

Landowner attitudes toward introduced wild turkeys in northwestern Minnesota

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Abstract. Wild turkeys (*Meleagris gallopavo*) were introduced to northwestern Minnesota, USA, in 2006 and 2007. This provided an opportunity to examine landowner feelings for a wildlife species not endemic to the region. In 2007, we mailed surveys to 200 landowners to evaluate landowner interactions, feelings, and concerns with turkeys. Overall response rate was 76%. Eighty-nine percent of respondents in northwestern Minnesota reported positive feelings toward turkeys, 9% were indifferent, and 2% reported negative feelings. The introduced turkeys were not perceived to be problematic: <1% of respondents reported existing problems, and only 8% reported concerns about future problems. We speculate that the small turkey population and respondents' values toward wildlife and land contributed to the strong positive feelings reported for turkeys. Results from this survey suggest that landowners in northwestern Minnesota accepted and valued wild turkey introductions. Accordingly, natural resource agencies in Minnesota (and potentially other northern regions) should consider these perceptions if future wild turkey introductions are contemplated at the northern periphery of the turkeys' range in North America.

Key words: attitudes, eastern wild turkey, feelings, human–wildlife conflicts, introduced, landowners, mail-survey, *Meleagris gallopavo silvestris*, Minnesota

HISTORICALLY, SEVERE WINTER conditions (i.e., deep and persistent snow cover) were believed to be the primary limiting factor that regulated the existence of eastern wild turkeys (*Meleagris gallopavo silvestris*) in northern regions. However, a variety of experiments investigating the winter ecology of wild turkeys suggested that they are physiologically capable of survival in northern regions (Gray and Prince 1988, Haroldson et al. 1998, Coup and Pekins 1999). Field studies demonstrated that turkeys were even capable of survival in regions having severe winters, provided that sufficient high-energy food was available (Nguyen et al. 2003, Kane et al. 2007, Restani et al. 2009, Parent et al. 2011). In light of these studies, many state and provincial wildlife agencies have successfully released turkeys north of their ancestral range (Kimmel and Krueger 2007).

The impetus for northward expansion of the wild turkey range varies, but in general one of the main goals is to maximize recreational opportunity (Kimmel and Krueger 2007). While turkey relocation programs would be

welcomed by some stakeholders (e.g., turkey hunters; Glines 2003), it is unclear how other stakeholders (e.g., farmers, landowners) feel about the northern expansion of the turkey range, in particular, stakeholders living in the vicinity of the introduction sites. Many management concerns have not been addressed because northward expansion of the turkey range is still a recent event (Kimmel and Krueger 2007). A nuanced understanding of stakeholder perceptions is important for formulating management strategies that not only improve how turkeys are managed by natural resource agencies, but also to improve stakeholder knowledge and acceptance of expansions. Additionally, because turkeys are relatively mobile (Hurst 1992) and have a high reproductive potential (Vangilder 1992), natural expansion into unoccupied habitats is also possible (Kimmel and Krueger 2007). Presumably, management strategies used to manage introduced turkeys overlap with strategies used to manage naturally expanding turkeys. Therefore, there is utility in obtaining

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perceptions of landowners living in proximity to introduced turkeys because they are the closest surrogate to landowners experiencing turkeys for the first time.

Management approaches that incorporate human dimensions are critical because the perceptions and attitudes formed by the public about wildlife partially influence how wildlife species are managed (Butler et al. 2003). Our objectives were to identify how landowners felt toward newly introduced wild turkeys and to provide a basic benchmark for managing newly introduced or naturally expanding turkey populations in regions where turkeys were previously not endemic.

Study area

We conducted this survey in Pennington (PEN) and Red Lake (RL) counties in northwestern Minnesota (Figure 1). The historic distribution of wild turkeys included the southern portion of Minnesota, but probably fluctuated with winter severity (Leopold 1931). The nearest established population of wild turkeys was located approximately 55 km south of our study area.

