PERCEPTIONS OF PUBLIC FOREST MANAGERS CONCERNING TRAIL USE BY OFF-HIGHWAY VEHICLE RIDERS IN THE NORTHEAST UNITED STATES

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Abstract.—This research provides information about natural resource managers' perceptions of off-highway vehicle (OHV) riders' attitudes towards two OHV riding behaviors: (1) the use of trails on which OHVs are prohibited; and (2) the development and/or use of unauthorized trails (i.e., trails not authorized or created by a public land management agency). In the spring of 2006, we surveyed 498 managers of state and federal forestlands in the northeast; 168 (34 percent) managers completed and returned a questionnaire. Results indicate moderate relationships between managers' perceptions of OHV riders' attitudes and intentions. Managers thought that the most effective strategies for influencing rider behaviors were listing trail use regulations at access areas and educating riders about fines related to breaking the regulations.

1.0 INTRODUCTION

Between 1999 and 2004, an estimated 13.4 million people (age 16 or older) used off-highway vehicles (OHV) in the northern United States (i.e., New England, Mid Atlantic and Great Lakes states; Cordell et al. 2005). OHV use increased nearly 42 percent during this timeframe in the United States overall. This trend holds particular significance for public forests in the northeast United States (i.e., Maine, New Hampshire, Vermont, New York, New Jersey, Connecticut, Rhode Island, and Massachusetts), where high population density and limited available acres of public land tend to magnify issues related to outdoor recreation.

In 2006, we surveyed forest managers about their perceptions of OHV riders' attitudes and intentions concerning two trail-use behaviors: (1) the use of trails on which OHVs are prohibited; and (2) the development and/or use of unauthorized trails (i.e., trails not authorized or created by the land management agency in charge of the property). The objective of the study was to identify the relationship between managers' years of work experience and personal riding experience, and their perceptions of riders' attitudes and intentions. We also examined the perceived effectiveness of management strategies for addressing both behaviors. For this study, OHVs included four-wheel drive jeeps or sport utility vehicles (SUVs) that are used off-highway for recreational purposes, motorcycles designed for off-highway use (i.e., off-highway motorcycles (OHMs) or dirt bikes), and all-terrain vehicles (ATVs) designed for off-highway use including 4- and 6-wheelers. We excluded snowmobiles from this study due to differences in the perceived impacts of snowmobiles on trail erosion as compared to other OHVs.

This study uses the Theory of Planned Behavior (Ajzen 1991, Hrubes et al. 2001) as a framework for examining managers' perceptions of OHV riders' attitudes and intentions towards the two trail-use behaviors. The Theory of Planned Behavior suggests that attitudes and beliefs influence intentions towards specific behaviors, which in turn influence the actual behaviors. Ajzen (1991) describes three types of beliefs (i.e., behavioral, control, and normative) as well as attitudes towards the behavior, subjective norms, and perceived behavioral controls as antecedents of intended behaviors. Our study focuses on the relationship between attitudes towards the

behavior (i.e., an individual's positive or negative evaluations of performing a specific behavior; Ajzen and Fishbein 1980) and intentions.

2.0 METHODS

In 2006, a census of state and federal forest managers and rangers was compiled from U.S. Forest Service lists, state natural resource agency lists, and Internet sources for the states of New York, Connecticut, Vermont, New Hampshire, Rhode Island, and Massachusetts, Maine, New Jersey, and Pennsylvania. The final mailing list included 509 managers and rangers throughout the northeast in 161 state and federal agency offices.

The survey consisted of four separate mailings to managers using a modified Tailored Design Method (Dillman 2000). The questionnaire included 112 questions about managers' work experience and use of OHVs, management strategies implemented at the sites they managed/patrolled, and their perceptions of OHV riders' attitudes, and intended behaviors. Questions used to obtain information about management, attitudes, and intended behaviors were based on prior works (Ajzen 2001, Ajzen and Driver 1992, Bright and Manfredo 1996, Rogers 1985). Respondents were asked to indicate their agreement or disagreement with statements related to their perceptions of OHV riders' attitudes and intended behaviors towards the two trail use behaviors. Attitudes were conceptualized as managers' perceptions of riders' evaluations of the two behaviors as positive/good, neutral or negative/bad. Three attitude questions were included for each behavior using a five-point scale (-2 = very negative, -1 = negative, 0 = neutral, 1 = positive, 2 = very positive). Questions on intentions towards the two behaviors were stated in the positive (e.g., most OHV riders do NOT intend to [trail use behavior]). Three intention questions were included for each behavior and five-point scales (-2 = strongly disagree, -1 = disagree, 0= neutral, 1 = agree, 2 = strongly agree) were used. Responses to intention questions were reverse coded during analysis to match the direction of response for the attitude questions.

