement is involved, cost-share agreements have duration for a minimum of 10 years and provide 75% of the cost of restoring wetlands. Landowners maintain access to their land and may be permitted to utilize the easement (grazing, timber harvesting, etc) if they are consistent with long-term wetland protection and enhancement objectives. The WRP, coupled with the promotion of conversion of cropland to perennial cover, will best benefit nesting ducks as mean nest success is a function of both proportion of cropland and wetland density (Drever et al. 2007).

Farmers and ranchers who face serious threats to water, soil, and other natural resources can enroll in the Environmental Quality Incentive Program (EQIP) (U.S. Department of Agriculture 2008a). It offers financial, educational, and technical assistance for installing structural conservation practices, implementing management practices, and establishing vegetation.

The 2008 Farm Bill was enacted during June 2008, and will govern most Federal agriculture and related programs over the next 5 years (U.S. Department of Agriculture 2008b). The 2008 Farm bill continues many of the commodity programs already introduced with adjustments made to payment levels and eligibility. Wetland restoration and farmland preservation programs also continue. The bill also introduces a new average crop revenue
election program, a permanent disaster assistance program and adjusts some details of the long-standing crop insurance program. Beginning and socially disadvantaged farmers and ranchers are consistently provided with enhanced support across most of the titles in the legislation. The 2008 bill also benefits “green” operations. New titles provide for horticultural crops and organic agriculture, with programs established to support producers transitioning to organic agriculture, tailor conservation programs to organic practices, and increase research into organic agriculture. Also, the Energy Title expands existing programs and adds a number of new ones to encourage production, use, and development of biobased and other renewable energy sources. The bill includes a number of tax provisions, including several related to biofuels, including a tax credit for ethanol after the Renewable Fuel Standard for ethanol is reached, a tax credit for cellulosic biofuels and an extension of the additional duty on ethanol imported for fuel use through 2010.

Value orientations and attitudes

The cognitive hierarchy is comprised of behaviors, behavioral intentions, norms, attitudes, basic beliefs, and values (Ball-Rokeach, et al. 1984, Homer and Kahle 1988, Kahle and Timmer 1983, Rokeach 1973, 1979). Like an inverted pyramid with values as the basis of the foundation and behaviors forming the top, these cognitions theoretically build upon one another.

Fundamental values are first order cognitions and are the most central to the cognitive structure, and are the most-stable and fewest in number (Rokeach 1973). Rokeach (1973) found that values are limited in number because they represent basic needs; they address only a few fundamental social and biological human needs. Values are not focused on specific situations but are abstract and concerned with general modes of conduct and desirable end-states. They therefore transcend specific situations and influence and direct the remaining cognitions of the cognitive hierarchy; serving both an influence on and a powerful explanation of behavior
Attitudes are much more numerous than values and are easily articulated. Behavioral intentions and behaviors top off the inverted pyramid of the cognitive hierarchy. Behavioral intentions are described as the endeavor of an individual while behavior is the actual action taken or displayed by an individual. Behaviors are manifestations of attitudes.

Value orientations are described as a pattern of direction and intensity among a set of basic beliefs (Fulton et al. 1996). They represent an individual’s application of values to concrete issues; value orientations guide cognitions which influence behaviors. Moreover, they give organization and meaning to an individual’s values and as a result link them to an array of specific attitudes and behaviors (Zinn et al. 2002). Value orientations therefore provide a foundation for attitudes and norms which, in turn, guide behavior (Manfredo et al. 2003).

Research has shown that value orientations concerning natural resources can be arrayed along a continuum ranging from biocentric to anthropocentric (Steel et al. 1994, Vaske and Donnelly 1999). Anthropocentric value orientations are defined as representing a human-centered view of the non-human world (Eckersely 1992). Anthropocentric value orientations are the basis of traditional natural resource management. Conversely, biocentric value orientations are nature-centered and elevate all components of ecosystems to hold the same rights as humans (Eckersely 1992). While human needs and desires are still important, those with biocentric value orientations tend to see the big picture. Steel et al. (1994) note that biocentric and anthropocentric value orientations are not mutually exclusive. As a result, the two views fall on opposite ends of a continuum with the midpoint representing a mixture of the two extremes.

Attitudes towards land management for wildlife and conservation easements

The significant anthropogenic landscape changes identified above had major impacts on wildlife, habitat, and ecosystems. Management strategies intended to deal with these problems
will require landscape-scale solutions (Wilmot and Brunson 2008). These solutions must reduce, reverse, or mitigate ecosystem degradation while being economically feasible and socially acceptable. For most farmers, economics and social acceptability go hand-in-hand. As agricultural producers control nearly 43% of the total surface area of the United States (U.S. Bur. Of Census 2006) impact on wildlife resources in the U.S. is immense (Kellert and Berry 1980). Their perceptions about wildlife and conservation programs are a crucial issue to wildlife management (Conover 1994). However, perceptions of agricultural producers tend to differ from those held by the general public (Kellert and Berry 1980, McIvor and Conover 1994). Therefore, a firm understanding of their attitudes towards both land management for wildlife and conservation easements is critical to conserving quality habitat on a landscape-level.

Conover (1994) surveyed grass-root leaders of the agricultural community and found that most respondents spend both time and money to improve wildlife habitat on their land. However, for many agricultural producers an abundance of wildlife on their property brings costs as well as benefits (Conover 1997). Most farmers report lost income due to wildlife damage (Conover 1994, Wywialowski 1994). Perceptions of high levels of wildlife damage can reduce a farmer’s tolerance of the species at fault (Conover 1997) with landowners who derive a moderate to high proportion of income from their land being less tolerant of wildlife damage than other landowners (Decker and Brown 1982, Daley et al. 2004). Pease (1993) found a significantly greater proportion of farmers who were not wildlife oriented reported damage than those who were wildlife oriented. Similarly, farmers not wildlife oriented reported nearly twice the dollar value of wildlife damage than wildlife oriented farmers. A consensus was noted among professionals working for federal or state wildlife or agricultural agencies across the U.S. that
wildlife-induced damage reduces the profitability of agricultural producers, with the problem worsening over the past few decades (Conover and Decker 1991).

A 1994 survey of agricultural producers throughout the United States revealed that over half (51%) purposely managed for wildlife on their land in the form of providing cover near fields, providing a water source, leaving crop residue in the field, leaving a portion of the crop unharvested, and providing salt licks—a large portion of farmers and ranchers place a high value on wildlife that inhabit their lands (Conover 1994). However, 80% of the respondents suffered wildlife damage in 1993 with 53% reporting damage that exceeded their tolerance, with the problem species including deer (*Odocoileus* spp.), raccoons (*Procyon lotor*), coyotes (*Canis latrans*), and ground hogs (*Marmota* spp.). Over 40% of agricultural producers in Conover’s (1997) study reported that wildlife damage on their farms or ranches was so severe that they would oppose the creation of a wildlife sanctuary nearby.