Potential habitat was identified by the Minnesota Department of Natural Resources (MNDNR) using a geographic information system. Introduction sites that met wild turkey habitat requirements, allowed for future expansion, and decreased the potential for unwanted human–turkey interactions were selected. Accordingly, introduction sites were located in rural areas far removed from urban areas (>11 km in PEN, >3 km in RL). Agriculture was the primary land use in our study areas, which consisted of row-crop farming (58% in PEN, and 56% in RL; Parent 2008), with sugar beet, soybeans, potatoes, flax, and alfalfa being the typical crops in our study area. The remaining land was a mixture of deciduous forest, wetland, and pasture (collectively, 40% at PEN and 41% at RL), with scattered (<4% cover collectively) grasslands, evergreen forests, and gravel quarries.

Methods

Survey design

This study was part of an overall larger research project on the ecology of wild turkeys introduced to northwestern Minnesota from

2006 to 2007 (Parent 2008; Figure 2). Based on radiotelemetry data, most wild turkeys were located within 5 km of their release site (99% in PEN and 90% in RL; Parent 2008). We created 2 survey groups using the radiotelemetry data that was based on landowner probability of interacting with turkeys: landowners residing inside the 5-km radii who had a higher probability of interacting with turkeys (hereafter, turkey group), and landowners residing outside of the 5-km radii who had a lower probability of interacting with turkeys (hereafter, without-turkey group). Two turkeys established core home ranges outside of the 5-km radius in Red Lake Falls and River Falls townships (each located in RL county). Landowners from these townships were excluded from the survey because our study assumed that landowners residing outside the 5-km radii are not exposed to wild turkeys.

We identified 200 randomly selected rural landowners from county plat maps. Landowners were distributed equally among counties and survey groups (50 landowners/county/survey

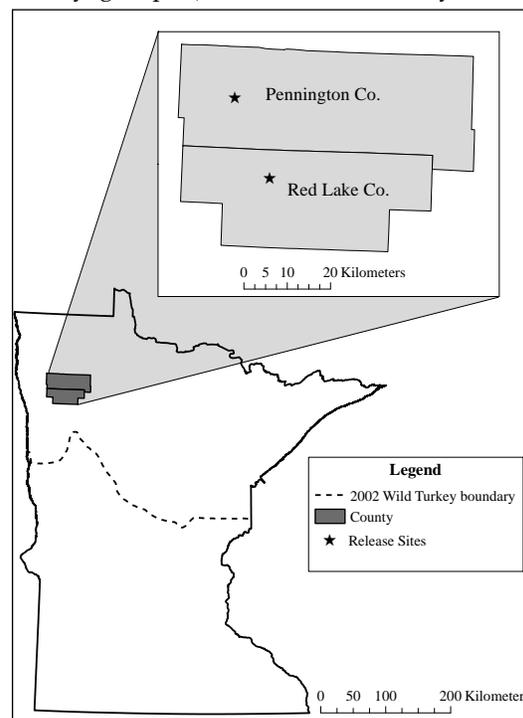


Figure 1. A survey of landowners living in Pennington and Red Lake counties, Minnesota, USA, was conducted in 2007 to identify feelings toward the introduction of wild turkeys. Turkeys were introduced to these counties from 2006 to 2007 to study winter ecology in northern regions. Dashed line represents the northernmost extent of 2002 wild turkey range.

group). We mailed each selected landowner a survey packet containing a cover letter, survey, and postage paid mail-back envelope. The initial mailing occurred on July 7, 2007, a postcard reminder was mailed 4 weeks later, and a follow-up telephone survey (identical to the mail-back survey) was conducted for nonrespondents 6 weeks after the initial mailing. In an attempt to exclude turkey interactions that did not occur on the landowner's property, we asked respondents to answer questions based on observations within 0.4 km of their home. Survey methods were approved by the Institutional Review Board at the University of North Dakota (IRB-200705-351).