Managers were also asked to identify how frequently they used different management strategies on a five-point scale (0 = never used, 1 = used for 1 to 25 percent of riders or trail system, 2 = used for 26 percent to 50 percent of riders or trail system, 3 = used for 51 percent to 75 percent of riders or trail system, and 4 = used for over 75 percent of riders or trails). Managers identified which management strategies they used and the perceived effectiveness of each strategy on a scale of 0 to 4 (0 = not effective for any riders, 1= effective for 1 percent to 25 percent of riders, 2 = effective for 26 percent to 50 percent of riders, 3 = effective for 51 percent to 75 percent of riders, 4 = effective for over 75 percent of riders). Information about the year the manager was first employed by the agency and their use of OHVs for work and recreation was also requested.

Following data entry, descriptive statistics were used to quantify manager characteristics. Variables related to the attitudes, intentions, and management strategies concerning the two trail-use behaviors were combined into factors based on previous research (Ajzen and Driver 1992, Bright and Manfredo 1996, Rogers 1985). We quantified the attitudes and intentions in SPSS by averaging the variables comprising each factor for each behavior. A Cronbach's alpha of 0.7 or greater was used to establish the reliability of factors (Hair et al. 1998, p. 118). A step-wise regression analysis for each behavior was conducted to identify relationships between intentions (dependent variable; reverse coded for the regression analysis) and the independent variables of attitude, years of employment, and days spent riding an OHV for work and recreation in 2006.

3.0 RESULTS

Of the 509 managers identified in the census, a qualified sample of 498 was obtained after removing undeliverable mail. From the qualified sample, we received 168 responses (34 percent response rate) from 134 offices (83 percent of the offices).

Managers had been employed by the agency for which they currently worked for an average of 17 years. A total of 77 percent of the responding managers used an OHV for work or recreation. Sixty-seven percent rode an ATV—76 percent for work only and 24 percent for work and recreational purposes. Sixty-three percent rode a four-wheel drive vehicle off-road—52 percent for work only, 5 percent for recreation only, and 43 percent for both work and recreation. The smallest percent of respondents (7 percent) rode a dirt bike—46 percent for work only and 54 percent for recreation only.

Several management strategies were commonly used by managers (Table 1). The most commonly used strategies were posting trail markers to identify where OHVs were permitted, requiring that riders be registered with the Department of Moter Vehicles (DMV), posting OHV regulation information on agency Web sites and at trailheads, and talking about OHV regulations with riders. The most used strategy (posting trail markers) received an average response of 2.8 on a scale of 0 to 4, indicating that it was used for nearly 51 percent to 75 percent of trails on average.

Managers were also asked to identify if they thought different management strategies were effective at influencing OHV rider behaviors (Table 2). Most strategies were identified as moderately effective (i.e., effective for 26 percent to 50 percent of all riders) by those managers who used them; effectiveness ratings by managers who did not use specific strategies were lower. The most effective measures were perceived to be listing trail use regulations at access areas and informing OHV riders of the dollar amount of the fine they would receive if they broke regulations.

Table 1.—Management strategy use

Management strategy	Number of responses (n)	Strategy use [a]
Posting trail markers along trails to identify if OHVs are permitted or not.	160	2.8
Requiring that OHV riders be registered with the state's DMV in order to ride on agency lands.	155	2.5
Posting information about OHV-related regulations on the agency's Web site.	150	2.2
Posting information about OHV-related regulations at trailheads or other access points.	160	2.1
Talking with OHV riders about the OHV-related regulations for the area in which they are riding.	160	2.0
Talking with OHV riders about the potential positive and negative social and environmental impacts associated with OHV use.	158	1.6
Posting educational information on the agency's Web site that discusses the potential positive and negative social and environmental impacts associated with OHV use.	151	1.6
Providing maps to OHV riders that clearly identify trails designated for OHV use.	159	1.3
Posting educational information at trailheads that discusses the potential positive and negative social and environmental impacts associated with OHV use.	157	1.3
Providing educational brochures to OHV riders that discuss potential positive and negative social and environmental impacts associated with OHV use.	159	1.1
Requiring that OHV riders obtain a permit before riding on agency lands.	156	0.8
Requiring that OHV riders pay a user fee before riding on agency lands.	156	0.2

[a] Average use is based on a five point scale of 0 = never used, 1 = used for 1 to 25 percent of riders or trail system, 2 = used for 26 percent to 50 percent of riders or trail system, 3 = used for 51 percent to 75 percent of riders or trail system, and 4 = used for over 75 percent of riders or trails.

Table 2.—Perceptions concerning the effectiveness of management strategies when used and not used

Behavior to which strategy applies	Management strategy	Number of responses (n)	Strategy used (%)	Average effectiveness when used[a]	Perceived effectiveness when not used[a]
Both behaviors	Educating OHV riders about how they can reduce negative impacts (e.g., stay on OHV trails only, slow down when passing others).	127	57	1.7	1.3
	Educating OHV riders about how easy it is to make minor changes in their actions during a ride that can reduce negative impacts.	124	52	1.7	1.4
	Listing trail-use regulations at all or most access areas so that riders are informed about the official trails on which they can legally ride.	128	69	2.1	1.6
Riding on trails on which OHVs are prohibited	Educating OHV riders about the amount of negative environmental and social impacts that will occur if they use an official trails on which OHV use is prohibited.	138	73	1.8	1.2
	Informing OHV riders of the dollar amount of the fine they will receive if they break regulations that prohibit riding on certain official trails.	140	77	2.0	1.7
Creating and/or using unauthorized trails	Educating OHV riders about the amount of damage to natural resources that is caused by the development and/or use of unauthorized trails.	132	72	1.5	1.5
	Informing OHV riders of the dollar amount of the fine they will receive if they break regulations concerning the development and/or use of unauthorized trails.	136	78	1.8	1.4