Many farmers paradoxically enjoy having abundant wildlife on their property but do not like the damage caused by wildlife; therefore, they take steps to try to accomplish both objectives (Conover 1994). Farmers who allowed hunting were more likely to have wildlife damage and were more likely to consider the damage unacceptable than farmers who prohibited hunting. These results suggest farmers who experience wildlife damage are more likely to allow hunting in an effort to reduce wildlife damage. Attitudes towards wildlife are also species specific (Conover 1997)—sunflower growers in North Dakota, for instance, simultaneous spent resources to protect their crop from blackbirds while attempting to increase pheasant populations for hunting. Most agricultural producers of southern Utah believed the federally listed “threatened” Utah prairie dog (*Cynomys parvidens*) has a right to exist only on public land (Elmore 2006).
Farmers have also revealed a paradoxical viewpoint in terms of government regulations. Svoboda (1984) surveyed private agriculture and forest landowners in Minnesota and found that 82% either disagreed or strongly disagreed that government should regulate private land for wildlife purposes. However, 90% of the same respondents considered the opportunity to observe wildlife on their land as important to highly important. Moreover, 70% of the respondents agreed that government should provide incentives. They also felt little obligation regarding wildlife management—18% said they had little or no obligation, 11% said that landowners have a social or moral obligation, and 23% said the choice should be voluntary. For example, individual acceptance and implementation of riparian forest buffers is tied to positive attitudes towards government programs, poor water quality, and perceived outcome effectiveness of adopted practices (Skelton 2004).

The type of agriculture by which a landowner derives his income also affects his attitudes towards specific species. For example, livestock producers were found to most frequently cite carnivores, with coyotes (*Canis latrans*) the most specified species, as the cause of wildlife damage on their property (Wywialowski, 1994). However, in the Northern Great Plains, prairie dogs and gophers (Geomyidae) were frequently cited. Those who produce field crops cited hoofed mammals (deer), rabbits and rodents, omnivores, and birds as damaging their property. Specifically, pronghorn (*Antilocarpa americana*), elk (*Cervus elaphus*), woodchucks (*Marmota monax*), gophers (Geomyidae), squirrels (*Spermophilus* spp. and *Sciurus* spp.), and raccoon (*Procyon lotor*) were most-often cited. Conover and Decker (1991) results show that deer (*Odocoileus* spp.), blackbirds (Icterinae), beaver (*Castor canadensis*), geese (Anserini), Blackbirds and European starlings (*Sturnus vulgaris*) were ranked the highest causes of damage by wildlife and natural resource professionals.
With the passage of stricter environmental laws, private property owners may feel their property rights are being violated. Many farmers in the PPR are a prime example of private property owners who distrust the government and are less willing to cooperate with programs aimed at increasing quality wildlife habitat. Conservation programs often times have the illusion of loss of property rights (perpetual easements, 15-year contract periods, etc.). As noted above, however, it is crucial to maintain agriculture producers’ trust and willingness to participate in these programs.

Landowners generally want to reduce annual expenses while still holding title to and administrative control of the land (Noonan and Zagata 1982). Conover and Decker (1991) found that state agencies provided a greater level of assistance to farmers during 1987 than they did during 1957. With the passage of numerous conservation easement programs since 1987, we may be able to assume that agencies are still providing reasonable assistance to farmers. However, a lack of communication can foster the idea among farmers that government agencies are not sensitive to their needs or aware of their problems, and that their interests are being sacrificed for those of hunters, recreationists, and other wildlife users (Decker and Brown 1982). Conflicts that are handled improperly can be the source of continued public frustration and both further reduce the credibility of the agency administering the program and detract from long-term objectives (Hewitt and Messmer 1997). However, economic, personal and social incentives can be used to overcome landowner conflicts with agencies or government programs and encourage landowners to manage for wildlife (Svoboda 1984).

The objectives of the research were to determine value orientations of agricultural producers in the PPR and establish correlations between value orientation and wildlife management on property and enrollment in conservation easements. I hypothesized stakeholder
value orientations would be predictive of their attitudes towards land management. I also predicted stakeholders who enroll land in conservation easements would have different value orientations than those who do not.

METHODS

Population Sampled

I surveyed agricultural producers in 3 states of the prairie pothole region of the upper central plains (North Dakota, South Dakota, Minnesota). Agriculture is a dominant industry in this region with the number of farms equally 31,300, 30,100, and 79,000 in South Dakota, North Dakota, and Minnesota respectively (U. S. Department of Agriculture, 2008). These farms compose 90.2%, 89%, and 54% of the total land area in their respective states. A total of 6,000 agriculture producers were randomly selected (2,000 per state) using SIC codes from the U.S. Census Bureau (2005) with the names and addresses obtained from a commercial sampling firm. To avoid possible complications encountered by farms owned by partnerships or corporations the sample frame was delimited to individual-owned farms. Survey participants were randomly selected by county for western counties in the state of Minnesota and throughout the states as a whole for farms in North and South Dakota. No effort was made to stratify producers by type of agriculture operation (e.g., row crop, pasture). Sample sizes were determined at the 95% confidence interval with ±3% sample error.

Questionnaire Development and Administration

Data for this study were gathered via a self-administered return mail 8-page questionnaire (including cover and comments section, leaving 7 pages for items) for each of the population samples (Appendix A). The questionnaire was developed in cooperation with biologists with Delta Waterfowl. The survey questionnaire examined attitudes towards enrollment in
conservation easements, attitudes towards management practices implemented to benefit wildlife, past experience with predators, knowledge of and attitudes toward predators, and attitudes toward predator management. We implemented the survey using a modified Dillman (2007) methodology and employed an initial mailing of questionnaire, cover letter, and stamped return envelope (questionnaire packet), with non-respondents receiving a reminder postcard (Appendix B and C). A survey wave comprised of a questionnaire mailing and a postcard reminder. Data from 2 waves were used in this thesis. The first mailing was sent June 19th, June 23rd, and June 26th 2008 for South Dakota, North Dakota, and Minnesota, respectively. Reminder postcards were sent on July 10th, 2008. The second mailing was sent August 13th, 2008 with the reminder postcard sent August 27th, 2008. Data were coded and entered in an SPSS database for analysis.