Survey content

The survey consisted of 11 questions, including 7 closed-ended and 4 open-ended questions (Appendix A). We designed closed-ended questions using 2 formats: categorical multiple-choice format with statements and, for attitudinal questions (i.e., How do you feel about wild turkeys on your property?), a 5-point Likert scale format, where 1 = Very Unhappy, 2 = Unhappy, 3 = Indifferent, 4 = Happy, and 5 = Very Happy. Respondents were instructed to answer "Yes" or "No" to open-ended questions and explain their answers. The survey was designed to collect information on 3 categories of human-turkey interactions: frequency of observations, observed turkey behavior, and landowner attitudes toward wild turkeys and other wildlife species.

We identified how frequently landowners interacted with turkeys by asking respondents to estimate frequency (days/week) that they observed turkeys on their property during each season (i.e., spring, summer, fall, and winter). We collected information on behaviors of turkeys by asking respondents to indicate if they ever observed turkeys feeding, roosting, or passing through on their property. We



Figure 2. Wild turkeys were introduced to northwestern Minnesota as part of a larger research project on the ecology and management of turkeys in northern regions. Landowner attitudes were evaluated to improve wild turkey management in Minnesota.

quantified respondent feelings toward turkeys on their property and in their county by asking respondents to indicate their feelings using the Likert scale. To estimate current and future perceived level of concerns with turkeys, respondents answered open-ended questions. Similarly, we used the same open-ended format mentioned above to assess any predisposed negative attitudes toward other wildlife by asking respondents to indicate if there are other problematic wildlife species on their property.

We asked respondents to identify the primary reason they owned their property to evaluate if landowner-specific characteristics influenced their feelings toward turkeys. Respondents were instructed to indicate applicable reasons for ownership of their property from 6 statements: (1) I use my land to make a living farming; (2) I use my land for recreational purposes; (3) I want to preserve my land for the future; (4) I like wildlife on my land; (5) I hunt on my land; and (6) This is my primary residence.

Data analysis

We pooled data by survey group (i.e., turkey group or without-turkey group) due to similarities in each county. We summarized frequencies of responses for each survey question. We analyzed nominal data using con-

tingency tables to evaluate responses by each survey group and between groups. For ordinal data (i.e., questions using the Likert scale), we used 2 statistical tests: the Mann-Whitney U test to evaluate if the survey groups felt the same about turkeys and the Wilcoxon paired-sample test to evaluate if the feelings for turkeys within a survey group were the same for their property and county. All analyses were conducted in R 2.9.2 (R Development Core Team 2010).

Results

The overall survey response rate was 76% (78% in turkey group and 69% in without-turkey group). Landowners who returned surveys (hereafter, respondents) in the turkey group reported seeing turkeys 0.8 to 1.3 days/week on average, and observation rates varied by season (highest during spring, followed by summer, fall, and winter). The most common behaviors reported were passing through (86%), feeding (41%), and roosting (14%); these percentages do not sum to 100% because respondents were instructed to report all behaviors they observed. Ten percent of respondents from the without-turkey group reported seeing turkeys on their property <0.1 days/week, on average, depending on season (highest during summer, followed by spring, fall, and winter). The most common behaviors reported were passing through (82%) and feeding (82%).

Most respondents reported positive feelings (4 = Happy or 5 = Very Happy) about wild turkeys in their county (89% turkey group and 85% without-turkey group) and on their property (87% in the turkey group and 85% in the without-turkey group). Few respondents reported negative feelings (1 = Very Unhappy or 2 = Unhappy) toward turkeys in their county (3% in the turkey group and 4% in the without-turkey group) and on their property (2% in the turkey group and 4% in the without-turkey group). Feelings toward turkeys were similar between groups at the county and property levels (county, $U_{78,69} = 294$; $P = 0.22$; property, $U_{78,69} = 268$; $P = 0.98$). Respondents in the turkey group felt more positively about the presence of turkeys in their county rather than on their property ($T_{78} = 66.0$, $P < 0.001$). These statistical differences did not exist in the without-turkey group. Respondents in the without-turkey group reported identical frequencies toward

turkeys in their county and on their property for each Likert scale category (i.e., 1 = Very Unhappy, 2 = Unhappy, etc.).