[a] Average effectiveness is based on a five point scale of 0 = not effective for any riders, 1 = effective for 1 to 25 percent of all riders, 2 = effective for 26 percent to 50 percent of all riders, 3 = effective for 51 percent to 75 percent of all riders, and 4 = effective for over 75 percent of all riders. Effectiveness is averaged only for managers who utilized the strategy.

Managers' perceptions of OHV riders' attitudes towards both behaviors were neutral, while their perceptions of OHV rider intentions were moderately positive (0.42 for riding on trails where OHVs are prohibited and 0.51 for creating and/or using unauthorized trails; Table 3). Regression analyses revealed significant relationships between managers' perceptions of OHV rider attitudes and intentions, but low R^2 values (0.181 for riding on trails where OHVs are prohibited and 0.276 for creating and/or using unauthorized trails; Table 4). There were no significant relationships between managers' years of employment or days spent riding an OHV in 2006, and perceptions of OHV riders' intentions.

4.0 DISCUSSION AND CONCLUSION

The objective of this study was to examine the relationship between manager's perceptions of OHV rider attitudes and intentions for two trail use behaviors. While significant relationships were identified between these two constructs for both behaviors, the R^2 of both regressions was low. In addition, no significant relationships were identified between OHV use or years on job and perceptions of riders' intentions. The results do, however, support the attitude-intention relationship identified in the Theory of Planned Behavior. Using additional constructs included in the Theory such as subjective norms and behavioral controls could possibly lead to improved results in future OHV studies.

Table 3.—OHV rider attitudes and intentions as perceived by managers

Behavior	Factor	Number of responses (n)	Factor mean (Cronbach's alpha)
OHV rider use of trails on which OHVs are prohibited.	Attitude [a]	156	0.01 (0.748)
	Intention [b]	160	0.42 [c] (0.834)
The development/use of unauthorized trails by OHV riders.	Attitude [a]	156	0.08 (0.836)
	Intention [b]	159	0.51 [c] (0.826)

[a] Average is based on a five point scale of -2 (strongly negative) to 0 (neutral) to 2 (strongly positive).
[b] Average is based on a five point scale of -2 (strongly disagree) to 0 (neutral) to 2 (strongly agree).
[c] Reverse coded from original survey question.

Table 4.—Regression analysis results for managers' perceptions of two trail use behaviors

Behavior	Overall	Dependent variable	Independent variables	Beta	p-value
Riding on trails on which OHVs are prohibited	F = 32.059 p = 0.001 R^2 = 0.181	Intended behavior[a]	Attitude	0.628	0.001
Creating and/or using unauthorized trails	F = 54.137 p = 0.001 R^2 = 0.276	Intended behavior[a]	Attitude	0.677	0.001

[a] Reverse coded.

This study also examined management strategies and their perceived effectiveness for influencing trail-related behaviors. Listing regulations at access areas and informing OHV riders of fines for breaking regulations were believed to be the most effective management strategies. Educating users about the social and environmental impacts of trail use behaviors was also somewhat effective. None of the management strategies were considered to be strongly effective alone; however, this result may indicate that obtaining a high effectiveness rating for management strategies may involve using a diversity of strategies rather than relying on one strategy alone. Interestingly, two of the management strategies not based on education (i.e., requiring that OHV riders obtain a permit before riding on agency lands, and requiring that OHV riders pay a user fee before riding on agency lands) were ranked the lowest in use by managers (see Table 1).

A comparison of the results of this study with previous research examining riders' perceptions of these two trail use-related behaviors (Kuehn et al. 2011) reveals similar preferences for information-based strategies. For example, riders had strong preferences for having regulations listed at access areas and for educating riders about how they can reduce social and environmental impacts of OHV riding. Comparisons of riders' attitudes with managers' perceptions of riders' attitudes, however, revealed differences. While managers' perceptions of riders' attitudes were near neutral, riders' attitudes were moderately negative towards the two behaviors. Similarly, managers perceived moderately positive intentions by riders towards the two behaviors, while the intentions reported by riders were moderately negative. It is important to note, however, that because all riders surveyed were members of an OHV association, these respondents may have different perceptions of the two behaviors than would riders not affiliated with OHV clubs or associations.

In summary, the Theory of Planned Behavior was a useful framework for studying the relationships between managers' perceptions of OHV rider attitudes and intentions. While this study provides information that will be useful to forest managers and OHV associations interested in collaborative efforts towards trail development and maintenance, additional research is needed concerning other potential antecedents of intentions. Collaboration between riders and managers is essential for limiting OHV-related social and environmental impacts and providing quality OHV riding experiences in the future.

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