RESULTS

Descriptive findings

Of the total sample of 6,000 agricultural producers, 369 (6%) were returned undeliverable. We also received 9 direct requests from individuals to remove them from the mailing list. Also, 65 (1.15%) individuals returned incomplete questionnaires. We received a total usable response of 1,226 (22.0%) usable questionnaires, for a confidence interval of ± 2.05% at a 95% ($\alpha = 0.05$) confidence level. Of the questionnaires returned, 347 (18.5%) were from North Dakota, 411 (22.2%) were from South Dakota, and 468 (25.3%) were from Minnesota.

Most respondents (91.9%) were male, and the average response age was 60 years old. Ninety-five percent of the respondents reported having their land in production during the upcoming farming season with 73.3% farming the land themselves. Most (83.5%) producers
planted row crops, followed by 43.8% raising livestock, 40.4% planting forage crops, 18.1% planting wheat or small grain, 6.9% other, and 3.6% had dairy operations. A majority (75.3%) said farming is their primary source of income, and the mean number of acres owned is 807.

Analysis

The 15 Likert-type questions were subjected to principal component factor analysis with varimax rotation (PCA) using SPSS 16.0 (Chicago, Illinois) for Windows. PCA identified 3 components with eigenvalues exceeding 1.0, explaining 30.11%, 18.32%, and 9.16% of the variance, respectively (Table 2.1). The third component pertained to government regulation rather than value orientations; as such, it was not used in further analysis seeking to describe value orientations. The 2 component solution explained 54.33% of the variance, with 33.30% and 21.02% contributed by Component 1 and 2, respectively. Cronbach’s Alpha test for reliability was .811.

Whereas most research examines 2 anthropocentric/biocentric (occasionally termed ecocentric) groups (Bright and Burtz 2006, McFarlane and Boxall 2000, Vaske and Donnelly 1999), we followed the study by Manfredo et al. (1999) and split the respondents into 3 groups—anthropocentric, biocentric, and moderate. We then performed chi-square tests for independence, checking group size effect with eta.

Attitude toward land management

When comparing value orientations of respondents we found significant differences in attitudes towards wildlife management on their property. Significantly more biocentric respondents (48.8%) implemented wildlife management project(s) on their property in the past 12 months than moderate (28.6%) or anthropocentric (15.4%) respondents (Table 3.2). Whereas
nearly half of biocentric respondents implemented management project(s) to benefit wildlife, nearly 85% of anthropocentric respondents did not.

We found significant differences when comparing value orientations to all management projects listed—conservation tillage, leaving portion of crop unharvested, no-till farming, wetland management, planting trees, shrubs, or grass for cover, and leaving stubble or other crops for residue. In all cases, significantly more biocentric respondents implemented these projects than the other two groups (Table 3.3). Nearly four times as many biocentric respondents as anthropocentric respondents left stubble or other crop residue for cover. Over five times as many biocentric respondents as anthropocentric respondents planted cover for wildlife. Twice as many moderate respondents and three times as many biocentric respondents used no-till farming methods compared to anthropocentric respondents. Wetland management was the least implemented project for all groups. An overwhelming majority of moderate and anthropocentric respondents did not implement any wildlife management projects; oftentimes, an overwhelming majority of biocentric respondents also did not implement any wildlife management projects.

Value Orientations and Enrollment in Conservation Easements

We found significant differences when comparing value orientations and enrollment in conservation easements. Over half of biocentric (50.5%), 44.2% of moderate, and about one third (33.7%) of anthropocentric respondents currently have land enrolled in a conservation easement (Table 3.4). Of those who did not currently have land enrolled, an overwhelming majority also had not enrolled land in the past 10 years (Table 3.5). However, significantly more anthropocentric respondents (9.6%) than moderate (5.0%) or biocentric (2.0) respondents had enrolled land in the past 10 years. Whereas 70% of anthropocentric respondents were not enrolled in any easements, only 59.2% of moderate and 52.6% of biocentric respondents were
not enrolled. Conversely, nearly half (47.4%) of biocentric respondents had land enrolled in one or more easements whereas 40.8% of moderate and 30.1% of biocentric respondents did the same (Table 3.6).

When asked if respondents would enroll in a wetland restoration program if they were offered the full cost of restoration and land value, an overwhelming 83.6% of anthropocentric respondents responded no, even with the option to receive annual payment for crop losses (Table 3.7). Conversely, 27% and 38.3%, respectively, of biocentric respondents would agree to outright enroll it in or to enroll in it if annual payment for crop losses was included. A total of 65.3% of biocentric respondents would enroll in the program. Nearly 40% of moderate respondents would enroll in the program—12.4% would outright enroll in the program whereas 27.5% agreed to do so if they received annual payment for crop loss.

DISCUSSION

Whereas Conover (1994) found most grass-root leaders of agricultural communities surveyed spend both time and money to improve wildlife habitat, our findings show, regardless of value orientation, a minority of agricultural producers in the PPR would do the same. Agriculture is the dominant industry in the PPR (U.S. Department of Agriculture, 2008), and landowners who receive most of their income from farming are less tolerant to wildlife damage than other landowners (Decker and Brown 1982, Daley et al. 2004). Also, over 40% of agricultural producers would oppose the creation of a wildlife sanctuary nearby due to the severity of wildlife damage on their farms or ranches (Conover 1997). However, Pease (1993) found wildlife oriented farmers to be more tolerant of wildlife damage than farmers who were not wildlife oriented. Similarly, biocentric respondents from our survey were three times more likely to implement wildlife management projects on their property than anthropocentric
respondents. However, over half of the biocentric respondents did not implement wildlife management on their property. Our results suggest that although that group is considered biocentric, it is only considered so in relation to the moderate and anthropocentric group. In other words, all of our respondents are rural residents for at least part of the year rendering them more likely to be anthropocentric (Manfredo et al. 2003). As such, the biocentric respondents are more likely to exhibit some anthropocentric-like attitudes and behaviors than urban biocentrics.

Previous research of agricultural producers in the Great Plains found 31.0% of respondents reporting leaving crop residue in the fields for wildlife, 9.5% leaving some crops unharvested for wildlife, and 36.0% leaving cover near croplands for wildlife (Conover 1994). Similarly, 31.8%, 18% and 28.4% of biocentric respondents reported the same in our study. However, moderate and anthropocentric respondents were significantly less likely to do the same. Encouraging wildlife by utilizing these kinds of management practices may prove detrimental to producer’s profit margins; landowners commonly attempt to reduce annual expenses while still holding title to and control of land (Noonan and Zagata 1982). As anthropocentrics have a human-centered view of the non-human world (Eckersely 1999), it is logical that our anthropocentric respondents would favor decreasing losses due to wildlife rather than creating habitat that would benefit wildlife and arguably put their profits at risk.