One respondent (<1%) from the turkey group reported problems with crop depredation and turkey defecation. There were no complaints about turkeys in the without-turkey group. In the turkey group, 9% of respondents expressed concerns with turkeys on their property in the future, including crop depredation (4%), attraction of hunters onto their land (3%), turkeys spooking cattle (1%), and an increased presence of natural resources agency personnel (1%). In the without-turkey group, 7% of landowners expressed concerns about the potential for future problems with turkeys on their property, including crop depredation (3%), disease transmission (1%), turkey overpopulation (1%), and unspecified concerns (1%). In comparison, 51% of respondents from both groups reported problems with white-tailed deer (*Odocoileus virginianus*; 49%), raccoons (*Procyon lotor*; 22%), coyotes (*Canis latrans*; 11%), striped skunks (*Mephitis mephitis*; 4%), plains pocket gophers (*Geomys bursarius*; 4%), and avian raptors (4%; commonly, bald eagles [*Haliaeetus leucocephalus*] and great horned owls [*Bubo virginianus*]), rabbits (*Sylvilagus* spp.; 1%); 5% of respondents indicated that they did not know the species of problematic wildlife.

When survey groups were pooled, respondents reported the following reasons for owning their land (Table 1): “I like the wildlife on my land” (67%); “I want to preserve my land for the future” (50%); “I hunt on my land” (42%); “I use my land for recreational purposes” (39%); “I use my land to make a living farming” (39%); and “This is my primary residence” (26%). When separated by landowner group, the reasons for owning land were different among the turkey and without-turkey groups ($\chi^2_5 = 11.33$, $P < 0.05$). While the responses, “I like the wildlife on my land” and “I want to preserve my land for the future,” were ranked the same as when the groups were pooled; the remaining responses were ranked differently. In particular, respondents from both groups reported using their property as their primary residence more often than expected, and respondents from the without-turkey group hunted on their property less often than expected (Table 1).

Table 1. Number of responses to statements associated with the question, “Why do you own your residence?” by 2 categories of survey respondents—landowners living near the release site of wild turkey translocations (turkey group; $n = 78$) and landowners far removed from the site of wild turkey translocations (without-turkey group; $n = 69$). Survey responses were derived from a survey mailed to landowners in northwestern Minnesota, USA, in 2007.

Statement	Number of responses	
	Turkey group	Without-turkey group
I like the wildlife on my land.	58	41
I want to preserve my land for the future.	46	27
I hunt on my land.	41	21
I use my land for recreational purposes.	33	24
I use my land to make a living farming.	32	25
This is my primary residence.	13	25

Discussion

Landowner interaction with turkeys in the turkey group varied widely; some landowners never observed a turkey, while others reported observations as frequent as 7 days/week, depending on the season. This is consistent with the small, localized turkey home ranges observed in this area (Parent 2008). However, we suspect that observation rates were inflated because some landowners may have reported observations outside the survey guidelines (i.e., ≤ 0.4 km from their home). For example, some landowners in the without-turkey group—the group residing outside the 5-km radii where turkeys were less likely to occur—reported observing turkeys. Alternatively, without-turkey group landowners may have been reporting observations of observed, nonradio-marked male turkeys (released simultaneously with radio-marked females) or escaped turkeys from a commercial poultry processing facility that is located near the study site. Even if respondents did not strictly adhere to the survey protocol, the overall trend was acceptance of turkeys at both the county and property level, and we do not feel this influences our conclusions or the implications of this study.