Whereas 90% of agriculture and forest landowners in Minnesota considered the opportunity to observe wildlife as important to highly important, 82% either disagreed or strongly disagreed that government should regulate private land for wildlife purposes (Svoboda 1984). Very few respondents (11%) reported landowners have a social or moral obligation to manage for wildlife. Our results show significantly more biocentric than moderate or
anthropocentric respondents are currently enrolled in a conservation easement, and significantly more biocentric respondents are enrolled in one or more program than moderate or anthropocentric respondents. Biocentric respondents likely feel the social or moral obligation described in Svoboda’s (1984) research due to their appreciative view of wildlife. This obligation is likely rooted in the importance placed on the opportunity to view wildlife and that may be linked to their appreciative views of wildlife. Conversely, anthropocentric respondents have wildlife values centered in traditional natural resource management (Eckersley 1992). The low number of anthropocentric respondents enrolled in conservation easements is likely connected to the low proportion of anthropocentrics who implement wildlife management on their property.

Interestingly, significantly more anthropocentric respondents who are not currently enrolled in a conservation easement reported having enrolled in a conservation easement in the past 10 years than moderate or biocentric respondents. Changes in the Farm Bill likely have caused anthropocentric respondents to choose to no longer enroll in easements while not affecting the enrollment of biocentric or moderate respondents.

Significantly more anthropocentric respondents than moderate or biocentric respondents would not enroll in a wetland restoration program if they were offered the full cost of restoration and land value as well as an annual payment for crop loss. Whereas bolstering profits is likely more important to anthropocentrics than restoring wetlands, anthropocentric respondents are likely more opposed to government programs than biocentric or moderate respondents. Anthropocentric respondents likely believe enrolling in such a program would cause them to surrender control over parts or all of their property.
MANAGEMENT IMPLICATIONS

Biocentric respondents were much more likely to implement wildlife management projects than anthropocentric or moderate respondents, but with only 48.8% of biocentric respondents doing so. Biocentric respondents were also much more likely to enroll in a conservation easement than anthropocentric and moderate respondents were. As agriculture is a dominant industry in the PPR, composing an overwhelming majority of the land area in North Dakota and South Dakota and a majority in Minnesota (U. S. Department of Agriculture 2008a), farmers have a significant impact on wildlife and natural resources (Conover 1994). It is crucial to wildlife, particularly waterfowl, that private landowners in this region are favorable to implementing management techniques that will benefit wildlife. In order to increase the number of agricultural producers who are willing to implement these techniques, managers need a better understanding of motivations which are and are not favorable to doing so.

Our results indicate groups with different value orientations also differ in their willingness to implement these techniques and to enroll in conservation easements. Values, and thus value orientations, are the most-stable in the cognitive structure (Rokeach 1973), rendering them difficult, if not impossible, to alter. However, managers can employ education strategies by targeting audiences with a variety of messages in hopes of shifting attitudes. Many respondents indicated wildlife managers from a variety of agencies are unaware of typical farming practices, and attempt to alter those practices without considering the farmers’ needs. As a result, many farmers likely feel misunderstood and distrustful towards agencies. By highlighting the control landowners retain and openly discussing the role of government in easements, managers will likely gain the trust of agricultural producers, particularly anthropocentric respondents. Discussing the benefits to wildlife certain management techniques
and enrollment in conservation easements have, managers will likely appeal to biocentric respondents. Moderate respondents will likely be benefited by both approaches. With astounding numbers of lost CRP acres in 2007—>12% of all CRP in North Dakota (DU News Release 2008)—wildlife in the PPR are facing severe habitat crisis. It is imperative to wildlife that managers and farmers respect one another, communicate honestly and work jointly. In order to do so, managers must understand not only the attitudes of farmers, but the values those attitudes are rooted in.
Table 3.1. Principal Component Analysis (PCA) of values orientation, Prairie Pothole Region, 2008. (n = 1006)

<table>
<thead>
<tr>
<th>Item</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not enjoy seeing wildlife during my daily routine</td>
<td>.839</td>
<td>.021</td>
</tr>
<tr>
<td>Having wildlife on my land is not important to me.</td>
<td>.823</td>
<td>.090</td>
</tr>
<tr>
<td>I do not enjoy seeing waterfowl in my wetlands</td>
<td>.785</td>
<td>.183</td>
</tr>
<tr>
<td>Encountering wildlife is not a natural part of farming</td>
<td>.746</td>
<td>-.156</td>
</tr>
<tr>
<td>Prairie potholes are not crucial for waterfowl production</td>
<td>.647</td>
<td>.218</td>
</tr>
<tr>
<td>Set aside programs do not provide benefits beyond subsides</td>
<td>.516</td>
<td>.065</td>
</tr>
<tr>
<td>Landowners have the right to use their land as they see fit</td>
<td>-.058</td>
<td>.773</td>
</tr>
<tr>
<td>Agricultural producers are the best judges of how to use their land</td>
<td>.048</td>
<td>.764</td>
</tr>
<tr>
<td>Property owners should have more control over wildlife on their land.</td>
<td>-.030</td>
<td>.719</td>
</tr>
<tr>
<td>Farmers should be able to remove problem wildlife without first getting state permits or permission.</td>
<td>.032</td>
<td>.685</td>
</tr>
<tr>
<td>Farming is a better use of land than retaining wetlands</td>
<td>.361</td>
<td>.654</td>
</tr>
<tr>
<td>Crop production is more important than wildlife production on agricultural land</td>
<td>.315</td>
<td>.575</td>
</tr>
<tr>
<td>% variance explained</td>
<td>33.3</td>
<td>21.0</td>
</tr>
</tbody>
</table>
Table 3.2 Responses of agricultural producers by value orientation when asked if they implemented wildlife management projects on their property in the past year, Prairie Pothole Region, 2008. (n = 997)

<table>
<thead>
<tr>
<th>Value Orientation</th>
<th>n</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biocentric</td>
<td>207</td>
<td>48.8</td>
<td>51.2</td>
</tr>
<tr>
<td>Moderate</td>
<td>588</td>
<td>28.6</td>
<td>71.4</td>
</tr>
<tr>
<td>Anthropocentric</td>
<td>214</td>
<td>15.4</td>
<td>84.6</td>
</tr>
</tbody>
</table>

\( \rho = .000; \chi^2 = 57.116; \eta = .235 \)
Table 3.3 Responses of agricultural producers in the Prairie Pothole Region by value orientation when asked which type of wildlife management practice they implemented on their property during the past 12 months, Prairie Pothole Region, 2008. (n = 1046)

<table>
<thead>
<tr>
<th></th>
<th>Biocentric (n=211)</th>
<th>Moderate (n=612)</th>
<th>Anthropocentric (n=223)</th>
<th>( \chi^2 )</th>
<th>( \eta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leave stubble or other crop residue</td>
<td>31.8 68.2</td>
<td>17.2 82.8</td>
<td>8.1 91.9</td>
<td>41.911**</td>
<td>0.197</td>
</tr>
<tr>
<td>Planting trees, shrubs, grass for cover</td>
<td>28.4 71.6</td>
<td>12.4 87.6</td>
<td>5.4 94.6</td>
<td>51.078**</td>
<td>0.212</td>
</tr>
<tr>
<td>Conservation tillage</td>
<td>23.7 76.3</td>
<td>15.2 84.8</td>
<td>8.1 91.1</td>
<td>20.368**</td>
<td>0.139</td>
</tr>
<tr>
<td>No-till farming</td>
<td>18.5 81.5</td>
<td>12.9 87.1</td>
<td>6.7 93.3</td>
<td>13.553**</td>
<td>0.114</td>
</tr>
<tr>
<td>Leave portion of crop unharvested</td>
<td>18.0 82.0</td>
<td>9.0 91.0</td>
<td>1.8 98.2</td>
<td>34.028**</td>
<td>0.180</td>
</tr>
<tr>
<td>Wetland management</td>
<td>13.3 86.7</td>
<td>4.6 95.4</td>
<td>3.1 96.9</td>
<td>25.122**</td>
<td>0.136</td>
</tr>
</tbody>
</table>

** denotes \( p \leq 0.001 \)
Table 3.4. Responses of agricultural producers by value orientation when asked if they currently have land enrolled in a conservation easement, Prairie Pothole Region, 2008. (n = 667)

<table>
<thead>
<tr>
<th>% Response</th>
<th>n</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biocentric</td>
<td>208</td>
<td>50.5</td>
<td>49.5</td>
</tr>
<tr>
<td>Moderate</td>
<td>581</td>
<td>44.2</td>
<td>55.8</td>
</tr>
<tr>
<td>Anthropocentric</td>
<td>208</td>
<td>33.7</td>
<td>66.3</td>
</tr>
</tbody>
</table>

$p = .002; \chi^2 = 12.456; \eta = .110$
Table 3.5. Responses of agricultural producers by value orientation when asked if they do not currently have land enrolled in a conservation easement, have they enrolled land in the past 10 years, Prairie Pothole Region, 2008. (n = 551)

<table>
<thead>
<tr>
<th>Value Orientation</th>
<th>n</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biocentric</td>
<td>99</td>
<td>2.0</td>
<td>98.0</td>
</tr>
<tr>
<td>Moderate</td>
<td>317</td>
<td>5.0</td>
<td>95.0</td>
</tr>
<tr>
<td>Anthropocentric</td>
<td>135</td>
<td>9.6</td>
<td>90.4</td>
</tr>
</tbody>
</table>

*p=.035; χ²=6.7; η=.109*
Table 3.6. Responses of agriculture producers by value orientation when asked how many conservation easement programs they are currently enrolled in, Prairie Pothole Region, 2008. (n = 1046)

<table>
<thead>
<tr>
<th>Value Orientation</th>
<th>Total number of program enrolled in</th>
<th>% Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>0</td>
</tr>
<tr>
<td>Biocentric</td>
<td>211</td>
<td>52.6</td>
</tr>
<tr>
<td>Moderate</td>
<td>612</td>
<td>59.2</td>
</tr>
<tr>
<td>Anthropocentric</td>
<td>223</td>
<td>70.0</td>
</tr>
</tbody>
</table>

$p=.006; \chi^2=18.246; \eta=.124$
Table 3.7 Responses of agriculture producers when asked if they would enroll in a wetland restoration program, Prairie Pothole Region, 2008 (n = 973)

<table>
<thead>
<tr>
<th>% Response</th>
<th>Yes</th>
<th>Included</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you enroll in a wetland restoration program if you were offered the full cost of restoration and land value?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, with annual payment for crop loss included</td>
<td>27.0</td>
<td>38.3</td>
<td>34.7</td>
</tr>
<tr>
<td>Biocentric</td>
<td>196</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>564</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anthropocentric</td>
<td>213</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( p = .000; \chi^2 = 8.08; \eta = .333 \)
Literature Cited


The Prairie Pothole Region (PPR) annually produces approximately 50% of North America’s waterfowl (Kirby et al. 2002). The PPR has seen many land use changes over the past century, and as a result waterfowl numbers have steadily decreased (Greenwood and Sovada 1996). Studies have revealed the primary cause of this decline to be predation on nests. Predator trapping could be a solution to this problem in some areas. Americans have historically trapped furbearing animals for numerous reasons, including reducing damage caused by predators, providing commodities, and enjoying the outdoors (Gerstell 1985, Daigle et al. 1998). However, the overall number of trapping licenses sold has generally declined (Daigle et al. 1998) with a variety of issues identified as the cause, including: anti-trapping sentiment, recruitment into the activity, pelt prices, public image, and access to lands (Miller et al. 2002, Armstrong and Rossi 2000).

A number of researchers examined attitudes toward predators and distinctions have been found among attitudes of different social-demographic groups. Generally, rural residents have been found to have more anthropocentric attitudes towards wildlife while urban residents have more biocentric attitudes towards wildlife (Manfredo et al. 2003). Perceptions of individual predator species originate from a diversity of factors including the size and intelligence of the species, perceived danger of the animal or threat to property, relationship of the animal to people, its cultural relationship and aesthetic value (Kellet 1994). Without a firm understanding of
public attitudes regarding particular management techniques repercussions can spread far and wide.

While critical to waterfowl production, the PPR is also critical to crop production for human consumption. Agriculture is a dominant industry in this region with the number of farms equally 31,300, 30,100, and 79,00 in South Dakota, North Dakota, and Minnesota respectively (U. S. Department of Agriculture 2008). Farms comprise 90.2%, 89%, and 54% of the total land area in the respective states. Few occupational groups have as significant an impact on wildlife and natural resources as do farmers (Conover 1994). As a result, agriculture shapes the landscape and quality of habitat of the PPR. Individual farmers make land use decisions based on expertise, lifestyle choice, tradition, and economic profitability with a dynamic interplay occurring among these factors (Ringelman 2005). Although farmers are generally reluctant to take on radical changes in their expertise by adopting new traditions, changes are occurring within the PPR that are reshaping the landscape and quality of wildlife habitat in that region.