The results of our survey indicate that rural landowners in northwestern Minnesota feel positively about introductions of wild turkeys and currently do not have negative attitudes toward introduced populations of turkeys. Although we did not attempt to quantify the values or value orientations of landowners in our survey, we did ask landowners to answer questions about general statements concerning land ownership and the nature of their interaction

with other wildlife species. Our survey indicated that landowners placed a high regard on seeing wildlife (despite many reporting problems with other wildlife species) and preserving habitat on their property. We speculate that these values likely influenced respondents' feelings toward introductions of turkeys. Kellert (1996) suggested that an individual's values toward animals and nature affect their perceptions of wildlife species. Fulton et al. (1996) suggested that value orientation dimensions strongly influence how the public identifies with wildlife. Value orientations exist on a spectrum (i.e., the protection-use spectrum), which is influenced by beliefs of how wildlife should be used, wildlife rights, and hunting. Respondents from our survey appear to possess values that predispose them to appreciating wildlife based on their responses to questions about land ownership.

The application of the values and value orientations concepts also can be used to make conclusions about the survey questions that quantified negative interactions with turkeys. Only 1 respondent from our survey reported a problem with wild turkeys, and few reported concerns about future problems. We anticipated greater concern among respondents, particularly from those in groups with historic problems with wild turkeys (e.g., farmers, livestock producers; Payer and Craven 1995). The implications of these results suggest 2 potential conclusions: (1) turkeys were indeed not problematic for respondents; or (2) turkeys might have been problematic, but respondents were willing to tolerate problematic behavior due to their values toward wildlife. The first

conclusion is especially likely when populations are small and novel, such as the population at our study areas. The second conclusion is also likely: what constitutes problematic behavior of turkeys is subjective and varies with landowner backgrounds and previous experiences with turkeys. Therefore, landowners likely relied on their general values toward wildlife to formulate their feelings toward turkeys.

Most existing work exploring human attitudes toward wild turkeys evaluates farmers' attitudes toward crop depredation issues or hunters regarding hunt quality. Such surveys are not directly comparable to our survey, as they do not evaluate the attitudes held by other important stakeholder groups. We are aware of only 2 comparable studies (Craven 1989, Reynolds 2000) that have investigated the attitudes held by farmers and landowners toward recently introduced populations of turkeys.

Previous surveys of farmers and landowners in Wisconsin and Ohio demonstrated that attitudes and acceptance of wild turkeys can change over time. In Wisconsin, Craven (1989) surveyed 294 farmers living in the vicinity of a growing population of introduced turkeys in 1987. Craven (1989) observed a negative shift in attitudes and increased reports of crop depredation over a 5-year period as turkey abundance increased. Similarly, in farmland regions of Ohio, results from a mail survey demonstrated that attitudes toward wild turkeys shifted markedly. From 1995 to 2000, there was a 49% reduction of landowners who indicated that they enjoyed turkeys on their property and an increase in landowner indifference (Reynolds 2000). Results by Craven (1989) and Reynolds (2000) suggested that farmers and landowners may experience a negative shift in attitudes toward turkeys over time. Specifically, the novelty of introduced wild turkeys wears off as the population increases. This is an important point because the populations in our study were small relative to other turkey populations where they were endemic (Parent et al. 2011).

The reasons for shifts in attitudes vary and may be only indirectly related to turkeys. In Wisconsin, Craven (1989) suggested that the increased perception of crop depredation by turkeys was responsible for the shift. This

is not surprising, considering that farmers experience negative wildlife interactions more frequently than did other groups (McIvor and Conover 1994, Conover 1998). Further, turkeys are commonly perceived as a species that depredate crops, despite substantial evidence of the contrary (Gabrey et al. 1993, Swanson et al. 2001, Humberg et al. 2007). We did not detect a significant amount of negative attitudes toward turkeys by farmers (which comprised 39% of respondents) in our study at current low population densities. As a subgroup, farmer feelings toward turkeys averaged >4.4, though they were the group with the most concern (54%) for future turkey problems and the only group experiencing negative interactions with turkeys at the time of the survey. In Ohio, landowners living in regions with high densities of turkeys experienced increased problems with turkey hunters over time, which indirectly shifted attitudes toward turkeys (Reynolds 2000). The first spring hunting season for turkeys in our study area was held in 2011; therefore, the presence of hunters should not have influenced respondents' feelings on our survey.