The conversion of grassland to cropland has increased the grazing intensity on remaining grasslands (Ringelman 2005). Nearly 3.5 million acres of rangeland (14% decrease) were converted to cropland during 1977-1997 in South Dakota with similar patterns existing throughout North Dakota (Higgins et al. 2002). In 1997 alone, North Dakota lost nearly 420,000 acres of CRP (DU Press Release 2008). Changes in field sizes and crop types have decreased the quality of wildlife habitat on these farm landscapes (Ringelman 2005). Cereal crops that provided some nesting cover are now being replaced by row crops that provide no habitat for grassland birds. The use of genetically modified row crops and current emphasis in crop research to develop more drought-tolerant and herbicide-resistant varieties has led to once unviable crops being produced in new regions. Also, four renewable energy sources being
developed in the PPR include wind power, fuels from grass biomass products, soy fuels from soybeans and ethanol from corn (Ringelman 2005). Biofuels have the potential to reduce carbon dioxide emissions and air pollution, with plants such as Switchgrass (*Panicum virgatum*) noted as potential biomass fuel crops.

Current information on stakeholder acceptance of predator trapping and attitudes towards predators, stakeholder attitude towards land management, and value orientations of stakeholders who enroll in conservation easements is not available. In order to determine management strategies that are acceptable to the public, managers need better understanding of current public attitudes. Failure to integrate public interest with resource management has proven to be a critical hindrance to both managers and the resources they are meant to conserve. To determine stakeholder attitudes regarding predator removal, attitudes towards land management and enrollment in conservation easements, I assessed stakeholder value orientations. The goals of my study were to: 1) determine value orientations of stakeholders and examine how their differences predicted their attitudes towards predator removal and 2) determine how attitudes towards land management and enrollment in conservation easements differ in terms of value orientations. This study, similar to other human dimensions studies, is not attempting to supersede biological data with public preference; rather, my hopes are to delve into avenues that allow the incorporation of public input into management strategies, discover education opportunities, and to move forward with management with the least amount of resistance.

We found majority public support for most lethal management situations presented in this study; however some situations received greater support than others. Respondents, regardless of value orientation, were overwhelmingly supportive of trapping wildlife to protect livestock and property, prevent the spread of disease and prevent economic loss. Respondents were less
supportive of trapping primarily for income or recreation. Significantly fewer anthropocentric respondents than biocentric and moderate respondents would support a program to reduce predators on private land if the program was intended to increase waterfowl production. However, no significant differences were found when each group was asked if they currently allow trappers on their land or if they would be willing do so. Moreover, most respondents believed trapping foxes, raccoons, coyotes, ground squirrels, muskrats, and skunks was acceptable in some or in all cases.

Results of this study may assist managers striving to increase waterfowl numbers. Agricultural producers in the prairie pothole region, like most rural Americans (Manfredo et al. 2003), are more anthropocentric than urbanites in other parts of the country which, perhaps paradoxically, may prove beneficial for some wildlife species. They are supportive of predator reduction in most situations, and would find it acceptable to trap numerous species that are known duck predators. Whereas significantly fewer anthropocentric respondents would support a program intended to increase waterfowl numbers than the other respondents, a majority (54.1%) said they would either outright support the program or would support it under certain conditions—mostly, if they were given financial incentives to do so and if they controlled who trapped, when and how many animals were trapped. Values, and thus value orientations, are the most-stable in the cognitive structure (Rokeach 1973), rendering them difficult, if not impossible, to alter. However, with a firmer understanding of anthropocentric respondent’s resistance to increasing waterfowl numbers—mainly, crop depredation, and the desire for financial incentives to do so and control over how it’s done—managers can decipher steps in creating programs that appeal to both agricultural producers and biologists hoping to increase waterfowl numbers.
Biocentric respondents were much more likely to implement wildlife management projects than anthropocentric or moderate respondents, but with only 48.8% of biocentric respondents doing so. Biocentric respondents were also much more likely to enroll in a conservation easement than anthropocentric and moderate respondents were. As agriculture is a dominant industry in the PPR, composing an overwhelming majority of the land area in North Dakota and South Dakota and a majority in Minnesota (U. S. Department of Agriculture 2008a), farmers have a significant impact on wildlife and natural resources (Conover 1994). It is crucial to wildlife, particularly waterfowl, that private landowners in this region are favorable to implementing management techniques that will benefit wildlife. In order to increase the number of agricultural producers who are willing to implement these techniques, managers need a better understanding of motivations which are and are not favorable to doing so.

Our results indicate groups with different value orientations also differ in their willingness to implement these techniques and to enroll in conservation easements. Values, and thus value orientations, are the most-stable in the cognitive structure (Rokeach 1973), rendering them difficult, if not impossible, to alter. However, managers can employ education strategies by targeting audiences with a variety of messages in hopes of shifting attitudes. Many respondents indicated wildlife managers from a variety of agencies are unaware of typical farming practices, and attempt to alter those practices without considering the farmers’ needs. As a result, many farmers likely feel misunderstood and distrustful towards agencies. By highlighting the control landowners retain and openly discussing the role of government in easements, managers will likely gain the trust of agricultural producers, particularly anthropocentric respondents. Discussing the benefits to wildlife certain management techniques and enrollment in conservation easements have, managers will likely appeal to biocentric
respondents. Moderate respondents will likely be benefited by both approaches. Given numbers of acres removed from CRP during 2007 —more than 12% of all CRP in North Dakota (DU Press Release 2008)—wildlife in the PPR are facing severe loss of habitat. It is imperative to wildlife that managers and farmers respect one another, communicate honestly and work jointly. In order to do so, managers must understand not only the attitudes of farmers, but the values those attitudes are rooted in.
Literature Cited


APPENDICES
Appendix A. Wildlife and Agriculture Mail Questionnaire

Wildlife and Agriculture

ALL RESPONSES ARE ANONYMOUS
THANK YOU FOR YOUR COOPERATION!
Postage-paid return envelope provided

Warnell School of Forestry and Natural Resources

University of Georgia

The Warnell School of Forestry and Natural Resources at the University of Georgia is requesting disclosure of information concerning your attitudes toward wildlife as part of a regional research project. Disclosure of information is voluntary.

The Warnell School of Forestry and Natural Resources at the University of Georgia is conducting a study of farmers and wildlife. By wildlife, we mean raccoons, deer, geese, and other wild animals. Please take 15 minutes of your time to complete this questionnaire. Your responses will tell us more about wildlife activities on your land and in your local community.
Section 1 Agricultural Operations. Please help us find out more about your agricultural operations by completing the questions listed below.

1. Will your land be in production during the upcoming growing season? (Please check ONLY ONE.)
   _____ Yes (Please go to question 1a and 1b.)  _____ No (Please go to question 2.)

   1a. If “Yes,” who farms your land?
      _____ I farm it myself  _____ I lease my land to another producer
      _____ I have a farm manager  _____ Other (Please identify):______________________

   1b. What type of agricultural operations are done on your land? (Please check ALL that apply.)
      _____ row crops  _____ forage crops  _____ livestock  _____ dairy
      _____ Other (Please Identify):__________________________________________

2. How many acres do you own?  ______ acres

3. How many of your acres are in the following? (Please write the number in each blank.)
   _____ Cropland  _____ Forage Crops  _____ Ponds  _____ Wetlands

4. Is farming your primary source of income?  _____ Yes  _____ No

5. Do you have land enrolled in conservation programs (for example CRP, CREP)?
   _____ Yes (Please go to questions 5a, b and c.)  _____ No (Please go to question 6.)

   5a. If “Yes,” was your property already enrolled when you purchased or received the land?
      _____ Yes  _____ No

   5b. Please list the programs and number of acres you are currently enrolled in (for example CRP, GRP).

<table>
<thead>
<tr>
<th>Program</th>
<th>Number of Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   5c. What year did you initially enroll?  _____ Year enrolled
6. If you do not currently have land placed in conservation programs, have you enrolled land in the past?
   _____ Yes (Please go to question 6a, b and c.) _____ No (Please go to question 7.)
   a. Please list the programs and number of acres you formerly enrolled in (for example CRP, CREP).
      
      Program            | Number of Acres
      -------------------|-------------------
      __________________|__________________
      __________________|__________________
      __________________|__________________

   b. Which of the following reasons explain why you no longer enroll your land? (Please check ALL that apply.)
      _____ Higher crop prices       _____ Land no longer eligible
      _____ Enrollment payment not high enough       _____ Dissatisfied with agency involved
      _____ Contract period too long       _____ Dissatisfied with enrollment program
      _____ Other (Please Identify): __________________________

   c. What year did you stop enrollment? ________ Year stopped

7. Wetland restoration sometimes recreates ponds that were drained. Would you enroll in a wetland restoration program?
   _____ Yes       _____ No

8. During the past 12 months, did you have any wildlife management projects on your property (habitat creation, nest boxes, etc.)
   _____ Yes (Please go to question 8a.) _____ No (Please go to question 9.)
   a. If “Yes,” please check the following management practices you perform. (Please check ALL that apply.)
      _____ Conservation tillage       _____ Wetland management
      _____ Leaving portion of crop unharvested       _____ Planting trees, shrubs, or grasses for cover
      _____ No-till farming       _____ Leave stubble or other crop residue in fields
      _____ Other (Please Identify): __________________________

9. Which of the following wildlife species causes problems on your land? Please check all that apply.
   _____ Canada geese       _____ deer       _____ beavers       _____ ground squirrels/gophers
   _____ skunks       _____ rabbits       _____ coyotes       _____ raccoons
   _____ muskrats       _____ foxes       _____ birds (please identify): ___________________
   _____ Other (please identify): __________________________
Section 2. Trapping & Hunter Access. Please tell us how you feel about trapping, hunting, and access on your land.

1. Would you support a program to reduce predators (trapping) such as raccoons, foxes, and coyotes on private land if the program was intended to increase waterfowl production?

   _____ Yes, I would support such a program in all cases (Please go to question 2.)
   _____ Yes, but I would support such a program under certain conditions (Please go to question 1a.)
   _____ No, I would not support such a program under any conditions. (Please go to question 2.)

1a. If you would support such a program, but only under certain conditions, please indicate the conditions you would wish to see in this program by checking ALL that apply.

   _____ Tax incentives for landowners
   _____ Program administered by state agency
   _____ Program administered by federal agency
   _____ Landowner controls who traps, when, and how many animals are trapped
   _____ Other (Please Identify): ______________________________________________

2. Would you support the removal of the species below to increase waterfowl production? Please circle the number that matches your response.

   Wildlife Species | Unacceptable in all cases | Unacceptable in some cases | Unsure | Acceptable in some cases | Acceptable in all cases
---|---|---|---|---|---
Raccoons | 1 | 2 | 3 | 4 | 5
Coyotes | 1 | 2 | 3 | 4 | 5
Mink | 1 | 2 | 3 | 4 | 5
Foxes | 1 | 2 | 3 | 4 | 5
Ground Squirrels | 1 | 2 | 3 | 4 | 5
Muskrats | 1 | 2 | 3 | 4 | 5
Skunks | 1 | 2 | 3 | 4 | 5

3. Would you allow trappers on your land to reduce predators in the spring and summer without receiving a payment?

   _____ Yes (Please go to question 4.)
   _____ No (Please go to question 3a.)

3a. If “No,” please check the following reasons you wouldn’t allow trappers on your land. (Please check ALL that apply).

   _____ I don’t think predators need to be reduced on my land
   _____ I have friends who trap for me
   _____ I trap predators myself
   _____ I’m opposed to all trapping
   _____ I’m not interested in increasing waterfowl numbers
   _____ I want to be paid to allow trappers
   _____ I’m not opposed to trapping, I just don’t want people on my land
4. Please state your support for the following statements by circling the number that matches your answer.

<table>
<thead>
<tr>
<th>Trapping wildlife is acceptable…</th>
<th>Unacceptable in all cases</th>
<th>Unacceptable in some cases</th>
<th>Unsure</th>
<th>Acceptable in some cases</th>
<th>Acceptable in all cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>to prevent the spread of disease</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>to prevent economic loss</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>to protect livestock and property</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>if it is done primarily to get money</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>for recreation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

5. Do hunters request permission to hunt on your property?  _____ Yes  _____ No

6. Do you currently allow hunters on your property?  _____ Yes (go to question 6a)  _____ No (go to question 6b)

6a. If “yes,” how long have you been allowing hunters on your property?  __________ years

6b. If “no,” which of the following reasons best describe why you don’t give hunters permission to hunt on your land?  Please check ALL that apply.