Based on research by others and the results of this study, it appears that there is a relationship between turkey population demographics, people's knowledge of turkey biology, and human values for wildlife. For landowners in northern regions located near a wild turkey introduction site, this means exposure to a variety of issues, both positive and negative. At our study areas, hunting is now permitted, and turkeys will undoubtedly occupy agricultural habitat (because it is proportionally more abundant), which, based on work by Craven (1989) and Reynolds (2000), were indirect triggers for a shift in attitudes toward turkeys. Accordingly, it is conceivable that we may see a shift in attitudes over time in our study, but it is unclear what trajectory the shift in attitudes may be or what factor will cause the shift because our survey included multiple stakeholder groups.

Understanding landowner perceptions and their concerns is an important component of introducing a new species into an area and provides wildlife managers with a baseline for management. Based on our results, we anticipate that landowners in other areas of northern Minnesota (and possibly other northern regions) would respond similarly to introduced

populations of wild turkeys. We envision that a survey like this could also be useful to proactively manage naturally expanding turkey populations. Turkeys in highly productive habitats will inevitably migrate to new areas as large populations outgrow available habitat. Results from a pre-expansion survey could be used to formulate a public outreach, education, and risk communication campaigns designed to provide factual information about wild turkeys and an agencies' future management strategy (e.g., landowner workshops, direct mailings, technical assistance, etc).

Finally, there is a need to study landowners' acceptance capacity for wild turkeys as the birds become more abundant. Previous human dimensions work on wild turkeys demonstrates a negative shift in feelings through time; however, the source of the shift is not clear. While it appears that turkeys are only proximate factors in these shifts, there is a paucity of studies documenting this (Craven 1989, Reynolds 2000). Therefore, future work in this area should attempt to isolate why feelings toward turkeys change. Until further research can answer these research questions, natural resource agencies can utilize pre-release surveys as a baseline for management and as an indicator of potential acceptance of planned introductions.

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Appendix A

Pennington and Red Lake County Landowner Survey

Please complete this short survey and return it in the enclosed postage paid envelope. Please base your answers on observations on your farmstead or rural residence or in the area within ¼ mile of your farmstead.

1) In what township is your farmstead or rural residence located?

_____ Township

2) Is this your primary residence? Yes / No

3) Why do you own this farmstead/rural residence: (circle all that apply)

- A. Use it to make a living farming.
- B. Use it for recreational purposes.
- C. Want to preserve the land for the future.
- D. Like the wildlife that lives on my land.
- E. Use it for hunting.
- F. This is my primary residence.

4) In a normal week, how often did you see wild turkeys on your land? (circle the best answer)

Fall: Days per week:	0	1	2	3	4	5	6	7
Winter: Days per week:	0	1	2	3	4	5	6	7
Spring: Days per week:	0	1	2	3	4	5	6	7
Summer: Days per week:	0	1	2	3	4	5	6	7

5) When you saw wild turkeys on or around your property what were they doing? (circle all that apply)

- A. Feeding
- B. Resting
- C. Passing through

6) How do you feel about wild turkeys in your county? (circle the best answer)

Very Unhappy Unhappy Indifferent Happy Very Happy

7) How do you feel about wild turkeys on your property? (circle the best answer)

Very Unhappy Unhappy Indifferent Happy Very Happy

8) Do you have concerns with wild turkeys being in the area or on your property? If yes, what types of concerns.

Yes / No

9) In the last year, did you ever have a problem with wild turkeys? If yes, what types of problems.

Yes / No

10) In the last year, did you ever have a problem with other wild game (i.e., deer, coyotes, raccoons) on or near your property? If yes, explain what types of problems.

Yes / No

11) Anything else you would like to tell us about wild turkeys on or around your property?

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