- _____ hunters were inconsiderate of my land
- _____ concerns for my or my family’s safety
- _____ liability
- _____ damage to property/equipment
- _____ I don’t like hunting/hunters
- _____ other (please identify): __________________________

7. If you allow hunting, what do you consider to be the benefits of hunters on your property?

- _____ control wildlife
- _____ maintain relations with neighbor/friend/family
- _____ source of income
- _____ provide me with wild game
- _____ discourage trespassers
- _____ other (please identify): __________________________

8. Do you currently allow trapping on your property?

- _____ Yes (Please go to questions 8b.)  _____ No (Please go to question 8a.)

8a. Which of the following reasons best describes why you don’t allow trapping on your land?  Please check ALL that apply.

- _____ trappers were inconsiderate of my land
- _____ liability
- _____ safety concerns for my family
- _____ injury to livestock or pets
- _____ damage to property/equipment
- _____ I don’t like trapping
- _____ other (please identify): __________________________

8b. Which of the following species do you allow hunters to hunt?  Please check all that apply.

- _____ pheasants/quail
- _____ ducks
- _____ doves
- _____ geese
- _____ turkey
- _____ predators
- _____ cranes
- _____ deer
- _____ Other  (Please identify): __________________________
9. Have you had problems with people hunting on your land without permission? _____ Yes _____ No

**Section 3. Attitudes towards waterfowl management practices.** Please respond to the following questions concerning your attitudes towards waterfowl management.

1. Please give your opinions of the statements below by circling the number that matches your response.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Unsure</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers should be able to remove problem wildlife without first getting state permits or permission.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Having wildlife on my land is important to me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Property owners should have more control over wildlife on their land.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I enjoy seeing wildlife during my daily routine.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Landowners have the right to use their land as they see fit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Encountering wildlife is a natural part of farming.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Farming is a better use of land than retaining wetlands.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Set-aside programs provide benefits beyond subsides.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Agricultural producers are the best judges of how to use their land.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Prairie potholes are crucial for waterfowl production.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I enjoy seeing waterfowl in my wetlands.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Crop production is more important than wildlife production on agriculture land.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
**Section 4. Wildlife Agencies and Organizations.** Please answer the following three questions regarding your opinions of the agencies and organizations listed below. Please indicate the extent to which you agree or disagree with each of the following statements by circling **ONE NUMBER** for each agency.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Neutral</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Manages wildlife as I would</strong>…</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State DNR</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Duck’s Unlimited</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>NRCS</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>USFWS</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Delta Waterfowl</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

| **2. Expresses views similar to mine**… |
| State DNR      | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
| Duck’s Unlimited | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
| NRCS           | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
| USFWS          | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
| Delta Waterfowl | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |

| **3. Manages land the same way I would**… |
| State DNR      | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
| Duck’s Unlimited | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
| NRCS           | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
| USFWS          | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
| Delta Waterfowl | 1                  | 2                   | 3                 | 4       | 5             | 6               | 7              |
Section 5 Demographics. Please respond to the following demographic questions so we can better understand social trends. All of your responses are anonymous.

1. Are you… ______ Male ______ Female

2. Please give your age. ______ Years

3. What is your county of residence? ________________ County

4. Do you belong to any environmental or conservation organizations? ______ Yes ______ No

4a. If “Yes,” how many? _______ conservation organizations

5. Have you or other members of your immediate family hunted in the past 5 years? ______ Yes ______ No

   If “Yes,” please check all of the following game that you or your family member(s) have hunted in the past 5 years. (Please check ALL that apply.)

   ______ deer ______ waterfowl
   ______ upland Birds (pheasants, turkey, etc.) ______ elk
   ______ small game (rabbits, raccoons, etc.) ______ doves
   ______ Other (Please Identify): ______________________________________

COMMENTS

RETURN ENVELOPE IS PROVIDED – POSTAGE-PAID
THANK YOU FOR YOUR TIME AND ASSISTANCE!

Your input will help us understand more about agriculture and wildlife.

Additional questions or problems regarding your rights as a study participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu. There are no risks or discomforts expected from your participation in this research.
Appendix B. Wildlife and Agriculture questionnaire cover letter.

Dear Farm Owner,

You are one of a select group of farm owners from your state asked to provide information about wildlife and agriculture on your land during the past year. Please complete the enclosed questionnaire and return it to us as soon as possible. The information you and other selected farm owners furnish wildlife managers is vital for proper wildlife resources management and allows us to safeguard your state’s natural resources while providing for our wildlife heritage.

This survey is limited to those farm owners selected. Please take 15 minutes to complete the enclosed questionnaire. Participation in this survey is completely voluntary, and you can choose to not participate without giving reasons for doing so. All responses are kept anonymous and your information will not be used for any other purposes. A postage-paid envelope is provided for returning the questionnaire to us.

Additional questions or problems regarding your rights as a study participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu.

Thank you for your time and assistance.

Sincerely,

Craig A. Miller, Ph.D.
Warnell School of Forestry and Natural Resources
University of Georgia
Athens, GA 30602
(706) 583-8930
Answers to some questions you may have about this study:

What is the purpose of this research project?

To provide information from farm owners regarding wildlife and agriculture to wildlife managers so they can better understand wildlife interactions with farm owners and to better manage wildlife in the state where you live.

How did you choose me as a participant?

Names and addresses of participants are chosen at random through public telephone listings.

How will my response be used?

Your response will be used to ensure we cover the full range of farm owner opinions and preferred management options regarding wildlife and agriculture.

How will the final results of the survey be used?

Results of the survey will be compiled into a report. Copies of the report will be available to members of the public.

Will my responses be anonymous?

Absolutely. No identifiers are used to locate participants, no identifiers are requested on the survey questionnaire, and no names, addresses, telephone numbers or other information is gathered from participants or reported.

PLEASE NOTE:

Participation in this study is completely voluntary.
Refusal to participate will result in NO penalty to you whatsoever.
You may discontinue participation at any time.
You may decline to answer any individual questions in the survey questionnaire.
If you have any questions regarding this survey, please contact Dr. Craig Miller 706-583-8930.
Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu
Appendix C. Wildlife and Agriculture reminder postcard to nonrespondents.

Dear Farm Owner,

You have been selected to participate in the Wildlife and Agriculture Survey. A survey questionnaire was recently mailed to you. At the time of this mailing, we have not received your completed questionnaire. If you have returned this questionnaire, we thank you. If you have not filled out and returned the questionnaire, please do so as soon as possible. Your input is important!

Your name and address will be deleted from our mailing list when your questionnaire is received.

Thank you for your cooperation.